Preliminary Application Document

Sartell Hydroelectric Project

FERC Project No. 8315

Mississippi River
Benton and Stearns Counties, Minnesota

Submitted by Licensee
Eagle Creek Sartell Hydro, LLC
Neshkoro, Wisconsin

Report prepared by

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List of Abbreviations

ADA	American with Disabilities Act
APE	Area of Potential Effect
Applicant	Eagle Creek Sartell Hydro, LLC
BEHI	Bank Erosion Hazard Index
CEII	Critical Energy Infrastructure Information
CFR	Code of Federal Regulations
cfs	Cubic Feet per Second
Commission	Federal Energy Regulatory Commission
dam	Sartell Dam
DNE	Determined Not Eligible
DLA	Draft License Application
DSSMR	Dam Safety Surveillance Monitoring Report
Eagle Creek	Eagle Creek Renewable Energy, LLC
EA	Environmental Assessment
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
°F	Temperature in degrees Fahrenheit
FERC	Federal Energy Regulatory Commission
FLA	Final License Application
HUC	Hydraulic Unit Code
ILP	Integrated Licensing Process
IPaC	Information for Planning and Consultation
kV	Kilovolts
kW	Kilowatts
Licensee	Eagle Creek Sartell Hydro, LLC
LLC	Limited Liability Corporation
mg/L	Milligrams per Liter
MDA	Minnesota Department of Agriculture
MDNR	Minnesota Department of Natural Resources
MN Rule 7050	Minnesota Administrative Rule 7050
MPCA	Minnesota Pollution Control Agency
MVA	Mega Volt Amp
MWh	Megawatts per Hour
NEPA	National Environmental Policy Act
NGVD	National Geodetic Vertical Datum
NHIS	Natural Heritage Information System
NLEB	Northern Long-Eared Bat
No.	Number
NOI	Notice of Intent
NOAA	National Oceanic Atmospheric Association
NRCS	Natural Resource Conservation Service
NRHP	National Register of Historic Places
NWI	National Wetland Inventory

PAD	Preliminary Application Document
PDF	Portable Document Format
Project	Sartell Hydroelectric Project
RUSLE2	Revised Universal Soil Loss Equation, Version 2
§	Section
Sartell Hydro	Eagle Creek Sartell Hydro, LLC
Sartell Project	Sartell Hydroelectric Project
SCORP	Statewide Comprehensive Outdoor Recreation Plan
Section 106	Section 106 of the Historic Preservation Act of 1966
SU	Standard Units
SHPO	State Historic Preservation Officer
SWCD	Soil and Water Conservation District
TLP	Traditional Licensing Process
UMCC	Upper Mississippi Conservation Committee
USACE	US Army Corps of Engineers
USDA	United States Department of Agriculture
USFWS	United States Fish & Wildlife Service
USGS	United States Geological Survey

1. Introduction

Eagle Creek Sartell Hydro, LLC (Sartell Hydro, Licensee, or Applicant), a wholly-owned indirect subsidiary of Eagle Creek Renewable Energy, LLC (Eagle Creek), a Delaware limited liability company (LLC), is licensed by the Federal Energy Regulatory Commission (FERC or Commission) to operate the Sartell Hydroelectric Project (Sartell Project or Project). The Licensee operates and maintains the Sartell Project dam, which is located on the Mississippi River in the city of Sartell in Benton and Stearns Counties, Minnesota **(Figure 1-1)**. The current Sartell Project license, designated as FERC Project No. 8315, was originally issued on March 13, 1985 with an effective date of March 1, 1985 for a term of 40 years and expires on February 28, 2025 (FERC, 1985).

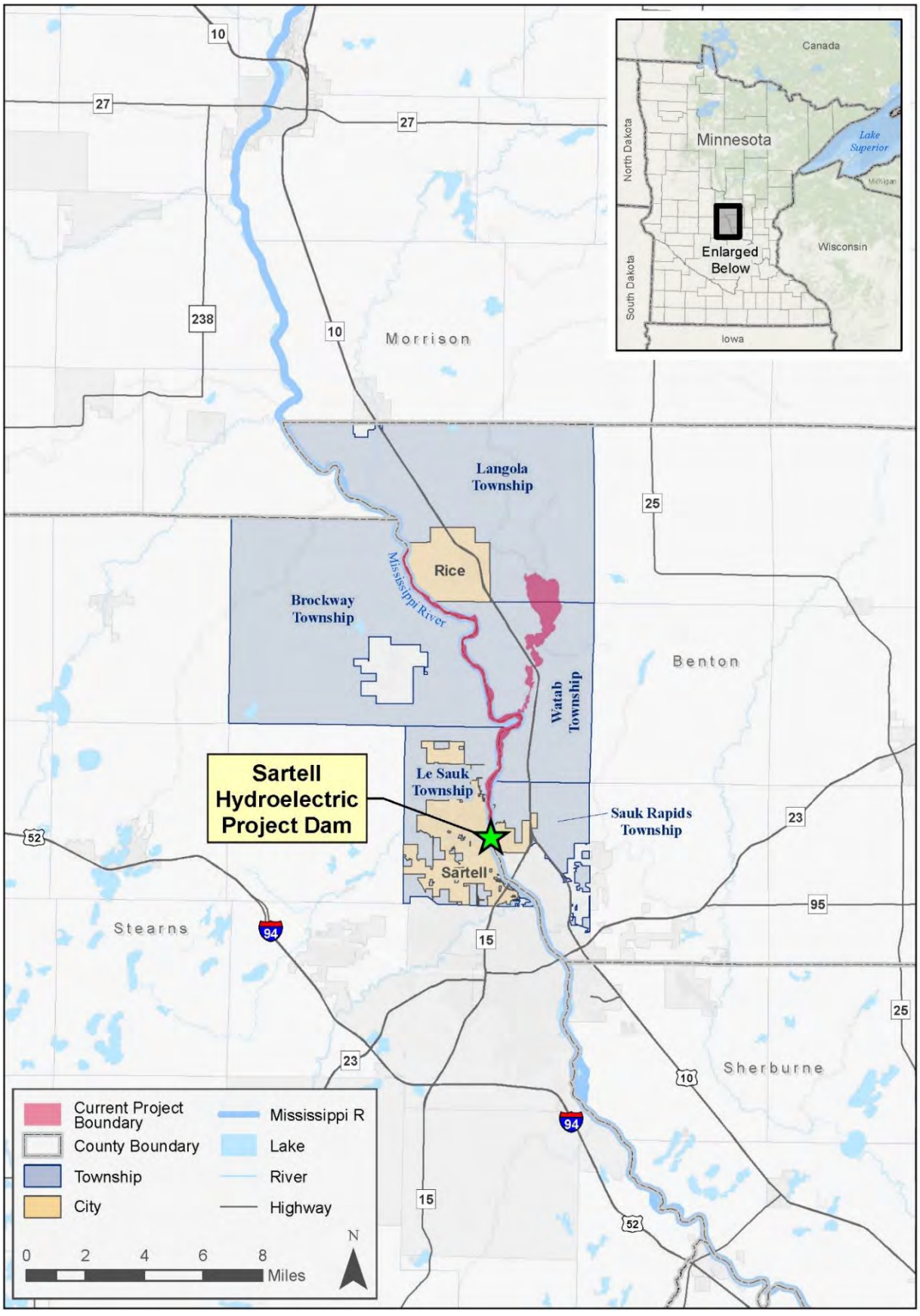
Applying for a new license requires the Licensee to first prepare a Notice of Intent (NOI) and Preliminary Application Document (PAD) between 5 and 5.5 years prior to license expiration. The NOI and PAD must be completed pursuant to 18 Code of Federal Regulations (CFR) Part 5 (CFR, 2016). The Licensee must submit a new license application for the Sartell Project to the Commission no later than February 28, 2023 in order to receive a new license prior to the February 28, 2025 expiration date.

FERC requires a Licensee to use the Integrated Licensing Process (ILP) unless the Commission grants a request to use an alternative process. Pursuant to 18 CFR Section (§) 5.3, such a request must accompany the NOI and PAD submittal, as well as set forth specific information justifying the request. A request to use FERC's Traditional Licensing Process (TLP) for the Sartell Project is included with the NOI and PAD submittal.

When the Licensee files a new license application, notice of the application will be published to give interested persons and agencies an opportunity to present their views concerning the Project and any potential effects of the Project operations.

This PAD presents required information consistent with 18 CFR § 5.6 for the Sartell Project.

Figure 1-1: Project Location



1.1 Authorized Agents (18 CFR § 5.6(d)(2)(i))

The following are authorized to act as agents for the Applicant pursuant to 18 CFR § 5.6(d)(2)(i):

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1.2 PAD Content

The PAD is generally organized based on requirements set forth in 18 CFR § 5.6(c), § 5.6 (d), and § 16.7 (CFR, 2016; CFR, 2018). The purpose of the PAD is to:

- Describe the existing hydroelectric project and its proposed operations,
- Summarize existing information relevant to the evaluation of the Project's impact on the area,
- Determine initial concerns or issues various resource agencies may have concerning the Project, and
- Begin to identify potential studies that may need to be conducted to support a new license application.

To assist with this PAD development, various entities at the federal, state, regional, and local level, as well as Indian tribes, were contacted to gather input regarding information and studies that may be relevant to the Sartell Project, as well as any possible concerns or issues. Consultation is summarized in Section 6 of this PAD.

1.3 References

- Federal Energy Regulatory Commission. 1985. Order Issuing License (Major Project) (FERC No. 8513). Issued March 13, 1985.
- United States Code of Federal Regulations. 2016. Title 18, Part 5. Revised April 1, 2016.
- United States Code of Federal Regulations. 2018. Title 18, Part 16. Updated April 1, 2018.

2. Process Plan and Schedule (18 CFR § 5.6(d)(1))

2.1 Process Plan and Schedule Through Filing of License Application

This PAD represents one of the first steps in the Licensee's efforts to obtain a new license from the FERC to continue operating and maintaining the Sartell Project. Simultaneous with filing this PAD, the Licensee will file an NOI for the Project to obtain a new license. Pursuant to 18 CFR § 5.5, the NOI filing marks the beginning of the relicensing process and sets the schedule for further licensing activities. In addition to filing the NOI and PAD, the Licensee filed a request asking the FERC to utilize the Traditional Licensing Process. The request to use the TLP was filed as a related submittal under 18 CFR § 5.3. The Licensee's justification to utilize the TLP is included in this submittal along with the NOI and PAD.

Initial activities under the TLP plan and schedule include filing the NOI and PAD, as well as requesting to use the TLP, by February 28, 2020. Based upon a filing date of February 27, 2020,[1] comments regarding the proposed use of the TLP must be filed with the FERC no later than March 28, 2020. It is anticipated the FERC will approve the proposed use of the TLP within 60 days of filing the request (by April 27, 2020), at which time Stage 1 of the formal three-stage consultation process would begin. In accordance with this schedule, within 30 days of receiving the TLP approval from the FERC, the Licensee will issue the Notice for a Joint Meeting with stakeholders that includes resource agencies and Indian tribes. Based upon the anticipated April 27, 2020 approval to utilize the TLP, the Joint Meeting will be held within 60 days (no later than June 27, 2020). Based on this schedule, stakeholder comments on the PAD would be due within 60 days of the Joint Meeting (by August 26, 2020).

Stage 2 consultation begins after written comments are received on the PAD, or 120 days after the FERC approval of use of the TLP, whichever occurs first. It is anticipated this stage will include consultations with resource agencies regarding study requests. Coordination with resource agencies to develop study plans is expected to occur prior to the implementation of the studies.

Preparation of the Draft License Application (DLA) will begin August 1, 2021; the DLA will be filed by October 2, 2022. The stakeholder review of the DLA is expected to occur during the 90 days between October 3, 2022 and December 31, 2022.

Preparation of the Final License Application (FLA) is expected to begin by January 1, 2023 with a filing date to the FERC no later than February 28, 2023. Once the FLA is filed, Stage 3 consultation would begin.

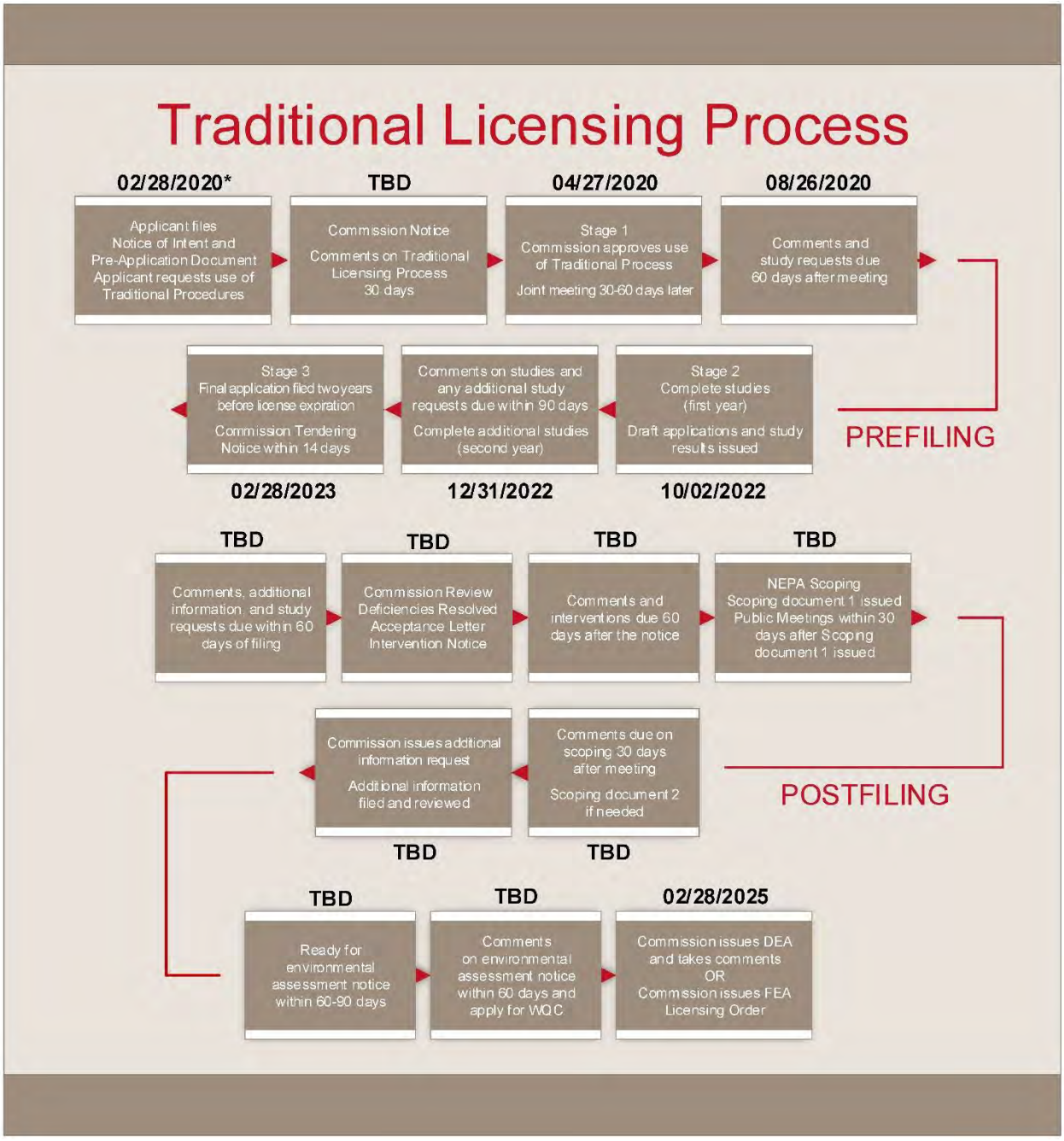
Based on the February 28, 2023 FLA filing date, the following will occur during the two years between February 28, 2023 and February 28, 2025:

- Review of the FLA by the FERC
- FERC Issuance of the FLA acceptance letter
- Stakeholder submittal of comments, terms, and conditions
- FERC conducts scoping under the National Environmental Policy Act (NEPA)
- FERC Preparation of draft Environmental Assessment (EA) or Environmental Impact Statement (EIS)
- FERC resolution of issues, if any, under Federal Power Act § 10(j)
- FERC preparation of final EA or EIS

[1] Sartell Hydro intends to file the NOI, PAD, and TLP request one day earlier than the required date of February 28, 2020.

Based on this anticipated schedule, the FERC would issue a License Order by February 28, 2025. A graphic outlining the TLP planned schedule is displayed below in **Figure 2.1-1**.

Figure 2.1-1: FERC Traditional Licensing Process Planned Schedule



*Licensee intends to file the NOI, PAD, and TLP request on 02/27/2020, one day earlier than required date of 02/28 2020.

The TLP plan and schedule for the Sartell Project is summarized below in **Table 2.1-1.**

Table 2.1-1: Traditional Licensing Process Plan and Schedule

TLP Steps	Timelines	Due Date[1]
Initial Activities		
Licensee submits NOI, PAD, and TLP Requests	5 years before the license expiration date	02/28/2020[2]
Stakeholders provide comments regarding TLP	30 days after the request	03/28/2020
FERC approval of TLP	60 days after the request	04/27/2020
Stage 1 Consultation		
Licensee conducts Joint Meeting and site visit with potential stakeholders	30 to 60 days after the TLP approval	06/27/2020
Stakeholders submit comments on PAD and study requests	60 days after stakeholder meeting	08/26/2020
Stage 2 Consultation		
Licensee's Study, Year 1	Begins after receipt of study requests	September 2020 to September 2021
Licensee's Study, Year 2 if necessary	Begins after completion of Study Year 1	October 2021 to October 2022
Licensee submits DLA to FERC and relicensing participants for comment	Begins after completion of Study Year 2 (soft deadline)	10/02/2022
Stakeholders and FERC provide comments on the DLA	90-days after receipt of DLA	12/31/2022
Licensee Files FLA	At least two years prior to license expiration	02/28/2023
Stage 3 Consultation		
FERC review of FLA	Planned for 6 months	TBD[3]
FERC Additional Information Request	Response planned within 90 days	TBD
FERC Notice ready for Environmental Analysis	Task expected to take 90 days	TBD
Sartell Hydro Applies for 401 Water Quality Certification	Apply no earlier than Final License Application filing and no later than 60 days after FERC Notice Ready for Environmental Analysis	TBD
FERC NEPA Scoping	Planned for 6 months	TBD
FERC Issues EA/EIS	Comment period planned for 65 days	TBD
FERC Order Issuing New License	FERC goal is to issue the new license before the current license expires	2/28/2025

[1] Due dates are based upon the FERC authorizing TLP use on 04/27/2020; it is likely the authorization letter will be issued prior to 04/27/2020.
[2] Licensee intends to file the PAD, NOI, and TLP request on 02/27/2020, one day earlier than required date of 02/28/2020.
[3] Once the FLA is filed, the FERC determines the actual schedule for Stage 3 consultation.

2.2 Proposed Communications Protocols

The TLP is a consultation-intensive process during which stakeholders have an opportunity to provide input during several stages. The current distribution list for this PAD is included as part of the Certificate of Service. The distribution list will be updated throughout the licensing process based on feedback from those interested in participating in the relicensing process.

2.2.1 General Communications

Primary means of written communication and document distribution will be via email, unless email addresses are not available or unless otherwise requested. A mailing service will be used for distribution of hard copies. Telephone will serve as an informal method of communication. In addition, a relicensing website linked in Section 2.2.3 has been developed to include major document submissions, major FERC Orders, and other relevant documents. All filings related to the relicensing process are available from the FERC's eLibrary website at https://www.ferc.gov/docs-filing/elibrary.asp. Search for filings with Docket Number P-8315 for information regarding the Sartell Project.

2.2.2 Meetings

Several stakeholders will be interested in participating in the relicensing process. All essential process-related meetings will be scheduled on weekdays (Monday through Friday) to allow for participation during the working hours of 8:00 a.m. to 4:30 p.m. central prevailing time. Meetings will occur in person in a reasonable location close to the Project or by conference call. It may become impractical to accommodate each relicensing stakeholder's unique schedule; however, every effort will be made to schedule meetings to accommodate the majority of stakeholders.

The Licensee will strive to provide all stakeholders with a notification of any process-required meeting at least fifteen days prior to the scheduled meeting date. A meeting agenda and any necessary meeting materials will also be provided prior to the meeting date.

2.2.3 Documents

A hard copy of the NOI, PAD, and TLP request will be available for public viewing during normal business hours in the public reference file at the following location:

- Great River Regional Library - St Cloud at 1300 W. St. Germain Street, St. Cloud, Minnesota

Copies of process-related documents can be viewed electronically in portable document format (PDF) and printed from the following websites:

- Relicensing website at http://www.eaglecreekre.com/sartell-relicensing
- FERC's eLibrary website at https://elibrary.ferc.gov/idmws/search/fercgensearch.asp

Certain documents will contain Critical Energy Infrastructure Information (CEII) or sensitive/privileged information and will be designated as such. Not all relicensing stakeholders will be able to view CEII or sensitive/privileged documents. Information on obtaining access to view CEII or sensitive/privileged information can be found by following the instructions provided at: https://ferc.gov/legal/ceii-foia/foia.asp.

Requests for hard copies of relicensing documents should be sent to Michael Scarzello using the contact information provided in Section 1.1. Requests should clearly indicate the document name, publication date (if known), and the FERC Project No. A reproduction charge of $0.25 per page and postage fees may be assessed for hard copies requested by the public. The United States Fish & Wildlife Service (USFWS), Minnesota Department of Natural Resources (MDNR), and Indian tribes will not be subject to document reproduction or postage fees.

2.2.4 Study Requests

The TLP allows relicensing stakeholders to request studies in order to provide information that was not available during the development of this PAD. Study requests must be submitted within 60 days after the Joint Meeting resulting from the filing of this PAD.

FERC regulations under 18 CFR § 16.8(b)(5) specify what information must be included in any study request when using the TLP. Although the Licensee is proposing to relicense the Project using the TLP, Sartell Hydro believes the ILP study request criteria specified in 18 CFR § 5.9 will result in more thorough study requests. Therefore, Sartell Hydro requests all submitted study requests follow the ILP criteria specified in 18 CFR § 5.9, which includes:

- Describe goals and objectives of each study proposal and information to be obtained;
- Explain the relevant resource management goals of the agencies or Indian tribes with jurisdiction over the resource to be studied;
- If the requester is not a resource agency, explain any relevant public interest considerations;
- Describe the existing information concerning the subject of the study proposal and the need for additional information;
- Explain any nexus between project operations and effects on the resource to be studied and how the study results would inform the development of license requirements;
- Explain how any study methodology is consistent with generally accepted practice in the scientific community; and
- Describe consideration of level of effort and costs, and why any proposed alternative studies would not be sufficient to meet the stated information needs.

Any study requests should be provided to Michael Scarzello at michael.scarzello@eaglecreekre.com or Shawn Puzen at shawn.puzen@meadhunt.com.

3. Project Location, Facilities, and Operation (18 CFR § 5.6(d)(2))

3.1 Project Location (18 CFR § 5.6(d)(2)(ii))

The Sartell Project dam is located on the Mississippi River at approximate river mile 932 in the city of Sartell in Benton and Stearns Counties, Minnesota. The Project is located about 70 miles northwest of Minneapolis, Minnesota and approximately two miles north of the city of St. Cloud, Minnesota.

3.2 Project Facilities (18 CFR § 5.6(d)(2)(iii))

From left to right looking downstream,[2] Project structures include the powerhouse, a concrete dam containing three sections (non-overflow section, tainter gate section, bascule gate section), and a floodwall extending upstream of the dam on the right (west) bank, as shown in **Figure 3.2-1** on the following page. A description of each of these structures (from left to right), as well as the tailrace, transmission equipment, reservoir, and appurtenant equipment is provided in the following paragraphs.[3] Exhibit F drawings showing Project features are included in **Appendix 3.2-1** and have been filed as CEII.

3.2.1 Powerhouse

The powerhouse was constructed between 1905 and 1907 and includes a concrete substructure and masonry superstructure with an overall length of 234 feet, 7 inches. The powerhouse, which is divided into two sections, the grinder bay section and the generator bay section, includes 12 separate turbine bays which are numbered in order from the left to right (east to west).

3.2.1.1 Grinder Bay Section

Bays 1 through 9 are referred to as the grinder bay section. As originally designed, these units supplied mechanical energy for the production of stone groundwood pulp, hence the grinder bay designation. Currently, bays 2 through 9 each contain a turbine; bay 1 does not have a turbine. The grinder bay section extends 155 feet, 6 inches between the left abutment and the generator bay section. It extends 81 feet, 9 inches from the upstream end of the flume to the downstream side of the tailrace. Bay 1 has a clear width of 14 feet, 11 inches; bays 2 through 9 each have a clear width of 13 feet, 11 inches; and each bay is separated by 3-foot thick divider wall in the tailrace area.

3.2.1.2 Generator Bay Section

Bays 10 through 12 are referred to as the generator bay section and each of the three bays contain a turbine. The generator bay section extends 79 feet, 1 inch from the grinder bay section to the dam section and extends 100 feet from the upstream end to the downstream side of the tailraces. Bays 10 and 11 have a clear width of 21 feet, 5 inches; bay 12 has a clear width of 25 feet 1 inch; and each bay is separated by a 3-foot thick partition wall in the tailrace area.

3.2.1.3 Turbines and Generators

The Sartell Project includes eleven Alice Chalmers horizontal quadruple runner Francis turbines (bays 2-12) that are connected to generators via a horizontal shaft extending through the concrete headwall. The Project has a total installed capacity of 8,925 kilowatts (kW). Turbine and generator data are presented in **Table 3.2.1.3-1**.

[2] Direction of left or right, when describing facilities, is given looking downstream.
[3] All Sartell Project facility description attributes are from revised Exhibit A filed with the FERC on December 17, 2019 (Sartell Hydro, 2019)

Figure 3.2-1: Sartell Project Facilities

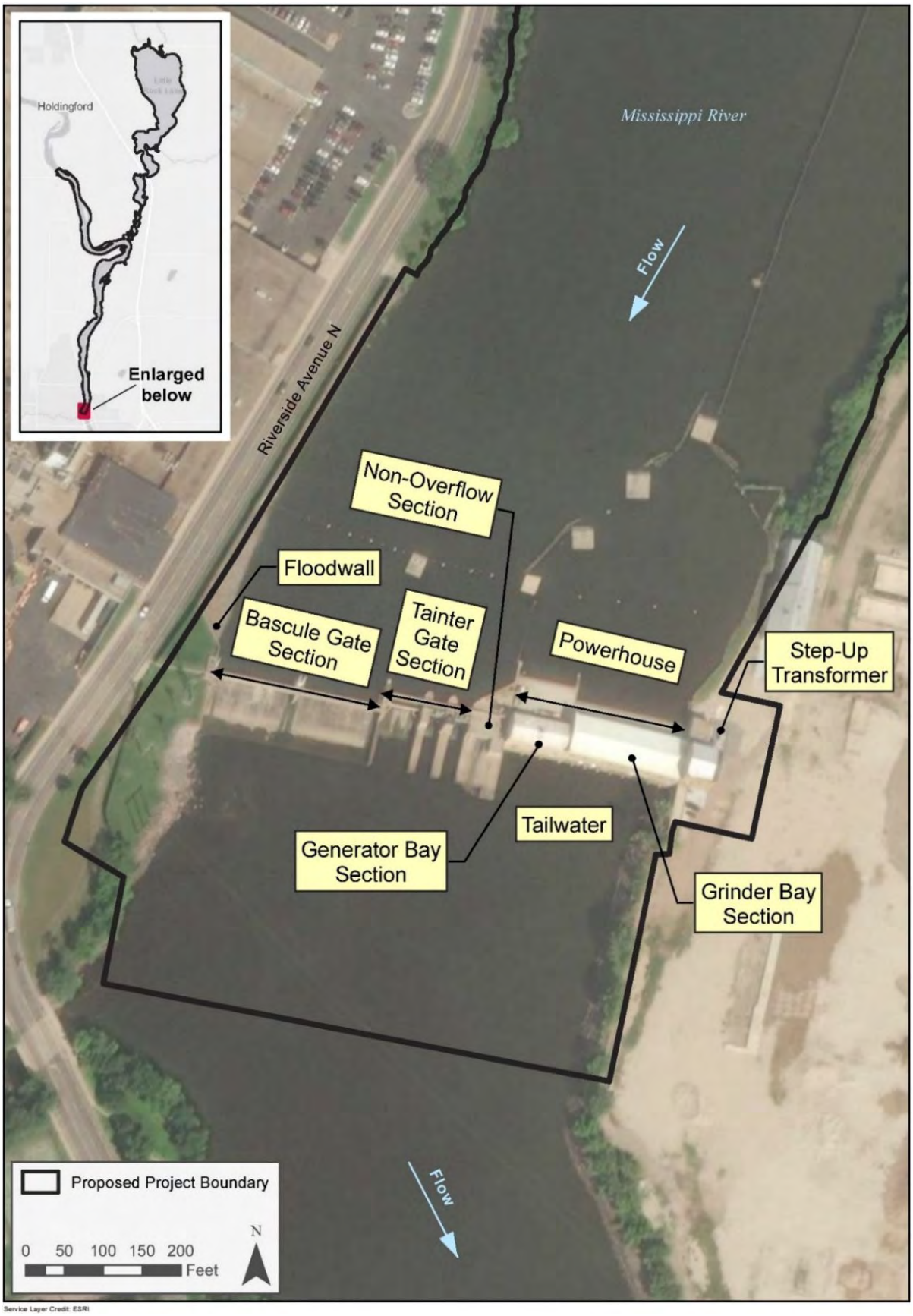


Table 3.2.1.3-1: Sartell Project Turbine and Generator Data

Bay No.	Turbines						Generators	
	Description	Wheel Diameter (IN.)	RPM	Output (H.P.) [1]	Output (KW)	Rated Discharge CFS	Description	Rated Output (kW)
1	N/A	Bay No. 1 Not Used				N/A	N/A	N/A
2	Allis Chalmers Horizontal Quadruple Runner Francis Turbines	29	240	1,075	806.25	550	Existing Reconditioned General Electric Synchronous Motor	937.5
3	Allis Chalmers Horizontal Quadruple Runner Francis Turbines	29	240	1,075	806.25	550	Existing Reconditioned General Electric Synchronous Motor	937.5
4	Allis Chalmers Horizontal Quadruple Runner Francis Turbines	29	240	1,075	806.25	550	Existing Synchronous Motor (Reconditioned)	937.5
5	Allis Chalmers Horizontal Quadruple Runner Francis Turbines	29	240	1,075	806.25	550	Reconditioned General Electric Synchorus Motor-Generator	925.0
6	Allis Chalmers Horizontal Quadruple Runner Francis Turbines	29	240	1,075	806.25	550	Existing Reconditioned General Electric Synchronous Motor	750.0
7	Allis Chalmers Horizontal Quadruple Runner Francis Turbines	29	240	1,075	806.25	550	Existing Reconditioned General Electric Synchronous Motor	750.0
8	Allis Chalmers Horizontal Quadruple Runner Francis Turbines	29	240	1,075	806.25	550	Existing Reconditioned Allis Chalmers Synchronous Motor	750.0
9	Allis Chalmers Horizontal Quadruple Runner Francis Turbines	29	240	1,075	806.25	550	Existing Reconditioned Allis Chalmers Synchronous Motor	750.0
10	Allis Chalmers Horizontal Quadruple Runner Francis Turbines	30	240	1,200	900	600	Reconditioned General Electric Synchronous Motor	925.0
11	Allis Chalmers Horizontal Quadruple Runner Francis Turbines	30	240	1,200	900	600	Reconditioned General Electric Synchronous Motor Generator	925.0
12	Allis Chalmers Horizontal Quadruple Runner Francis Turbines	30	240	1,200	900	600	Reconditioned General Electric Synchronous Motor Generator	925.0

Total Authorized Installed Capacity 8,925 KW (Authorized Installed Capacity is the Lower of Turbine Capacity or Generator Capacity for each unit per 18 C.F.R § 11.1(i))

Units 2, 3, 4, 5, 10, 11, 12 Turbine Limited 5,925 kW
Units 6, 7, 8, 9 Generator Limited 3,000 kW

3.2.2 Sartell Dam

The concrete dam is 46 feet high and 388 feet long and consists of three sections referred to as the non-overflow section, tainter gate section, and bascule gate section.

3.2.2.1 Non-Overflow Section

The 48-foot long non-overflow section is located between the powerhouse and tainter gate section, Prior to 1985, the transformers were located on this section; however, they are now located on the east side of the powerhouse.

3.2.2.2 Tainter Gate Section

The tainter gate section is 114 feet long and includes three tainter gates. Two small tainter gates are located on the left side of this dam section. These gates are approximately 20 feet wide and 16.7 feet high with a sill elevation of 998.87 feet National Geodetic Vertical Datum (NGVD) 1929,[4] The small tainter gates are operated with a 480-volt motor control center. One large tainter gate, which is 46.5 feet wide and 15 feet high with a sill elevation of 1,000.5 feet, is located between the small tainter gates and bascule gate section. The large tainter gate is operated with a hydraulic lift.

3.2.2.3 Bascule Gate Section

The bascule gate section includes two bascule gates that are 106.5 feet wide and 7.3 feet high with a sill elevation of 1,007.5 feet. These gates are operated by hydraulic lifts and are maintained in the closed position except as required to pass ice or high flows.

[4] All elevations in this document refer to National Geodetic Vertical Datum 1929.

3.2.3 Flood Wall

A 494.5-foot long reinforced concrete flood wall with a steel sheetpile cutoff is located in the west abutment area. When the flood wall was constructed in 1987, the abutment elevation was raised to its current level of 1,023.0 feet, which allows the structure to pass the 400-year flood event without overtopping.

3.2.4 Substation and Transmission Equipment

The equipment required to transmit electrical generation to a non-project distribution system includes a 2 Mega Volt Amp (MVA) transformer, a 10 MVA transformer, a 34.5 Kilovolt (kV) transmission line, and appurtenant facilities. The 2 MVA transformer steps up voltage from the two generators (0.48 kV each) to 2.4 kV. The 10 MVA transformer steps up the voltage from the 2 MVA transformer and the remaining nine generators to 34.5 kV. The 715-foot long transmission line extends from the 10 MVA transformer across the Project dam to the distribution system interconnection pole on the west side of the dam. The one-line diagram of principal electrical circuits is shown in **Appendix 3.4.2-1**.

3.2.5 Reservoir

The current license lists the reservoir as encompassing approximately 2,400 acres with an estimated gross storage capacity of 15,500 acre-feet based on a normal pool elevation of 1,014.5 feet. The Project operates in a run-of-river mode and therefore has no usable storage (St. Regis Corporation, 1984).

In the development of this PAD, the current Project boundary shown on the current Exhibit G was georeferenced and digitized to a seamless digital US Geologic Survey (USGS) topographic map using geographic information system software.[5] The Project boundary shown on the georeferenced Exhibit G is mapped upstream on the Mississippi River to an elevation of 1,018.0 feet, which results in a calculated acreage of the current Project boundary to be approximately 2,800 acres. The current Project boundary, based on the upstream location of elevation 1,018.0 feet and assuming the same average water depth, has a gross storage capacity of approximately 18,100 acre-feet.

The maximum elevation required to operate the Project is 1,015.0 feet (FERC, 1985). As stated above, the georeferenced Exhibit G is mapped upstream to 1,018.0 feet; however, this elevation does not have any relevance in the operation of the Project. The Project boundary shown on the current Exhibit G likely is mapped upstream due to mapping inaccuracies that result when USGS paper topographic maps with 10- or 20-foot contours were used to hand-trace the 1,014.5-foot contour line verses the mapping accuracy that can be achieved when using LiDAR data.

Based on the proposed Project boundary described in Section 3.2.7, the reservoir will extend upstream to elevation 1,015.0 feet, which is the maximum operating elevation of the Project. The proposed Project boundary reservoir will encompass approximately 2,366 acres with an estimated gross storage capacity of 15,380 acre-feet.

Table 3.2.5-1 on the following page summarizes the reservoir size and storage capacity based on the descriptions in the paragraphs above.

[5] Georeferencing is the process of associating a physical map (current Exhibit G) with specific locations using geographic information system software; digitizing is the process of turning a physical map into a digital format.

Table 3.2.5-1: Reservoir Size and Storage Capacities

Project Boundary	Elevation	Reservoir Size	Reservoir Gross Storage Capacity
Current Exhibit G	at 1,014.5 feet	2,400 acres	15,500 acre-feet
Georeferenced Exhibit G*	at 1,018.0 feet	2,800 acres	18,100 acre-feet
Proposed Project Boundary	at 1,015.0 feet	2,366 acres	15,380 acre-feet

*Please refer to Section 3.2.7 below for further information on the georeferenced current Exhibit G boundary. Also refer to Figure 3.2.7-1; the blue-shaded area represents the georeferenced reservoir size, which was used to calculate the gross storage capacity. In addition, elevations based on LiDAR are shown and called out for 1,014.5, 1,015.0, and 1,018.0 feet. Note the upper extent on the Mississippi River of the georeferenced current Exhibit G boundary ends at LiDAR elevation 1,018.0 feet.

3.2.6 Appurtenant Equipment

Appurtenant equipment includes but is not limited to bearing lubrication and generator ventilation systems, other gate hoist equipment, protective and metering devices, switchboards, and switchgear.

3.2.7 Project Boundary

The current FERC license, issued March 13, 1985, established the Project boundary at the normal reservoir surface elevation of 1,014.5. This includes all lands below elevation 1,014.5 feet, and is inclusive of Project lands containing the powerhouse, dam, and flood wall. The current Project boundary depicted in the current Exhibit G is included in **Appendix 3.2.7-1**.

The Licensee completed a review of the Project boundary on the current Exhibit G, which was likely developed using USGS topographic paper maps that displayed 10- or 20-foot contours, as discussed in Section 3.2.5. In an effort to provide relevant information to describe the existing environment, the Licensee remapped the Project boundary based on LiDAR elevation data with an accuracy of ±0.35 feet.[6] The Project boundary remapping includes all land necessary or appropriate for the maintenance and operation of the Project. Under the current license, Sartell Hydro operates the Project between reservoir elevations 1,014.0 and 1,015.0 feet. The current Exhibit G only maps the Project boundary at the mid-point elevation of 1,014.5 feet, which is not representative of all lands necessary or appropriate for Project operation. The remapped or proposed Project boundary is similar to the Project boundary on the current Exhibit G; however, the elevation used to remap the proposed Project boundary was increased from 1,014.5 to 1,015.0 feet. A map depicting the current and proposed Project boundary is shown in **Figure 3.2.7-1** at the end of this section.

Analysis of LiDAR data identified the upper extent of the Project boundary on the current Exhibit G contains free-flowing Mississippi River reaches that are not impounded at the maximum operating elevation of 1,015.0 feet. As discussed in Section 3.2.5, when the current Exhibit G was georeferenced using LiDAR data, it was shown to extend upstream to an elevation of 1,018.0 feet, which is beyond what is required for Project operation. As a result, the proposed Project boundary does not extend as far upstream on the Mississippi River as the Project boundary on the current Exhibit G. In addition, LiDAR

[6] LiDAR data is available for Benton and Stearns Counties from Minnesota Geospatial Commons (Minnesota Geospatial Commons, 2006; Minnesota Geospatial Commons, 2011).

data identified the upper extent of the Project boundary on the current Exhibit G does not include all reaches of Little Rock Creek that are impounded at the maximum operating elevation of 1,015.0 feet.

The proposed Project boundary extends approximately 7.8 miles upstream of the Project dam on the Mississippi River and approximately 10.4 miles upstream of the Project dam on the Little Rock Creek The current Project boundary based on the georeferenced Exhibit G extends approximately 13 miles upstream of the Project dam on the Mississippi River and approximately 10.3 miles upstream of the Project dam on the Little Rock Creek.

3.2.8 Proposed Facilities

The Licensee is currently considering several unit efficiency upgrades to the turbines and generators. Other than efficiency upgrades, no new facilities are being proposed as part of this relicensing effort.

Figure 3.2.7-1: Sartell Current and Proposed Project Boundary

3.3 Project Operation (18 CFR § 5.6(d)(2)(iv))

3.3.1. Current Operation

The Project currently operates in a run-of-river mode where discharge measured immediately downstream of the Project tailrace approximates the sum of inflows into the Project. This operation mode protects fish, wildlife, and recreational resources in the Mississippi River. There are no minimum flow requirements.

The Project is operated manually, no remote operations are in place. During normal operations, personnel are present at the dam eight hours a day, five days a week. In addition to daily staffing, an operator is on call 24-hours a day, seven days per week should an abnormal condition be detected. During periods of high flow, an operator is on site 24-hours per day (Sartell Hydro, 2017).

Gate and turbine adjustments are made locally by operating personnel as necessary to maintain the reservoir at a constant level. River flow rates are received daily by telephone from the upstream Blanchard Dam near Royalton, Minnesota. Operating personnel determine the operations mode for the Project based on flows reported at the Blanchard Dam, assuming an approximate water travel time of eight hours. Flow in excess of power production requirements are spilled through the tainter gates and bascule gates to maintain the normal pool elevation. During periods when river flow does not satisfy power production requirements, supplemental electric power is purchased to operate equipment and hydraulic turbines are shut down to maintain normal pool levels (Sartell Hydro, 2017).

3.3.2 Proposed Operation

The Licensee does not propose any changes to the current Sartell Project operations.

3.4 Other Project Information (18 CFR § 5.6(d)(2)(v))

3.4.1 Current License Requirements

The Project license includes a series of License Articles that specify actions the Licensee must take to remain in compliance with its license terms and conditions (FERC, 1985). The license conditions are summarized in **Table 3.4.1-1**. A copy of the existing FERC license is included in **Appendix 3.4.1-1**.

Table 3.4.1-1: Current License Conditions

License Article	Brief Description
Article 15	Requires the Licensee to implement reasonable modification of Project structures and operation when ordered by the Commission upon the recommendation of fish and wildlife agencies.
Article 16	Requires the Licensee to permit the United States or its designated agency to use, free of cost, the Licensee's lands and interests in lands, reservoirs, waterways, and Project works to construct fish and wildlife facilities or to improve existing fish and wildlife facilities.
Article 17	Allows for reasonable recreational facilities development by the Licensee, after notice and opportunity for hearing.
Article 18	Requires Licensee to allow the public free access to Project waters and adjacent Project lands owned by the Licensee for navigation and outdoor recreational purposes.
Article 19	Requires the Licensee to take reasonable measures to prevent soil erosion, sedimentation, and water or air pollution during any construction, maintenance, or operation of the Project.
Article 20	Requires the Licensee to clear lands along open conduits, remove dead trees, and dispose of unnecessary materials in accordance with local, state, and federal regulations.
Article 30	Requires the Licensee to commence construction within two years and complete construction within four years of license issuance.
Article 31	Requires the Licensee to provide final contract drawing and specification for pertinent features of the Project at least 60 days prior to the start of construction.
Article 32	Requires Licensee to file revised Exhibit A and F drawings within 90 days of completion of construction.
Article 33	Requires the Licensee to pay an annual charge to the United States for administration costs of Part I of the Federal Power Act
Article 34	Requires Licensee to operate the Project in run-of-river mode where outflows below the tailrace approximate inflows into the forebay to protect aquatic resources.
Article 35	Requires the Licensee to consult with Minnesota State Historic Preservation Officer (SHPO) about the need for any cultural resource survey and salvage work necessary prior to any future construction.
Article 36	Requires the Licensee to set aside surplus earnings of the Project after a specified reasonable rate of return, to be set aside in an amortization reserve account.
Article 37	Standard land use article that outlies the authority of the Licensee to grant certain types of use and occupancy of Project lands and waters.

3.4.2 Compliance History

The FERC issued one notice of non-compliance during the current license term, as listed below.

- January 24, 2019: Licensee received a letter from the FERC indicating failure to submit the required Sartell Project Dam Safety Surveillance and Monitoring Report (DSSMR) by the due date. The DSSMR was submitted on February 13, 2019 (FERC, 2019).

3.4.3 Sartell Project Summary of Project Generation and Flow Records

Generation and average outflow for the last five years are summarized in **Table 3.4.3-1**. Generation is given in megawatts per hour (MWh) and average outflow is given in cubic feet per second (cfs).

Table 3.4.3-1: Summary of Sartell Project Generation and Flow Records

Time Period	Annual Generation (MWh)	Monthly Average Generation (MWh)	Average Outflow* (cfs)
1/1/2014 to 12/31/2014	850.8**	70.8	11,385
1/1/2015 to 12/31/2015	33,806.6	2,817.2	5,782
1/1/2016 to 12/31/2016	41,716.1	3,476.3	8,078
1/1/2017 to 12/31/2017	37,997.9	3,166.5	8,348
1/1/2018 to 12/31/2018	35,412.1	2,951.0	9,228

* Average outflow as measured at Royalton USGS Gage No. 05267000; average outflow is adjusted according to drainage basin area at the Project dam.
** Generation began 12/11/2014, units were out of service prior to this date.

3.4.4 Current Net Investment

Project net investment is provided as privileged information in **Appendix 3.4.4-1**.

3.5 References

- Federal Energy Regulatory Commission. 1985. Order Issuing License (Major Project) (FERC No. 8513). Issued March 13, 1985.
- Federal Energy Regulatory Commission. 2019. Letter citing non-compliance of Dam Safety Surveillance and Monitoring Reports for multiple projects under P-6476, et. al. January,24, 2019.
- Minnesota Geospatial Commons. 2006. LiDAR Elevation, Stearns County, Minnesota, 2006. Website https://gisdata.mn.gov/dataset/elev-lidar-stearns2006.
- Minnesota Geospatial Commons. 2011. LiDAR Elevation, Twin Cities Metro Region, Benton County, Minnesota, 2011. Website https://gisdata.mn.gov/dataset/elev-lidar-metro2011.
- Sartell Hydro. 2017. Supporting Technical Information Document. September 12, 2017.
- Sartell Hydro. 2019. Additional information regarding Exhibits A, F, and G. Submitted 12/17/2019.
- St. Regis Corporation. 1984. Application for license for Major Project-Existing Dam, Sartell Dam Hydroelectric Project, Sartell, MN. April,1984.

4. Description of Existing Environment and Resource Impacts

This section summarizes water; topography; geology and soils; fish and aquatic; botanical species; wetlands; wildlife; invasive species; rare, threatened, and endangered species; recreation and land use; aesthetics; cultural; socio-economic; and tribal resources as related to the Project.

4.1 General Description of the Project Area (18 CFR § 5.6(d)(3)(xiii))

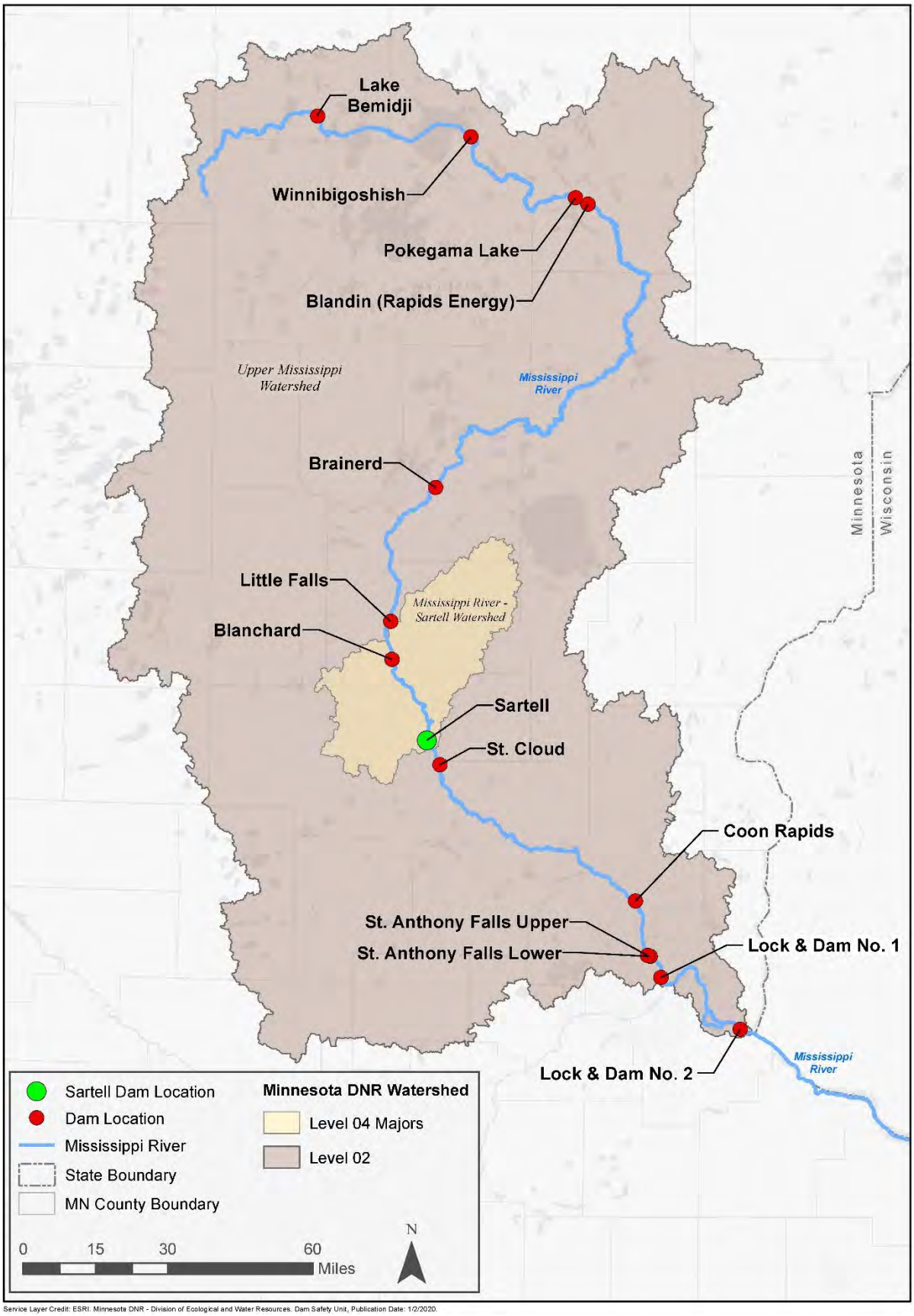
The Sartell Project is located in the Mississippi River-Sartell watershed within the larger Upper Mississippi River Basin. The Upper Mississippi River Basin includes 15 individual major watersheds and covers approximately 20,100 square miles in the state of Minnesota (MPCA, 2020). The drainage area upstream of the Sartell Project is 12,265 square miles (St. Regis Corporation, 1984). The Mississippi River originates in Lake Itasca within Itasca State Park in Itasca County. From there, the Mississippi River runs in a general northeasterly direction to Bemidji, then flows eastward to Grand Rapids before flowing south through Brainerd, Little Falls, Sartell, St. Cloud, and the Twin Cities metropolitan area before its confluence with the St. Croix River at Lock and Dam No. 2 near Hastings, Minnesota. The Upper Mississippi River Basin drains 15 of the 80 major watersheds in Minnesota and all of or portions of 21 Counties (MPCA, 2020).

There are 14 regulated dams on the main stem of the Mississippi River within the Upper Mississippi River Basin, which include six FERC-regulated hydroelectric project dams, six US Army Corps of Engineers (USACE) dams with third party hydropower generation under FERC Licenses, one USACE dam that does not generate power, and two state-regulated dams that do not regulate power. The dams on the main stem of the Mississippi River are listed from upstream to downstream in **Table 4.1-1** and **Figure 4.1-1** shows the Upper Mississippi River Basin and each of the 14 regulated dams located on the main stem of the Mississippi River.

Table 4.1-1: Dams on the Main Stem of the Mississippi River in the Upper Mississippi Basin

Dam Name	Location	Regulating Authority	FERC Project No.	Authorized Capacity (kW)
Lake Bemidji Dam	Bemidji	State-regulated	N/A	N/A
Winnebigosh Dam	Deer River	USACE Dam	N/A	N/A
Pokegama Lake Dam	Cohasset	USACE Dam	P-9974	300
Blandin Dam	Grand Rapids	FERC License	P-2362	2,100
Brainerd Dam	Brainerd	FERC License	P-2533	3,542
Little Falls Dam	Little Falls	FERC License	P-2532	4,720
Blanchard Dam	Royalton	FERC License	P-345	18,000
Sartell Dam	Sartell	FERC License	P-8315	8,925
St. Cloud Dam	St. Cloud	FERC License	P-4108	8,860
Coon Rapids Dam	Coon Rapids	State-regulated	N/A	N/A
St. Anthony Falls - Upper Dam	Minneapolis	FERC Licenses on USACE Dam	P-2056	14,245
			P-14628	600
St. Anthony Falls - Lower Dam	Minneapolis	FERC License on USACE Dam	P-12451	8,980
Lock and Dam No. 1 (Ford Dam)	St. Paul	FERC License on USACE Dam	P-362	19,920
Lock and Dam No. 2	Hastings	FERC License on USACE Dam	P-4306	4,400

Figure 4.1-1: Dams on the Main Stem of the Mississippi River in the Upper Mississippi River Basin



4.1.1 Sartell Project

The Sartell Project is located in Benton and Stearns Counties in central Minnesota, 70 miles northwest of Minneapolis and 2 miles north of the city of St. Cloud. Project structural facilities, including the dam and powerhouse, are located in the city of Sartell in Section 9, Township 36 North, Range 31 West in Benton County and Section 21, Township 125 N, Range 28 West in Stearns County, along the Mississippi River at approximate river mile 932 (MDNR, 2019). The dam impounds the Mississippi River creating a reservoir which extends north from the city of Sartell for about 13 miles under the current Project boundary and 7.8 miles under the proposed project boundary. Municipalities within the current Project boundary include the cities of Sartell and Rice and the townships of Brockway, Langola, Le Sauk, Sauk Rapids, and Watab. Municipalities within the proposed Project boundary include all those listed above, excluding the city of Rice.

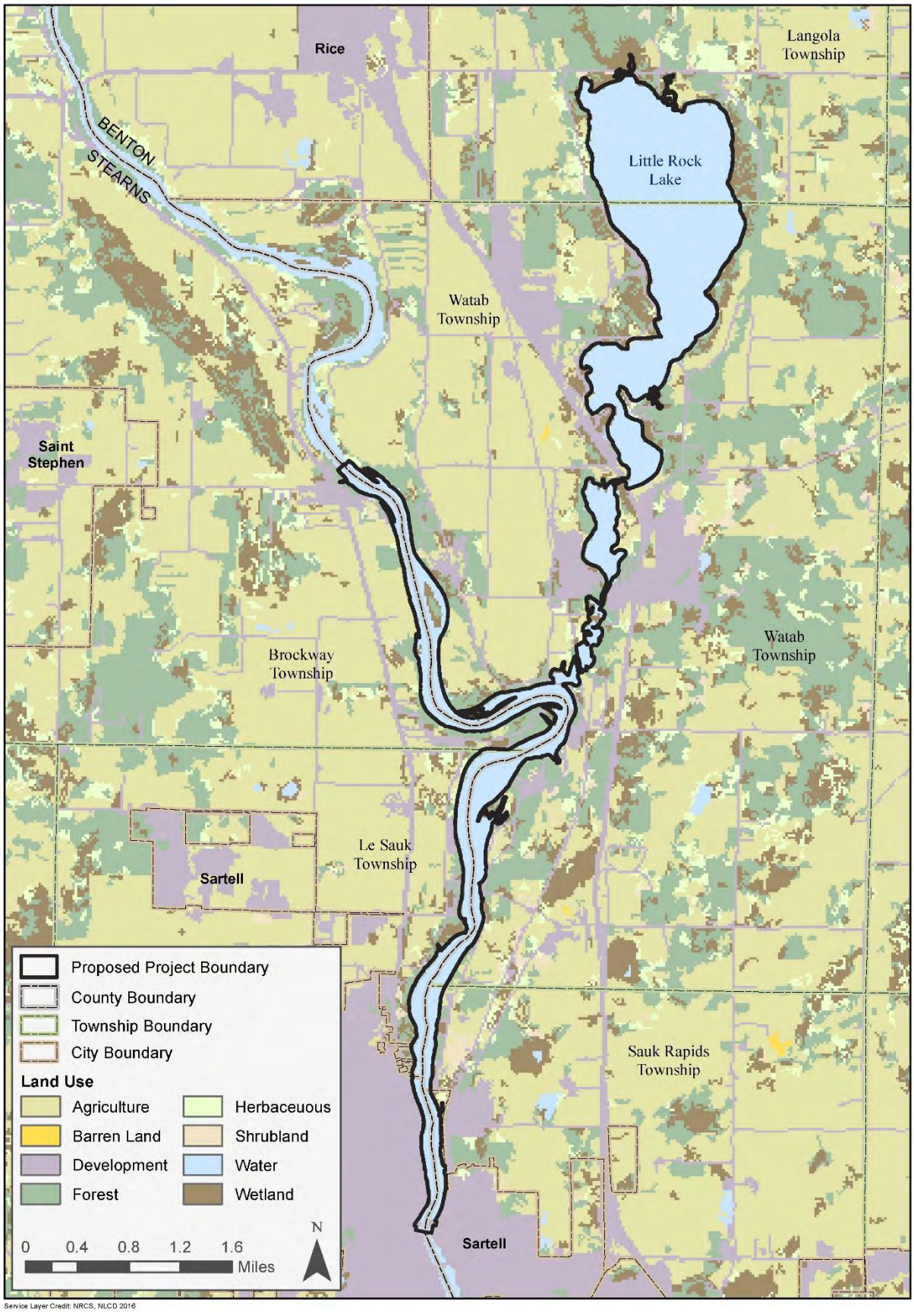
4.1.2 Major Land Uses

Land use in the Mississippi River-Sartell Watershed is primarily dominated by two forms of agriculture, which include rangeland at 35.2% and cropland at 28.5%. Forest/shrub land covers 17.5% and wetlands make up 10.5% of the land area. Developed lands, at 5.8%, are most prominent in the southern portion of the watershed. Open water covers 2.5% of the surface area and is most prominent in the northeast and southwest portions of the watershed. The majority of the watershed is under private ownership (MPCA, 2019). Land uses within the Project vicinity include agricultural, residential, forest, wetland, and park and recreational. A map included as **Figure 4.1.2-**1 depicts the major land uses in the vicinity of the Sartell Project proposed boundary.

Major land uses in Benton County consist of 76% agricultural, 10% incorporated or under annexation agreements, 9% residential, 3% rural vacant land, 2% parks and open space, <1% commercial and industrial, and <1% public facilities/other (Benton County, 2019).

Major land uses in Stearns County consist of 78% agricultural use 12% forested, 5% urban, 3% water, 2% wetland, and <1% extractive/other (Stearns County, 2019).

Figure 4.1.2-1: Major Land Uses in the Vicinity of Sartell Project Proposed Boundary



4.1.3 Major Water Uses

The central Minnesota region was historically rich in resources such as fur and timber. The fur trade industry began during the mid-17th century and continued to be the most prominent industry of the Upper Mississippi River Valley until the mid-1800s, when logging took over as the largest industry in Minnesota. The Mississippi River and its tributaries were an important resource used by the lumber industry for transporting logs and other goods. Historically, a number of dams were built to aid in log transportation, control water levels, and provide electricity (MPCA, 2019). The primary present-day uses of the Mississippi River are industrial water supply, hydroelectric power production, navigation, recreation, and fish and wildlife habitat.

Of the 12 hydroelectric facilities on the main stem of the Mississippi River, Sartell Hydro owns and operates one facility with an authorized capacity of 8,925 kW. There are 11 other facilities with a combined capacity of 94,592 kW.

Aside from industry and hydroelectric power, the Mississippi River is also utilized for navigation and recreation. The most notable recreational activities include fishing, boating, canoeing, and kayaking.

4.1.4 Project Reservoir

The Sartell Project dam impounds the Mississippi River at approximate river mile 932 (MDNR, 2019). Under the proposed Project boundary described in Section 3.2.7, the reservoir encompasses approximately 2,366 acres with an estimated storage capacity of 15,380 acre-feet at the maximum operating elevation of 1,015.0 feet. See Section 3.2.5, specifically **Table 3.2.5-1**, for the current Exhibit G and georeferenced Exhibit G reservoir size and storage capacities.

4.1.5 Climate

The Sartell Project is located within the Warm Summer Continental Climate Region, which is characterized by hot, humid summers and cold winters with moderate snowfall (EarthHow.com, 2019). Based on data from 1981-2010, the average monthly minimum temperature ranges from 2 degrees Fahrenheit (°F) in January to 58°F in July. The average monthly maximum temperature ranges from 21°F in January to 82°F in July. The overall monthly average temperature ranges from 11.5°F in January to 69.0°F in July. The average annual precipitation total is 27.72 inches, with about three quarters of the precipitation falling during the growing season of April through September (US Climate Data, 2019).

4.1.6 References

- Benton County. 2019. Benton County Comprehensive Plan. Chapter 4 Land Use. Online. https://www.co.benton.mn.us/DocumentCenter/View/5920/Chapter-4-Land-Use?bidId=. Accessed December 31, 2019.
- EarthHow.com. 2019. What are the 5 Koppen Climate Classification Types? Online. https://earthhow.com/koppen-climate-classification/#4_Continental_D. Accessed November 25, 2019.
- Minnesota Department of Natural Resources. 2019. Mississippi River State Water Trail. Online. https://files.dnr.state.mn.us/maps/canoe_routes/mississippi7.pdf. Accessed January 2, 2020.
- Minnesota Pollution Control Agency (MPCA), 2019. Mississippi River-Sartell Monitoring and Assessment Report. July 2019.

- Minnesota Pollution Control Agency. 2020. Upper Mississippi River Basin. Online. https://www.pca.state.mn.us/water/upper-mississippi-river-basin. Accessed January 9, 2020.
- Stearns County. 2019. Stearns County Local Water Management Plan 2008-2017. Online. https://co.stearns.mn.us/Portals/0/docs/Department%20Files/EnvironmentalSvs/CLWP2008-2017.pdf. Accessed December 31, 2019.
- St. Regis Corporation. 1984. Application for license for Major Project-Existing Dam, Sartell Dam Hydroelectric Project, Sartell, MN. April,1984.
- US Climate Data. 2019. https://www.usclimatedata.com/climate/saint-cloud/minnesota/united-states/usmn1290. Accessed November 25, 2019.

4.2 Geology, and Soils (18 CFR § 5.6(d)(3)(ii))

4.2.1 Geology

The Sartell Project is located at the southern edge of the Brainerd-Automba Drumlin field. The field is fan-shaped and interrupted by numerous outwash plains. The largest such outwash plain is the Mississippi Valley terrain. The southern portion of the drumlin field is also interrupted by sharp erosional valleys containing lakes or underfit streams. The valleys are believed to be tunnel valleys formed by subglacial flow under great hydrostatic pressure (Sartell Hydro, 2017).

The composition of unconsolidated surface material varies considerably in the Project vicinity. It is generally composed of red drift from the Wisconsin Age, which overlies older grey drift from the Kansan and Nebraska Ages. Along the Mississippi River, drifts represent recent alluvium deposits. Some lacustrine silts of glacial Lake Grantsburg may also be present. Drift thickness varies from zero to 175 feet and changes considerably over relatively short distances (Sartell Hydro, 2017).

The bedrock in the area is predominately Precambrian igneous and metamorphic rock. Outcropping is generally composed of granite; however, weathered gneiss and various other Precambrian rock are also present (Sartell Hydro, 2017).

Surface topography in the Project vicinity is relatively flat to gently rolling land, bisected by the Mississippi River and a narrow floodplain. Total relief ranges from hilltops in excess of 1,140 feet elevation to less than 960 feet at the Mississippi River near the St. Cloud dam tailwaters. In areas near the Mississippi River, land surfaces slope toward the river in the downstream direction. Most slopes are no more than one to two degrees and maximum slopes of up to six degrees occur near the river banks. Glacial sediments are thin near the river at 30 feet or less, with several outcrops of Precambrian granites at the surface (St. Regis Corporation, 1984).

4.2.2 Soils

There are 45 soil types found throughout the Project vicinity, which are grouped into 34 major soil associations with distinctive soil patterns, relief, and drainage factors (USDA-NRCS, 2019). A custom soils report and map for the general Project vicinity is include in **Appendix 4.2.2-1**.

Hubbard, Zimmerman, Isan-Isan Complex, and Fordum-Winterfield Complex soils are the most prevalent soil series found in the Project vicinity, with the most commonly identified soil classifications being Hubbard loamy sand, Zimmerman fine sand, Isan-Isan frequently ponded complex, and Fordum-Winterfield frequently flooded complex in respective order of abundance. (USDA-NRCS, 2019). Soil characteristics are shown in **Table 4.2.2-1** on the following page.

Table 4.2.2-1: Prevalent Soil Characteristics in the Sartell Project Vicinity

Soil Series	Drainage Classification	Formation	Water Transmittal Capacity	Runoff Class
Hubbard	Excessively Drained	Stream terraces and flats	High to Very High	Low
Zimmerman	Excessively Drained	Outwash plains	High to Very High	Low
Isan-Isan Complex	Poorly Drained to Very Poorly Drained	Stream terraces, flats, and depressions	High	Moderate
Fordum-Winterfield Complex	Somewhat Poorly Drained to Very Poorly Drained	Flood plains	High to Very High	Moderate

4.2.3 Reservoir Shoreline Conditions

In conjunction with a planned drawdown of the Sartell Project reservoir in 2016, the Stearns County Soil and Water Conservation District (SWCD) and the MDNR completed a shoreline erosion survey of the portion of the reservoir on the Mississippi River. A total of 18 sites were identified where erosion rates were estimated. **Table 4.2.3-1** details information regarding each of the sites. All shorelines owned by the licensee have been stabilized with rip rap. Other shoreline areas not identified in the 2016 erosion survey have existing riparian buffers.

Table 4.2.3-1: Stearns County SWCD and MDNR Sartell Reservoir Erosion Survey

Station	BEHI* Erosion Rating	Length of Bank (feet)	Sturdy Bank Height (feet)	Bank Erosion Rate (feet/year)	Bank Erosion Rate (tons/year/feet)
E033034	Very High	70	50	0.58	1.38
E031032	Very High	150	30	0.58	0.83
E023024	High	205	17	0.87	0.71
W005006	High	100	25	0.58	0.69
E025026	High	96	19	0.58	0.53
W009010	High	270	25	0.38	0.46
W007008	Very High	75	16	0.58	0.44
E029030	Very High	500	15	0.58	0.42
E021022	High	150	11	0.58	0.30
W011012	High	1,000	10	0.58	0.28
W003004	Very High	100	15	0.38	0.27
E019020	Very High	300	8	0.58	0.22
E017018	High	1,372	10	0.38	0.18
E015016	High	350	8	0.38	0.15
W013014	High	121	12	0.25	0.14
E035036	High	150	4	0.58	0.11
E027028	High	240	5	0.38	0.09
W001002	Low	200	2.5	0.07	0.01

* BEHI = Bank Erosion Hazard Index

4.2.3.1 County Regulations

Benton County enforces a Shoreline Management Ordinance that classifies shoreline areas, as well as establishes minimum setback requirements for buildings and septic systems, maximum amounts of impervious area, and standards for shoreland alterations including alterations of vegetation and topography (Benton County, 2020).

Stearns County also enforces a Shoreland Management Ordinance. Stearns County requires permits for all structural use, shoreland alteration, and vegetation removal activities within the shoreland zone in order to adhere to the standards of the shoreland management program (Stearns County, 2020).

4.2.4 Erosion

The United States Department of Agriculture (USDA)-Natural Resource Conservation Service (NRCS) uses a computer software model called Revised Universal Soil Loss Equation Version 2 (RUSLE2) to estimate soil loss from erosion caused by rainfall on cropland. The factors described in the following paragraphs are reviewed in RUSLE2 to estimate soil erosion based upon erodibility within the Project vicinity.

4.2.4.1 Hydrologic Group

The Hydrologic Group for each soil is based upon runoff potential for saturated and bare soils and range from Group A through Group D, with Group A having the lowest runoff potential and Group D having the highest (USDA-NRCS, 2019).

Hubbard loamy sands with 0-2% slopes (D67A) reside in Group A, Zimmerman fine sands with banded substratum and 1-6% slopes (D55B) reside in group A, Isan-Isan frequently ponded complex soils with 0-2% slopes (D20A) reside in group A/D[7], and Fordum-Winterfield complex, frequently flooded complex soils with 0-2% slopes (1011A) reside in group B/D.

4.2.4.2 T Factor

The T Factor is an estimate of the maximum average rate of soil erosion in tons per acre per year that can occur without affecting crop productivity over a sustained period. T Factor also relates to the ability of the soil to revegetate once it is disturbed (USDA-NRCS, 2019).

Hubbard loamy sands with 0-2% slopes have a T Factor of 5 tons per acre, Zimmerman fine sands with banded substratum and 1-6% slopes have a T factor of 5 tons per acre, Isan-Isan frequently ponded complex soils with 0-2% slopes have a T Factor of 2 tons per acre, and Fordum-Winterfield complex, frequently flooded complex soils with 0-2% slopes have a T Factor of 3 to 5 tons per acre.

[7] If two letters are listed in Hydrologic Group, the first letter applies to drained soils and the second letter applies to soils that are not drained.

4.2.4.3 Kf Factor

The Kf Factor gives an indication of how susceptible a soil surface is to erosion caused by water and range from 0.02 to 0.69, with 0.69 having the highest susceptibility to erosion (USDA-NRCS, 2019). Based upon the RUSLE2 information, lands in the Project vicinity have Kf factors in the low to moderate range due to the soil particle susceptibility to detachment due to runoff.

Hubbard loamy sands with 0-2% slopes have a Kf Factor of 0.02, Zimmerman fine sands with banded substratum and 1-6% slopes have a Kf factor of 0.1, Isan-Isan frequently ponded complex soils with 0-2% slopes have a Kf Factor of 0.2, and Fordum-Winterfield complex, frequently flooded complex soils with 0-2% slopes have a Kf Factor 0.17 to 0.28.

4.2.4.4 Percent Sand, Percent Silt, and Percent Clay

The USDA-NRCS also provides a representative value of the sand, silt, and clay composition in the dominant soils (USDA-NRCS, 2019).

Hubbard loamy sands with 0-2% slopes are composed of 86% sand, 8% silt, and 6% clay. Zimmerman fine sands with banded substratum and 1-6% slopes are composed of 97.3% sand, 0.7% silt, and 2% clay. Isan-Isan frequently ponded complex soils with 0-2% slopes are composed of 67% sand, 24% silt, and 9% clay. Fordum-Winterfield complex, frequently flooded complex soils with 0-2% slopes are composed of 65.0 to 87.3% sand, 6.7 to 27.0% silt, and 6 to 8% clay.

4.2.5 References

- Benton County. 2020. Benton County Shoreland Management Ordinance. Online. https://www.co.benton.mn.us/DocumentCenter/View/221/Shoreland-Management-Ordinance-PDF?bidId=. Accessed January 8, 2020.
- Sartell Hydro. 2017. Supporting Technical Information Document-Sartell Hydroelectric Project, FERC Project No P-8315. September 12, 2017.
- Stearns County. 2020. Shoreland Management. Online. https://co.stearns.mn.us/Environment/WaterResources/ShorelandManagement. Accessed January 8, 2020.
- St. Regis Corporation. 1984. Application for license for Major Project-Existing Dam, Sartell Dam Hydroelectric Project, Sartell, MN. April,1984.
- United States Department of Agriculture-Natural Resource Conservation Service. 2019. https://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx. Accessed November 27, 2019.

4.3 Water Resources (18 CFR § 5.6(d)(3)(iii))

The Sartell Project is located in the Mississippi River-Sartell watershed, which is designated as Hydraulic Unit Code (HUC) 8, and lies within the larger Upper Mississippi River Basin, designated as Mississippi River Headwaters (HUC 4), as shown in **Figure 4.3-1** on the following page. The Upper Mississippi River Basin includes 15 separate major watersheds and covers approximately 20,100 square miles in the state of Minnesota. The Mississippi River begins at Lake Itasca in Itasca State Park in Itasca County. From there, the Mississippi River runs in a general northeasterly direction to Bemidji, then flows eastward to Grand Rapids before flowing south through Brainerd, Little Falls, Sartell, St. Cloud, and the Twin Cities metropolitan area before its confluence with the St. Croix River at Lock and Dam No. 2 near Hastings, Minnesota. The basin drains 15 of the 80 major watersheds in Minnesota and all of or part of 21 counties (MPCA, 2020).

4.3.1 Drainage Area

The Sartell Project is influenced by the Mississippi River-Sartell major watershed in Minnesota. The drainage area of the watershed lies within portions of Benton, Crow Wing, Mille Lacs, Morrison, Stearns, and Todd Counties and drains approximately 1,020 square miles (MPCA, 2019a).

The watershed is further divided into minor watersheds and catchments, as listed in **Table 4.3.1-1** and shown in **Figure 4.3.1-1**. The Mississippi River flows through the middle of the watershed. The river experiences one of its greatest drops in elevation in the Upper Mississippi Basin within this watershed, dropping 6.5 feet per mile along the river between Little Falls and Royalton (MPCA, 2019a). Main tributaries of the Mississippi River-Sartell watershed include Platte River, Little Two River, South Two River, Spunk Creek, Little Rock Creek, Zuleger Creek, and Watab River.

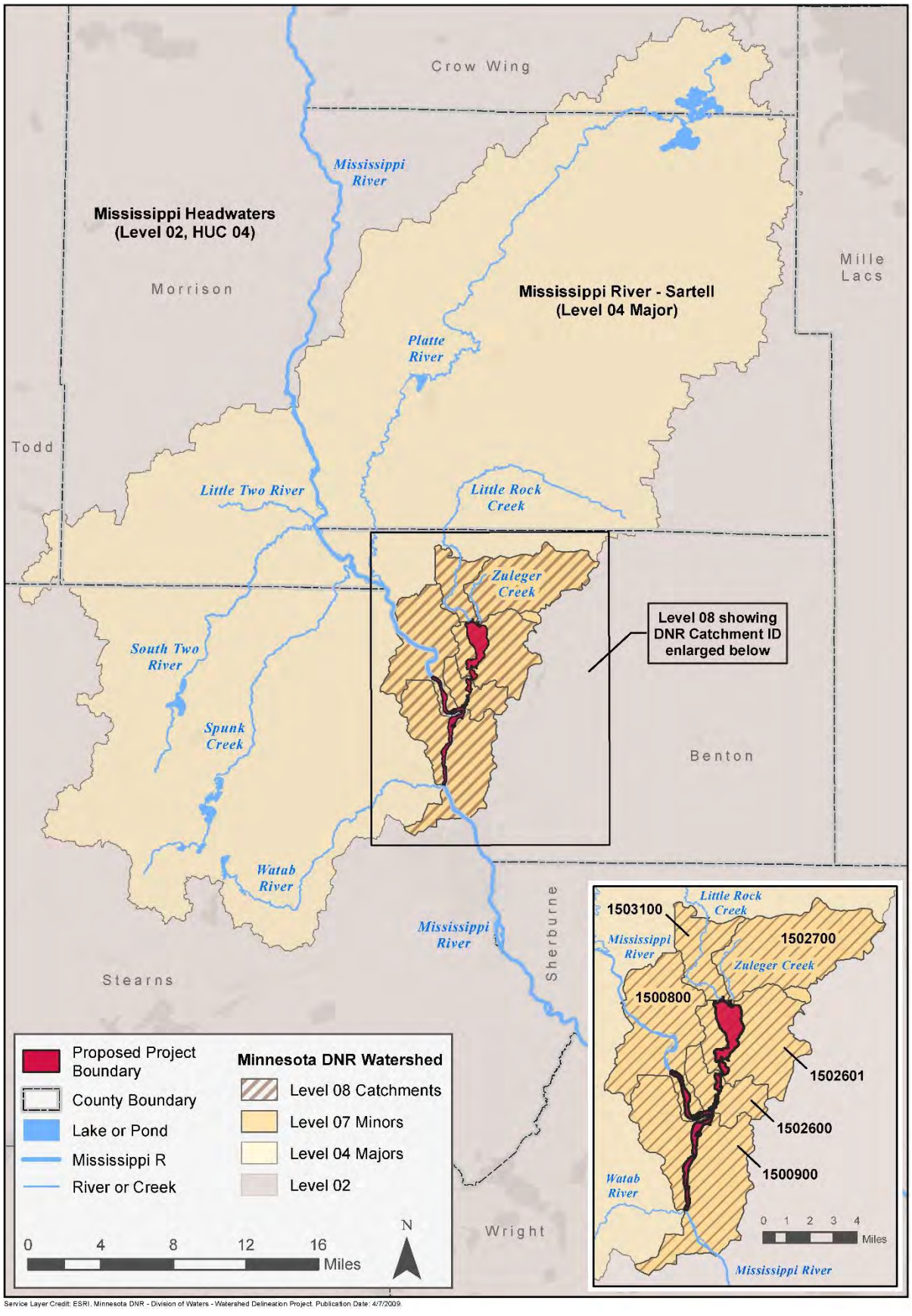
Table 4.3.1-1: Hydrologic Unit Description for the Project

MDNR Hierarchy	Name
Level 2 Basin	Mississippi Headwaters (Upper Mississippi Basin)
Level 4 Major Watershed	Mississippi-Sartell Watershed
Level 7 Minor Watershed	Little Rock Creek
	Mississippi River
Level 8 Catchments	Catchment 1500800
	Catchment 1500900
	Catchment 1502600
	Catchment 1502601
	Catchment 1502700
	Catchment 1503100

Figure 4.3-1: Major Watersheds of Minnesota

Service Layer Credit: Minnesota Department of Natural Resources Watershed Suite

Figure 4.3.1-1: Sartell Project Water Resources and Drainage Areas



4.3.2 Streamflow, Gage Data, and Flow Statistics

Monthly flow duration curves were developed based on data recorded at USGS Gage No. 05267000, which is located approximately 20 miles upstream near Royalton, Minnesota. The gage location has a drainage area of 11,600 square miles and is adjusted for the drainage area of 12,265 square miles at the Project Dam. The USGS gage data was analyzed from January 1924 to December 31, 2018. Based upon the data for the adjusted drainage area for the analyzed period, the average annual calendar year flow at the Project is 5,233 cfs. The maximum annual calendar year flow was 11,385 cfs in 2014. The minimum annual calendar year flow was 1,178 cfs in 1934. The monthly flow duration curves and exceedance table for the analyzed period are available in **Appendix 4.3.2-1**. The Project monthly minimum, mean, and maximum flows are shown in **Table 4.3.2-1**.

Table 4.3.2-1: Monthly Minimum, Mean, and Maximum Flows (1924 to 2018)

Month	Monthly Minimum (cfs)	Monthly Mean (cfs)	Monthly Maximum (cfs)
January	371	2,944	7,332
February	587	2,856	13,735
March	527	4,308	26,308
April	970	9,968	40,360
May	1,141	9,496	32,330
June	722	7,370	29,161
July	315	5,623	31,802
August	332	3,990	21,871
September	317	3,794	19,863
October	453	4,546	24,089
November	268	4,465	19,758
December	399	3,432	14,052

4.3.3 Existing and Proposed Uses of Water

4.3.3.1 Existing

As previously described in Section 4.1.3, the fur trade industry began in central Minnesota during the mid-17th century and continued to be the most prominent industry of the Upper Mississippi River Valley until the mid-1800s, when logging took over. A number of dams were built to aid in log transportation, control water levels, and provide electricity (MPCA, 2019a). Present-day uses of the Mississippi River are primarily industrial water supply, hydroelectric power production, navigation, recreation, and fish and wildlife habitat.

In a search of the Minnesota Pollution Control Agency (MPCA) wastewater permit viewer, five industrial wastewater permits were identified in the Project vicinity. One is a municipal wastewater permit for the city of Sartell north waste treatment plant under general permit number GEN 20170001. Another is an industrial wastewater permit associated with De Zurik Inc's. rubber mill cooling discharge under general permit number GEN 2012001. Two industrial wastewater permits are associated with Knife River Central Minnesota under permit numbers GEN 2019001 and GEN 20190002. The final permit is associated with Virnig Manufacturing's permit discharge to publicly

owned treatment works under permit number GEN 20180001 (MPCA, 2019b). Each of the permitted discharges has the potential to impact waters within both the current and proposed Project boundaries.

4.3.3.2 Proposed

Although hydroelectric power production is a non-consumptive use of water, some hydroelectric projects periodically store water for future release. The Sartell Project is operated in a run-of-river mode and does not store water for future release. The Licensee is not proposing any changes to operation that would affect water use.

4.3.4 Existing Instream Flow Uses

Article 402 of the current Sartell Project license requires operation in a run-of-river mode. The Licensee does not propose any changes to the run-of-river flows.

4.3.5 Existing Water Rights

The Licensee owns or has the rights necessary to operate the Sartell Project.

4.3.6 Reservoir Bathymetry

The Project reservoir is approximately 2,400 acres at normal reservoir elevation of 1,014.5 feet, the reservoir surface elevation under normal operating conditions, based on the current Exhibit G. Based on the proposed Project boundary described in Section 3.2.7, the reservoir encompasses a total of 2,366 acres with an estimated gross storage capacity of 15,380 acre-feet at the maximum operating elevation of 1,015.0 feet.

In 2016, the MDNR completed bathymetric maps of the Project reservoir on the main Mississippi River channel, Little Rock Lake, and the Little Rock Creek channel between Little Rock Lake and the Mississippi River. Bathymetric maps are located in **Appendix 4.3.6-1** (MDNR, 2017).

4.3.7 Water Quality

The Project waters are subject to Minnesota Administrative Rule 7050, Waters of the State, Water Quality Standards for Protection of Waters of the State (MN Rule 7050) and are administered by the MPCA (MPCA, 2019c). All surface waters in Minnesota are classified and protected for multiple beneficial uses. The full text of MN Rule 7050 can be found in **Appendix 4.3.7-1**.

4.3.7.1 Surface Water Designated Use Categories

MN Rule 7050 groups waters of the state into one or more of the use classifications described below.

- **Class 1 Waters, Domestic Consumption**
  Domestic consumption waters include all waters of the state that are or may be used as a source of supply for drinking, culinary or food processing use, or other domestic purposes for which quality control is or may be necessary to protect public health and welfare (MPCA, 2019c).

- **Class 2 Waters, Aquatic Life and Recreation**
  Aquatic life and recreation waters include all waters of the state that support or may support aquatic biota, bathing, boating, or other recreational purposes and for which quality control is or may be necessary to protect aquatic or terrestrial life or their habitats or public health, safety, or welfare (MPCA, 2019c).

- **Class 3 Waters, Industrial Consumption**
  Industrial consumption waters include all waters of the state that are or may be used as a source of supply for industrial process or cooling water, or any other industrial or commercial purposes and for which quality control is or may be necessary to protect public health, safety, or welfare (MPAC, 2019c).

- **Class 4 Waters, Agriculture and Wildlife**
  Agriculture and wildlife waters include all waters of the state that are or may be used for any agricultural processes, including stock watering and irrigation, or by waterfowl or other wildlife and for which quality control is or may be necessary to protect terrestrial life and its habitat or public health, safety, or welfare (MPCA 2019c).

- **Class 5 Waters, Aesthetic Enjoyment and Navigation**
  Aesthetic enjoyment and navigation waters include all waters of the state that are or may be used for any form of water transportation or navigation or fire prevention and for which quality control is or may be necessary to protect public health, safety, or welfare (MPCA, 2019c).

- **Class 6 Waters, Other Uses and Protection of Border Waters**.
  Other uses includes all waters of the state that serve or may serve the uses of Class 1 to Class 5 waters and any other beneficial uses not listed in MN Rule 7050 including any uses in Minnesota or any other state, province, or nation of any waters flowing through or originating in Minnesota and for which quality control is or may be necessary to conform with the requirements of the legally constituted state or national agencies having jurisdiction over such waters (MPCA, 2019c).

- **Class 7 Waters, Limited Resource Value Waters**
  Limited resource value waters include surface waters of the state that have been subject to a use attainability analysis and have been found to have limited value as a water resource (MPCA, 2019c).

Designated uses and water quality standards applicable to waters within the Sartell Project are provided in **Table 4.3.7.1-1** and **Table 4.3.7.1-2**, respectively.

Table 4.3.7.1-1: Designated Uses for Waters Within the Sartell Project

Classified Waters	Project Area Included within Classified Waters	Use Classes	Class Category
Mississippi River from Sauk River to Swan River	Portion of Project reservoir on main stem of Mississippi River and reach of river downstream of the Project	1C, 2Bdg, 3C, 4A, 4B, 5, and 6	Cool and warm water aquatic life and habitat
Unlisted Waters (lotic)	Portion of Little Rock Creek between Little Rock Lake and the Mississippi River	2Bg, 3C, 4A, 4B, 5, and 6	Cool and warm water aquatic life, aquatic habitat, and wetlands
Unlisted waters	Little Rock Lake	2B, 3C, 4A, 4B, 5, and 6	Cool and warm water aquatic life, aquatic habitat, and wetlands

Source: MN Rule 7050

Table 4.3.7.1-2: Water Quality Standards for Waters within the Sartell Project.

Parameter	Numeric Criteria
Dissolved Oxygen	The quality of class 2B surface waters shall be such as to permit the propagation and maintenance of a healthy community or cool or warm water aquatic biota and their habitats. These waters shall be suitable for aquatic recreation of all kinds, including bathing, for which the waters may be usable. 5.0 milligrams per liter as the daily minimum.
pH	6.5 to 8.5 standard units; maintain background per 7050.0222, subpart 6.
Temperature degrees Fahrenheit (˚F)	Temperature must not exceed 5˚F above natural temperature in streams and 3˚F above natural temperatures in lakes, based on monthly average of maximum daily temperature, except in no case shall it exceed the daily average temperature of 86˚F.

Source: MN Rule 7050

4.3.8 Water Quality Data

4.3.8.1 Historic

During the previous relicensing efforts for the Sartell Project, the water quality certification, as required by Section 401 of the Clean Water Act, was waived by the MPCA. The FERC determined that continued operation of the facility would cause no significant changes to the environmental conditions in the Project vicinity (FERC, 1985).

4.3.8.2 Existing

Waters within the current Sartell Project boundary include the Mississippi River from the Sartell dam upstream approximately 13 miles, Little Rock Creek from the start of Little Rock Lake at the US Hwy 10 bridge downstream to the Mississippi River, and all of Little Rock Lake. A search of the MPCA surface water data system identified available water quality assessments and monitoring data for each of these water bodies, which are described in further detail in the following paragraphs.

Mississippi River: Swan River to Sauk River (Stream No. 07010201-631)

According to the MPCA surface water data system, the Mississippi River from the Swan River to the Sauk River is identified as Stream Number 07010201-631. The portion of both the current and proposed Sartell Project boundary on the Mississippi River is located within this river reach. The MPCA stream assessment identified the reach as "suitable for swimming and wading, with low bacterial levels throughout the open water season. Available data indicate a thriving community of fish and other aquatic organisms" (MPCA, 2019d).

According to the MPCA Special and Impaired Waters Search Tool, this reach of the Mississippi River is listed as being impaired for mercury in fish tissue with a total maximum daily load approved. No other impairments are listed, and the water is not designated as a special water (MPCA, 2019d).

The MPCA's Surface Water Search Map-Based Tool was used to compile water quality data collected on the Mississippi River within the Sartell Project vicinity (MPCA, 2019d). Water quality data were available for five sites, as listed below. Water quality monitoring data from the Mississippi River monitoring stations is located in **Appendix 4.3.8.2-1**.

- Biological Monitoring Station 13UM009 located 10.5 river miles upstream of the Project dam.
- Stream Monitoring Station S006-059 located 8.7 miles upstream of the Project dam.
- Stream Monitoring Station S004-320 located 4.8 miles upstream of the Project dam and a short distance upstream of the mouth of Little Rock Creek.
- Biological Monitoring Station 07UM283 located 3.6 miles upstream of the Project dam.
- Stream Monitoring Station S006-147 located 0.6 miles upstream of the Project dam.

Monitoring data showed dissolved oxygen levels met the state criterion and ranged between 6.2 milligrams per liter (mg/L) to 11.8 mg/L. Only one pH reading was included in the monitoring data, but at 8.8 Standard Units (SU), it was above the state criterion of 6.5 SU – 8.5 SU (MPCA, 2019d).

Little Rock Creek: Little Rock Lake (Lake No. 05-0012-00) to Mississippi River (Stream No. 07010201-577)

According to the MPCA surface water data system, the Little Rock Creek from Little Rock Lake to the Mississippi River is identified as Lake Number 05-0012-00 and Stream Number 07010201-577. The entire reach is located within both the current and proposed Sartell Project boundary. The MPCA stream assessment for the reach indicated that "not enough data is available to determine aquatic life, aquatic recreation or aquatic consumption condition" (MPCA, 2019e). According to the MPCA Special and Impaired Waters Search Tool, this reach of the Little Rock Creek is not listed as an impaired or special water (MPCA, 2019f).

Water quality data on this stretch of Little Rock Creek were compiled from the MPCA's Surface Water Map-Based Search Tool and are discussed below. Monitoring data is available from three monitoring stations as listed below.

- Stream Monitoring Station S-005-004 located 4.8 miles upstream of the Project dam and 1.2 miles upstream of the mouth of Little Rock Creek.
- Lake Monitoring Station 05-012-00-209 located 6.1 miles upstream of the Project dam and 1.4 miles upstream of the mouth of Little Rock Creek.
- Lake Monitoring Station 05-012-00-209 located 6.4 miles upstream of the Project dam and 1.7 miles upstream of the mouth of Little Rock Creek.

While the MPCA assessment of the waterbody indicated there was not enough data to determine the overall condition of the water body, the dissolved oxygen levels met the state criterion and ranged from 6.7 to 13.8 mg/L (MPCA 2019e). Water quality monitoring data from the Little Rock Creek monitoring stations is located in **Appendix 4.3.8.2-2**.

Little Rock Lake (Lake No. 05-0013-00)

According to the MPCA surface water data system, the Little Rock Lake is identified as Lake Number 05-0013-00. A search of the MPCA surface water data system identified a lake quality assessment for Little Rock Lake, which is entirely located within both the current and proposed Sartell Project boundary. The MPCA indicated the water body is "not always suitable for swimming and wading due to low clarity or excessive algae caused by the presence of nutrients such as phosphorous in the water" (MPCA, 2019g). According to the MPCA Special and Impaired Waters Search Tool, the lake is listed as being impaired for mercury in fish tissue and nutrients with an approved total maximum daily load (MPCA, 2019f). The total maximum daily load indicates that the highest concentrations of phosphorous and other nutrients are seen during spring runoff with animal waste being a significant source (MDNR, 2017). The trophic state index is used to summarize a lake's overall nutrient richness. Based on data from 2008 to 2017, Little Rock Lake has a trophic state index of 87, which falls in the hypereutrophic category with very high nutrient levels (MPCA, 2019g).

Water quality data collected on Little Rock Lake within the Sartell Project vicinity were compiled from the MPCA's Surface Water Search Map-Based Tool. Water monitoring data with water chemistry or temperature information were available from 12 sites spaced throughout Little Rock Lake. An additional five sites only maintained water clarity information. The data shows that on numerous occasions the dissolved oxygen levels did not meet the minimum state criterion of 5 mg/L (MPCA, 2019g). MPCA water monitoring data from Little Rock Lake is located in **Appendix 4.3.8.2-3**.

In order to improve water quality within Little Rock Lake, the MDNR proposed completing a three-foot drawdown of the Sartell reservoir pool for a six-week period to expose portions of the Little Rock Lake bed and shoreline to allow native aquatic plants to become re-established. The vegetation would, in turn, help reduce phosphorous levels (MDNR, 2017). The 2017 Little Rock Lake-Sartell Pool Drawdown Feasibility Study is located in **Appendix 4.3.8.2-4**. The drawdown was completed in 2019.

4.3.8.3 Future Water Quality Monitoring

Based upon historical monitoring data, sufficient information exists to evaluate water quality at the Sartell Project. In addition, the Licensee is not proposing any changes to the current operation nor the addition of any new facilities. As such, the existing water quality data is representative and continued operation at the Project is not expected to adversely impact water resources in the area.

4.3.9 References

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- Minnesota Pollution Control Agency, 2019f. Special and Impaired Waters Search Tool. Online. https://pca-gis02.pca.state.mn.us/CSW/index.html. Accessed December 30, 2019.
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4.4 Fish and Aquatic Resources (18 CFR § 5.6(d)(iv))

4.4.1 Fish and Aquatic Communities

Several specific fish and aquatic community-related studies relevant to the Sartell Project have been completed within the Mississippi River and Little Rock Lake. The following sections provide an overview of surveys characterizing the fish community within the Project vicinity.

4.4.1.1 Fisheries

Mississippi River

The MPCA conducted biological monitoring of two sites on the Mississippi River within the Project vicinity. Biological monitoring site 13UM009 is located 10.5 miles upstream of the Project dam. Fisheries data was collected at this site in 2013. Biological monitoring site 07UM283 is located 3.6 miles upstream of the Project dam. Fisheries data was collected at this site in 2007. Between the two monitoring sites, 25 fish species were identified. Of the 509 fish identified during the surveys, the ten most predominant species collected are listed below (MPCA, 2019).

- Bluegill (*Lepomis macrochirus) at 104 or 20.4% (most abundant fish)*
- Smallmouth bass (*Micropterus dolomieu)* at 102 or 20.0%
- Logperch (*Percina caprodes) at 53 or 10.4%*
- Common shiner (*Luxilus cornutus) at 27 or 5.3%*
- White sucker (*Catostomus commersonii) at 27 or 5.3%*
- Yellow perch (*Perca flavescens*) at 30 or 5.9%
- Johnny darter (*Etheostoma nigrum*) at 22 or 4.3%
- Rock bass (*Ambloplites rupestris*) at 22 or 4.3%
- Shorthead redhorse (*Moxostoma macrolepedidotum*) at 22 or 4.3%
- Silver redhorse (*Moxostoma anisurum*) at 17 or 3.3%

Little Rock Lake

Since 1990, the MDNR completed fisheries surveys of Little Rock Lake in 1990, 1996, 2002, 2008, 2009, and 2014. The six surveys identified 32 fish species. Of the 7,942 fish identified during the surveys, the ten most predominant species collected are listed below (MDNR, 2019).

- White sucker (*Catostomus commersonii) at 2,397 or 30.2% (most abundant fish)*
- Yellow perch (*Perca flavescens*) at 1,899 or 23.9%
- Black crappie (*Pomoxis nigromaculatus)* at 670 or 8.4%
- Logperch (*Percina caprodes)* at 581 or 7.3%
- Bluegill (*Lepomis macrochirus)* at 365 or 4.6%
- Walleye (*Sander vitreus)* at 350 or 4.4%
- Johnny darter (*Etheostoma nigrum*) at 202 or 2.5%
- Channel catfish (*Ictalurus punctatus)* at 198 of 2.5%
- Northern pike *(Esox lucius)* at 190 or 2.4%
- White crappie (*Pomoxis annularis)* at 172 or 2.2%

The species list for all fish identified within the Project vicinity is provided in **Table 4.4.1.1-1.** The data list for the Mississippi River survey sites is included in **Appendix 4.4.1.1-1** and the data list for the Little Rock Lake surveys is included in **Appendix 4.4.1.1-2**.

Table 4.4.1.1-1: Fish Species Identified in MPCA Biological Monitoring and MDNR Lake Survey Data

Fish Species	Scientific Name	Mississippi River	Little Rock Lake
Bigmouth buffalo	*Ictiobus cyprinellus*		X
Black bullhead	*Ameiurus melas*		X
Black crappie	*Pomoxis nigromaculatus*	X	X
Bluegill	*Lepomis macrochirus*	X	X
Bluntnose minnow	*Pimephales notatus*	X	X
Bowfin	*Amia calva*		X
Brassy minnow	*Hybognathus hankinsoni*		X
Brook silverside	*Labidesthes sicculus*		X
Brown bullhead	*Ameiurus nebulosus*		X
Burbot	*Lota*	X	X
Central stoneroller	*Campostoma anomalum*	X	
Channel catfish	*Ictalurus punctatus*		X
Common carp	*Cyprinus carpio*	X	X
Common shiner	*Luxilus cornutus*	X	X
Creek chub	*Semotilus atromaculatus*	X	
Fathead minnow	*Pimephales promelas*		X
Greater redhorse	*Moxostoma valenciennesi*	X	
Green sunfish	*Lepomis cyanellus*		X
Hornyhead chub	*Nocomis biguttatus*	X	
Hybrid sunfish	*Lepomis cyanellus*	X	X
Johnny darter	*Etheostoma nigrum*	X	X
Largemouth bass	*Micropterus salmoides*	X	X
Logperch	*Percina caprodes*	X	X
Mimic shiner	*Notropis volucellus*		X
Northern pike	*Esox lucius*	X	X
Pumpkinseed	*Lepomis gibbosus*	X	
Rock bass	*Ambloplites rupestris*	X	
Shorthead redhorse	*Moxostoma macrolepidotum*	X	X
Silver redhorse	*Moxostoma anisurum*	X	X
Smallmouth bass	*Micropterus dolomieu*	X	X
Spotfin shiner	*Cyprinella spiloptera*	X	X
Spottail shiner	*Notropis hudsonius*	X	
Tadpole madtom	*Noturus gyrinus*		X
Trout-perch	*Percopsis omiscomaycus*		X
Walleye	*Sander vitreus*	X	X
White crappie	*Pomoxis annularis*		X
White sucker	*Catostomus commersonii*	X	X
Yellow bullhead	*Ameiurus natalis*		X
Yellow perch	*Perca flavescens*	X	X

4.4.1.2 Mussels

According to Freshwater Mussels of the Upper Mississippi River there are a total of 51 native mussels in the Upper Mississippi River and its major tributaries as of 2015. Several species are protected under federal and state endangered species regulations. Mussels identified in the Upper Mississippi River Basin and the federal and state listing status are summarized in **Table 4.4.1.2-1** (Tiemann et. al, 2015).

Table 4.4.1.2-1: Freshwater Mussels of the Upper Mississippi River

Mussel Species	Scientific Name	Federal Status*	State Status*
Black sandshell	*Liguma recta*		SC
Bluefer	*Potamilus purpuratus*		
Butterfly	*Ellipsaria lineolata*		THR
Creek heelsplitter	*Lasmigona compressa*		SC
Creeper	*Strophitus undulatus*		
Cylindrical papershell	*Anodontoides ferussacianus*		
Deertoe	*Truncilla truncata*		
Ebonyshell	*Fusconaia ebena*		
Elephantear	*Elliptio crassidens*		END
Elktoe	*Alasmidonta marginata*		THR
Ellipse	*Venustaconcha ellipsiformis*		THR
Fatmucket	*Lampsilis siliquodea*		
Fat pocketbook	*Potamilus capax*	END	EXT
Fawnsfoot	*Truncilla donaciformis*		THR
Fingernail clams	*Sphaeriidae*		
Flat floater	*Utterbackia suborbiculata*		SC
Fluted-shell	*Lasmigona costata*		THR
Fragile papershell	*Leptodea fragilis*		
Giant Floater	*Pyganodon grandis*		
Gulf Mapleleaf	*Quadrula nobilis*		
Hickorynut	*Obovaria olivaria*		
Higgins' eye	*Lampsilis higginsii*	END	END
Lilliput	*Toxolasma parvum*		
Mapleleaf	*Quadrula*		
Monkeyface	*Theliderma metanevra*		THR
Mucket	*Actinonaias ligamentina*		THR
Paper pondshell	*Utterbackia imbecillis*		
Pimpleback	*Amphinaias pustulosa*		
Pink heelsplitter	*Potamilus alatus*		
Pink papershell	*Potamilus ohiensis*		
Pistolgrip	*Tritogonia verrucosa*		END
Plain pocketbook	*Lampsilis cardium*		
Pondmussel	*Ligumia subrostrata*		THR
Purple wartyback	*Cyclonaias tuberculata*		END
Rock pocketbook	*Arcidens confragosus*		END
Round pigtoe	*Pleurobema sintoxia*		SC

Salamander mussel	*Simpsonaias ambigua*		END
Scaleshell	*Leptodea leptodon*	END	EXT
Slippershell	*Alasmidonta virdis*		
Sheepnose	*Plethobasus cyphyus*	END	END
Snuffbox	*Epioblasma triquetra*	END	END
Spectaclecase	*Margaritifera monodonta*	END	END
Spike	*Eilliptio dilatata*		THR
Threehorn wartyback	*Obliquaria reflexa*		
Three-ridge	*Amblema plicata*		
Wabash pigtoe	*Fusconaia flava*		
Wartyback	*Amphinaias nodulata*		THR
Washboard	*Megalonaias nevosa*		END
White heelsplitter	*Lasmigona complanata*		
Winged Mapleleaf	*Quadrula fragosa*	END	END
Yellow Sandshell	*Lampsilis teres*		END

* Federal/State Status: END=endangered, THR=threatened, EXT=extirpated, SC=special concern

4.4.2 Essential Fish Habitat

Under the Magnuson-Stevens Fishery Conservation Management Act, an Essential Fish Habitat is not mapped in the Project vicinity and therefore does not apply (NOAA, 2019).

4.4.3 Fish Entrainment and Mortality

The Sartell Project contains a 234-foot, 7-inch wide by 15.9-foot high trash rack with 1.75-inch clear spacing. The trashrack intake velocity at the Sartell Project is relatively low, between 1.4 to 2.1 feet per second (St. Regis Corporation, 1984). A search of available literature did not identify any entrainment and mortality information regarding the Sartell Project.

4.4.4 References

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4.5 Wildlife and Botanical Resources (18 CFR § 5.6(d)(3)(v))

Ecological landscapes in their natural state are primarily defined by the physical environment which includes climate, geology and landforms, and hydrology. The Sartell Project is located in the Anoka Sand Plain subsection of the Minnesota and Northeast Iowa Morainal Section of the Eastern Broadleaf Province. The section is a long band of deciduous forest, woodland, and prairie that extends from Polk County in Northwestern Minnesota south to the Iowa border. Floodplain forests, terrace forests, and farmlands are prominent today along the Mississippi River Valley, which is also characterized by herbaceous and shrubby shore communities along shorelines and on sand bars (MDNR 2020a). Maps showing the ecological sections and subsections within Minnesota are included in **Appendix 4.5-1**.

4.5.1 Botanical species

The pre-settlement pattern of upland vegetation in the Minnesota and Northeast Iowa Morainal Section was dominated by prairie, savanna, and woodlands (oak and aspen) along sandy terraces of the Mississippi River. Floodplain forests were also present (MDNR, 2020a; MDNR, 2020b). Typical riparian vegetation within the Project boundary consists of floodplain forest species. Biological species likely to occur in the Project vicinity are shown in **Table 4.5.1-1**.

Table 4.5.1-1: Botanical Species Likely to Occur in the Sartell Project Vicinity

Botanical Species	Scientific Name
TREES	
American elm	*Ulmus americana*
Basswood	*Tilia americana*
Black ash	*Fraxinus nigra*
Box elder	*Acer negundo*
Cottonwood	*Populus deltoides*
Green ash	*Fraxinus pennsulvanica*
Hackberry	*Celtis occidentalis*
Rock elm	*Ulmus thomasii*
Silver Maple	*Acer saccharinum*
Sugar Maple	*Acer saccharum*
SHRUBS/VINES	
Chokecherry	*Prunus virginiana*
Grey dogwood	*Cornus racemosa*
Hawthornes	*Crataegus spp.*
Missouri gooseberry	*Ribes missouriense*
Prickly gooseberry	*Ribes cynosbati*
Red-berried alder	*Sambucus racemosa*
Wild black currant	*Ribes americanum*

Botanical Species	Scientific Name
GROUND LAYER	
Aniseroot	*Osmorhiza longistylis*
Blue phlox	*Phlox divaricata*
Claytons sweet cicely	*Osmorhiza clatonii*
Cleavers	*Galium aparine*
Cow parsnip	*Heracleum lanatum*
Early meadow rue	*Thalictrum dioicum*
False rue anemone	*Enemion biternatum*
Hispid buttercup	*Ranunculus hispidus*
Jack-in-the-pulpit	*Arisaema triphyllum*
Mayapple	*Podophyllum peltatum*
Ontario Aster	*Aster ontarionsis*
Stemless blue violets	*Viola egglestonii*
Stinging nettle	*Urtica dioica*
Virgins bower	*Clematis virginiana*
Virginia bluebells	*Mertensia virginica*
Virginia waterleaf	*Hydrophyllum virginianum*
Yellow trout lily	*Erythronium americanum*

Source MDNR, 2005

4.5.2 Wildlife

Wildlife found in the Project vicinity includes various mammals, birds, reptiles, and amphibians.

4.5.2.1 Mammal Species

Mammals occupy a wide variety of habitat types, which may shift during different life stages or seasons. **Table 4.5.2.1-1** provides a list of mammal species likely to occur in the Project vicinity (MDNR, 2019a). These species would be fairly tolerant to urbanization.

Table 4.5.2.1-1: Mammal Species Likely to Occur in the Sartell Project Vicinity

Mammal Species	Scientific Name
American badger	*Taxidea taxus*
American beaver	*Castor canadensis*
Black bear	*Ursus americanus*
Chipmunk	*Tamias striatus*
Cottontail rabbit	*Sylvillagus floridanus*
Coyote	*Canis latrans*
Deer mouse	*Peromuscus manoculatus*
Eastern pipistrelle	*Perimyotis subflavus*
Fox squirrel	*Sciurus niger*
Gray fox	*Urocyon cineoargenteus*
Gray squirrel	*Sciurus carolinensis*
Fox squirrel	*Sciurus niger*
House mouse	*Mus musculus*
Little brown bat	*Myotis lucifugus*
Long-tailed weasel	*Mustel frenata*
Meadow jumping mouse	*Zapus hudsonius*
Meadow vole	*Microtus pennsylvanicus*
Muskrat	*Ondontra zibethicus*
Mink	*Mustela vison*
Porcupine	*Erethizon dorsatum*
Opossum	*Didelphis marsupialis*
Northern long-eared bat	*Myotis septentionalis*
Northern flying squirrel	*Glaucomys sabrinus*
Raccoon	*Procyon lotor*
Red fox	*Vulpes*
Red squirrel	*Tamiasciurus hudsonicus*
River otter	*Lontra canadensis*
Short-tailed weasel	*Mustela erminea*
Southern flying squirrel	*Glaucomys volans*
Striped skunk	*Mephitis mephitus*
Thirteen-lined ground squirrel	*Spermophilus tridecemlineatus*
White-tailed deer	*Odocoileus virginianus*
White-tailed jackrabbit	*Lepus townsendii*
White-footed mouse	*Peromyscus leucopus*
Woodchuck	*Marmota monax*
Woodland jumping mouse	*Napaeozapus insignis*

4.5.2.2 Bird Species

Bird species found on the Cornel E-Birds Mississippi River Park checklist are included in **Table 4.5.2.2-1** and are likely to be found in the Project vicinity (Cornell E-Bird, 2019).

Table 4.5.2.2-1: Bird Species Likely to Occur in the Sartell Project Vicinity

Bird Species	Scientific Name
American crow	*Corvus brachyrhynchos*
American goldfinch	*Spinus tristis*
American kestral	*Falco sparverius*
American redstart	*Setophaga ruticilla*
American tree sparrow	*Spizela arborea*
American robin	*Turdus migratorius*
Bald eagle	*Haliaeetus leucocephalus*
Baltimore oriole	*Icterus galbula*
Barn swallow	*Hirundo rustica*
Barred owl	*Strix varia*
Bay-breasted warbler	*Setophaga castanea*
Black-and-white warbler	*Mniotilta varia*
Black-capped chickadee	*Poecile atricapillus*
Blue-gray gnatcatcher	*Polioptla caerulea*
Blue-headed vireo	*Vireo solitarius*
Bluejay	*Cyanocitta cristata*
Brewers blackbird	*Euphagus cyanocephalus*
Broad-winged hawk	*Buteo platypterus*
Brown creeper	*Certhia americana*
Brown thrasher	*Toxostoma rufum*
Brown-headed cowbird	*Molothrus ater*
Canada goose	*Branta canadensis*
Canada warbler	*Cardellina canadensis*
Cedar waxwing	*Bombycilla cedrorum*
Chestnut-sided warbler	*Setophaga pensylvanica*
Chipping sparrow	*Spizella passerina*
Clay-colored sparrow	*Spazella pallida*
Cliff swallow	*Petrochelidon pyrrhonota*
Common grackle	*Quiscalus quiscula*
Common nighthawk	*Chordeiles minor*
Common raven	*Crovus corax*
Common yellowthroat	*Geothylpis trichas*
Cooper's hawk	*Accipiter cooperii*
Dark-eyed junco	*Junco hyemalis*
Downy woodpecker	*Picoides pubescens*
Eastern bluebird	*Sialia sialis*
Eastern kingbird	*Tyrannus*
Eastern phoebe	*Sayornis phoebe*
Eastern wood-pewee	*Contopus virens*
European starling	*Sturnus vulgaris*
Field sparrow	*Spizella pusilla*
Golden-winged warbler	*Vermivora chrysoptera*
Gray catbird	*Dumetella carolinensis*
Great blue heron	*Ardea herodias*
Great crested flycatcher	*Myiarchus crinitus*
Great-horned owl	*Bubo virginianus*
Green heron	*Butorides virescens*
Hairy woodpecker	*Leuconotopicus villosus*

House sparrow	*Passer domesticus*
House wren	*Troglodytes aedon*
Indigo bunting	*Passerina cyanea*
Killdeer	*Charadrius vociferus*
Mallard	*Anas platyrhynchos*
Magnolia Warbler	*Setophaga magnolia*
Mourning dove	*Zenaida macroura*
Nashville warbler	*Leothlypis ruficapilla*
Northern cardinal	*Carinalis cardinalis*
Northern flicker	*Colaptes auratus*
Northern harrier	*Circus cyaneus*
Northern parula	*Setophaga americana*
Northern rough-winged swallow	*Stelgidopteryx serripennis*
Northern saw-whet owl	*Aegolius acadicus*
Northern shrike	*Lanius excubitor*
Northern waterthrush	*Parkesia noveboracensis*
Osprey	*Pandion haliaetus*
Ovenbird	*Seiurus aurocapilla*
Palm warbler	*Setophaga pamarum*
Pied-billed grebe	*Podilymbus podiceps*
Pileated woodpecker	*Drycopus pileatus*
Philadelphia vireo	*Vireo phiadephicus*
Prothenary warbler	*Protonotaria citrea*
Purple finch	*Haemorhous pupureus*
Purple matin	*Progne subis*
Red crossbill	*Loxia cuvirostra*
Red-eyed vireo	*Vireo olivaceus*
Red-bellied woodpecker	*Melnarpes carolinus*
Red-breasted nuthatch	*Sitta canadensis*
Red-shouldered hawk	*Buteo lineatus*
Red-tailed hawk	*Buteo jamaicensis*
Red-winged blackbird	*Agelaius phoeniceus*
Rose-breasted grosbeak	*Pheucticus ludovicianus*
Ruby-crowned kinglet	*Regulus calendula*
Ruby-throated humingbird	*Archilochus colubris*
Ruffed grouse	*Bonasa umbellus*
Sandhill crane	*Grus canadensis*
Sedge wren	*Cistothorus patensis*
Sharp-shinned hawk	*Accipiter striatus*
Song sparrow	*Melospiza melodia*
Spotted sandpiper	*Actitis macularius*
Swainson’s Thrush	*Catharus ustulatus*
Tennessee warbler	*Leiotlypis peregrina*
Tree swallow	*Tachineta bicolor*
Trumpeter swan	*Cygnus buccinator*
Turkey vulture	*Cathartes aura*
Vesper sparrow	*Pooecetes gramineus*
White-breasted nuthatch	*Sitta carolinensis*
White-throated sparrow	*Zonotrichea albicollis*
Wilson’s warbler	*Cardellina pusilla*
Winter wren	*Troglodytes hiemalis*
Wood duck	*Aix sponsa*
Yellow-bellied sapsucker	*Sphyrapicus varius*
Yellow-rumped warbler	*Setophaga coronata*
Yellow warbler	*Setophaga petechia*

4.5.2.3 Reptile and Amphibian Species

Although no records of herpetological species surveys were found during literature review, based on the habitat within the Project vicinity and the geographical range, it is likely a variety of frogs, snakes, turtles, and salamanders exist in the area. **Table 4.5.2.3-1** details reptiles and amphibians identified on the MDNR website that likely occur within the Project vicinity (MDNR, 2019b; MDNR, 2019c).

Table 4.5.2.3-1: Reptile and Amphibian Species Likely to Occur in the Sartell Project Vicinity

Reptiles and amphibians	Scientific Name
American toad	*Bufo americanus*
Blanding's turtle	*Emydoidea blandingii*
Blue-spotted salamander	*Ambystoma laterale*
Brown snake	*Storeria dekayi*
Bullsnake (gophersnake)	*Pituophis melanoleucus*
Common gartersnake	*Thamnophis sirtalis*
Common map turtle	*Graptemys geographica*
Common snapping turtle	*Chelydra serpentina*
Copes gray treefrog	*Hyla chrysoscelis*
Eastern red-backed salamander	*Plethodon cinereus*
Eastern hognose snake	*Heterodon platirhinos*
False map turtle	*Graptermys psuedogeographica*
Gray treefrog	*Hyla chysoscelis*
Green frog	*Lithobates clamitans*
Leopard frog	*Rana pipiens*
Mink frog	*Lithobates septentrionalis*
Mudpuppy	*Nocturus maculosus*
Northern map turtle	*Graptemys geographica*
Northern water snake	*Neorodia sipedon*
Ouachita map turtle	*Graptemys ouachitensis*
Painted turtle	*Chrysemys picta*
Plains garter snake	*Thamnophis radix*
Plains hognose snake	*Heterodon nasicus*
Redbelly snake	*Storeria occipitomachulata*
Smooth green snake	*Opheodrys vernalis*
Spiny softshell turtle	*Apalone spinifera*
Spotted salamander	*Ambystoma maculatum*
Spring peeper	*Pseudacris crucifer*
Tiger salamander	*Ambystoma tigrinum*
Western chorus frog	*Pseudacris triseriata*
Wood frog	*Lithobates sulvaticus*
Wood turtle	*Glyptemys insculpta*

Source MDNR 2019d; MDNR2019e

4.5.3 Invasive Species

4.5.3.1 Terrestrial Species

Minnesota has several different classifications of terrestrial noxious weeds. According to the Minnesota Department of Agriculture (MDA), Prohibited Noxious Weeds are designated as having the potential to be, or are known to be, detrimental to human or animal health, the environment, public roads, crops, livestock, or other property. There are two regulatory lists for Prohibited Noxious Weeds and one for Restricted Noxious Weeds. Plants on the Prohibited-Eradicate List are not currently known to be present or are not widely established in the state and are required to be eradicated. Plants on the Prohibited-Control List are established throughout the state or regions of the state. Plants on this list are required to be controlled by preventing the reproduction and spread of the species. Restricted Noxious Weeds are already widely distributed in the state and have been designated as having the potential to be detrimental to human health, the environment, public roads, crops, livestock, or other property and can only be controlled if they are not allowed to spread (MDA, 2020). Species identified by the MDA as Prohibited or Restricted Noxious Weeds are listed in **Table 4.5.3.1-1**.

Table 4.5.3.1-1: Prohibited and Restricted Noxious Weeds

Common Name	Scientific Name	Classification
Black swallow-wort	*Cynanchum louiseae*	Prohibited-Eradicate
Brown knapweed	*Centaurea jacea*	Prohibited-Eradicate
Common teasel	*Dipsacus fullonum*	Prohibited-Eradicate
Cutleaf teasel	*Dipsacus laciniatus*	Prohibited-Eradicate
Dalmation toadflax	*Linaria dalmatica*	Prohibited-Eradicate
Diffuse knapweed	*Centaurea diffusa*	Prohibited-Eradicate
Giant hogweed	*Heracleum mantegazzianum*	Prohibited-Eradicate
Grecian foxglove	*Digitalis lanata*	Prohibited-Eradicate
Japanese hopps	*Humulus japonicus*	Prohibited-Eradicate
Meadow knapweed	*Centaurea x moncktonii*	Prohibited-Eradicate
Oriental bittersweet	*Celastrus orbitulatus*	Prohibited-Eradicate
Palmer amaranth	*Amaranthus palmeri*	Prohibited-Eradicate
Poison hemlock	*Conium maculatum*	Prohibited-Eradicate
Yellow starthistle	Centaurea solstitialis	Prohibited-Eradicate
Canada thistle	*Cirsum arvense*	Prohibited-Control
Common barberry	*Berberis vulgaris*	Prohibited-Control
Common tansy	*Tanacetum vulgare*	Prohibited-Control
Leafy spurge	*Euphobia esula*	Prohibited-Control
Narrowleaf bittercress	*Cardamine impatiens*	Prohibited-Control
Plumeless thistle	*Carduus acanthoides*	Prohibited-Control
Purple Loosestrife	*Lythrum salicaria*	Prohibited-Control
Spotted knapweed	*Centaurea stoebe*	Prohibited-Control
Wild parsnip	*Pastinaca sativa*	Prohibited-Control
Amur honeysuckle	*Lonicera maackii*	Restricted

Bell's honeysuckle	*Lonicera x bella*	Restricted
Black locust	*Robina pseeudacacia*	Restricted
Common buckthorn	*Rhamus cathartica*	Restricted
Common reed	*Phragmites austrailis*	Restricted
Crownvetch	*Securigera varia*	Restricted
Garlic mustard	*Alliaria petiola*	Restricted
Glossy buckthorn	*Frangula alnus*	Restricted
Japanese barberry	*Berberis thunbergii*	Restricted
Multiflora rose	*Rosa multiflora*	Restricted
Morrows honeysuckle	*Lonicera morrowii*	Restricted
Porcelain berry	*Ampelopsis brevipedunculata*	Restricted
Tartarian honeysuckle	*Lonicera tatarica*	Restricted
Tree of heaven	*Ailanthus altissima*	Restricted
Wild carrot	*Caucus carota*	Restricted

4.5.3.2 Aquatic Invasive Species

Aquatic Invasive Species Regulations

Minnesota Rule Chapter 6216, Department of Natural Resources Invasive Species addresses invasive species using a four-tiered category system, as follows (MDNR, 2020c):

- Prohibited Invasive Species: species can threaten natural resources. It is unlawful to possess, import, purchase, transport, or introduce these species except under a permit for disposal, control, research, or education.
- Regulated Invasive Species: species are legal to possess, sell, buy, and transport. However, they may not be introduced into a free-living state, such as being released or planted in public waters.
- Unregulated Nonnative Species: species are not subject to regulation under Minnesota Invasive Species regulations.
- Unlisted Nonnative Species: species include all nonnative species that are not otherwise classified as prohibited, regulated, or unregulated.

The full text of Minnesota Rule Chapter 6216, including a listing of all prohibited and restricted invasive species and unregulated, nonnative species, is located in **Appendix 4.5.3.2-1**.

Transportation Prohibitions

Minnesota law prohibits transportation of all aquatic plants, with few exceptions, in an effort to prevent the spread of aquatic invasive species. Under state law, the following activities are prohibited (MDNR, 2020c):

- Transporting watercraft without removing the drain plug;
- Arriving at a lake access with the drain plug in place;
- Transporting aquatic plants, zebra mussels, or other prohibited species on any roadway;
- Launching a watercraft with prohibited species attached;
- Transporting water from Minnesota lakes or rivers; and
- Releasing bait into the water.

Minnesota Infested Waters List

Minnesota maintains a list of water bodies infested with or connected to water bodies infested with the aquatic invasive species shown in **Table 4.5.3.2-1**. Project waters within both the Mississippi River and Little Rock Lake are listed as infested waters due to the presence of zebra mussels (*Dreissnia polymorpha*) (MDNR, 2020d). Plant surveys within Little Rock Lake also identified curly leaf pondweed (*Potamogeton crispus*), an invasive plant, within the Project boundary (MDNR, 2017).

Table 4.5.3.2-1: Aquatic Invasive Species Tracked in MDNR's Infested Waters List

Common Name	Scientific Name
Bighead carp	*Hypophthalmichthys nobilis*
Brazilian waterweed	*Egeria densa*
Brittle naiad	*Najas minor*
Eurasion water milfoil	*Myriophyllum spicatum*
Faucet snail	*Bithnia tentaculata*
Flowering rush	*Butomus umbellatus*
Grass carp	*Ctenopharyngodon idella*
New Zealand mud snail	*Potamopyrgus antipodarum*
Red Swamp crayfish	*Procambarus clarkii*
Round goby	*Neogobius melanostomus*
Ruffe	*Gynocephalus cernua*
Silver carp	*Hypophthalmichthys molitrix*
Spiny waterflea	Bythotrephes longimanus
Starry stonwort	*Nitellospsis obtusa*
Viral hemorrhagic septicema	*Piscine novirhabdovirus*
White perch	*Morone americana*
Zebra mussels	*Dreissena polymorpha*

4.5.4 References

- Cornell E-Bird. 2019. Website. Mississippi River County Park Checklist. https://ebird.org/printableList?regionCode=L830901&yr=all&m= . Accessed November 27, 2019.
- Minnesota Department of Agriculture. 2020. Minnesota Noxious Weed List. Online. https://www.mda.state.mn.us/plants-insects/minnesota-noxious-weed-list. Accessed January 7, 2020.
- Minnesota Department of Natural Resources, 2005. Field Guide to the Native Plan Communities of Minnesota: The Eastern Broadleaf Forest Province. Ecological Land Classification Program, Minnesota County Biological Survey, and Natural Heritage and Nongame Research Program. MNDNR St. Paul, MN. Pp.174-175.
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- Minnesota Department of Natural Resources 2020c. Minnesota Invasive Species Laws. Online. https://www.dnr.state.mn.us/invasives/laws.html#transportation. Accessed January 7, 2020.
- Minnesota Department of Natural Resources 2020d. Infested Waters List. Online. https://www.dnr.state.mn.us/invasives/ais/infested.html. Accessed January 12, 2020.

4.6 Wetlands, Riparian, and Littoral Habitat (18 CFR § 5.6(d)(3)(vi))

4.6.1 Riparian Habitat

Riparian habitat refers to the margins of the reservoir where vegetation exists but is not regularly submerged. The riparian habitat in the Project vicinity is a mixture of developed lands within the city of Sartell where shorelines are armored by rip rap or contain recreation facilities, Project facilities, residential property, or transportation infrastructure. Outside of the city limits, the riparian habitat is relatively undeveloped except for public recreation facilities and residential locations.

The riparian habitat in the Project vicinity is primarily a mixture of floodplain forest, shrub species, and groundcover species, all of which are typical of the Minnesota and Northeast Iowa Morainal Ecological Section as shown in **Table 4.5.1-1** in Section 4.5.1.

4.6.2 Wetlands Habitat

Wetland habitat includes terrestrial areas that are permanently, intermittently, or seasonally flooded. Wetlands help improve water quality and provide wildlife habitat, nutrient cycling and storage, aesthetics, and recreation. In riverine systems such as those within the Project vicinity, wetland functions include flood water storage, filtration, sedimentation reduction, and wildlife habitat and corridors. The value of wetlands in the Project vicinity includes flood peak mitigation, surface water quality enhancement, biodiversity preservation and enhancement, and recreational activity support and enhancement.

The USFWS National Wetland Inventory (NWI) classifies wetlands according to vegetation, cover type, hydrology, human influence factors, and special wetland characteristics. According to this classification system, wetland types are divided into eight major types with several subclasses for more precise definition (USFWS, 2019).

Wetlands identified within the proposed Project boundary are restricted to areas within and immediately adjacent to the reservoir. According to the NWI classification system, wetlands outside of open water areas (lake, riverine, pond) found within the Project vicinity fall into two main classes, which include forested/shrub wetlands and emergent wetlands.

In general, forested/shrub wetlands include bogs and forested floodplain complexes characterized by trees that are 20 feet or more in height, including species such as silver maple (*Acer sacharinum*), green ash (*Fraxinus pennsylvanica*), cottonwood (*Populus deltoides*), and American elm (*Ulmus americana*) (MDNR, 2005).

Emergent wetlands include such species as cattails (*Typha spp*.), lake sedge (Crex lacustrus), rice cut-grass (*Leersia oryzoides*), bulrushes (*Scirpus spp.*), woolgrass (*Scirpus cyprinus*), broad-leaved arrowhead (*Sagittaria latifolia*), and sedges (MDNR, 2020).

A figure displaying the wetlands in the Project vicinity are included in **Appendix 4.6.2-1**.

4.6.3 Littoral Habitat

Littoral habitat is the transition between aquatic and terrestrial habitats and is prevalent along most reservoir margins. Since the majority of shoreline located within the city of Sartell is developed, much of the littoral habitat is located outside of these areas and is most significant in Little Rock Creek, Little Rock Lake, unincorporated shorelines along the Mississippi River, and associated wetlands.

According to the 2017 Little Rock Lake-Sartell Pool Drawdown Feasibility Study, a significant portion of the Project reservoir is less than three feet deep. The three-foot drawdown, completed in 2019, exposed approximately 210 acres on the main channel of the Mississippi River, 239 acres in Little Rock Lake, and 67 acres in the Little Rock Creek channel between Little Rock Lake and the Mississippi River (MDNR, 2017).

4.6.4 References

- Minnesota Department of Natural Resources, 2005. Field Guide to the Native Plant Communities of Minnesota: The Eastern Broadleaf Forest Province. Ecological Land Classification Program, Minnesota County Biological Survey, and Natural Heritage and Nongame Research Program. MNDNR St. Paul, MN. Pg.177.
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- Minnesota Department of Natural Resources. 2020. Native Plant Communities and Rare species in Benton County, Minnesota. Online. https://files.dnr.state.mn.us/eco/mcbs/maps/benton.pdf. Accessed January 15, 2020.
- US Fish & Wildlife Service Website. 2019. https://www.fws.gov/wetlands/Data/Mapper-Wetlands-Legend.html. Accessed January 6, 2020.

4.7 Rare, Threatened and Endangered Species (18 CFR § 5.6(d)(3)(vii))

4.7.1 Overview

A review of the USFWS Information for Planning and Conservation (IPaC) website was used to create an IPaC Resource List for the Project. The Licensee submitted a Natural Heritage Information System (NHIS) data request to the MDNR to identify if any potential state-listed threatened, endangered, or special concern species are located within the Project vicinity.

4.7.2 IPaC Resource List

The IPaC Resource List identified one federally threatened species, the northern long-eared bat (*Myotis septentrionalis*) is likely to occur within the Project vicinity. The IPaC Resource List for the Project is included in **Appendix 4.7.2-1**.

4.7.2.1 Northern Long-Eared Bat

The Northern long-eared bat (NLEB) is a state and federally threatened mammal. The bat and roosts during the summer months underneath loose bark or in cavities or crevices of both live and dead trees. Non-reproducing females and males may also roost in cool places such as caves or mines. The bat feeds in the forest interior and hibernates in caves and mines during the months of October through April (USFWS, 2007). The Project is within the NLEB range (USFWS, 2020). However, according to the NHIS search, described below, no documented NLEB are known to occur within the Project vicinity (MDNR, 2020a).

4.7.3 Minnesota Natural Heritage Information System

The Minnesota NHIS provides information on rare plants, animals, native plant communities, and other rare features (MDNR, 2020b). Sartell Hydro requested NHIS data from the MDNR on December 3, 2019 to determine if any regulated endangered species are known to occur within the Project vicinity. NHIS data received from MDNR on January 17, 2020 identified three rare species likely to be located within the Project vicinity (MDNR 2020a) and are shown in **Table 4.7.3-1**.

Table 4.7.3-1: Threatened and Endangered Species Likely to Occur in the Sartell Project Vicinity

Species	Scientific Name	Group	State Status
American eel	*Anguilla rostrate*	Fish	Special Concern
Black sandshell mussel	*Ligumia recta*	Mussel	Special Concern
Blanding's turtle	*Emydoidea blandingii*	Reptile	Threatened

4.7.3.1 American Eel

The American eel prefers moderate-sized or large rivers having continuous flow and a mud or rock bottom that provides daytime cover, such as rocks and log jams. The species will also utilize lower reaches of tributaries to large rivers. In the Mississippi River, American eels have been found in backwaters, tailwater zones of dams, main channel borders, and side channel borders at depths of 2.6 to 10.2 feet (MDNR, 2020c).

4.7.3.6 Black Sandshell Mussel

The black sandshell is a state-threatened mussel and prefers medium-sized streams to large rivers with adequate current. Known host fish include walleye, sugar, sunfishes, and bass. (UMCC, 2014).

4.7.3.7 Blanding's Turtle

The Blanding's turtle needs both wetland and upland habitats to complete its life cycle. The turtle uses ponds, marshes, shrub swamps, bogs, and ditches and streams with slow moving water. Calm, shallow water bodies with mud bottoms and abundant aquatic vegetation are preferred. Extensive marshes bordering rivers provide excellent habitat. Nesting occurs in open sandy uplands, often some distance from water bodies. Blanding's turtles have also been known to nest successfully in areas with disturbed soils and on residential properties, particularly those in low density situations. The turtles overwinter in the muddy bottoms of deeper marshes or other water bodies where they are protected from freezing (MDNR, 2020d).

4.7.3.11 Bald Eagle

Bald eagles are also known be located along the Mississippi River in the Project vicinity. As of August 9, 2007, the bald eagle population had recovered to the extent that it no longer requires the protection of the federal Endangered Species Act; it remains protected by the Migratory Bird Treaty Act, Bald and Golden Eagle Protection Act, and Lacey Act (USFWS, 2007). The bald eagle is no longer listed as a threatened, endangered, or special concern species in Minnesota (MDNR, 2020e).

4.7.4 Summary

The Licensee is not proposing any new facilities or changes to the current Project operations that could impact sensitive species. As such, continued Project operation is not expected to adversely impact rare, threatened, or endangered species in the area. Any maintenance activities involving work on any Project structure or removal of trees within the Project boundary will need to be completed in accordance with the requirements outlined in the § 4(d) rule created for the NLEB, which is located in **Appendix 4.7.4-1**. These requirements, in addition to consulting with the USFWS prior to removing any bats, shall provide for the necessary protection of protected NLEB species.

4.7.5 References

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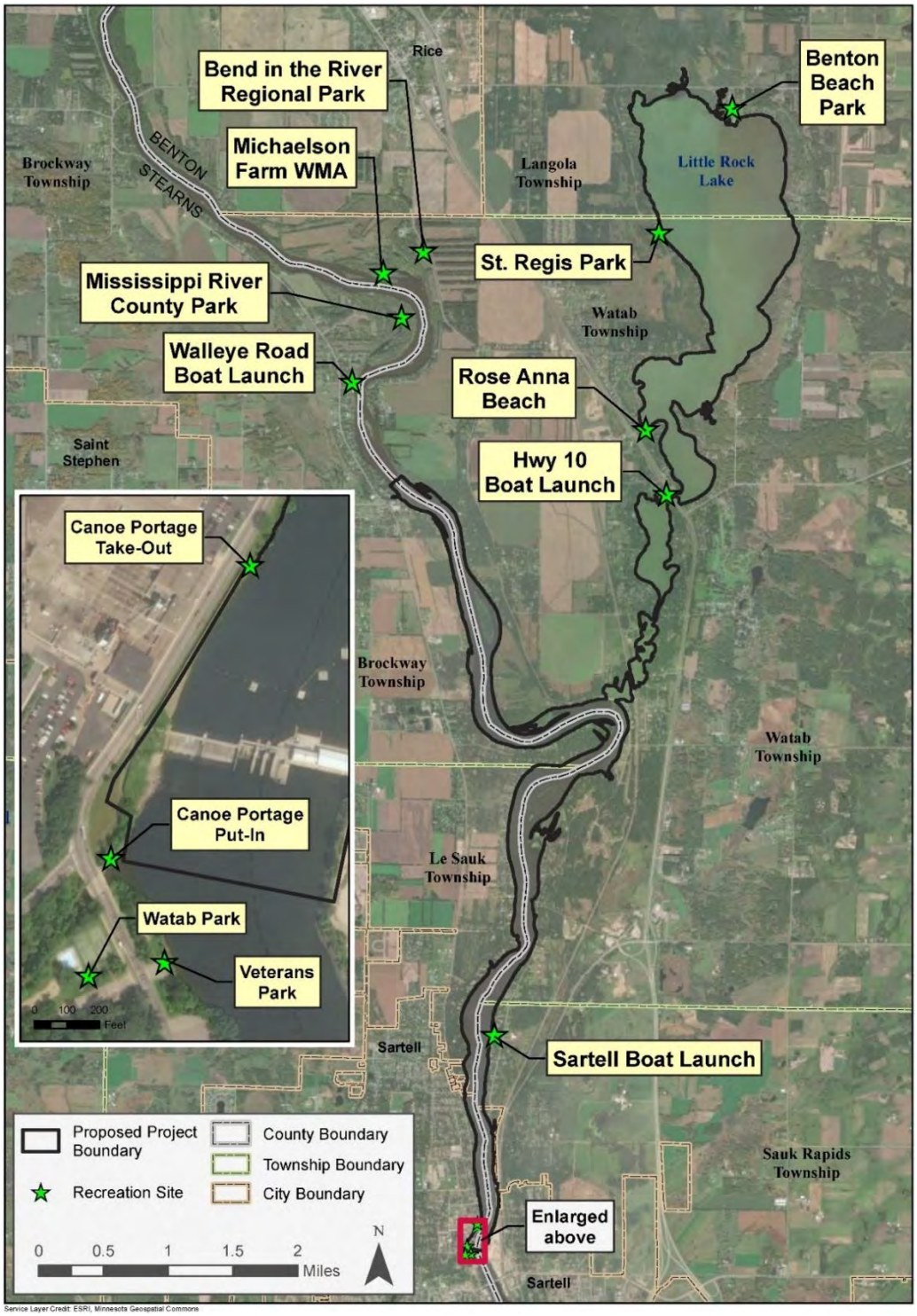
- US Fish & Wildlife Service Website. 2020. Northern Long-eared Bat. Online: https://www.fws.gov/midwest/Endangered/mammals/nleb/index.html. Accessed January 15, 2020.

4.8 Recreation and Land Use (18 CFR § 5.6(d)(3)(viii))

4.8.1 Sartell Project Existing Recreational Facilities and Opportunities

Existing recreation facilities within the Project vicinity are described in the following paragraphs from upstream to downstream and are shown in **Figure 4.8.1-1**.

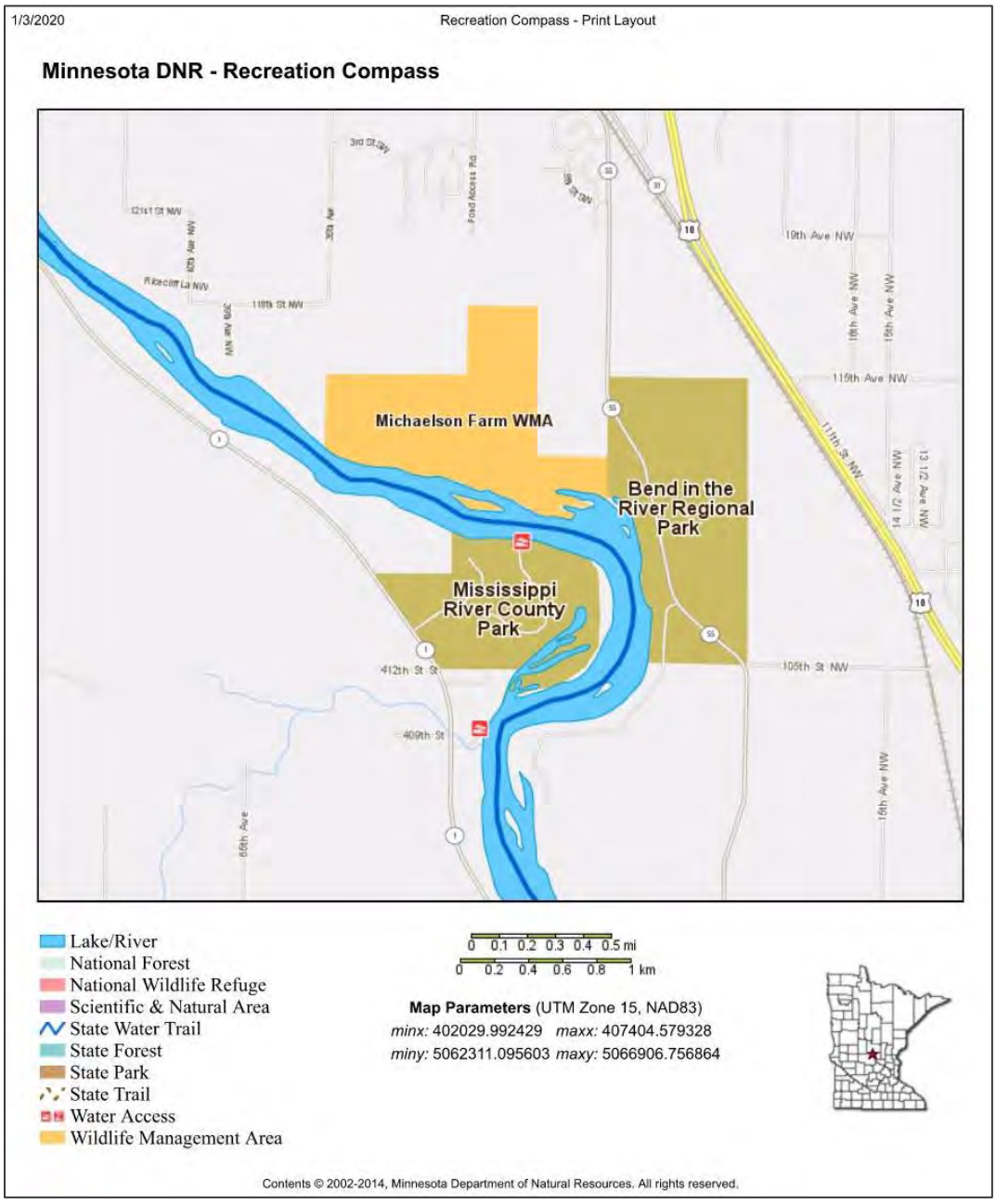
Figure 4.8.1-1: Sartell Project Vicinity Recreation Facilities



4.8.1.1 Michelson Farm Wildlife Management Area

The Michaelson Farm Wildlife Management Area is a 258-acre property on the east bank of the Mississippi River immediately adjacent to Bend in the River Regional Park (Section 4.8.1.2) and about 10 miles upstream of the Sartell Project dam. It is located approximately 2.2 miles upstream of the northern extent of the proposed Project boundary and the shoreline is located within the current Project boundary. The area is located within the Mississippi River floodplain and has a mix of cropland, restored native prairie, seasonally flooded timber, and lowland grass and brush. There are also areas of upland timber and restored prairie on a ridge overlooking the river valley. The site provides recreational opportunities throughout the year, including hunting, trapping, hiking, cross country skiing, show shoeing, and wildlife observation (MDNR, 2020a).

Figure 4.8.1.1-1: Michaelson Farm Wildlife Management Area Map



4.8.1.2 Bend in the River Regional Park

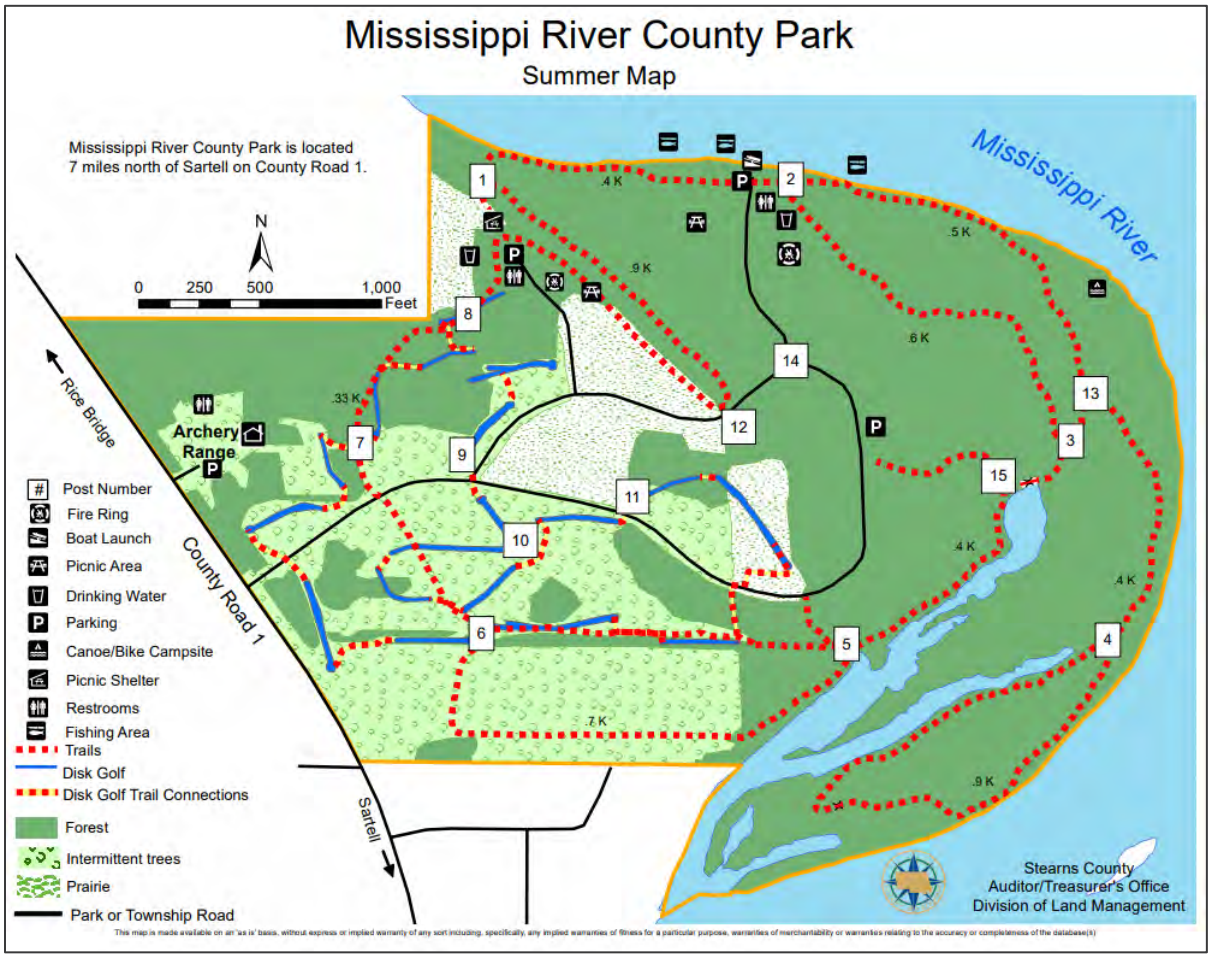
Bend in the River Regional Park encompasses 289 acres of land and 3,300 feet of primarily undeveloped shoreline along the Mississippi River approximately 9.9 miles upstream of the Sartell Project dam. It is located approximately 2.1 miles upstream of the northern extent of the proposed Project boundary and the shoreline is located within the current Project boundary. The park is owned and maintained by Benton County and includes two parking and picnicking areas, a historic farmstead, hiking trails, carry-in canoe access, restroom facilities, and wildlife observation blinds (Benton County, 2020a).

Figure 4.8.1.2-1: Bend in the River Regional Park

4.8.1.3 Mississippi River County Park

Mississippi River County Park includes 230 acres along 1.3 miles of the Mississippi River shoreline approximately 9.5 miles upstream of the Sartell Project dam. It is approximately 1.7 miles upstream of the northern extent of the proposed Project boundary and the shoreline is located within the current Project boundary. The park is owned and maintained by Stearns County. Park amenities include hiking trails, shelters, picnic areas, cross country ski trails, group campsite, bicycle campsite, canoe campsite, bank fishing, archery range, and boat launch (Stearns County, 2020).

Figure 4.8.1.3-1: Mississippi River County Park



4.8.1.4 Walleye Road Boat Launch

Walley Road Boat launch is located approximately 8.8 miles upstream of the Sartell Project dam and serves as a public water access to the Mississippi River. The site is located approximately 1 mile upstream of the northern extent of the proposed Project boundary and the shoreline is located within the current Project boundary. The site is owned and managed by Brockway Township and has a single lane boat launch with a concrete slab ramp. There is a paved parking area for approximately five vehicles with trailers (MDNR, 2020b).

Figure 4.8.1.4-1: Walley Road Boat Launch

4.8.1.5 Benton Beach Park

Benton Beach County Park is a 30-acre park that sits on the north shore of Little Rock Lake, about 9.8 miles upstream of the Sartell Project dam. The shoreline of the park is located within the current and proposed Project boundaries. The park is owned and maintained by Benton County and features a campground with 44 campsites for recreational vehicle and tent camping, picnic shelters, playground, basketball court, 18-hole disk golf course, sand volleyball court, softball field, and horseshoe pits, as well as a single-lane, gravel covered boat launch (Benton County, 2020b).

Figure 4.8.1.5-1: Benton Beach Park Boat Launch

4.8.1.6 St. Regis Park

St. Regis Park is a 0.6-acre park on the southwest side of Little Rock Lake approximately 9.1 miles upstream of the Sartell Project dam. The shoreline of the park is located within the current and proposed Project boundaries. The park is owned and maintained by Benton County and includes picnic tables, grills, and a portable restroom. The park also provides carry-in canoe access and winter access onto Little Rock Lake for ice fishing (Benton County, 2020c).

Figure 4.8.1.6-1: St Regis Park

4.8.1.7 Rose Anna Beach

Rose Anna Beach is a 0.6-acre park located on the south side of Little Rock Lake approximately 7.5 miles upstream of the Sartell Project dam. The shoreline of the park is located within the current and proposed Project boundaries. It is owned and maintained by Benton County and includes a picnic table and grill. The park also provides carry-in canoe access and winter access onto the lake (Benton County, 2020d).

Figure 4.8.1.7-1: Rose Anna Beach

4.8.1.8 Highway 10 Boat Launch

The Highway 10 Boat Launch is located just downstream of US Highway 10 on the Little Rock Creek approximately 6.6 miles upstream of the Sartell Project dam. The shoreline of the park is located within the current and proposed Project boundaries. It is owned and maintained by the MDNR Division of Parks and Trails. The site offers a large paved parking lot that houses 28 vehicles with trailers (MDNR, 2020c). The site contains two American with Disabilities Act (ADA) compliant parking spaces and portable toilet. The boat launch has two lanes composed of concrete planks with a courtesy dock located between the lanes.

Figure 4.8.1.8-1: Highway 10 Boat Launch

4.8.1.9 Sartell Boat Launch

The Sartell Boat launch is located on the Mississippi River along County Road 55 approximately 1.6 miles upstream of the Sartell Project dam. The shoreline of the park is located within the current and proposed Project boundaries. The site is owned and maintained by the MDNR Division of Parks and Trails. The site has a paved parking area with parking for 31 vehicles with trailers, two concrete plank boat launching lanes with a courtesy dock between the lanes, a separate fishing dock, and a portable restroom (MDNR, 2020c). There are two ADA-compliant parking spaces and portable restroom.

Figure 4.8.1.9-1: Sartell Boat Launch

4.8.1.10 Sartell Canoe Portage

The Sartell Project canoe portage extends approximately 1,050 feet from the north end of the floodwall on the west riverbank, follows approximately 595 feet along a mowed area between a security fence and Riverside Avenue N, then approximately 380 feet along a paved pathway before crossing a maintained lawn area to the put-in below the dam. The take-out is owned and maintained by Sartell Hydro. The portage trail mowed areas and paved pathway are maintained by the city of Sartell. The put-in is owned and maintained by the city of Sartell. The canoe take-out and put-in are shown in **Figure 4.8.1.10-1** and **Figure 4.8.1.10-2**, respectively.

Figure 4.8.1.10-1: Sartell Canoe Portage Take-out

Figure 4.8.1.10-2: Sartell Canoe Portage Put-in

4.8.1.11 Veterans Park

The city of Sartell owns and maintains Veterans Park along the west bank of the Mississippi River just downstream of the Sartell Project dam outside of the current and proposed Project boundaries. Park amenities include a paved parking area for six vehicles, a monument, gazebo, and swinging benches facing the river. There are also historical placards regarding the former paper mill (City of Sartell, 2020a).

Figure 4.8.1.11: Veterans Park

4.8.1.12 Watab Park

Watab Park is located on the Watab River, just across Riverside Avenue from Veterans Park and outside of the current and proposed Project boundary. It is owned and maintained by the city of Sartell. Park amenities include a wading pool, restrooms, play structures, swings, swinging benches, picnic tables, grills, a softball field, a volleyball court, and hiking trails. A new reservable park shelter was constructed in the spring of 2019 (City of Sartell, 2020b).

Figure 4.8.1.12-1: Watab Park

4.8.1.13 Mississippi River State Water Trail

The Mississippi State Water Trail consists of ten mapped segments extending from its source in Lake Itasca and ending at the Minnesota/Iowa border. The Sartell Project is located within the Little Falls to St. Cloud Reach, which is referred to as Reach 7. This section of the Mississippi River connects Minnesota's forests to its prairies. Shorelands are typically covered in mixed hardwood forest and nearby grassland prairie (MDNR, 2020d). The water trail passes through the portion of the Project reservoir located on the Mississippi River.

4.8.3 Recreational Needs Identified in Management Plans

4.8.3.1 State of Minnesota

The Minnesota Statewide Comprehensive Outdoor Recreation (SCORP) Plan, 2020-2024 was released in 2019 and is included in **Appendix 4.8.3.1-1** (MDNR, 2019).

Top priority needs identified the following strategic directions for the State:

- Connect people and the outdoors by developing Minnesota's stewards of tomorrow through efforts to increase life-long participation in outdoor recreation and appreciation of our natural heritage.
- Acquire land and create opportunities by expanding and creating new park and trail opportunities to satisfy current customers as well as to reach out to new ones.
- Take care of what we have to provide safe, high quality park and trail experiences by regular reinvestment in park and trail infrastructure, as well as natural resource management.
- Coordinate among partners to enhance coordination across the large and complex network of public, private, and non-profit partners that support Minnesota's parks and trails to ensure seamless, enjoyable park and trail experiences or Minnesotans.

The recreation amenities provided in the Project vicinity help fulfill these priority needs.

4.8.3.2 Benton County

Benton County developed the Master Plan for Parks, Trails and Open Space in 2002, which is included in **Appendix 4.8.3.2-1**. The plan provides a framework for the county to identify, preserve, enhance, and develop the parks, trails, and natural areas within the county for the enjoyment of future generations. The plan identified improvements for several existing parks, as well as opportunities for new park development. Improvements were recommended for several parks adjacent to the Project boundary, which are listed below.

Benton Beach County Park

Recommended improvements included adding hiking and biking trails, installing a fishing pier and upgrading camping facilities, the restroom shower facility, playground equipment, and shelters.

St. Regis Park

Recommended improvements included restoring the shoreline and installing a canoe launch and interpretive signs.

Rose Anna Beach

Recommended improvements included upgrades to the existing parking, establishment of a more defined picnic area, and installation of interpretive signs.

The Master Plan also identified the potential addition of a new park on the Mississippi River at the Graves Farm property. This area has since been developed by Benton County as Bend in the River Regional Park, which is described in Section.4.8.1.2 (Benton County, 2020e).

4.8.3.3 Stearns County

Stearns County approved the Stearns County Comprehensive Plan in March of 2008. Chapter 5 Parks, Open Space, and Recreation Plan provides a blueprint for Stearns County to follow to meet regional needs for recreation and open space and work toward natural resource preservation. Chapter 5 of this plan can be found in **Appendix 4.8.3.3-1**. Proposed improvements in the Project vicinity include expanding the Mississippi River Park to the north to capture a scenic bluff view of the river. The plan also called for the addition of new park and trail areas; these areas are located outside the Project vicinity (Stearns County, 2019).

4.8.3.4 City of Sartell

The city of Sartell approved the 2016 Comprehensive Plan on November 14, 2016. Section 7 Parks and Open Spaces addresses parks and open spaces within the community and can be found in **Appendix 4.8.3.4-1**. One of the main goals was to recognize the Mississippi, Watab, Sauk, and other rivers and natural areas as a major recreation, economic, and open space assets to the community (City of Sartell, 2016).

Under this overarching goal, the following strategies were identified:

- Maintain existing public access to the rivers and increase public access in new development and redevelopment projects, specifically within the Mill Property area;
- Work to connect rivers to neighborhoods, parks, and communities with trails and greenspace; and
- Work with the MDNR and other agencies to create and/or enhance portages within all of the navigable rivers.

4.8.4 Recreation Accessibility Under the Americans with Disabilities Act

ADA needs are accommodated in several locations in the Project vicinity, which include:

- Bend in the River Regional Park: ADA accessible parking, restrooms, and trails
- Mississippi River County Park: ADA accessible parking and open-air picnic shelter
- Benton Beach Park: ADA accessible parking and picnic shelter
- Highway 10 Boat Launch: ADA accessible parking and restroom facilities
- Sartell Boat Launch: ADA accessible parking and restroom facilities
- Veterans Park: ADA accessible parking and shelter
- Watab Park: ADA accessible parking and shelters

4.8.5 References

- Benton County. 2020a. Benton County Bend in the River Regional Park. Online. https://www.co.benton.mn.us/Facilities/Facility/Details/Bend-in-the-River-Regional-Park-Canoe-La-1. Accessed January 3, 2020.
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- Benton County. 2020.c. Benton County St. Regis Park. Online. https://www.co.benton.mn.us/Facilities/Facility/Details/St-Regis-Park-7. Accessed January 2020.
- Benton County. 2020d. Rose Anna Beach. Online. https://www.co.benton.mn.us/Facilities/Facility/Details/Rose-Anna-Beach-5 . Accessed January 2020.
- Benton County. 2020e. Benton County Master Plan for Parks, Trails, and Open Space. Online. https://www.co.benton.mn.us/393/Master-Plan-for-Parks-Trails-Open-Space. Accessed January 2020.
- City of Sartell. 2016. Sartell Comprehensive Plan. Online. https://sartellmn.com/government/departments/planning-community-development/2016-comprehensive-plan/. Accessed December 13, 2019.
- City of Sartell. 2020a. Veterans Park. Online. https://sartellmn.com/around-sartell/parks-trails/#1544561204046-f228665c-9a7b . Accessed January 3, 2020.
- City of Sartell. 2020b. Watab Park. Online. https://sartellmn.com/around-sartell/parks-trails/#1544561450383-2d368cdf-c506. Accessed January 3, 2020.
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- Stearns County. 2019. Chapter 5. Parks, Open Space and Recreation Plan. Online. https://co.stearns.mn.us/Portals/0/docs/CompPlan/CompPlan05Parks.pdf . Accessed 12/31/2019.
- Stearns County. 2020. Mississippi River County Park. Online. https://co.stearns.mn.us/Recreation/CountyParks/MississippiCountyPark. Accessed January 3, 2020.

4.9 Aesthetic Resources (18 CFR § 5.6(d)(3)(ix))

The topography in the Project vicinity was created from glacial activity and consists of outwash plains formed when glaciers melted and receded. The topography is relatively flat to gently rolling land is bisected by the Mississippi River floodplain. In areas near the river, land surfaces slope toward the river in a downstream direction. Most slopes are no more than one or two degrees, with maximum slopes of up to six degrees occurring near the river banks.

4.9.1 Visual Character of Project Land and Waters

The upstream view of the Sartell dam is dominated by the reservoir, safety buoys, and both developed and undeveloped shoreline, as shown in **Figure 4.9.1-1**.

Figure 4.9.1-1: View of the Project Reservoir Upstream from the Sartell Dam

The view looking downstream of the Sartell dam, as shown in **Figure 4.9.1-2**, provides a view of the tailwater, Veterans Park, and a historic bridge.

Figure 4.9.1-2: View Downstream of the Sartell Dam

The view upstream of Veterans Park shows the Project dam and powerhouse (**Figure 4.9.1-3**).

Figure 4.9.1-3: View of the Sartell Dam from Veterans Park

A view of the powerhouse and tailwater is shown in **Figure 4.9.1-4**.

Figure 4.9.1-4: Sartell Project Powerhouse and Tailwater

4.9.2 Nearby Scenic Attractions

4.9.2.1 River Bluffs Regional Park

River Bluffs Regional Park was added to the public access system in 2012 and is located along the wooded bluffs on the west side of the Mississippi River approximately 9 miles downstream of the Sartell Project dam. The park provides a boat launch, paved parking area, and picnic area. Hiking trails along the bluff provide scenic views of the river (MDNR, 2020).

4.9.2.2 Quarry Park and Nature Preserve

Quarry Park and Nature Preserve is the largest park operated by Stearns County at 683 acres. It is located approximately 6 miles southwest of the Project dam. Natural features include scenic woodlands and overlooks, open prairie, wetlands, and unquarried bedrock. Manmade features include large hills composed of quarried rock remnants. Two of the quarries are designated as public swimming areas and are popular with rock climbers and scuba divers. The St. Cloud Red Granite was quarried at this location until the mid-1950s. The area was purchased by Stearns County in 1992 and the park opened in 1998. (Stearns County, 2020). Figure 4.9.2-1 shows one of the water-filled quarries within the park.

Figure 4.9.2-1: Quarry Park

4.9.3 References

- Minnesota Department of Natural Resources. 2020. Mississippi River Guide-St. Cloud/River Bluffs Regional Park. Online. https://files.dnr.state.mn.us/areas/fisheries/saukrapids/riverbluff.pdf. Accessed January 15, 2020.
- Stearns County. 2020. Quarry Park and Nature Preserve. Online. https://co.stearns.mn.us/Recreation/CountyParks/QuarryParkandNaturePreserve. Accessed January 15, 2020.

4.10 Historical and Cultural Resources (18 CFR § 5.6(d)(3)(x))

The Minnesota State Historic Preservation Office (SHPO) maintains a database of historic sites and structures and archaeological sites within the state, including those within Benton and Stearns Counties.

4.10.1 Historic/Architectural Resources

The Licensee contacted the Minnesota SHPO via a questionnaire in December 2019. Sarah Beimers, Environmental Review Program Manager, responded to the questionnaire on December 30, 2019 and indicated the FERC must submit Section 106 consultation, all requests for review must be made in hard copy, and the Licensee should submit a request for a database search of historic sites and structures, as well as archaeological sites. On January 6, 2020 the Licensee requested an inventory of historic sites and structures within the Project vicinity.[8] On January 8, 2020, the Minnesota SHPO responded by providing a Historic Sites and Structures Inventory within the Project vicinity, which is included as **Table 4.10.1-1**. The Minnesota SHPO also provided an Archaeological Site Inventory, which is described in Section 4.10.2. With the filing of this PAD, the Licensee is requesting authorization from the FERC to act as their non-federal representative for the purposes of conducting consultation under Section 106 of the National Historic Preservation Act (Section 106), at which point official Section 106 consultation will begin.

In 2019, the MDNR Section of Fisheries, working in conjunction with the Licensee, Benton County SWCD, and Little Rock Lake Association, requested a temporary drawdown of water levels within the Sartell Project to assist with improving water quality within the Little Rock Lake Basin. The Licensee consulted with Minnesota SHPO pursuant to Section 106. The Area of Potential Effects (APE) for the Project included the entire Sartell reservoir up to the normal pool elevation 1,014.5 feet. The Historic Site and Structure Inventory review for the proposed drawdown indicated sites BN-STC-001, BN-WAT-006, and BN-WAT-009 (bolded in **Table 4.10.1-1**) were within the Sartell Project APE (Sartell Hydro, 2019).

Table 4.10.1-1: Historic Sites and Structures Inventory in Vicinity of Sartell Project

State Inventory No	Site Name	Municipality	Status*
BN-LAN-004	Bridge No. 5521 (Co Hwy 2/Mississippi R)	Langola Township	DNE for NRHP
BN-STC-001	St. Regis Mill and Dam	City of Sartell	Within APE
BN-STC-002	Sartell Bridge (Bridge 5506)	City of Sartell	Outside APE
BN-STC-003	Workers Houses	City of Sartell	Outside APE
BN-SRT-005	Fort Ripley Military Road: Sauk Rapids Township Segment	Sauk Rapids Township	Outside APE
BN-SRT-006	Brainerd Branch: Sauk Rapids to Brainerd Railroad	Sauk Rapids Township	Outside APE
BN-WAT-003	Willis A. Graves Farmstead	Watab Township	Outside APE
BN-WAT-004	John M. McNeal Farmhouse	Watab Township	Outside APE
BN-WAT-006	Fort Ripley Military Road-Watab Segment	Watab Township	Within APE
BN-WAT-007	Peace Rock	Watab Township	Outside APE
BN-WAT-008	Old Section of TH 10	Watab Township	Outside APE

[8] MN SHPO Historic Site and Structures Inventory provides information down to the section level. Search results will identify all historic sites and structures within an entire section, rather than just a portion within the Project boundary.

BN-WAT-009	Brainerd Branch: Sauk Rapids to Brainerd Railroad	Watab Township	Within APE
BN-WAT-010	Bridge No. 2972, CR 55/Little Rock Cr	Watab Township	DNE for NRHP
BN-WAT-011	Bridge L9200, Sucker Cr Rd/Sucker Cr	Watab Township	Outside APE
SN-STC-001	Sartell Village Hall	City of Sartell	Outside APE

* APE: Area of Potential Effect; DNE: Determined not Eligible; NRHP: National Register of Historic Places

4.10.2 Archaeological Resources

As mentioned in Section 4.10.1, the Minnesota SHPO provided an Archaeological Site Inventory of sites in the Project vicinity, which are identified in **Table 4.10.2-1**.

An archaeological review of the Project was conducted in conjunction with the temporary drawdown of water levels within the Project. The project APE included the entire Sartell reservoir, up to elevation 1,014.5 feet. Review of the Archaeological Site Inventory identified sites 21BN0008, 21BN0009, 21BN0029, and 21BNj (bolded in **Table 4.10.2-1**) were within or immediately adjacent to the APE since they were adjacent to Sartell reservoir and may contain submerged cultural deposits (Sartell Hydro, 2019). Monitoring of these sites and newly exposed lake/river beds for previously unrecorded cultural sites was conducted by MDNR during the drawdown. Sartell Hydro has not received the results of this monitoring from MDNR at the time of this filing. The record of Section 106 consultation with the Minnesota SHPO is included in **Appendix 4.10.2-1**.

Table 4.10.2-1: Archaeological Site Inventory in Vicinity of Sartell Project

State Inventory No	Site Name	Town (North)	Range (West)	Section
21BN0002	Unnamed	36	31	9
21BN0007	Little Rock Lake Mounds (Burton Mounds, within 21BNj)	37	31	11
21BN0008	Little Rock Lake North	37	31	14 and 15
21BN0009	Little Rock Lake South (within 21BNj)	37	31	14 and 15
21BN0015	Unnamed	38	32	36
21BN0024	Unnamed	37	31	14
21BN0029	Pirate's Cove	37	21	27
21BNa	Hudson's Bay Trading Post / Little Rock Trading Post / Watab Trading Post	37	31	22
21BNb	Sand Dune Mound / Watab Mound	37	31	22
21BNg	Unnamed	38	31	35
21BNj	Little Rock Village Area (includes 21BN0007 and 21BN0009)	37	31	2, 11, 14 and 15
21SNaq	Unnamed	125	28	21
21SNt	Sartell	125	28	21

4.10.3 Tribal Cultural Resources (18 CFR § 5.6(d)(3)(xii))

There are eleven recognized Native American Tribes in Minnesota, which include seven Chippewa (Ojibwe) communities and four Dakota (Sioux) communities. The seven Chippewa communities include Grand Portage, located in the northeast corner of the state; Bois Forte, located in extreme northern Minnesota; Red lake, located west of the Bois Forte in extreme northern Minnesota; White Earth, located in northwestern Minnesota; Leech Lake, located in the north central portion of the state; Fond du Lac, located west of Duluth in northeast Minnesota; and Mille Lacs, located in the central part of the state. The four Sioux communities include Shakopee Mdewakanton, located near Prior Lake south of the Twin Cities; Prairie Island, located near Red Wing; Lower Sioux, located near Redwood Falls; and Upper Sioux, located near the city of Granite Falls (Indian Affairs Council, 2019a).

4.10.3.1 Chippewa/ Ojibwe

Each of the seven Chippewa communities, or Bands, represent reservations originally established by treaty and are considered separate and distinct nations by the United States government. Each community is described in the paragraphs that follow. In some cases, the tribe retained additional lands through an Executive Order of the President. Six of the seven reservations were allotted when the General Allotment Act passed. Red Lake Reservation is the only closed reservation, meaning the reservation was never allotted to individual tribal members and the land continues to be held in common by all tribal members.

Grand Portage Band of Lake Superior Chippewa

The Grand Portage Band is located in Cook County in the northeastern corner of Minnesota about 150 miles northeast from Duluth. The name Grand Portage comes from the nine-mile-long portage used to bypass the cascading waters of the Pigeon River to get inland from Lake Superior to the fur-rich lakes and rivers of Northern Minnesota. The community arrived in the Grand Portage area after migrating along the northern shore of Lake Superior. The French used the portage for fur trade beginning in 1731. British took over in the 1760s and the North West Company built the post at Grand Portage around 1785. In the early 1800s, the post was taken over by the American Fur Company. The Grand Portage Band were not participants in the early treaties with the United States. Under the terms of the Treaty of 1854, the Grand Portage Band ceded their lands to the United States and accepted the Grand Portage reservation (Indian Affairs Council, 2019b).

Bois Forte Band of Chippewa

The Bois Forte Band is located in Itasca and St. Louis Counties in Northern Minnesota about 45 miles south of the Canadian border. Bois Forte means “strong wood” and was given to the tribe by French fur traders since they lived in the densest forests of northern Minnesota. The Bois Forte Band has lived in northern Minnesota for centuries but did not originate there. The Band journeyed from the east coast of the United States, up the Saint Lawrence River, around the Great Lakes, and followed rivers and lakes inland from Lake Superior (Indian Affairs Council, 2019c).

Red Lake Band of Chippewa

The Red Lake Band is located in Beltrami and Clearwater Counties in northern Minnesota about 25 miles north of Bemidji. The Red Lake community has lived in the area since the Dakota moved from the region in the mid-1700s. The Red Lake Band gave up millions of acres of land through various

treaties and land agreements from 1863 to 1902, but never ceded the diminished reservation. The reservation was never allotted and all land is held in common by members of the Band (Indian Affairs Council, 2019d).

White Earth Band of Chippewa

The White Earth Band is located in Becker, Clearwater, and Mahnomen Counties in northwestern Minnesota about 68 miles east of Fargo, North Dakota. The name White Earth comes from the layer of white clay underneath the surface on the western half of the reservation. White Earth became a reservation in 1867 through a treaty with the Mississippi Band of Ojibwe. The White Earth reservation was to become the home of all Chippewa and Dakota; however, not all Bands wanted to move to one reservation and give up their lands (Indian Affairs Council, 2019e).

Leech Lake Band of Chippewa (Ojibwe)

The Leech Lake Band is located in Beltrami, Cass, Itasca, and Hubbard Counties in north central Minnesota. In the 1600s, the Dakota had communities at Leech Lake. The Ojibwe Band moved into the region during the mid to late 1700s. In 1847, treaties took a section on the southwest corner of their lands. The remaining land was ceded to the United States by treaty in 1855 and established the Leech Lake reservation (Indian Affairs Council, 2019f).

Fond du Lac Band of Lake Superior Chippewa

The Fond du Lac Band is located within Carlton and St. Louis Counties adjacent to the city of Cloquet and 15 miles west of Duluth. The first recorded contact with the French came in 1622. The LaPointe Treaty of 1854 was the last principal treaty between several bands of Chippewa living in northern Minnesota, northern Wisconsin, and the western part of Michigan's upper peninsula. The Fond du Lac reservation was established by this treaty (Indian Affairs Council, 2019g).

Mille Lacs Band of Ojibwe

The Mille Lacs community is located within Mille Lacs County in east Central Minnesota near the city of Onamia (Indian Affairs Council, 2019h).The band establish themselves in the region around Mille Lacs Lake in the mid-1700s and forced out the Dakota, who migrated west and south out of the area. The Treaty of 1837 ceded the Mille Lacs Band lands to the United States, but preserved their right to hunt, fish, and gather on the ceded lands. The Treaty of 1855 established the Mille Lacs reservation on and around the south end of Mille Lacs Lake ((Indian Affairs Council, 2019h; Mille Lacs Band of Ojibwe, 2019).

4.10.3.2 Sioux/Dakota

The original Dakota Community was established by treaty in 1851, which set aside a ten-mile wide strip of land on both sides of the Minnesota River as the permanent home of the Dakota. However, in the aftermath of the United States-Dakota Conflict of 1862, Congress repealed all treaties made with the Dakota and forced them from their homes in the state. Four Dakota communities were reestablished in their current location by acts of Congress in 1886. Today, these communities represent small segments of the original reservation that were restored to the Dakota by Acts of Congress or Proclamations of the Secretary of Interior (Indian Affairs Council, 2019a).

Shakopee Mdewakanton Sioux Community

The Shakopee Mdewakanton Sioux Community is located in Scott County near the city of Prior Lake and the Minnesota River. Mdewakanton means “those who were born of the waters”. European contact with the Dakota tribe was first recorded in the 1640s. The Community was granted official recognition as a Native American tribe in 1969 by the federal government. (Shakopee Mdewakanton Sioux Community, 2019).

Prairie Island Indian Community

The Prairie Island Community is located on an island in the Mississippi River located 14 miles north of Red Wing. The Prairie Island reservation was created in 1886 when land was purchased by the Department of Interior and placed into a trust (Indian Affairs Council, 2019i).

Lower Sioux Indian Community

The Lower Sioux Community is located in Redwood County near the city of Redwood Falls. The Community is located on the south side of the Minnesota River at the site of the US Indian Agency, a part of the original reservation established in an 1851 Treaty. The Dakota inhabited this area for thousands of years until the United States-Dakota Conflict of 1862 when the tribe was moved to reservations outside of Minnesota. Many members returned to their homeland and are now known as the Lower Sioux Indian Community (Indian Affairs Council, 2019j).

Upper Sioux Indian Community

The Upper Sioux Community is located on the Minnesota River in Yellow Medicine County, five miles south of the city of Granite Falls. The Dakota inhabited this area for thousands of years until the United States-Dakota Conflict of 1862 when the tribe was move to reservations outside of Minnesota. The Community was reestablished in 1938 when 746 acres of original Dakota lands were returned (Indian Affairs Council, 2019k).

4.10.4 Tribal Representatives Consulted with Questionnaire

A questionnaire was sent to the Tribal representatives listed in **Table 4.10.4-1** on August 23, 2019, which asked for any known information or potential impacts of the Sartell Project operations. Sartell Hydro did not receive any responses from the Tribal representatives.

Table 4.10.4-1: Tribal Representatives Consulted Through Questionnaires

Name	Organization
Mr. Bob Komardly	Apache Tribe of Oklahoma
Ms. Chrystal Lightfoot	Apache Tribe of Oklahoma
Mr. Robert Blanchard	Bad River Tribe of Lake Superior Tribe of the Chippewa
Ms. Edith Leoso	Bad River Band of the Lake Superior Tribe of the Chippewa
Mr. Clinton Parish	Bay Mills Indian Community of Michigan
Mr. Bill Latady	Bois Forte Band of Minnesota Chippewa
Ms. Catherine Chavers	Bois Forte Band of Minnesota Chippewa
Mr. Max Bear	Cheyenne and Arapaho Tribes of Oklahoma
Mr. Edward Hamilton	Cheyenne and Arapaho Tribes of Oklahoma
Gary Kills A Hundred	Flandreau Santee Sioux Tribe

Anthony Reider	Flandreau Santee Sioux Tribe
Mr. Kevin R. Dupis, Sr.	Fond Du Lac Band of Lake Superior Chippewa Indian Tribe
Ms. Jill Hoppe	Fond Du Lac Band of Lake Superior Chippewa Indian Tribe
Mr. Mark Azure	Fort Belknap Indian Community
Mr. Michael J. Blackwolf	Fort Belknap Indian Community
Ms. Beth Drost	Grand Portage Band of Chippewa Indians
Mr. Norman Dupuis	Grand Portage Band of Chippewa Indians
Ms. Mary Ann Gagnon	Grand Portage Band of Chippewa Indians
Mr. Gary F. Loonsfoot	Keweenaw Bay Indian Community of Michigan
Mr. Warren C. Swartz, Sr.	Keweenaw Bay Indian Community of Michigan
Mr. Mic Isham	Lac Courte Oreilles Band of Chippewa Indians
Mr. Brian Bisonette	Lac Courte Oreilles Band of Chippewa Indians
Mr. Joseph Wildcat	Lac Du Flambeau Band of Lake Superior Chippewa Indians
Ms. Melinda Young	Lac Du Flambeau Band of Lake Superior Chippewa Indians
Ms. Daisy McGeshick	Lac Vieux Desert Band of Lake Superior Chippewa Indians
Mr. James Williams, Jr.	Lac Vieux Desert Band of Lake Superior Chippewa Indians
Ms. Amy Burnette	Leech Lake Band of Ojibwe
Mr. Faaron Jackson	Leech Lake Band of Ojibwe
Mr. Robert Larson	Lower Sioux Indian Community
Ms. Cheyanne St. John	Lower Sioux Indian Community
Mr. Gary Besaw	Menominee Indian Tribe of Wisconsin
Mr. David Grignon	Menominee Indian Tribe of Wisconsin
Ms. Melanie Bejamin	Mille Lacs Band of Ojibwe
Ms. Natalie Weyaus	Mille Lacs Band of Ojibwe
Mr. Kevin Dupuis, Sr.	Minnesota Chippewa Tribe
Ms. Shelly Buck	Prairie Island Indian Community
Mr. Noah White	Prairie Island Indian Community
Mr. Bryan Bainbridge	Red Cliff Band of Lake Superior Chippewa Indians
Mr. Marvin Defoe	Red Cliff Band of Lake Superior Chippewa Indians
Mr. Darrell G. Seki, Sr.	Red Lake Band of Chippewa Indians of Minnesota
Mr. Roger Trudell	Santee Sioux Nation
Mr. Duane Whipple	Santee Sioux Nation
Ms. Dianne Desrosiers	Sisseton-Wahpeton Ovate of the Lake Traverse Reservation
Mr. Dave Flute	Sisseton-Wahpeton Ovate of the Lake Traverse Reservation
Mr. Charles R. Vig	Shakopee-Mdewakanton Sioux Community of Minnesota
Mr. Chris McGeshick	Sokaogon Chippewa Community
Dr. Erich Longie	Spirit Lake Tribe
Ms. Myra Pearson	Spirit Lake Tribe
Mr. Kevin Jensvold	Upper Sioux Community
Ms. Samantha Odegard	Upper Sioux Community
Ms. Jamie Arsenault	White Earth Band of the Minnesota Chippewa Tribe
Mr. Michael Fairbanks	White Earth Band of the Minnesota Chippewa Tribe
Ms. Erma Vizenor	White Earth Band of the Minnesota Chippewa Tribe

4.10.5 Tribal Representatives Consulted with FERC Letter

On August 23, 2019, the FERC sent a letter to the Tribal representatives outlined in **Table 4.10.5-1** to invite them to participate in the relicensing process for the Sartell Project (FERC, 2019a).

On October 11, 2019 and October 29, 2019, the FERC followed up the August 23, 2019 letter via email and telephone to determine if any of tribes would be interested in participating in consultation on the Sartell Project relicensing. As a result of this communication, the Flandreau Santee Sioux Tribe and Menominee Indian Tribe of Wisconsin requested electronic versions of the August 23, 2019 letter. No other comments were received. The Fond Du Lac Band of Lake Superior Indians indicated they were reviewing the Project and would confirm whether the office wanted to consult on the relicensing at a later date. No other comments were received. No other Tribal representatives responded to the telephone or email communication (FERC, 2019b).

Table 4.10.5-1: Tribal Representatives Invited by the FERC to Participate

Name	Organization
Mr. Bob Komardly	Apache Tribe of Oklahoma
Ms. Chrystal Lighfoot	Apache Tribe of Oklahoma
Mr. Robert Blanchard	Bad River Tribe of Lake Superior Tribe of the Chippewa
Ms. Edith Leoso	Bad River Band of the Lake Superior Tribe of the Chippewa
Mr. Max Bear	Cheyenne and Arapaho Tribes of Oklahoma
Mr. Edward Hamilton	Cheyenne and Arapaho Tribes of Oklahoma
Gary Kills A Hundred	Flandreau Santee Sioux Tribe
Anthony Reider	Flandreau Santee Sioux Tribe
Mr. Kevin R. Dupis, Sr.	Fond Du Lac Band of Lake Superior Chippewa Indian Tribe
Ms. Jill Hoppe	Fond Du Lac Band of Lake Superior Chippewa Indian Tribe
Mr. Mark Azure	Fort Belknap Indian Community
Mr. Michael J. Blackwolf	Fort Belknap Indian Community
Mr. Norman Deschampe	Grand Portage Band of Chippewa
Ms. Mary Ann Gagnon	Grand Portage Band of Chippewa Indians
Mr. Gary F. Loonsfoot	Keweenaw Bay Indian Community of Michigan
Mr. Warren C. Swartz, Sr.	Keweenaw Bay Indian Community of Michigan
Mr. Joseph Wildcat	Lac Du Flambeau Band of Lake Superior Chippewa Indians
Ms. Melinda Young	Lac Du Flambeau Band of Lake Superior Chippewa Indians
Ms. Daisy McGeshick	Lac Vieux Desert Band of Lake Superior Chippewa Indians
Mr. James Williams, Jr.	Lac Vieux Desert Band of Lake Superior Chippewa Indians
Ms. Amy Burnette	Leech Lake Band of Ojibwe
Mr. Faaron Jackson	Leech Lake Band of Ojibwe
Mr. Robert Larson	Lower Sioux Indian Community
Ms. Cheyanne St. John	Lower Sioux Indian Community
Mr. Gary Besaw	Menominee Indian Tribe of Wisconsin
Mr. David Grignon	Menominee Indian Tribe of Wisconsin
Ms. Melanie Bejamin	Mille Lacs Band of Ojibwe
Ms. Natalie Weyaus	Mille Lacs Band of Ojibwe
Mr. Kevin Dupis, Sr.	Minnesota Chippewa Tribe

Ms. Shelly Black	Prairie Island Indian Community
Mr. Bryan Bainbridge	Red Cliff Band of Lake Superior Chippewa Indians
Mr. Marvin Defoe	Red Cliff Band of Lake Superior Chippewa Indians
Mr. Roger Trudell	Santee Sioux Nation
Mr. Duane Whipple	Santee Sioux Nation
Ms. Dianne Desrosiers	Sisseton-Wahpeton Ovate of the Lake Traverse Reservation
Mr. Dave Flute	Sisseton-Wahpeton Ovate of the Lake Traverse Reservation
Mr. Chris McGeshick	Sokaogon Chippewa Community
Dr. Erich Longie	Spirit Lake Tribe
Ms. Myra Pearson	Spirit Lake Tribe
Mr. Kevin Jensvold	Upper Sioux Community
Ms. Samantha Odegard	Upper Sioux Community
Ms. Erma Vizenor	White Earth Band of the Minnesota Chippewa Tribe

4.10.6 Section 106 Consultation

The relicensing of the Sartell Project is considered a federal undertaking; therefore, formal consultation under Section 106 of the Historic Preservation Act of 1966 is required. With the filing of the NOI and this PAD, the Licensee will request approval from the FERC to be designated as a non-federal representative for Section 106 consultation during the relicensing process. When the Licensee receives confirmation from the FERC to act as a non-federal representative for Section 106, the Licensee will initiate formal consultation with the Minnesota SHPO regarding relicensing studies and National Register of Historic Places eligibility determinations.

4.10.7 References

- Federal Energy Regulatory Commission. 2019a. Letter Inviting Apache Tribe of Oklahoma, et al to participate in the relicensing process for the existing Sartell Dam Hydroelectric Project Under P-8315. August 23, 2019.
- Federal Energy Regulatory Commission. 2019b. Telephone Memo Discussing the Consultation with Tribes on the relicensing Process for the Existing Sartell Hydroelectric Project Under P-8315. November 13, 2019.
- Indian Affairs Council. 2019a. Indian Affairs Council. Website. https://mn.gov/indianaffairs/. Accessed December 13, 2019.
- Indian Affairs Council. 2019b. Grand Portage Land of Lake Superior Chippewa. Website. https://mn.gov/indianaffairs/grandportage-iac.html. Accessed December 15, 2019.
- Indian Affairs Council. 2019c. Bois Forte Band of Chippewa. Website. https://mn.gov/indianaffairs/boisforte-iac.html. Accessed December 15, 2019.
- Indian Affairs Council, 2019d. Red Lake Nation. Website. https://mn.gov/indianaffairs/redlake-iac.html. Accessed December 15, 2019.
- Indian Affairs Council, 2019e. White Earth Nation. Website. https://mn.gov/indianaffairs/whiteearth-iac.html. Accessed December 15, 2019.
- Indian Affairs Council, 2019f. Leech Lake Band of Ojibwe. Website. https://mn.gov/indianaffairs/leechlake-iac.html. Accessed December 15, 2019.
- Indian Affairs Council, 2019g. Fond du Lac Band of Lake Superior Chippewa. Website. https://mn.gov/indianaffairs/fonddulac-iac.html. Accessed December 15, 2019.

- Indian Affairs Council, 2019 h. Mille Lacs Band of Ojibwe. Website. https://mn.gov/indianaffairs/millelacs-iac.html. Accessed December 15, 2019.
- Indian Affairs Council, 2019i. Prairie Island Indian Community. Website. https://mn.gov/indianaffairs/prairieisland-iac.html
- Indian Affairs Council, 2019j. Lower Sioux Indian Community. Website. https://mn.gov/indianaffairs/lowersioux-iac.html. Accessed December 15, 2019.
- Indian Affairs Council, 2019k. Upper Sioux Indian Community. Website. https://mn.gov/indianaffairs/uppersioux-iac.html. Accessed December 15, 2019.
- Mille Lacs Band of Ojibwe. 2019. Website. http://www.millelacsband.com/about/our-history/historical-timeline. Accessed December 15, 2019.
- Shakopee Mdewakanton Sioux Community. 2019. Our History. Website. https://www.shakopeedakota.org/culture/our-native-american-history. Accessed December 15, 2019.
- Sartell Hydro. 2019. Section 106 Correspondence with Minnesota SHPO Regarding Sartell Pool Drawdown. March 18, 2019.

4.11 Socio-economic resources (18 CFR § 5.6(d)(3)(xi))

This section outlines historical population patterns and employment information for the counties and municipalities within the Sartell Project boundary.

4.11.1 Population and Housing Patterns

The 2010 populations for the city of Sartell, Benton County, and Stearns County were 15,876; 38,451; and 150,642 respectively. The population density in Benton County is 94.2 people per square mile with a housing unit density of 39.5 housing units per square mile. The population density in Stearns County is 112.2 people per square mile with a housing unit density of 46.1 housing units per square mile (US Census Bureau American Factfinder, 2010).

Population data available for the city of Sartell, Benton County, and Stearns County shows regular population increases since the 1980s. Historical population information and population forecasts for each municipality can be found in **Table 4.11.1-1** and **Table 4.11.1-2**, respectively (City of Sartell, 2019; Benton County, 2019; Stearns County, 2019).

Table 4.11.1-1: Municipality and County Historical Population

Municipality	1980	1990	2000*	2010*	Population Change 2010-2020
City of Sartell	3,427	5,354	9,641	15,876	64.7%
Benton County	25,187	30,185	34,266	38,451	12.3%
Stearns County	108,161	118,791	133,166	150,642	13.1%

Source: 2016 Sartell Comprehensive Plan and *US Census Bureau.

Table 4.11.1-2: Municipality and County Population Forecast

Municipality	2010-Census	2020	2025	2030	2040
City of Sartell	15,876	22,751	25,464	27,906	32,419*
Benton County	38,451	41,012	N/A	42,829	44,093
Stearns County	150,642	163,200	170,370	177,370	192,212**

Source: US Census Bureau, 2016 Sartell Comprehensive Plan, 2040 Benton County Comprehensive Plan, and 2030 Stearns County Comprehensive Plan.
* 2040 City of Sartell population calculated using 2030-2035 growth rate in comprehensive plan.
** 2040 Stearns County population calculated using 2025-2030 growth rate in comprehensive plan.

4.11.2 Economic patterns

4.11.2.1 Labor Force and Employment

The largest employment sectors in the city of Sartell, Benton County, and Stearns County include education and healthcare, manufacturing, and retail trade. **Table 4.11.2.1-1**, **Table 4.11.2.1-2**, and **Table 4.11.2.1-3** summarize the industry type, estimated number of jobs, and percentage of jobs for the city of Sartell, Benton County, and Stearns County, respectively.

Table 4.11.2.1-1: Employment Status, City of Sartell

Industry	Estimate	% Jobs
Civilian employed population 16 years and over	9,211	-
Agriculture, forestry, fishing, and hunting, and mining	49	0.5%
Construction	526	5.7%
Manufacturing	870	9.4%
Wholesale trade	201	2.2%
Retail trade	922	10.0%
Transportation and warehousing, and utilities	358	3.9%
Information	146	1.6%
Finance and insurance, and real estate and rental and leasing	791	8.6%
Professional, scientific, and management; administrative; and waste management services	864	9.4%
Educational services, and health care and social assistance	3239	35.2%
Arts, entertainment, recreation, accommodation, and food services	469	5.1%
Other services, except public administration	317	3.4%
Public administration	459	5.0%

Source: US Census Bureau, 2017 American Community Survey

Table 4.11.2.1-2: Employment Status, Benton County

Industry	Estimate	% Jobs*
Civilian employed population 16 years and over	20,468	-
Agriculture, forestry, fishing, and hunting, and mining	501	2.4%
Construction	1,517	7.4%
Manufacturing	2,862	14.0%
Wholesale trade	730	3.6%
Retail trade	2,700	13.2%
Transportation and warehousing, and utilities	1,234	6.0%
Information	167	0.8%
Finance and insurance, and real estate and rental and leasing	1,026	5.0%
Professional, scientific, and management; administrative; and waste management services	1,665	8.1%
Educational services, and health care and social assistance	5,059	24.7%
Arts, entertainment, and recreation, and accommodation and food services	1,173	5.7%
Other services, except public administration	1,120	5.5%
Public administration	714	3.5%

Source: US Census Bureau, 2017 American Community Survey; *Does not add to 100% due to rounding.

Table 4.11.2.1-2: Employment Status, Stearns County

Industry	Estimate	% Jobs*
Civilian employed population 16 years and over	85,604	-
Agriculture, forestry, fishing, and hunting, and mining	2,895	3.4%
Construction	5,475	6.4%
Manufacturing	12,132	14.2%
Wholesale trade	2,141	2.5%
Retail trade	11,693	13.7%
Transportation and warehousing, and utilities	3,814	4.5%
Information	1,172	1.4%
Finance and insurance, and real estate and rental and leasing	4,786	5.6%
Professional, scientific, and management; administrative; and waste management services	5,602	6.5%
Educational services, and health care and social assistance	23,000	26.9%
Arts, entertainment, and recreation, and accommodation and food services	6,815	8.0%
Other services, except public administration	3,927	4.6%
Public administration	2,152	2.5%

Source: US Census Bureau, 2017 American Community Survey; *Does not add to 100% due to rounding.

Other than considering generation efficiency improvements, the Licensee is not proposing the addition of any new facilities or changes to current Project operations. As such, continued operation of the Sartell Project is not expected to adversely impact the socioeconomic resources in the area.

4.11.3 References

- Benton County. 2019. 2040 Benton County Comprehensive Plan. https://www.co.benton.mn.us/560/Comprehensive-Plan. Accessed December 16, 2019.
- City of Sartell. 2019. Sartell 2016 Comprehensive Plan. https://sartellmn.com/government/departments/planning-community-development/2016-comprehensive-plan/. Accessed December 16, 2019.
- Stearns County. 2019. 2030 Stearns County Comprehensive Plan. https://co.stearns.mn.us/Government/CountyDevelopment/StearnsCountyComprehensivePlan. Accessed December 16, 2019.
- US Census Bureau, American Factfinder. 2010. Population Housing Units, Area, and Density: 2010-County County Subdivision and Place.https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=CF. Accessed December 16, 2019.
- US Census Bureau, American Factfinder, 2017 American Community Survey-Selected Economic Characteristics. https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=CF. Accessed December 16, 2019.

5. Preliminary Issues and Studies List (18 CFR § 5.6(d)(4))

This PAD must include a list of issues pertaining to the identified resources outlined in Section 4, potential studies, or information gathering requirements associated with the identified issues, relevant qualified federal and state or tribal comprehensive waterway plans, and relevant resource management plans.

5.1 Known or Potential Negative Impacts to the Identified Resources

For the purposes of this relicensing process, potential negative impacts are new impacts to the resources that are documented to occur, believed to be occurring, or believed will occur because of the continued operation of the Sartell Project through a successful relicensing.

5.1.1 Geology and Soils

Benton County and Stearns County have existing shoreland management ordinances establishing minimum setback requirements for buildings and septic systems, maximum amounts of impervious area, and standards for shoreland alterations including alterations of vegetation and topography within the shoreland zone. The requirements outlined in the ordinances will reduce the potential for future erosion on shorelands in the Project boundary.

5.1.2 Water Resources

No issues were identified concerning water resources through the stakeholder questionnaire.

5.1.3 Fish and Aquatic Resources

In their response to the questionnaire, Stearns County Soil and Water Conservation District indicated fish passage and invertebrate movement upstream is a resource issue.

5.1.4 Terrestrial Wildlife and Botanical Resources

In their response to the questionnaire, Stearns County SWCD indicated wildlife movement is a resource concern. There is no proposed construction or changes to operations that would impact terrestrial or botanical resources.

5.1.5 Wetlands, Riparian, and Littoral Habitat

In their response to the questionnaire, Stearns County SWCD indicated maintenance drawdowns may be needed to allow vegetation to reestablish. There are no proposed changes to operations, water levels, or flows that would cause new impacts to wetlands, riparian, or littoral habitat.

5.1.6 Critical Habitat and Threatened and Endangered Species

There are several identified state-listed and federal-listed species in the Project vicinity. Consultation with the USFWS and MDNR to determine potential impacts to threatened and endangered species related to Project operation will need to be completed. No issues were identified through the stakeholder questionnaire.

5.1.7 Recreation and Land Use

No issues were identified concerning recreation and land use resources through the stakeholder questionnaire. No new recreation facilities are being proposed; sufficient access to the Project exists.

5.1.8 Aesthetic Resources

No issues were identified concerning aesthetic resources through the stakeholder questionnaire.

5.1.9 Cultural and Tribal Resources

The Project, which is over 50 years old, has not been evaluated for NRHP eligibility. As a result, the Licensee will consult with the Minnesota SHPO to determine whether the Project needs to be evaluated for NRHP eligibility.

5.1.10 Socio-Economic Resources

No issues were identified concerning socio-economic resources through the stakeholder questionnaire.

5.2 Potential Studies or Information Gathering

This section identifies potential studies or information gathering that may be needed to analyze the preliminary resource issues identified in Section 5.1. In accordance with 18 CFR § 16.8(b)(5), within 60 days of the Joint Meeting, each interested resource agency, Indian tribe, and member of the public must provide any and all study requests to the Licensee.

All study requests must comply with the following criteria:

- Describe goals and objectives of each study proposal and information to be obtained;
- Explain the relevant resource management goals of the agencies or Indian tribes with jurisdiction over the resource to be studied;
- If the requester is not a resource agency, explain any relevant public interest considerations;
- Describe the existing information concerning the subject of the study proposal and the need for additional information;
- Explain any nexus between project operations and effects on the resource to be studied and how the study results would inform the development of license requirements;
- Explain how any study methodology is consistent with generally accepted practice in the scientific community; and
- Describe consideration of level of effort and costs, and why any proposed alternative studies would not be sufficient to meet the stated information needs.

The following is a list identifying potential studies and information gathering that may be needed to analyze the resource issues identified in Section 5.1.

5.2.1 Geology and Soils

The Licensee is not proposing any studies specific to geologic or soil resources. A shoreline erosion survey conducted in 2016 by Benton County SWCD and MDNR provides sufficient information regarding geologic and soil resources.

5.2.2 Water Resources

The Licensee is not proposing any studies specific to water resources.

5.2.3 Fish and Aquatic Resources

The Licensee is not proposing any studies specific to fish and aquatic resources.

5.2.4 Terrestrial Wildlife and Botanical Resources

The Licensee is not proposing any studies specific to wildlife and botanical resources.

5.2.5 Wetlands, Riparian, and Littoral Habitat

The Licensee is not proposing any studies specific to wetlands, riparian, and littoral habitat.

5.2.6 Critical Habitat and Threatened and Endangered Species

If the consultation process outlined in Section 5.1.6 does not identify any adverse effects from Project operations, more specifically to either critical habitat or threatened or endangered species, the Licensee will not propose any studies. However, maintenance activities involving work on any Project structure or removal of trees within the Project boundary could impact any unknown critical habitat for the NLEB or the species themselves. Instead of completing a study to determine their presence or absence, the Licensee proposes to implement the requirements outlined in the § 4(d) rule for the protected bat species throughout the term of the license to assure they are not adversely impacted by Project operations. These requirements, in addition to consulting with the USFWS prior to removing any bats that are not posing an immediate threat located on or in structures, shall provide for the necessary protection of protected bat species.

5.2.7 Recreation and Land Use

Recreation within the Project vicinity is dominated by city, township, and state-owned recreational facilities, which are regularly monitored by their respective staff. The FERC determined the Licensee was exempted from completing Form 80 recreation surveys in their letter order dated March 16, 1998 (FERC, 1998). Since recreational use is regularly monitored by the owners of the recreation sites, the Licensee owns very little property, there are no formal FERC-required recreation sites, and there is sufficient public access to the Project, the Licensee is not proposing any studies specific to recreation and land use.

5.2.8 Aesthetic Resources

The Licensee is not proposing any studies specific to aesthetic resources.

5.2.9 Historical and Cultural Resources

The Licensee is proposing to consult with Minnesota SHPO to determine whether the Project structures need to be evaluated for eligibility to the NRHP. Since a survey of the shoreline areas exposed in the 2019 drawdown was completed by MDNR, there should be sufficient information available regarding potential impacts to cultural sites. Therefore, the Licensee is not proposing to complete a shoreline survey.

5.2.10 Socio-Economic Resources

The Licensee is not proposing any studies specific to socio-economic resources.

5.2.11 Tribal Resources

The Licensee will continue to provide process documentation to tribal stakeholders and address, as necessary, any concerns brought forward by the tribal stakeholders. The Licensee is not proposing any studies related to tribal resources.

5.3 Mitigation Enhancement

The Project has been in operation since 1907. Existing available information for the Project does not identify any significant concerns or adverse effects upon the resources as a result of current Project operations. As a result, the Licensee does not propose any additional protection, mitigation, or enhancement measures in this document.

5.4 Federal, State, or Tribal Comprehensive Waterway Plans

Section 10(a)(2) of the Federal Power Act requires the FERC to consider the extent to which a project is consistent with existing federal or state comprehensive plans, as defined in § 2.19 under Part 2 of Chapter 1, Title 18, Code of Federal Regulations.

According to FERC Order No. 481-A issued on April 27, 1998 and revised Order No. 481 issued on October 26, 1997, the FERC will provide comprehensive plan status to any federal or state plan that is a comprehensive study of one or more beneficial uses of (a) waterway(s), specifies standards, data and methodology used, and is filed with the FERC Secretary.

A current listing of FERC-approved comprehensive plans that may be applicable to relicensing the Project is presented below. If an updated version of a plan is available, the updated plan is listed (FERC, 2019).

- Minnesota Department of Natural Resources,
  - *Minnesota State Parks and Trails System Plan*. 2015.
  - *Minnesota's Wildlife Action Plan 2015-2025*. 2016.
  - *Canoe and Boating Route Program*. Undated.
  - *Minnesota's State Comprehensive Outdoor Recreation Plan (SCORP) 2020-2024*. November 2019.
  - *Strategic Conservation Agenda: The DNR's 10-year Strategic Plan, 2015-2025*. Undated.
- Mississippi River Headwaters Board, *A Management Plan for the Upper Mississippi River*. January 1981.
- National Park Service, *The Nationwide Rivers Inventory*. US Department of the Interior. 1993.
- Upper Mississippi River Basin Commission. *Comprehensive Master Plan for the Management of the Upper Mississippi River System*. January 1982.
- US Fish & Wildlife Service, Canadian Wildlife Service, *North American Waterfowl Management Plan.* 2012.
- US Fish & Wildlife Service, *Upper Mississippi River & Great Lakes Region Joint Venture Implementation Plan: A Component of the North American Waterfowl Management Plan*. 1998.
- US Fish & Wildlife Service, *Fisheries-USA; The Fish and Wildlife Service Recreational Fisheries Policy.* December 5, 1989.

5.5 Relevant Resource Management Plans

In addition to the plans listed above, additional resource management plans have been developed by other entities to provide guidance with managing specific resources.

The plans listed below are believed to be relevant to the Project.

- Benton County, *2040 Benton County Comprehensive Plan*. June 4, 2019.
- Stearns County, *2030 Stearns County Comprehensive Plan*. March 2008.

5.6 References

- Federal Energy Regulatory Commission. 1998. Letter Order Accepting Champion International Papers Co's Request to be exempt from Form 80 Report, Sartell Dam. March 16, 1998.
- Federal Energy Regulatory Commission. May 2019. List of Comprehensive Plans.

6. Consultation in Preparation of the PAD (18 CFR § 5.6(d)(5))

Sartell Hydro began consultation in preparation of this PAD by developing a questionnaire with a fact sheet and providing it to pertinent stakeholders included on the FERC Mailing List and Service List and any other entities thought to be potential stakeholders. The information was sent via postal mail service on December 2, 2019. Sartell Hydro received several written responses to the questionnaire, which are summarized below. Information included in the responses is incorporated into this PAD as appropriate. A copy of the questionnaire, fact sheet, stakeholder list, and responses are included in **Appendix 6-1.**

- The city of Sartell responded to the questionnaire indicating they intend to participate in the relicensing process, have information available, and request an additional representative for the city of Sartell be added to the stakeholder list. The city of Sartell did not express support for or opposition to use of the TLP. The stakeholder list was updated to include the additional city representative.

- The city of St. Joseph responded to the questionnaire indicating they do not intend to participate in relicensing, do not have applicable information, and do support use of the TLP.

- The Environmental Protection Agency (EPA) indicated they intend to participate in the relicensing process and provided several websites where information regarding the current Project environments and potential Project impacts can be obtained. The information was reviewed and incorporated into this PAD as appropriate. The EPA did not express support for or opposition to the use of the TLP.

- The Minnesota SHPO responded to the questionnaire indicating they intend to participate in the relicensing process, have information available, request an additional representative be added to the stakeholder list, and support use of the TLP. In response to the Minnesota SHPO's questionnaire, Sartell Hydro requested a historic and archaeological site inventory, which was provided by Minnesota SHPO and incorporated into this PAD as appropriate. The additional representative was also added to the stakeholder list. The Licensee is requesting authorization to be the non-federal representative for Section 106 consultation from the FERC. Once the Licensee receives confirmation from the FERC they may act as a non-federal representative, formal Section 106 consultation will be initiated.

- The Stearns County Soil and Water Conservation District responded to the questionnaire indicating they intend to participate in relicensing, have applicable information available, and identified several potential resource issues, which include fish passage, invertebrate movement upstream, bed load transport, wildlife movement, flood passage, recreation connection upstream and downstream, and safety. Stearns County SWCD did not support or oppose use of the TLP due to unfamiliarity with either licensing process. Additional comments provided indicate there is a need for maintenance drawdowns to allow for vegetation to reestablish and streambank stabilization. There is also a need for a restoration component to connect the upstream and downstream for fish, aquatic organisms, and recreational activities.

- The Minnesota Pollution Control Agency responded to the questionnaire indicating they had information regarding water resources, wetlands, riparian, and littoral habitat and planned to participate in the relicensing process. The Licensee incorporated MPCA information into the PAD as appropriate. MPCA requested a bathymetry and sediment accumulation study be conducted to

provide baseline data. The Little Rock Lake-Sartell Pool Drawdown Feasibility Study (**Appendix 4.3.8.2-4**) provides bathymetric and sediment core information regarding the Project. The Licensee believes the available information is sufficient to analyze potential Project impacts. The MPCA also indicated they did not support the use of the TLP because they were not familiar with the differences between the ILP and TLP. The Licensee sent information regarding the two processes and requested they reconsider their opposition to the TLP. No response to this communication was received. The Licensee believes the TLP will provide the most efficient, effective, and least burdensome process for relicensing the Sartell Hydroelectric Project.

7. Public Utility Regulatory Policies Act

The Licensee has exercised their rights under the Public Utility Regulatory Policies Act and reserve the right to continue to do so in the future.

APPENDICES

Appendix 3.2-1	Sartell Project Exhibit F Drawings CUI//CEII
Appendix 3.2.4-1	Sartell Project One-line Diagram of Principal Electric Circuits
Appendix 3.2.7.1	Current Sartell Project Exhibit G
Appendix 3.4.1.1	Current Sartell Project FERC License
Appendix 3.4.4-1	Sartell Project Net Investment-CUI//PRIV
Appendix 4.2.2-1	Sartell Project Soils Report
Appendix 4.3.2-1	Sartell Project Flow Duration Curves and Exceedance Table
Appendix 4.3.6-1	Sartell Project Bathymetric Maps
Appendix 4.3.7-1	MN Rule 7050
Appendix 4.3.8.2-1	MPCA Mississippi River Water Quality Monitoring Data
Appendix 4.3.8.2-2	MPCA Little Rock Creek Water Quality Monitoring Data
Appendix 4.3.8.2-3	MPCA Little Rock Lake Water Quality Monitoring Data
Appendix 4.3.8.2-4	Little Rock Lake-Sartell Pool Drawdown Feasibility Study
Appendix 4.4.1.1-1	MPCA Biological Monitoring Fish Data
Appendix 4.4.1.1-2	MDNR Little Rock Lake Fish Data
Appendix 4.5-1	Ecological Sections and Subsection of Minnesota
Appendix 4.5.3.2-1	MN Rule 6216
Appendix 4.6.2-1	Wetlands in the Vicinity of the Projects
Appendix 4.7.2-1	Sartell Project IPaC List
Appendix 4.7.4-1	Northern Long-Eared Bat 4D Rule
Appendix 4.8.3.1-1	Minnesota Statewide Comprehensive Outdoor Recreation Plan
Appendix 4.8.3.2-1	Benton County Master Plan for Parks, Trails and Open Space
Appendix 4.8.3.3-1	Stearns County Parks, Open Space, and Recreation Plan
Appendix 4.8.3.4-1	City of Sartell Comprehensive Plan
Appendix 4.10.2-1	Section 106 Drawdown Consultation -CUI//PRIV
Appendix 6-1	Questionnaire Consultation

APPENDIX 3.2.7-1 **Current Sartell Project Exhibit G**

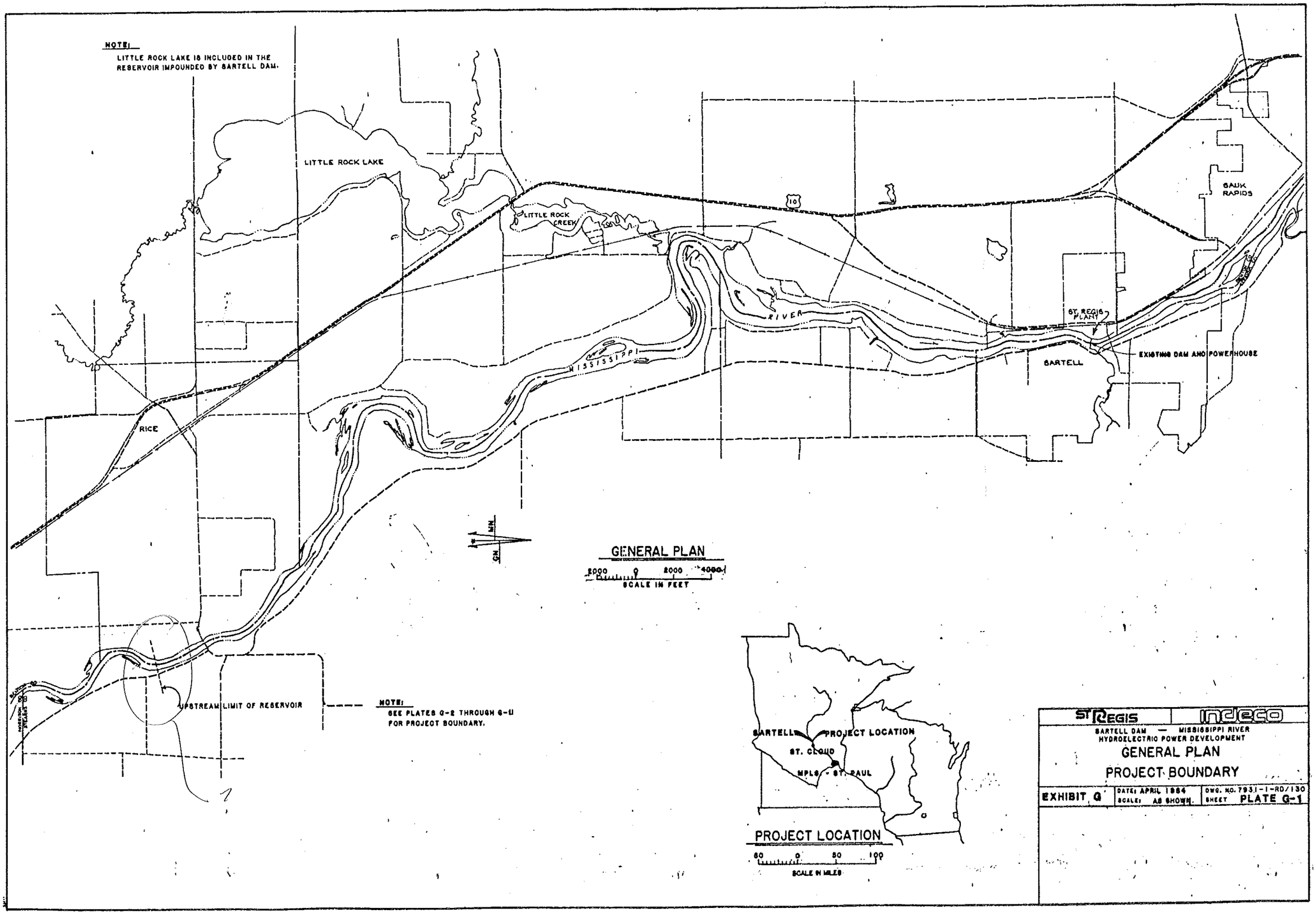
EXHIBIT G

PROJECT MAP

Plates G-1 through G-21 show the project boundary for the Sartell Project. Plate G-22 gives the elevation of the water surface at any point along the reservoir under normal flow conditions with the pool at the dam at elevation 1014.5.

Most of the flowage rights currently held by St. Regis are written in terms of the normal water surface elevation at the dam (1014.5 MSL 1929 aj.) rather than a specific shoreline elevation at a particular point on the reservoir. Thus, the gradient in the water surface profile of the reservoir is implicitly accounted for in the flowage deeds.

NOTE:
LITTLE ROCK LAKE IS INCLUDED IN THE RESERVOIR IMPOUNDED BY SARTELL DAM.



NOTE:
SEE PLATES G-2 THROUGH G-11 FOR PROJECT BOUNDARY.

GENERAL PLAN

4000 0 2000 4000
SCALE IN FEET

PROJECT LOCATION

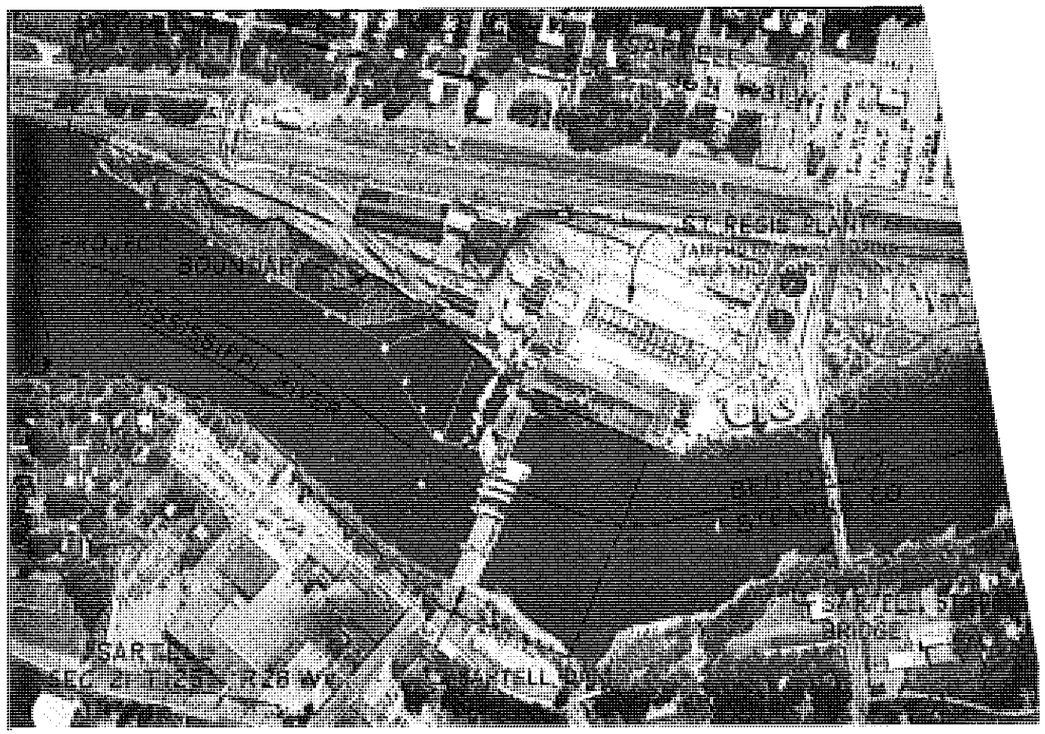
50 0 50 100
SCALE IN MILES

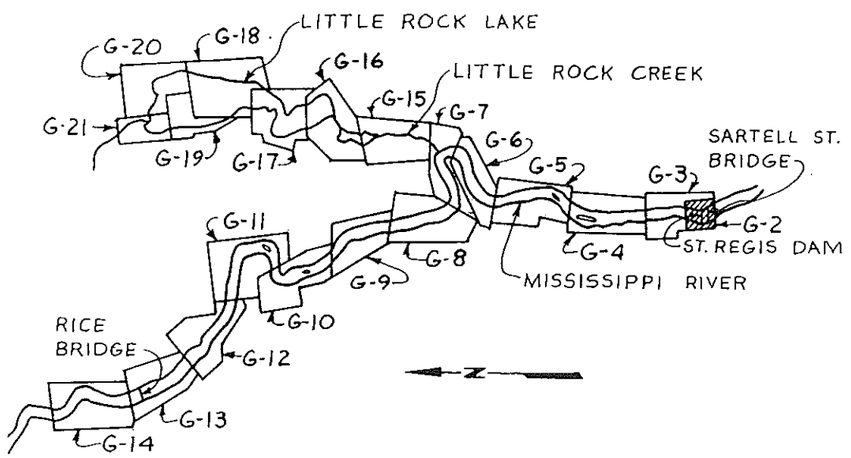
ST REGIS | indeco

SARTELL DAM — MISSISSIPPI RIVER
HYDROELECTRIC POWER DEVELOPMENT

GENERAL PLAN
PROJECT BOUNDARY

EXHIBIT G	DATE: APRIL 1984	DWG. NO. 7931-1-RD/130
	SCALE: AS SHOWN	SHEET PLATE G-1





NOTES:

1) SEE PLATE G-1 FOR GENERAL PLAN OF RESERVOIR
2) SEE PLATE G-22 FOR WATER SURFACE PROFILE AND SHORELINE ELEVATION OF PROJECT BOUNDARY ALONG THE RESERVOIR

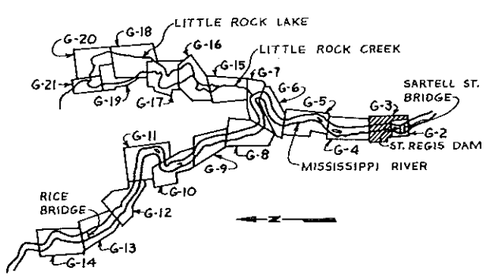
200 0 200 400
SCALE IN FEET

ST REGIS | indeco

SARTELL DAM — MISSISSIPPI RIVER
HYDROELECTRIC POWER DEVELOPMENT

PROJECT BOUNDARY

EXHIBIT G	DATE: APRIL 1984	DWG. NO. 7931-1-RD/131
	SCALE: AS SHOWN	SHEET PLATE G-2



NOTES:

1) SEE PLATE G-1 FOR GENERAL PLAN OF RESERVOIR
2) SEE PLATE G-22 FOR WATER SURFACE PROFILE AND SHORELINE ELEVATION OF PROJECT BOUNDARY ALONG THE RESERVOIR

200 0 200 400
SCALE IN FEET

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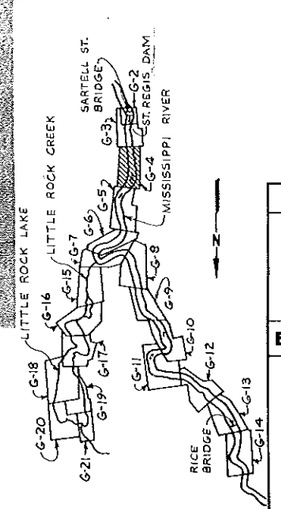
SARTELL DAM — MISSISSIPPI RIVER
HYDROELECTRIC POWER DEVELOPMENT

PROJECT BOUNDARY

EXHIBIT G	DATE: APRIL 1984	DWG. NO. 793.1-1-RD/132
	SCALE: AS SHOWN	SHEET PLATE G-3



200 0 200 400
SCALE IN FEET

NOTES:
1) SEE PLATE G-1 FOR GENERAL PLAN OF RESERVOIR
2) SEE PLATE G-22 FOR WATER SURFACE PROFILE AND SHORELINE ELEVATION OF PROJECT BOUNDARY ALONG THE RESERVOIR

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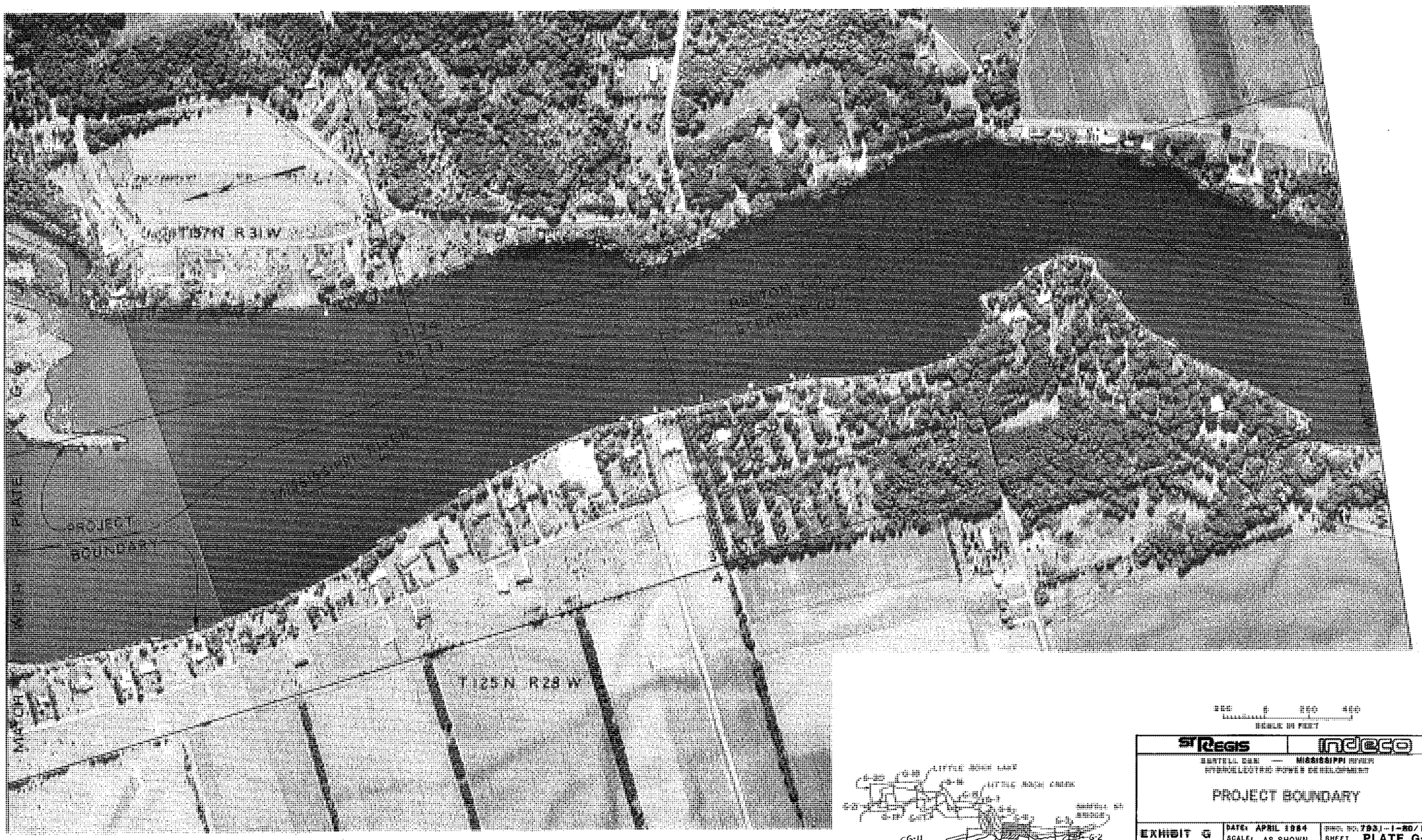
SARTELL DAM — MISSISSIPPI RIVER
HYDROELECTRIC POWER DEVELOPMENT

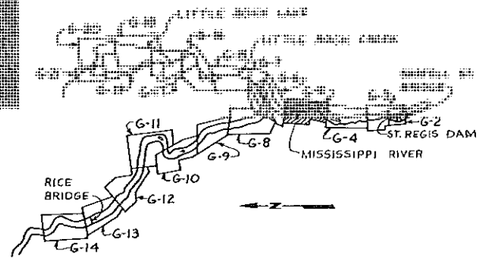
PROJECT BOUNDARY

EXHIBIT G	DATE: APRIL 1984	DWG. NO. 7931-1-RD/133
	SCALE: AS SHOWN	SHEET PLATE G-4



NOTES:

1) SEE PLATE G-1 FOR GENERAL PLAN OF RESERVOIR
2) SEE PLATE G-22 FOR WATER SURFACE PROFILE AND SHORELINE ELEVATION OF PROJECT BOUNDARY ALONG THE RESERVOIR



SCALE IN FEET

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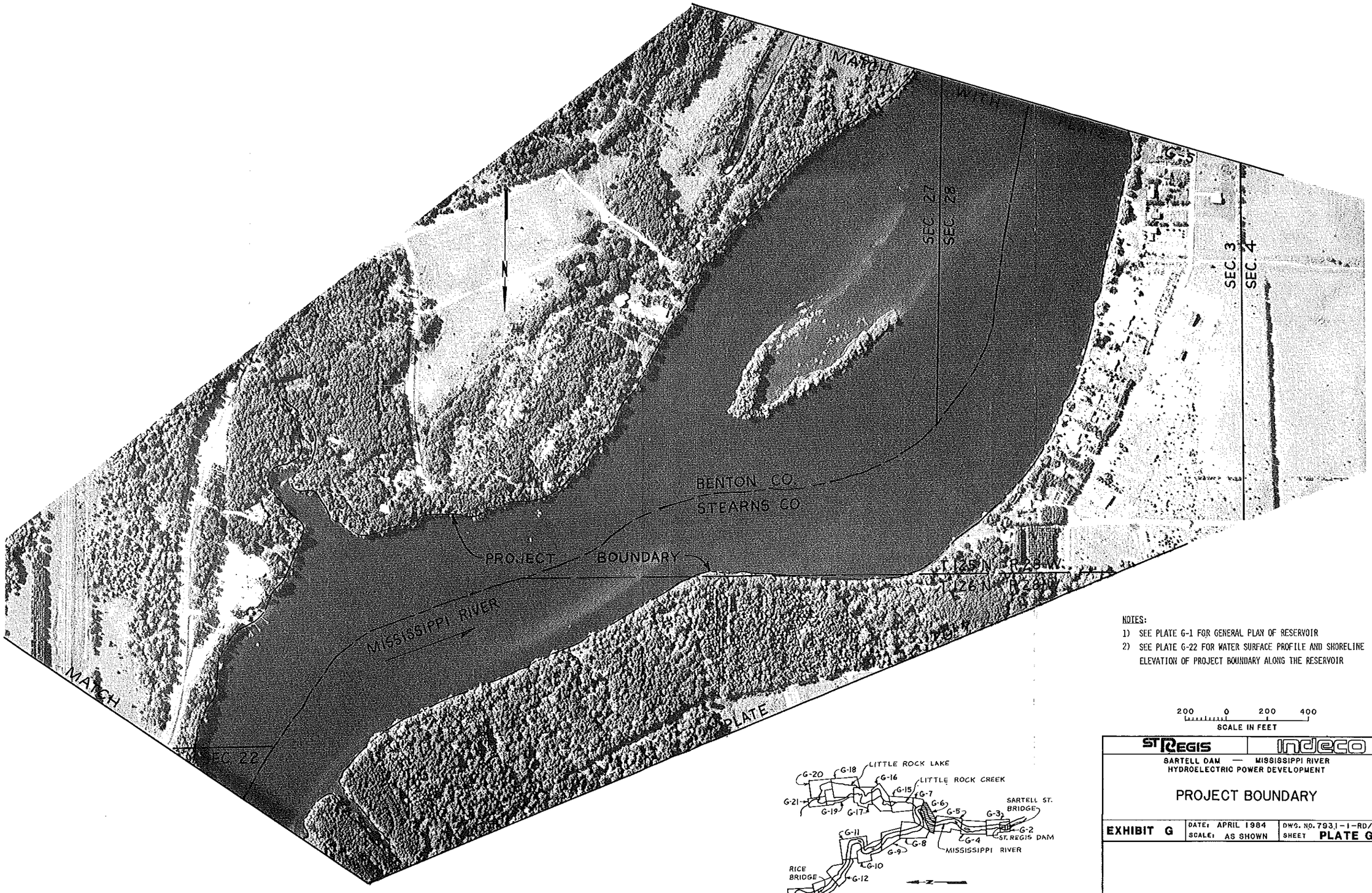
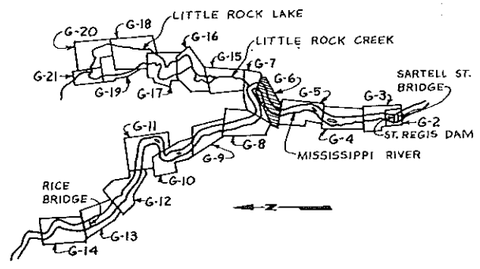
RUSSELL DAM — MISSISSIPPI RIVER HYDROELECTRIC POWER DEVELOPMENT	
PROJECT BOUNDARY	
EXHIBIT G	DATE: APRIL 1984
	SCALE: AS SHOWN
	DWG. NO. 793.1-1-80/134
	SHEET PLATE G-5



NOTES:

1) SEE PLATE G-1 FOR GENERAL PLAN OF RESERVOIR
2) SEE PLATE G-22 FOR WATER SURFACE PROFILE AND SHORELINE ELEVATION OF PROJECT BOUNDARY ALONG THE RESERVOIR



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SCALE IN FEET

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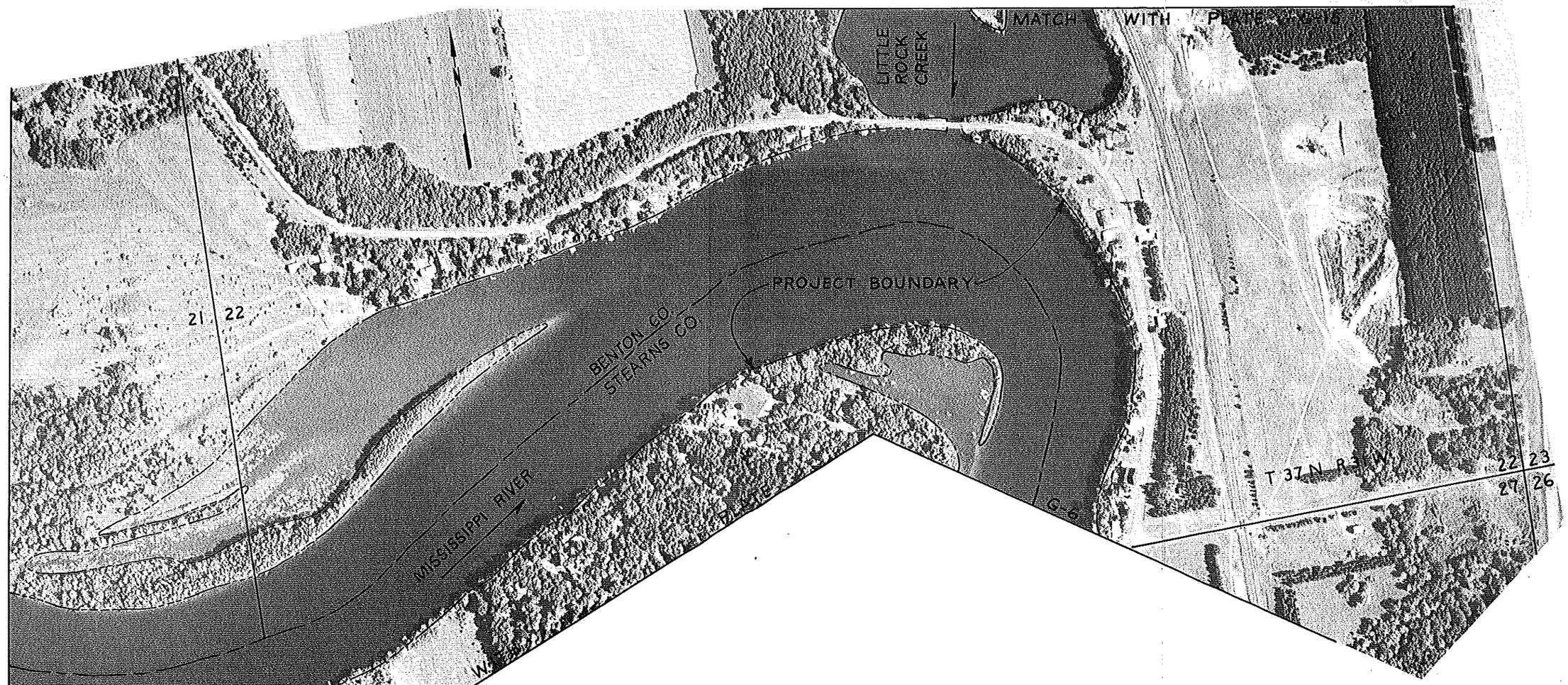
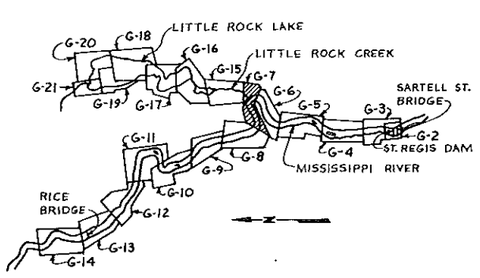
SARTELL DAM — MISSISSIPPI RIVER
HYDROELECTRIC POWER DEVELOPMENT

PROJECT BOUNDARY

EXHIBIT G	DATE: APRIL 1984	DWG. NO. 793.1-1-RD/135
	SCALE: AS SHOWN	SHEET PLATE G-6





NOTES:

1) SEE PLATE G-1 FOR GENERAL PLAN OF RESERVOIR
2) SEE PLATE G-22 FOR WATER SURFACE PROFILE AND SHORELINE ELEVATION OF PROJECT BOUNDARY ALONG THE RESERVOIR

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SCALE IN FEET

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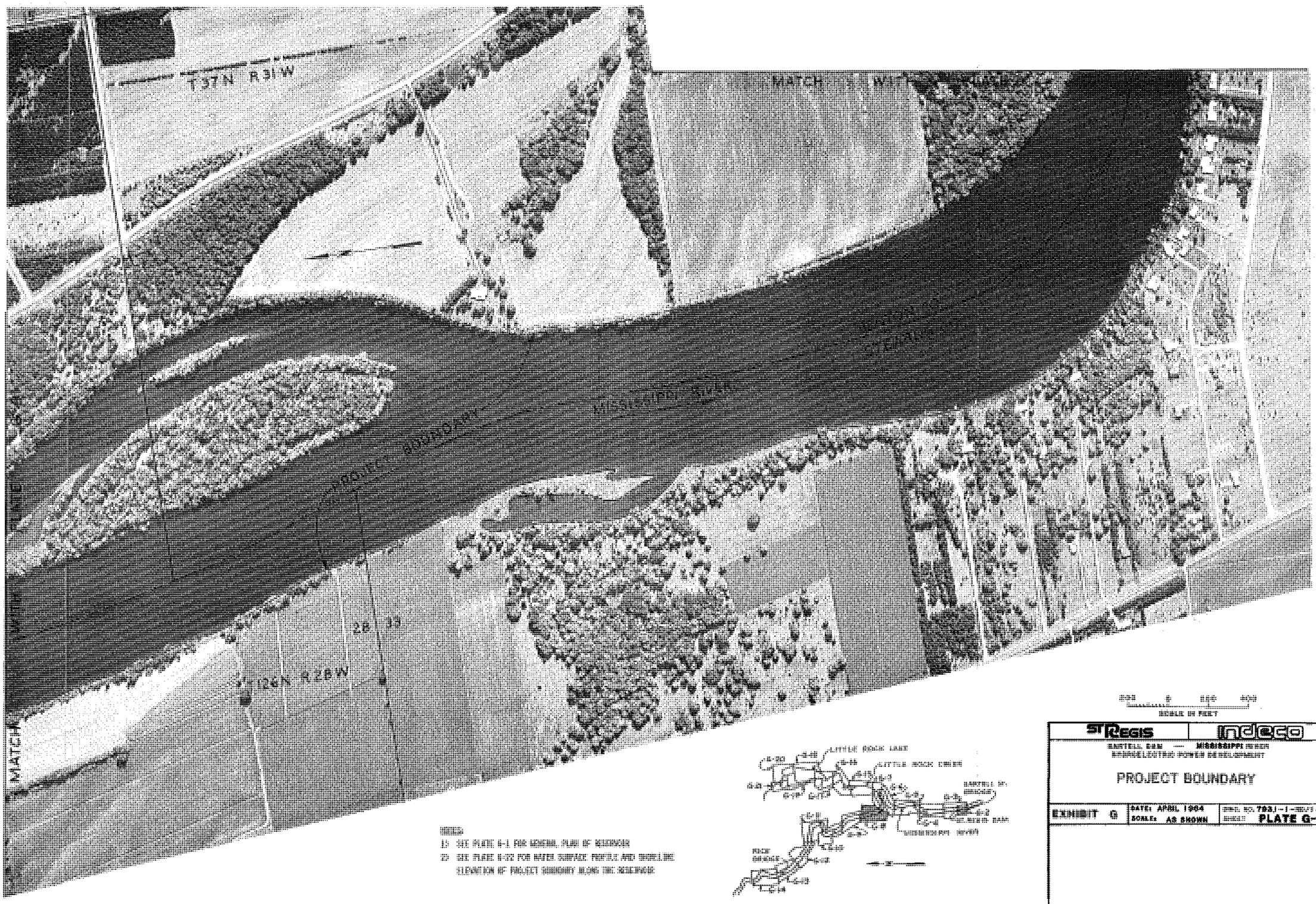
SARTELL DAM — MISSISSIPPI RIVER
HYDROELECTRIC POWER DEVELOPMENT

PROJECT BOUNDARY

EXHIBIT G	DATE: APRIL 1984	DWG. NO. 7931-1-RD/136
	SCALE: AS SHOWN	SHEET PLATE G-7



NOTES:

1) SEE PLATE 1-1 FOR GENERAL PLAN OF DEVELOPMENT.

2) SEE PLATE 1-02 FOR WATER SURFACE PROFILE AND CHANNEL AND ELEVATION OF PROJECT BOUNDARY ALONG THE RESERVOIR.

SCALE IN FEET

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BARTELL DAM — MISSISSIPPI RIVER
PUMPED-STORAGE POWER DEVELOPMENT

PROJECT BOUNDARY

EXHIBIT G	DATE: APRIL 1964	DWG. NO. 793-1-1-37
	SCALE: AS SHOWN	SHEET PLATE G-8

T37N R31W

PROJECT BOUNDARY

MISSISSIPPI RIVER

BENTON CO.

STEARNS CO.

MATCH LINE PLATE G-8

MATCH LINE PLATE G-10

T126N R28W

NOTES:

1) SEE PLATE G-1 FOR GENERAL PLAN OF RESERVOIR
2) SEE PLATE G-22 FOR WATER SURFACE PROFILE AND SHORELINE ELEVATION OF PROJECT BOUNDARY ALONG THE RESERVOIR

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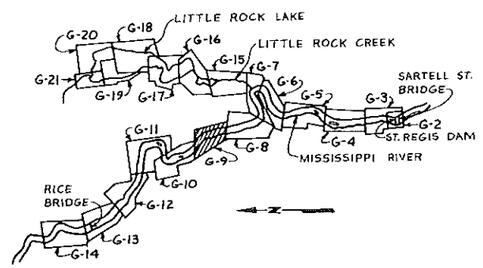
SCALE IN FEET



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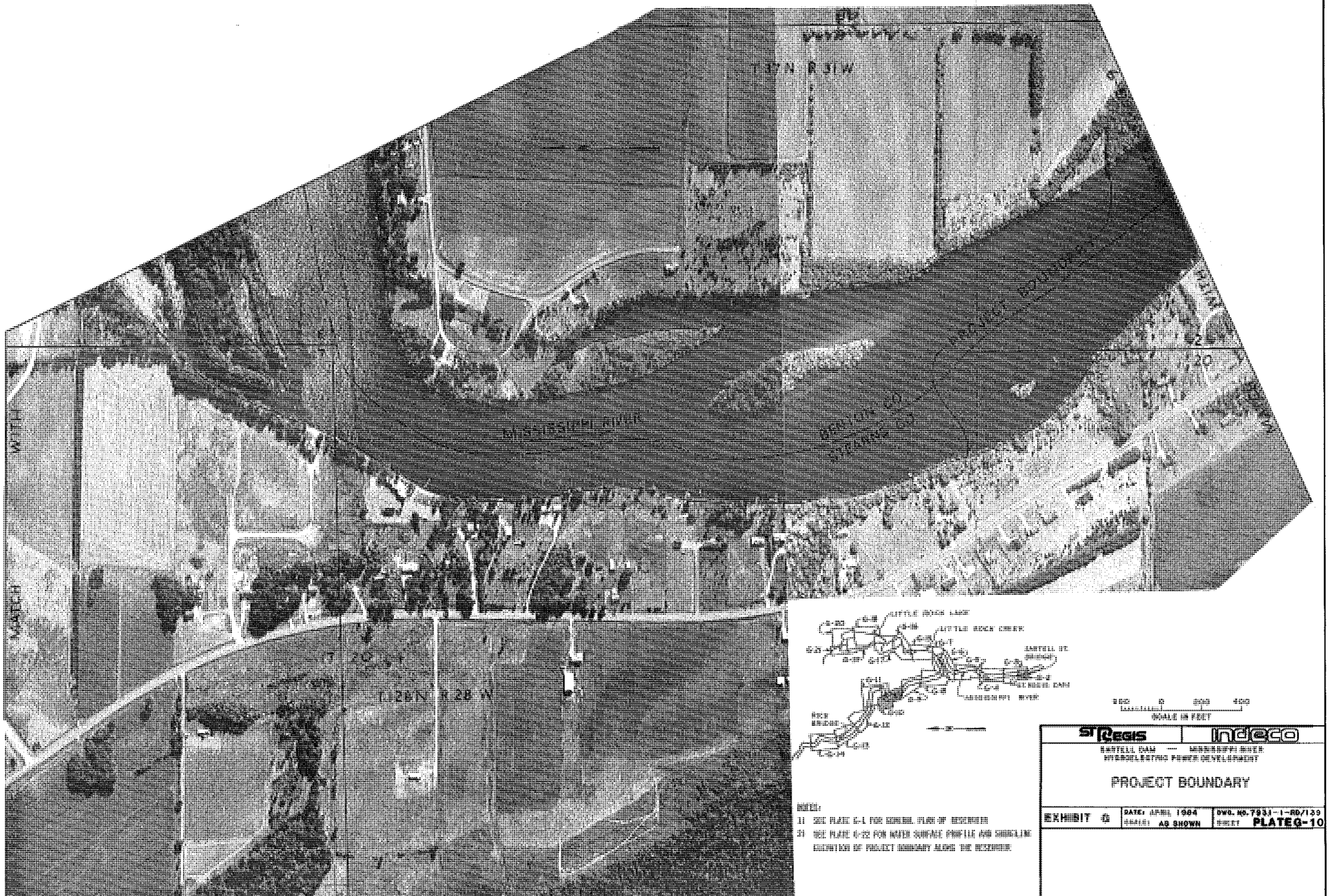
SARTELL DAM — MISSISSIPPI RIVER
HYDROELECTRIC POWER DEVELOPMENT

PROJECT BOUNDARY

EXHIBIT G	DATE: APRIL 1984	DWG. NO. 7931-1-RD/138
	SCALE: AS SHOWN	SHEET PLATE G-9



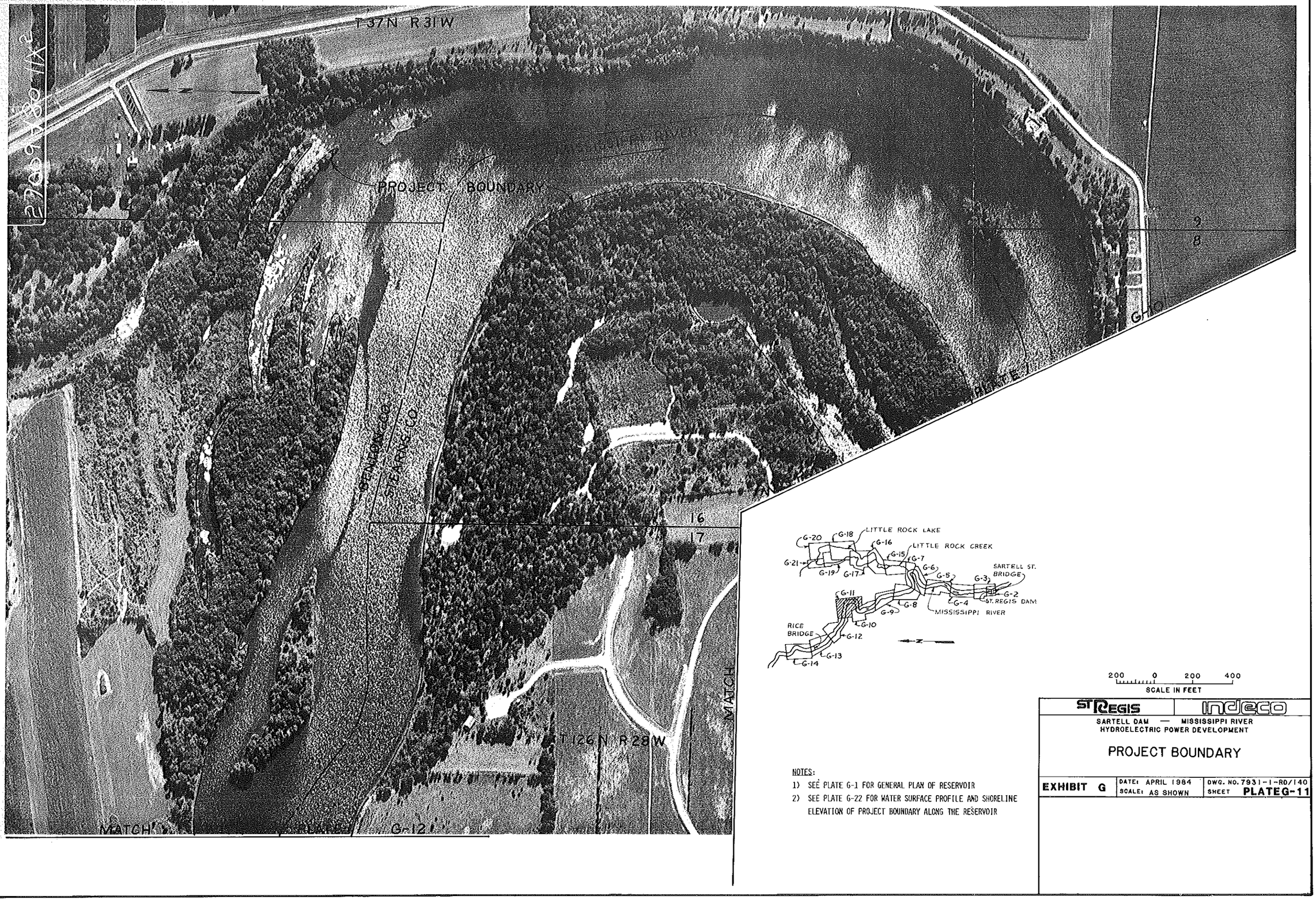
NOTES:
1) SEE PLATE E-1 FOR GENERAL PLAN OF DEVELOPMENT
2) SEE PLATE E-12 FOR WATER SURFACE PROFILE AND CENTERLINE LOCATION OF PROJECT BOUNDARY ALONG THE RESERVOIR

St Regis | Indeco

BARTELL DAM — MISSISSIPPI RIVER
HYDROELECTRIC POWER DEVELOPMENT

PROJECT BOUNDARY

EXHIBIT G | DATE: APRIL 1984 | SCALE: AS SHOWN | DWG. NO. 7931-1-RD/139 | SHEET PLATE G-10



NOTES:

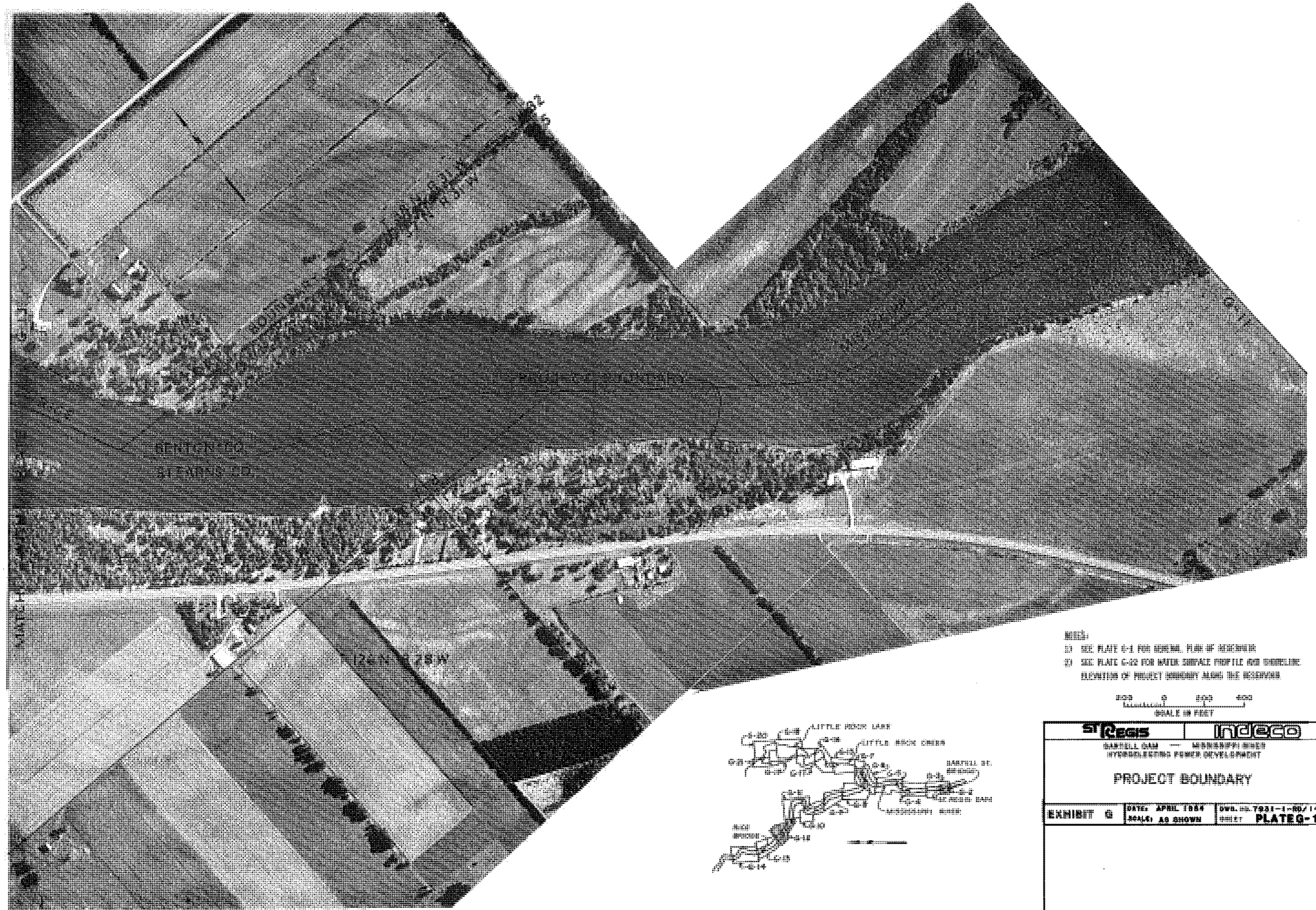
1) SEE PLATE G-1 FOR GENERAL PLAN OF RESERVOIR
2) SEE PLATE G-22 FOR WATER SURFACE PROFILE AND SHORELINE ELEVATION OF PROJECT BOUNDARY ALONG THE RESERVOIR

ST REGIS | INDECO

SARTELL DAM — MISSISSIPPI RIVER
HYDROELECTRIC POWER DEVELOPMENT

PROJECT BOUNDARY

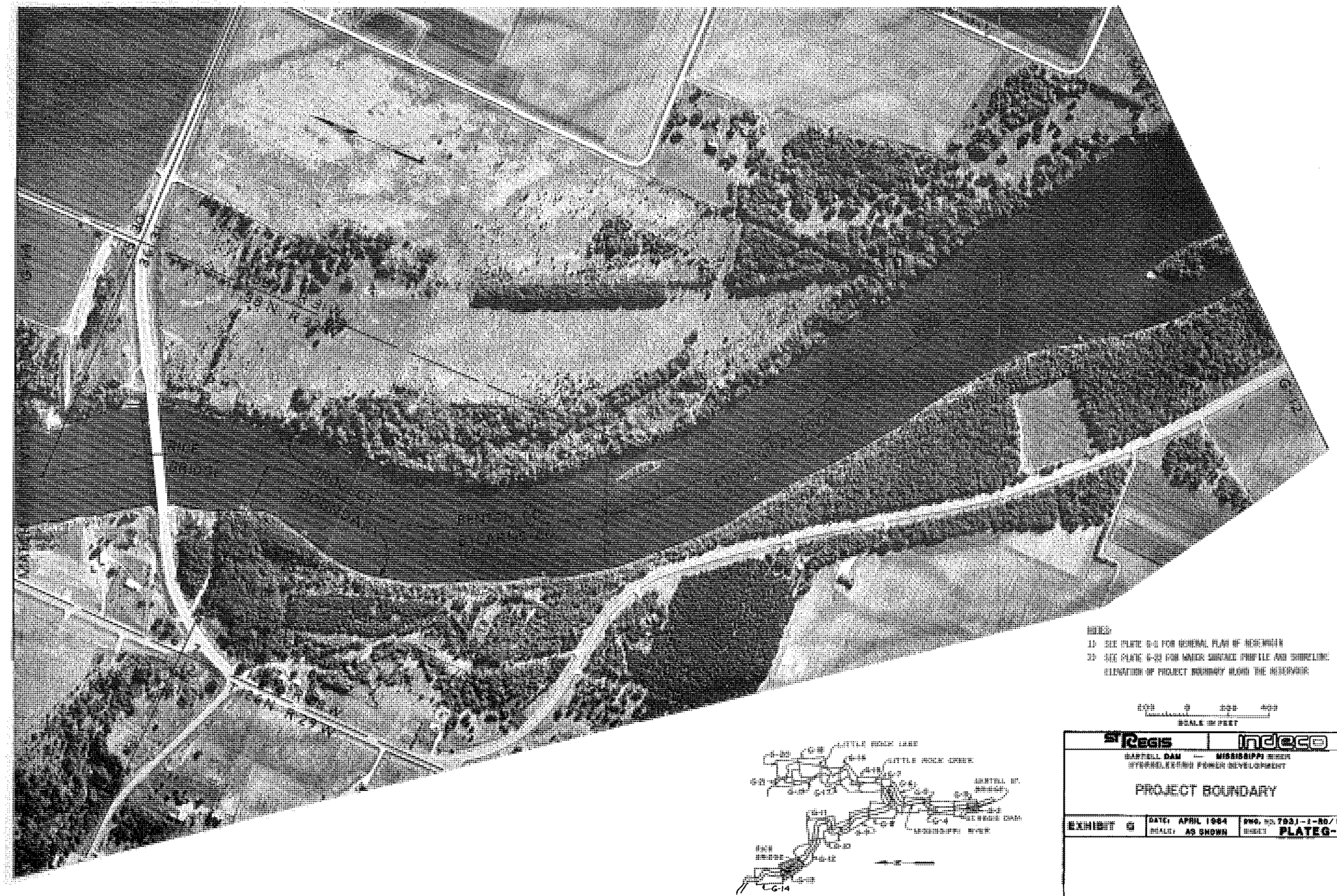
EXHIBIT G	DATE: APRIL 1984	DWG. NO. 7931-1-RD/140
	SCALE: AS SHOWN	SHEET PLATE G-11



NOTES:
1) SEE PLATE G-1 FOR GENERAL PLAN OF RESERVOIR
2) SEE PLATE G-22 FOR WATER SURFACE PROFILE AND CHANNELLINE ELEVATION OF PROJECT BOUNDARY ALONG THE RESERVOIR

0 500 1000
SCALE IN FEET

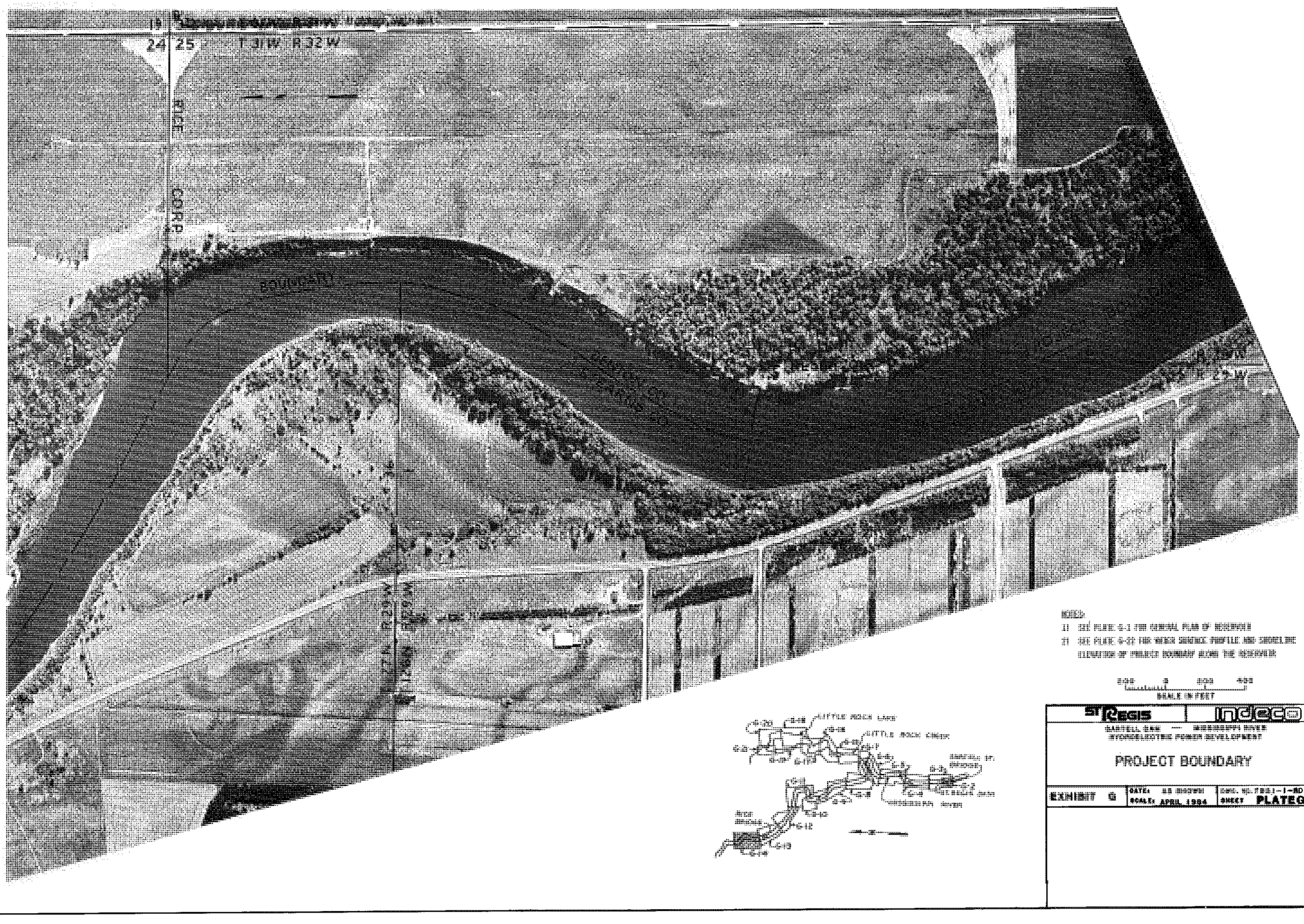
St Regis	Indeco
BARRELL DAM — MISSISSIPPI RIVER HYDROELECTRIC POWER DEVELOPMENT	
PROJECT BOUNDARY	
EXHIBIT G	DATE: APRIL 1984 SCALE: AS SHOWN
DWG. NO. 7931-1-RD/141 SHEET PLATE G-12	



NOTES:
1) SEE PLATE G-1 FOR GENERAL PLAN OF DEVELOPMENT
2) SEE PLATE G-20 FOR RIVER SURFACE PROFILE AND CHARACTERISTIC ELEVATIONS OF PROJECT ROADWAY ALONG THE RESERVOIR

SCALE IN FEET

St Regis / Indeco	
BARTELL DAM — MISSISSIPPI RIVER HYDROELECTRIC POWER DEVELOPMENT	
PROJECT BOUNDARY	
EXHIBIT G	DATE: APRIL 1984 SCALE: AS SHOWN
DWG. NO. 7831-I-RD/142 SHEET PLATE G-13	



NOTES:

1) SEE PLATE G-1 FOR GENERAL PLAN OF RESERVOIR
2) SEE PLATE G-21 FOR RIVER CHANNEL PROFILE AND CENTERLINE ELEVATION OF PROJECT BOUNDARY ALONG THE RESERVOIR

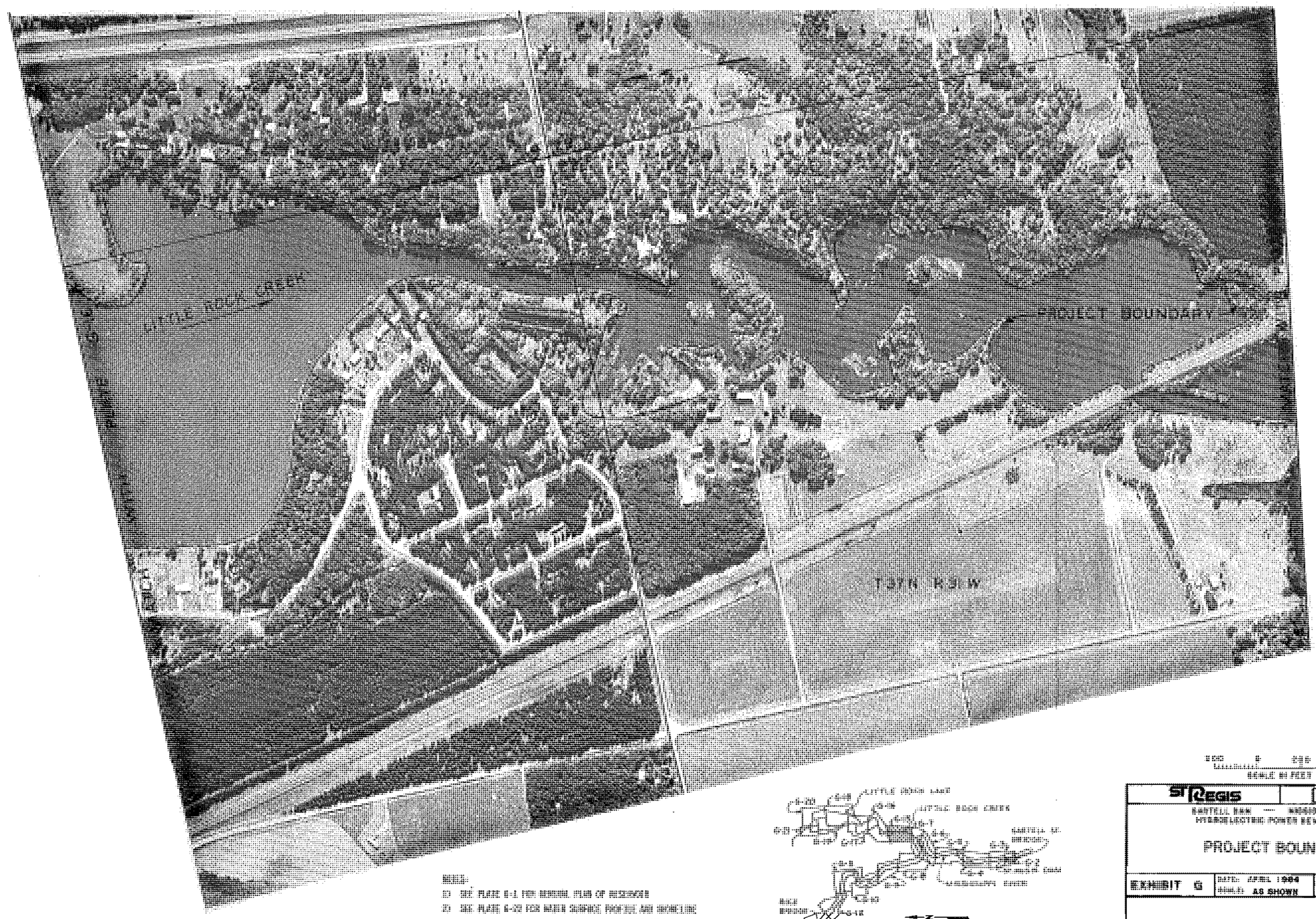
SCALE IN FEET

ST REGIS | Indeco

BARNWELL DAM — MISSISSIPPI RIVER
HYDROELECTRIC POWER DEVELOPMENT

PROJECT BOUNDARY

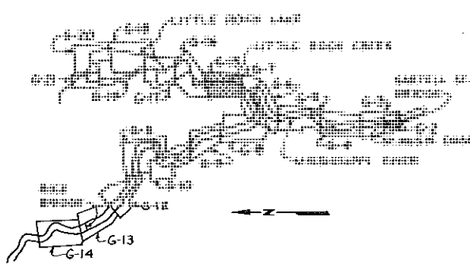
EXHIBIT G | DATE: AS INDICATED | SCALE: APRIL 1984 | DWG. NO. FERC-1-RD/143 | SHEET PLATEG-14



NOTES:

1) SEE PLATE G-1 FOR GENERAL PLAN OF RESERVOIR
2) SEE PLATE G-20 FOR WATER SURFACE PROFILE AND SHORELINE

ELEVATION OF PROJECT BOUNDARY ALONG THE RESERVOIR



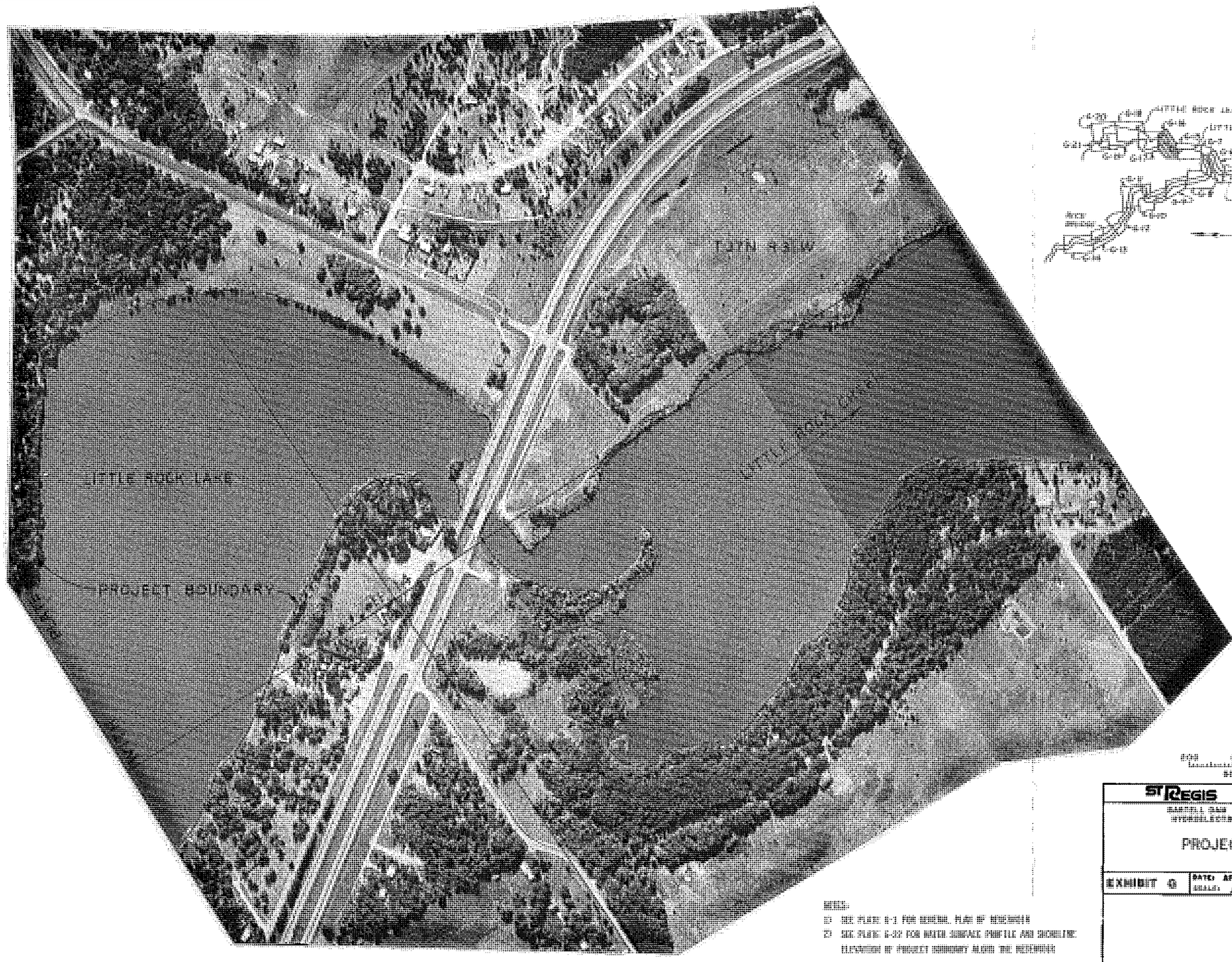
SCALE IN FEET 0 400

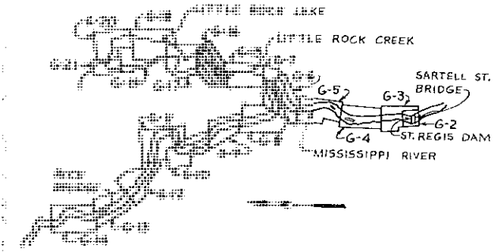
St Regis | Indeco

BANTELL DAM — MISSISSIPPI RIVER
MISSISSIPPI WESTERN POWER DEVELOPMENT

PROJECT BOUNDARY

EXHIBIT G | DATE: APRIL 1984 | SCALE: AS SHOWN | DWG. NO. 7931-1-RD/144 | SHEET PLATE G-15





NOTES:
1) SEE PLATE G-1 FOR GENERAL PLAN OF DEVELOPMENT
2) SEE PLATE G-27 FOR WATER SURFACE PROFILE AND SCHEMATIC ELEVATION OF PROJECT COMPONENTS ALONG THE WATERWAY

0 200 400
SCALE IN FEET

ST REGIS | indeco

SARTELL DAM — MISSISSIPPI RIVER
HYDROELECTRIC POWER DEVELOPMENT

PROJECT BOUNDARY

EXHIBIT G	DATE: APRIL 1984	DWG. NO. 793J-I-RD/145
	SCALE: AS SHOWN	SHEET PLATEG-16

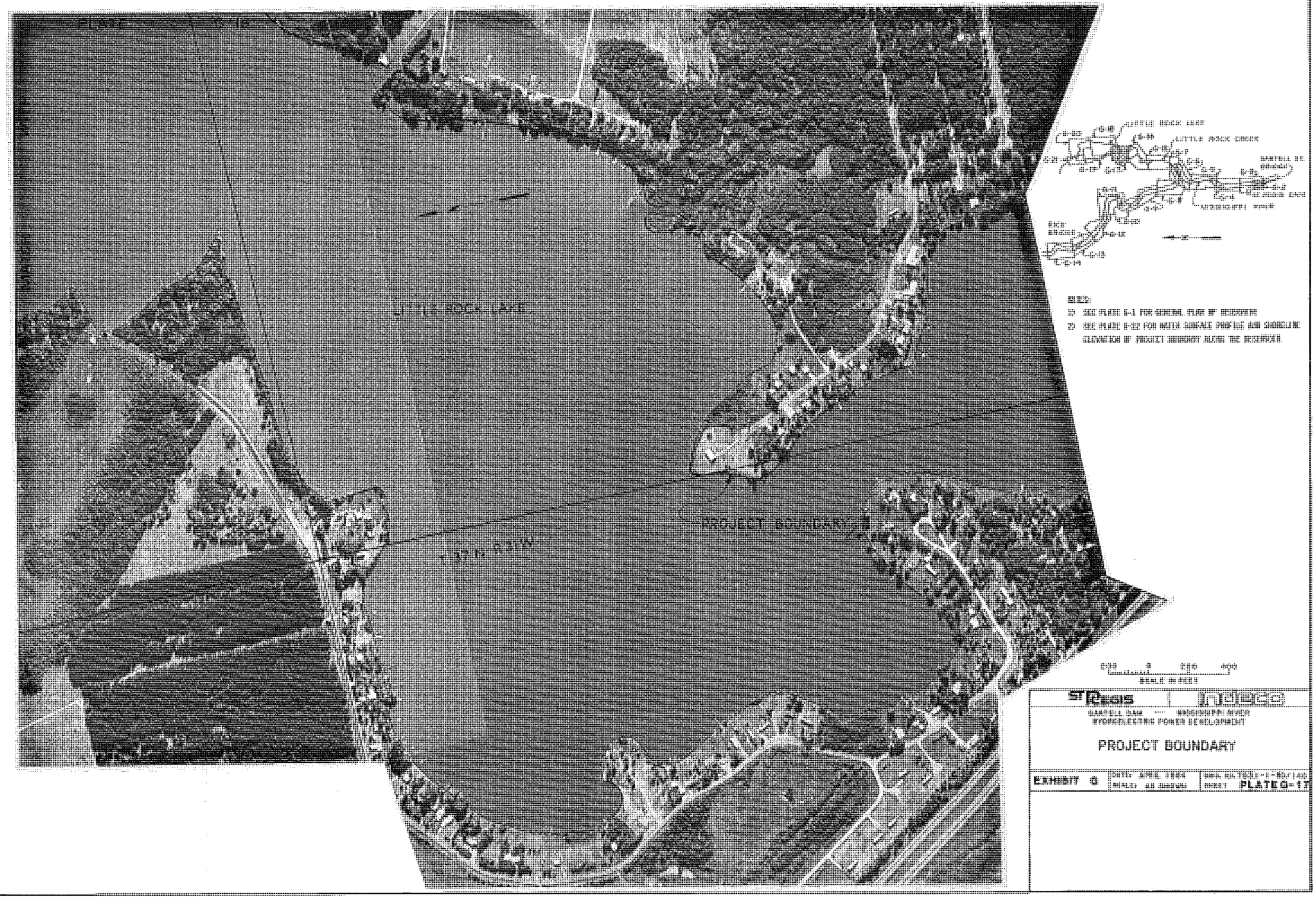
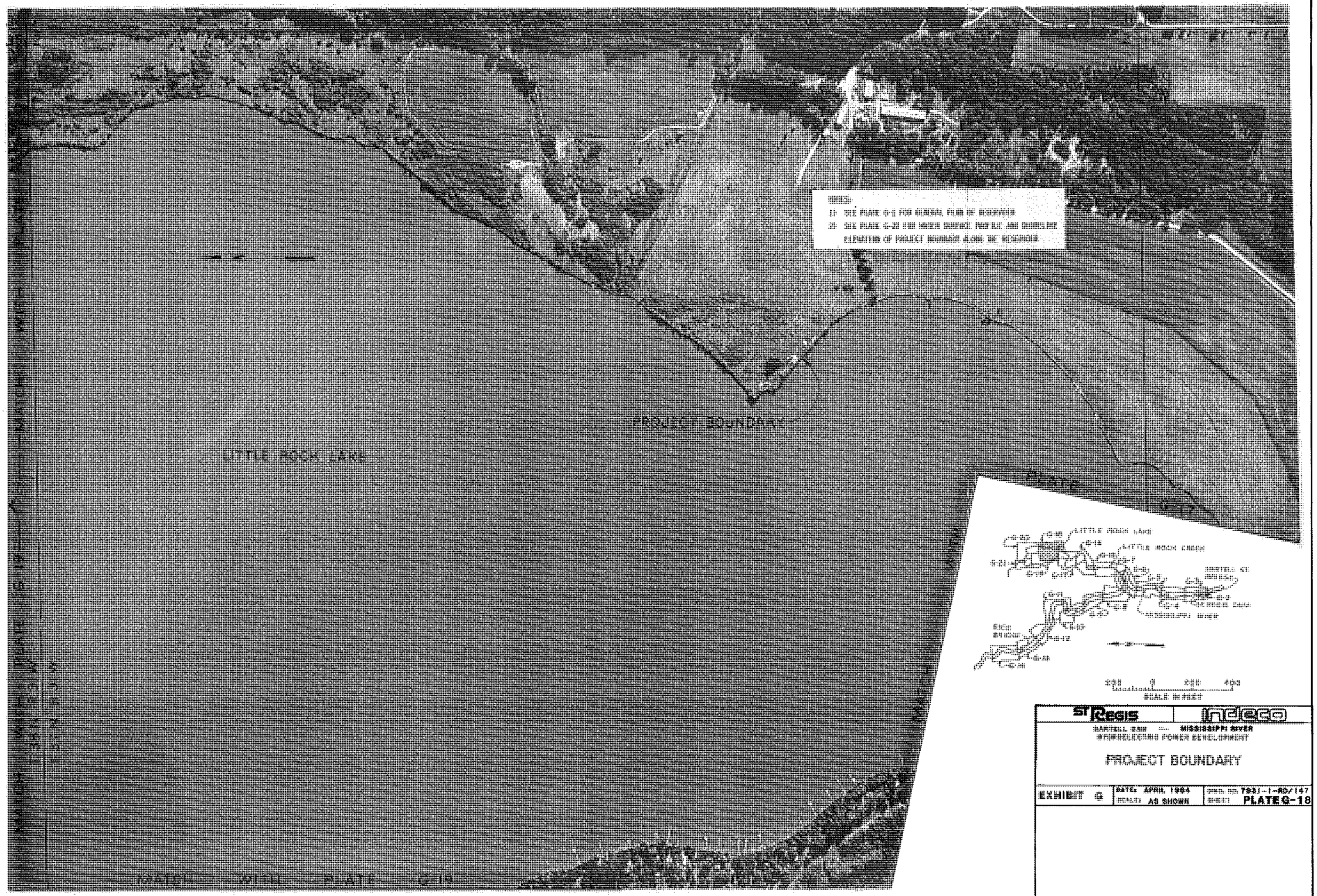


PLATE E-1
LITTLE ROCK LAKE
PROJECT BOUNDARY
STATE OF IDAHO
LITTLE ROCK LAKE
LITTLE ROCK CREEK
BASIN
NOTES:
1) SEE PLATE E-1 FOR GENERAL PLAN OF DEVELOPMENT
2) SEE PLATE E-22 FOR WATER SURFACE PROFILE AND CHANNEL
ELEVATION OF PROJECT DIVERSION ALONG THE PENSTOCK
0 1 2 3 4
SCALE IN MILES
ST. ANTHONY
BOISE
BASIN
PROJECT BOUNDARY
EXHIBIT G
PLATE G-17



ST REGIS | INDECO

BARTELL DAM — MISSISSIPPI RIVER
HYDROELECTRIC POWER DEVELOPMENT

PROJECT BOUNDARY

EXHIBIT G	DATE: APRIL, 1984	DWG. NO. T93J-1-RD/147
	SCALE: AS SHOWN	SHEET PLATE G-18

PLATE G-20

MATCH WITH PLATE G-21

PLATE G-18

LITTLE ROCK LAKE

PROJECT BOUNDARY

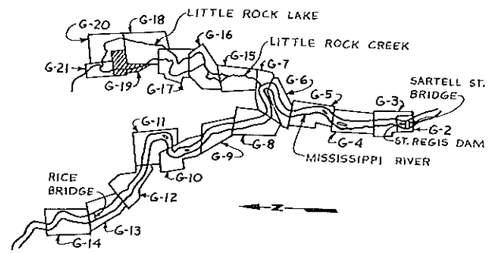
T38N R31W

T37N R31W

35 2

34 3

MATCH WITH PLATE G-21



200 0 200 400
SCALE IN FEET

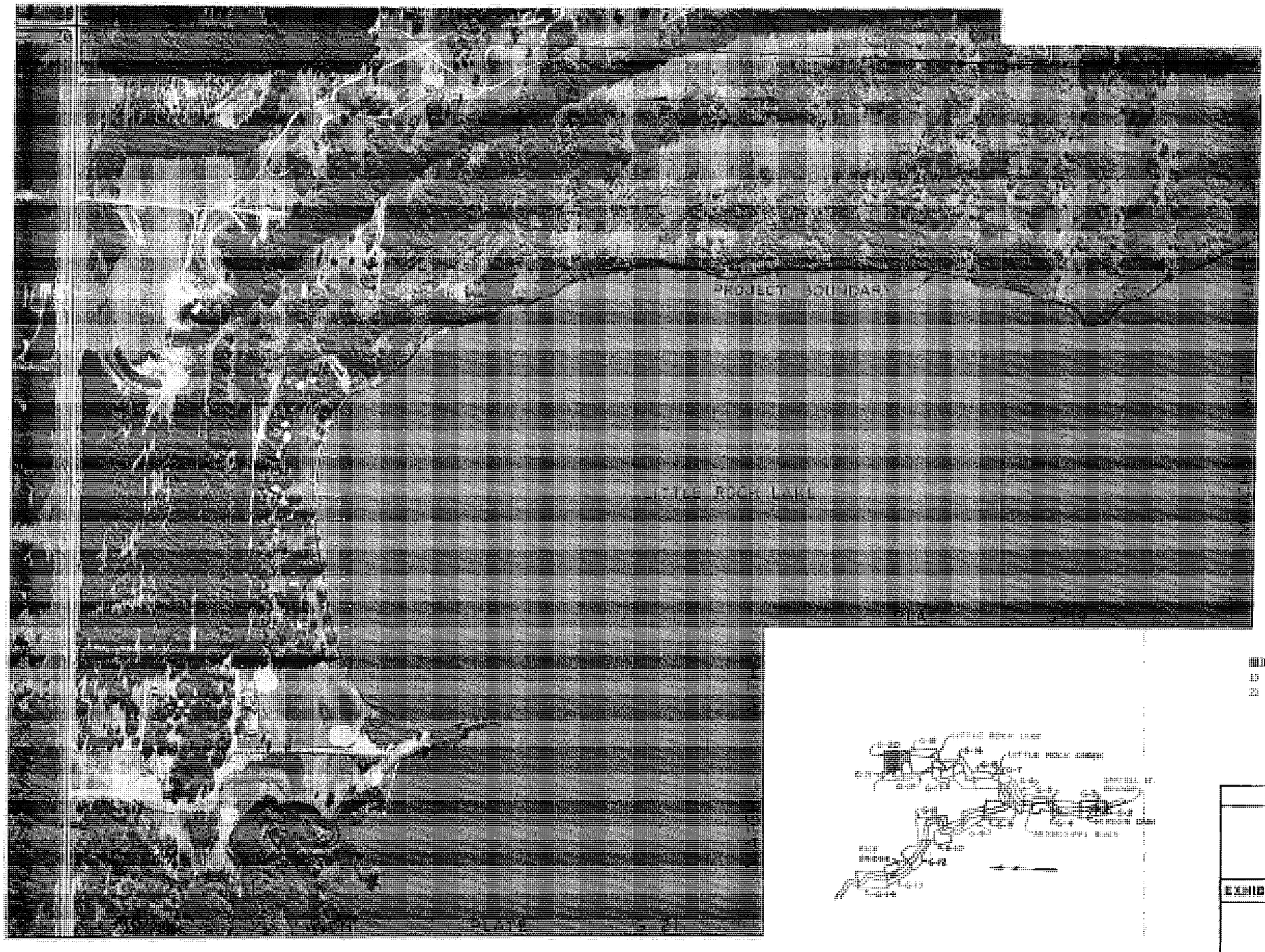
NOTES:
1) SEE PLATE G-1 FOR GENERAL PLAN OF RESERVOIR
2) SEE PLATE G-22 FOR WATER SURFACE PROFILE AND SHORELINE ELEVATION OF PROJECT BOUNDARY ALONG THE RESERVOIR

ST REGIS | indeco

SARTELL DAM — MISSISSIPPI RIVER
HYDROELECTRIC POWER DEVELOPMENT

PROJECT BOUNDARY

EXHIBIT G	DATE: APRIL 1984	DWG. NO. 793.1-1-RD/148
	SCALE: AS SHOWN	SHEET PLATEG-19



NOTES:
1. SEE PLATE G-1 FOR GENERAL PLAN OF RESERVOIR
2. SEE PLATE G-22 FOR WATER SURFACE PROFILE AND SHORELINE ELEVATION OF PROJECT BOUNDARY ALONG THE RESERVOIR

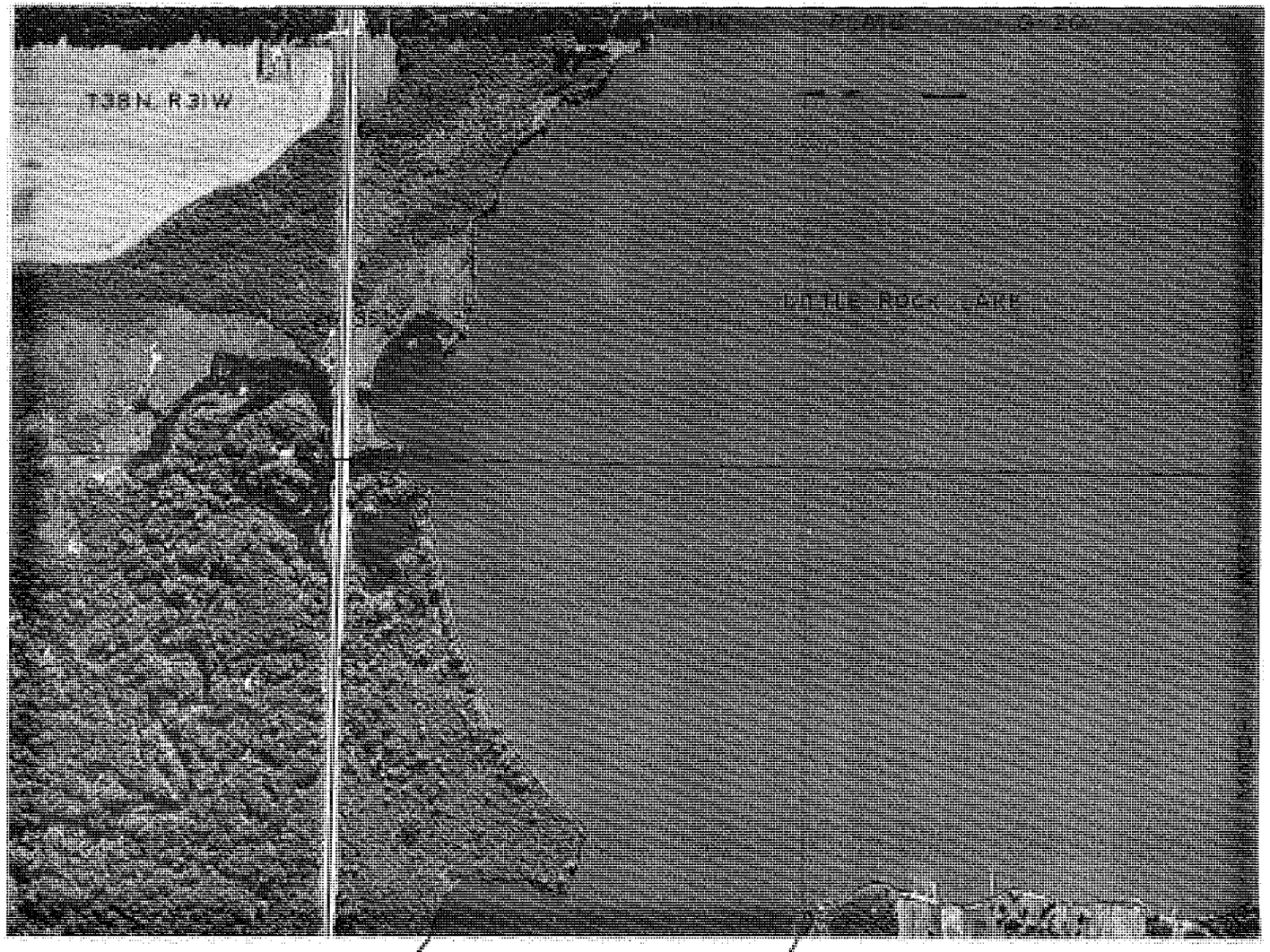
200 0 200 400
SCALE IN FEET

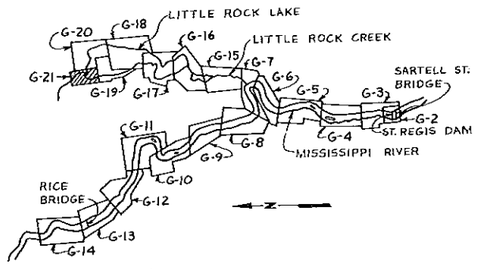
ST REGIS | INDECO

SARTELL DAM — MISSISSIPPI RIVER
HYDROELECTRIC POWER DEVELOPMENT

PROJECT BOUNDARY

EXHIBIT G	DATE: APRIL 1984	DWG. NO. 793,1-1-RD/149
	SCALE: AS SHOWN	SHEET PLATE G-20





NOTES:

1) SEE PLATE G-1 FOR GENERAL PLAN OF RESERVOIR
2) SEE PLATE G-22 FOR WATER SURFACE PROFILE AND SHORELINE ELEVATION OF PROJECT BOUNDARY ALONG THE RESERVOIR

200 0 200 400
SCALE IN FEET

ST REGIS | indeco

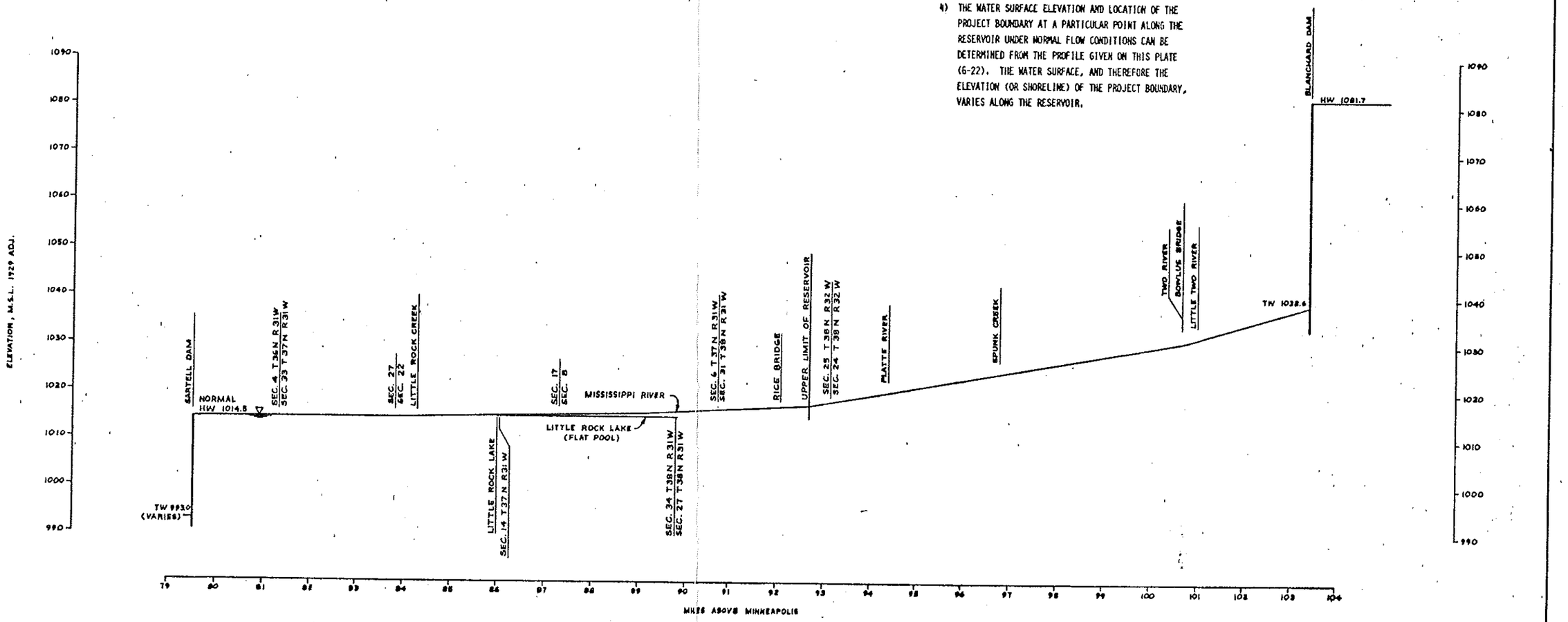
SARTELL DAM — MISSISSIPPI RIVER
HYDROELECTRIC POWER DEVELOPMENT

PROJECT BOUNDARY

EXHIBIT G	DATE: APRIL 1984	DWG. NO. 793.1-1-RD/150
	SCALE: AS SHOWN	SHEET PLATE G-21

NOTES:

1) WATER SURFACE ELEVATIONS BASED ON FIELD SURVEYS BY INDECO, FEBRUARY 27-28, 1984.
2) SEE PLATE G-1 FOR GENERAL PLAN OF RESERVOIR
3) SEE PLATES G-2 THROUGH G-21 FOR PLAN LOCATION OF SECTION LINES AND NATURAL FEATURES ALONG THE PROJECT BOUNDARY
4) THE WATER SURFACE ELEVATION AND LOCATION OF THE PROJECT BOUNDARY AT A PARTICULAR POINT ALONG THE RESERVOIR UNDER NORMAL FLOW CONDITIONS CAN BE DETERMINED FROM THE PROFILE GIVEN ON THIS PLATE (G-22). THE WATER SURFACE, AND THEREFORE THE ELEVATION (OR SHORELINE) OF THE PROJECT BOUNDARY, VARIES ALONG THE RESERVOIR.



WATER SURFACE PROFILE – SARTELL DAM TO BLANCHARD DAM

SCALE: 1" = 1 MILE HORZ. | 1" = 10' VERT.

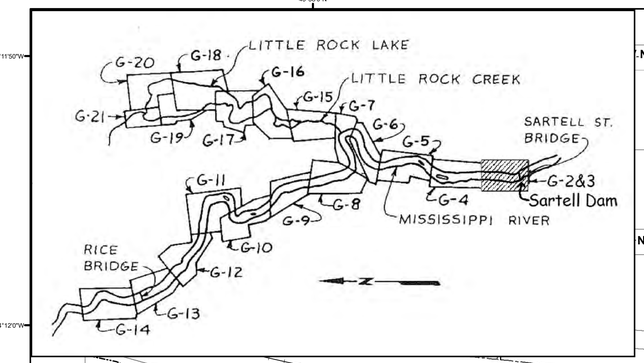
ST REGIS | indeco

SARTELL DAM — MISSISSIPPI RIVER
HYDROELECTRIC POWER DEVELOPMENT

PROFILE – PROJECT BOUNDARY

EXHIBIT G	DATE: APRIL 1984 SCALE: AS SHOWN	DWG. NO. 793.1-1-RD/151 SHEET PLATE G-22

Plates G2/G3 were updated in Eagle Creek Sartell Hydro, LLC's December 17, 2019 filing.



Sauk Rapids Township

TOWNSHIP 36N, RANGE 31W

City of Sartell, Minnesota

TOWNSHIP 125N, RANGE 28W

PROJECT BOUNDARY COURSE TABLE

Segment	Bearing	Distance (ft)	Notes
L1	S78° 31' 30.90"E	77.44	
L2	S11° 04' 12.75"W	174.99	
L3	N78° 31' 30.47"W	100.94	
L4	S17° 06' 53.27"W	14.32	
L5	S06° 29' 25.21"W	27.76	
L6	S87° 37' 12.98"W	17.25	
L7	S10° 44' 16.43"W	297.58	
L8	N80° 00' 51.23"W	663.30	
L9	N09° 41' 29.16"E	139.73	
L10	N60° 15' 04.00"W	88.41	
L11	N17° 18' 19.99"E	72.67	
L12	N33° 39' 02.81"E	188.98	
L13		598.63	Distance northwesterly along Parcel # 92.57116.0000 to L14
L14	S61° 47' 06.29"E	13.93	
L15	S63° 02' 18.82"E	1,984.60	From Point A to NE Corner Section 9, T36N, R31W, Benton county

Reference Point:
Northing: 555,783.500
Easting: 2,637,886.715

Reference Point:
Northing: 558,966.965
Easting: 2,636,022.254

Reference Point:
Northing: 553,915.102
Easting: 2,635,287.081

PROJECT BOUNDARY (1014.5 feet MSL 1929 adj.)

NEUTRAL GROUNDING REACTOR AND TRANSFORMERS

1,984.60 ft bearing S63° 02' 18.82"E along a line from Pt A to NE Corner Section 9

POWERHOUSE

SARTELL DAM

FLOODWALL

LOCATION OF THE INTERCONNECTION POLE/SWITCH (END OF THE PRIMARY LINE FROM THE POWER PLANT)

PT A

BENTON COUNTY

STEARNS COUNTY

MISSISSIPPI RIVER

MATCH LINE (SEE PLATE G-4)

BENTON DR N

RIVERSIDE AV N

1 AV N

2 AV N

3 AV N

3 AV NE

1 AV E

9 ST NE

8 ST NE

44 ST NW

8 ST N

6 ST N

4 ST N

3 ST NE

SARTELL ST E

RIVER ST

4

9

16

21

LEGEND

- Project Boundary
- Project Feature
- Parcel Boundary
- Fee Simple Ownership
- Corporate Boundary
- Section Line
- County Line
- Stream
- Mississippi River
- Railroad

MN 0° 53.4' E

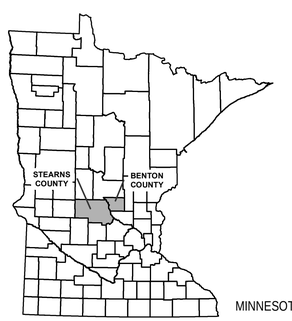
2019 Magnetic north declination at Sartell Dam

Notes:
1. The Sartell Hydroelectric Project is located in the City of Sartell, Benton and Stearns Counties, in the State of Minnesota.
2. Reference point coordinates are shown in the Minnesota State Plane Coordinate System, Central Zone, using the North American Datum of 1983 with units in feet.
3. The Project boundary description, as required by 18CFR4.41, is represented here by a grid of Latitude/Longitude around, and graticules within, the map frame. Any position in degrees, minutes, and seconds along the Project boundary can be determined using these references.
4. Licensee has obtained all flowage rights necessary for the adequate operation of the proejct either in fee title or by easement. All property records are kept on file with the licensee.
5. No federal lands are located within the project boundary.

SURVEYORS STATEMENT

I HEREBY CERTIFY TO THE FEDERAL ENERGY REGULATORY COMMISSION (FERC) THAT THIS PLAN MEETS THE CONDITIONS SET FORTH BY FERC FOR ITS EXPRESSED PURPOSE. THE PURPOSE OF THIS MAP IS TO PROVIDE A GEOREFERENCED VISUAL DEPICTION OF THE LOCATION OF PROJECT FEATURES AND BOUNDARIES BASED ON THE BEST AVAILABLE HISTORICAL DRAWINGS AND DIGITAL REFERENCE SOURCES INCORPORATED INTO THE GEOGRAPHIC INFORMATION SYSTEM (GIS). LOCATIONS HAVE NOT BEEN VERIFIED BY PHYSICAL FIELD SURVEYS AND THIS DRAWING SHOULD NOT BE USED FOR PURPOSES OF DEVELOPING PROPERTY BOUNDARY DESCRIPTIONS.

STATE OF MAINE
STEPHEN W. EVERETT 2161
PROFESSIONAL LAND SURVEYOR



MINNESOTA

EXHIBIT G PLATE G-2/G-3

SARTELL HYDROELECTRIC PROJECT

FERC PROJECT No. 8315-MN

PROJECT BOUNDARY MAP

0 100 200 400 600 800 Feet

EXHIBIT G FERC NO. 8315-XXXX

APPENDIX 3.4.1-1 Current Sartell Project FERC License

K. Sowada

FEDERAL ENERGY REGULATORY COMMISSION
WASHINGTON, D.C. 20426

MAR 1 1985

Project No. 8315-000
St. Regis Corporation

M. R. Asselin, Resident Mgr.
100 East Sartell St.
Sartell, Minnesota 56377

Gentlemen:

Enclosed are four copies of the Order Issuing License (Major), in the above-entitled matter.

Please execute the acknowledgement of acceptance attached to the order and return three copies of the order, the acceptance and resolution of your Board of Directors authorizing such acceptance.

Quentin A. Edson
Director, Office of
Hydropower Licensing

UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

St. Regis Corporation) Project No. 8315-000

ORDER ISSUING LICENSE (MAJOR)
(Issued March 13, 1985)

St. Regis Corporation (Applicant) filed on May 18, 1984, and supplemented on July 9, 1984, an application for license under Part I of the Federal Power Act (Act) for the construction, operation, and maintenance of the Sartell Dam Hydro Project No. 8315. 1/ The project, which will incorporate facilities initially constructed between 1905 and 1907 pursuant to a special act of Congress (Act of April 23, 1904), will be located at the Sartell Dam on the Mississippi River near Sartell, Stearns and Benton Counties, Minnesota. The project would be located on a reach of the Mississippi River which has been found to be a navigable water of the United States. 2/

Notice of the application has been published and comments have been received from interested Federal, state, and local agencies. No protests or motions to intervene were received and no parties objected to issuance of this license.

Project Description

The proposed project consists of: (1) an existing 46-foot-high and 388-foot-long dam; (2) an existing reservoir with a maximum surface area of 2,400 acres; (3) an existing powerhouse that will house 11 rehabilitated generating units with a total rated installed capacity of 9.5 MW; (4) a proposed upgraded floodwall in the west abutment of

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1/ Authority to act on this matter is delegated to the Director, Office of Hydropower Licensing, under §375.314 of the Commission's regulations, 49 Fed. Reg. 29,369 (1984) (Errata issued July 27, 1984), (to be codified at 18 C.F.R. §375.314). This order may be appealed to the Commission by any party within 30 days of its issuance pursuant to Rule 1902, 18 C.F.R. §385.1902 (1983). Filing an appeal and final Commission action on that appeal are prerequisites for filing an application for rehearing as provided in Section 313(a) of the Act. Filing an appeal does not operate as a stay of the effective date of this order or of any other date specified in this order, except as specifically directed by the Commission.

2/ See St. Anthony Falls W.P. Co. v. Board of Water Commissioners, 168 U.S. 349 (1897)

the dam approximately 500 feet long and aligned parallel to the river; (5) existing 2.4-13.8-kV transmission lines; and (6) appurtenant facilities. The power generated at this project would be used by the Applicant's papermaking operation. The project would produce up to 39,900 MWh annually, saving the equivalent of 64,000 barrels of oil or 18,500 tons of coal.

A more detailed project description is contained in ordering paragraph (B).

Safety and Adequacy

All project structures, machinery, and appurtenant facilities were analyzed and inspected by the Commission's staff for safety and adequacy. The Sartell Dam, which was originally constructed in 1906, is classified as high hazard. The facility structures have been well maintained since that time, and are in good condition. A stability analysis has shown that the dam and gates are stable, but that the powerhouse superstructure would fail during a 100-year flood event. A dam breach analysis was performed for the 100-year flood event, and it was found that a 1-foot flood wave would be induced downstream causing little or no increased hazard to the downstream area.

New construction proposed for the project will be limited to modifications to the floodwall, replacement of 4 generators, refurbishing 7 generators, and rehabilitating all 11 existing turbines in the existing powerhouse. The proposed project works to be constructed will be safe if constructed in accordance with the plans and specifications using sound engineering and construction procedures.

It is concluded that the project, under the conditions of this license, is safe and adequate.

Environmental Considerations

A. Run-of-river Operation

The Applicant states that Mississippi River flows, received daily from the upstream Blanchard Dam, determine the operational mode for the Sartell Dam powerhouse, and that the flows take about 8 hours to travel from the Blanchard Dam to Sartell Dam. The Applicant further states that the proposed project will continue to operate in a run-of-river mode, and that in response to normal increases or decreases in flows, turbines will be turned on or turned off, when needed, to maintain the normal pool elevation of 1,014.5 feet above mean sea level (MSL).

The Minnesota Department of Natural Resources (MDNR) and the U.S. Fish and Wildlife Service (FWS) state that no new significant impacts on the fish and wildlife resources are anticipated as a result of the proposed run-of-river operation.

The run-of-river mode of operation and the normal reservoir surface elevation of 1,014.5 feet above MSL should be maintained for the protection of the fish and wildlife resources. Article 34 requires the Licensee to operate the Sartell Dam Project in an instantaneous run-of-river mode and to maintain the reservoir surface elevation at 1,014.5 feet MSL.

B. Turbine Mortality of Fish

The MDNR states that the Mississippi River in the vicinity of the proposed project supports an important fishery that provides opportunities for anglers to fish for smallmouth bass, northern pike, walleye, channel catfish, and muskellunge. Because of the importance of the existing fishery, the MDNR and the FWS express concern about the unquantified existing impact of entrainment and turbine-induced mortality on the fish resources of the area. However, because rehabilitation of the existing turbine units would not entail any change in operation, both the MNDR and the FWS anticipate no change in the impacts of turbine-induced mortality with the project. The Applicant states that fish mortality will be reduced by operating each unit close to peak efficiency, and that individual turbines will be turned on or off in response to existing flow conditions. The Applicant agrees to consult with the MDNR and the FWS regarding protection of the fishery resources.

Rehabilitation of the proposed project would not increase the existing impacts to fishery resources because the project will be operated generally as it has been since 1946. Although project operation will continue to result in an unquantified impact to the fishery resources as a result of turbine mortality, the Mississippi River does support an excellent sport fishery in the vicinity of the project. Furthermore, evidence from various turbine mortality studies suggests that the greatest fish survival occurs when turbines, including both Francis and Kaplan type units, are operated at maximum efficiency. Potential turbine mortality, therefore, will probably be minimized by the operation of the project's Francis turbines near peak efficiency, as proposed by the Applicant.

To ensure the protection and enhancement of the fish and wildlife resources, Standard Article 15 requires the Licensee to implement reasonable modifications of project structures and operation when ordered by the Commission upon the recommendation of the fish and wildlife agencies.

The MDNR and the FWS recommend that the Licensee should be required to consult with both agencies whenever the replacement of the existing Francis turbines is considered in the future regarding the desirability of replacing the existing turbines with potentially less hazardous propeller-type units. It is not necessary that an article to this effect to be included in the license since Section 4.201 of the Commission's regulations (18 C.F.R. § 4.201 (1984)) requires that an application to amend a license (which the replacement of the existing turbines with a different type of turbine would require) include an Environmental Report (Exhibit E) and that Federal and state agencies be given an opportunity to comment on such an amendment before its filing.

Other Environmental Concerns

A. Water quality certification, as required by Section 401 of the Clean Water Act, was waived by the State of Minnesota Pollution Control Agency on July 18, 1984.

B. No Federally listed threatened or endangered species or critical habitat and no sites listed or eligible for listing on the National Register of Historic Places will be affected by the project.

C. Article 35 will protect any cultural resources that may be discovered during future activities at the site.

Finding of No Significant Environmental Impact

The continued operation of the facility would cause no significant changes in the environmental conditions of the project area. Turbine-related fish mortality is not expected to increase above the present level. Although this level is unquantified, the quality of the fishery below the project indicates that the present impact to aquatic resources is not significant. The project would be operated in a run-of-river mode, with no change in the operating elevation of the project reservoir.

In accordance with the National Environmental Policy Act of 1969, an Environmental Assessment was prepared for the Sartell Dam Hydroelectric Project (FERC No. 8315-000). 3/ On the basis of

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3/ Environmental Assessment, Sartell Dam Hydroelectric Project, FERC No. 8315-000--Minnesota, Division of Environmental Analysis, Office of Hydropower Licensing, Federal Energy Regulatory Commission, February 25, 1985. This document is available in the Division of Public Information and in the Commission's public file associated with this proceeding.

the record and Commission staff's independent environmental analysis, the issuance of a license for the project, as conditioned herein, will not constitute a major Federal action significantly affecting the quality of the human environment.

Hydroelectric Power Resources Utilization and Economic Feasibility

The power generated at this project will be consumed solely by the Applicant in its papermaking operations. The project's economic feasibility has been evaluated and it has been determined that the project would be economically feasible based on the cost of providing an equivalent amount of power from a coal-fuel electric plant.

It is concluded that the project will make good use of the flow and fall of the Mississippi River, is not in conflict with any plans for future development of the river, and will be best adapted to the comprehensive development of the basin upon compliance with the terms and conditons of the license.

License Term

Since on the basis of available evidence, it appears that the project has been operating under a valid pre-1920 authorization or permit, it comes within the purview of Section 23(a) of the Federal Power Act. Also, since the Applicant has proposed to add new capacity to the project, the licensing proposed is similar to the relicensing of a project for which a moderate amount of redevelopment is proposed. Accordingly, this license will terminate 40 years from the first day of the month in which it is issued. 4/

It is ordered that:

(A) This license is issued to St. Regis Corporation (Licensee) under Part I of the Federal Power Act (Act) for a period of 40 years, effective the first day of the month in which this order is issued, for the rehabilitation, operation, and maintenance of the Sartell Dam Hydro Project No. 8315, located on the Mississippi River, a navigable waterway of the United States, in Stearns and Benton Counties, Minnesota. This license is subject to the terms and conditions of the Act, which are incorporated by reference as part of this license, and subject to the regulations the Commission issues under the provisions of the Act.

4/ See Village of Lyndonville Electric Department, 7 FERC ¶ 61,324 (1979).

(B) The Sartell Dam Hydro Project No. 8315 consists of:

(1) All lands, to the extent of the Licensee's interest in those lands, constituting the project area and enclosed by the project boundary. The project area and boundary are shown and described by certain exhibits that forms part of the application for license and that are designated and described as:

Exhibit	FERC No. 8315-	Showing
G-1	9	Project Boundary
G-2	10	" "
G-3	11	" "
G-4	12	" "
G-5	13	" "
G-6	14	" "
G-7	15	" "
G-8	16	" "
G-9	17	" "
G-10	18	" "
G-11	19	" "
G-12	20	" "
G-13	21	" "
G-14	22	" "
G-15	23	" "
G-16	24	" "
G-17	25	" "
G-18	26	" "
G-19	27	" "
G-20	28	" "
G-21	29	" "
G-22	30	Project Boundary

(2) Project works consisting of: (1) a 46-foot-high and 388-foot-long concrete dam with 2 bascule gates and 3 Tainter gates; (2) a reservoir with a maximum surface area of 2,400 acres and a maximum storage capacity of approximately 15,500 acre-feet at elevation 1,014.5 M.S.L.; (3) a concrete powerhouse that will house seven 932-kW and four 746-kW generating units for a total rated installed capacity of approximately 9,500 kW; (4) a floodwall in the west abutment of the dam approximately 500 feet long and aligned parallel to the river; (5) the .48/2.4-kV generator leads; (6) two 2-MVA .48/2.4-kV 3-phase step-up transformers; (7) one 7.5-MVA 2.4/13.8-kV 3-phase step-up transformer; (8) one 5-MVA 2.4/13.8-kV 3-phase step-up transformer; (9) approximately 6 miles of 2.4/13.8-kV transmission line; and (10) appurtenant facilities.

The location, nature, and character of these project works are generally shown and described by the exhibit cited above and more specifically shown and described by certain other exhibits and reports that also form part of the application for license and that are designated and described as:

Exhibit	FERC No. 8315-	Showing
F-1	1	General Plan and Location
F-2	2	Plan and Profile
F-3	3	Powerhouse Plan
F-4	4	Generator Bay - Typical Section
F-5	5	Grinder Bay - Typical Section
F-6	6	Spillway - Typical Sections: Bascule and Large Tainter Gates Plan
F-7	7	Spillway - Typical Sections: Small Tainter Gate Plan
F-8	8	Floodwall - Plan and Sections

Exhibit A: Pages A-1 thru A-8, entitled "Description of Project" filed May 18, 1984.

(3) All of the structures, fixtures, equipment, or facilities used or useful in the operation or maintenance of the project, all portable property that may be employed in connection with the project, as approved by the Commission, and all riparian or other rights that are necessary or appropriate in the operation or maintenance of the project.

(C) Exhibits A, F and G designated in ordering paragraph (B) above are approved and made a part of the license.

(D) The license is also subject to the terms and conditions set forth in Form L-4 (revised October 1975) designated as Articles 1 through 6, 8 through 19, and 21 through 28 entitled "Terms and Conditions of License for Unconstructed Major Project Affecting Navigable Waters of the Unites States" attached to and made a part of this license. The license is also subject to the following additional articles.

Article 29. The fair value of the project shall be determined in accordance with Section 23(a) of the Act and the rules and regulations of the Commission, and the Licensee hereby agrees to accept such fair value so determined as being the net investment in the project as of the effective date of the license.

Article 30. The Licensee shall commence construction of project works within 2 years from the issuance date of the license and shall complete construction of the project within 4 years from the issuance date of the license.

Article 31. The Licensee shall provide to the Commission's Regional Engineer and the Director, Office of Hydropower Licensing, one copy each of the final contract drawings and specifications for pertinent features of the project, such as water retention structures, powerhouse, and water conveyance structures, at least 60 days prior to start of construction. The Director, Office of Hydropower Licensing, may require changes in the plans and specifications to assure a safe and adequate project.

Article 32. The License shall within 90 days of completion of construction file for approval by the Director, Office of Hydropower Licensing, revised Exhibits A and F to describe and show the project as-built.

Article 33. The Licensee shall pay the United States the following annual charge, effective the first day of the month in which this license is issued:

> For the purpose of reimbursing the United States for the cost of administration of Part I of the Act, a reasonable annual charge as determined by the Commission in accordance with the provisions of its regulations in effect from time to time. The authorized installed capacity for that purpose is 12,700 horsepower.

Form L-4
(Revised October, 1975)

FEDERAL ENERGY REGULATORY COMMISSION

TERMS AND CONDITIONS OF LICENSE FOR
UNCONSTRUCTED MAJOR PROJECT AFFECTING
NAVIGABLE WATERS OF THE UNITED STATES

Article 1. The entire project, as described in this order of the Commission, shall be subject to all of the provisions, terms, and conditions of the license.

Article 2. No substantial change shall be made in the maps, plans, specifications, and statements described and designated as exhibits and approved by the Commission in its order as a part of the license until such change shall have been approved by the Commission: Provided, however, That if the Licensee or the Commission deems it necessary or desirable that said approved exhibits, or any of them, be changed, there shall be submitted to the Commission for approval a revised, or additional exhibit or exhibits covering the proposed changes which, upon approval by the Commission, shall become a part of the license and shall supersede, in whole or in part, such exhibit or exhibits theretofore made a part of the license as may be specified by the Commission.

Article 3. The project works shall be constructed in substantial conformity with the approved exhibits referred to in Article 2 herein or as changed in accordance with the provisions of said article. Except when emergency shall require for the protection of navigation, life, health, or property, there shall not be made without prior approval of the Commission any substantial alteration or addition not in conformity with the approved plans to any dam or other project works under the license or any substantial use of project lands and waters not authorized herein; and any emergency alteration, addition, or use so made shall thereafter be subject to such modification and change as the Commission may direct. Minor changes in project works, or in uses of project lands and waters, or divergence from such approved exhibits may be made if such changes will not result in a decrease in efficiency, in a material increase in cost, in an adverse environmental impact, or in impairment of the general scheme of development; but any of such minor changes made without the prior approval of the Commission, which in its judgment have produced or will produce any of such results, shall be subject to such alteration as the Commission may direct.

Upon the completion of the project, or at such other time as the Commission may direct, the Licensee shall submit to the Commission for approval revised exhibits insofar as necessary to show any divergence from or variations in the project area and project boundary as finally located or in the project works as actually constructed when compared with the area and boundary shown and the works described in the license or in the exhibits approved by the Commission, together with a statement in writing setting forth the reasons which in the opinion of the Licensee necessitated or justified variation in or divergence from the approved exhibits. Such revised exhibits shall, if and when approved by the Commission, be made a part of the license under the provisions of Article 2 hereof.

Article 4. The construction, operation, and maintenance of the project and any work incidental to additions or alterations shall be subject to the inspection and supervision of the Regional Engineer, Federal Power Commission, in the region wherein the project is located, or of such other officer or agent as the Commission may designate, who shall be the authorized representative of the Commission for such purposes. The Licensee shall cooperate fully with said representative and shall furnish him a detailed program of inspection by the Licensee that will provide for an adequate and qualified inspection force for construction of the project and for any subsequent alterations to the project. Construction of the project works or any feature or alteration thereof shall not be initiated until the program of inspection for the project works or any such feature thereof has been approved by said representative. The Licensee shall also furnish to said representative such further information as he may require concerning the construction, operation, and maintenance of the project, and of any alteration thereof, and shall notify him of the date upon which work will begin, as far in advance thereof as said representative may reasonably specify, and shall notify him promptly in writing of any suspension of work for a period of more than one week, and of its resumption and completion. The Licensee shall allow said representative and other officers or employees of the United States, showing proper credentials, free and unrestricted access to, through, and across the project lands and project works in the performance of their official duties. The Licensee shall comply with such rules and regulations of general or special applicability as the Commission may prescribe from time to time for the protection of life, health, or property.

Article 5. The Licensee, within five years from the date of issuance of the license, shall acquire title in fee or the right to use in perpetuity all lands, other than lands of the United States, necessary or appropriate for the construction, maintenance, and operation of the project. The Licensee or its successors and assigns shall, during the period of the license, retain the possession of all project property covered by the license as issued or as later amended, including the project area, the project works, and all franchises, easements, water rights, and rights of occupancy and use; and none of such properties shall be voluntarily sold, leased, transferred, abandoned, or otherwise disposed of without the prior written approval of the Commission, except that the Licensee may lease or otherwise dispose of interests in project lands or property without specific written approval of the Commission pursuant to the than current regulations of the Commission. The provisions of this article are not intended to prevent the abandonment or the retirement from service of structures, equipment, or other project works in connection with replacements thereof when they become obsolete, inadequate, or inefficient for further service due to wear and tear; and mortgage or trust deeds or judicial sales made thereunder, or tax sales, shall not be deemed voluntary transfers within the meaning of this article.

Article 6. In the event the project is taken over by the United States upon the termination of the license as provided in Section 14 of the Federal Power Act, or is transferred to a new licensee or to a non-power licensee under the provisions of Section 15 of said Act, the Licensee, its successors and assigns shall be responsible for, and shall make good any defect of title to, or of right of occupancy and use in, any of such project property that is necessary or appropriate or valuable and serviceable in the maintenance and operation of the project, and shall pay and discharge, or shall assume responsibility for payment and discharge of, all liens or encumbrances upon the project or project property created by the Licensee or created or incurred after the issuance of the license: Provided, That the provisions of this article are not intended to require the Licensee, for the purpose of transferring the project to the United States or to a new licensee, to acquire any different title to, or right of occupancy and use in, any of such project property than was necessary to acquire for its own purposes as the Licensee.

Article 10. The Licensee shall, after notice and

Article 7. The actual legitimate original cost of the project, and of any addition thereto or betterment thereof, shall be determined by the Commission in accordance with the Federal Power Act and the Commission's Rules and Regulations thereunder.

Article 8. The Licensee shall install and thereafter maintain gages and stream-gaging stations for the purpose of determining the stage and flow of the stream or streams on which the project is located, the amount of water held in and withdrawn from storage, and the effective head on the turbines; shall provide for the required reading of such gages and for the adequate rating of such stations; and shall install and maintain standard meters adequate for the determination of the amount of electric energy generated by the project works. The number, character, and location of gages, meters, or other measuring devices, and the method of operation thereof, shall at all times be satisfactory to the Commission or its authorized representative. The Commission reserves the right, after notice and opportunity for hearing, to require such alterations in the number, character, and location of gages, meters, or other measuring devices, and the method of operation thereof, as are necessary to secure adequate determinations. The installation of gages, the rating of said stream or streams, and the determination of the flow thereof, shall be under the supervision of, or in cooperation with, the District Engineer of the United States Geological Survey having charge of stream-gaging operations in the region of the project, and the Licensee shall advance to the United States Geological Survey the amount of funds estimated to be necessary for such supervision, or cooperation for such periods as may be mutually agreed upon. The Licensee shall keep accurate and sufficient records of the foregoing determinations to the satisfaction of the Commission, and shall make return of such records annually at such time and in such form as the Commission may prescribe.

Article 9. The Licensee shall, after notice and opportunity for hearing, install additional capacity or make other changes in the project as directed by the Commission, to the extent that it is economically sound and in the public interest to do so.

Article 13. On the application of any person, association, corporation, Federal agency, State or municipality, the Licensee shall permit such reasonable use of its reservoir or other project properties, including works, lands and water rights, or parts thereof, as may be ordered by the Commission, after notice and opportunity for hearing, in the interests of comprehensive development of the waterway or waterways involved and the conservation and utilization of the water resources of the region for water supply or for the purposes of steam-electric, irrigation, industrial, municipal or similar uses. The Licensee shall receive reasonable compensation for use of its reservoir or other project properties or parts thereof for such purposes, to include at least full reimbursement for any damages or expenses which the joint use causes the Licensee to incur. Any such compensation shall be fixed by the Commission either by approval of an agreement between the Licensee and the party or parties benefiting or after notice and opportunity for hearing. Applications shall contain information in sufficient detail to afford a full understanding of the proposed use, including satisfactory evidence that the applicant possesses necessary water rights pursuant to applicable State law, or a showing of cause why such evidence cannot concurrently be submitted, and a statement as to the relationship of the proposed use to any State or municipal plans or orders which may have been adopted with respect to the use of such waters.

Article 14. In the construction or maintenance of the project works, the Licensee shall place and maintain suitable structures and devices to reduce to a reasonable degree the liability of contact between its transmission lines and telegraph, telephone and other signal wires or power transmission lines constructed prior to its transmission lines and not owned by the Licensee, and shall also place and maintain suitable structures and devices to reduce to a reasonable degree the liability of any structures or wires falling or obstructing traffic or endangering life. None of the provisions of this article are intended to relieve the Licensee from any responsibility or requirement which may be imposed by any other lawful authority for avoiding or eliminating inductive interference.

Article 15. The Licensee shall, for the conservation and development of fish and wildlife resources, construct, maintain, and operate, or arrange for the construction, maintenance, and operation of such reasonable facilities, and comply with such reasonable modifications of the project structures and operation, as may be ordered by the Commission upon its own motion or upon the recommendation of the Secretary of the Interior or the fish and wildlife agency or agencies of any State in which the project or a part thereof is located, after notice and opportunity for hearing.

Article 16. Whenever the United States shall desire, in connection with the project, to construct fish and wildlife facilities or to improve the existing fish and wildlife facilities at its own expense, the Licensee shall permit the United States or its designated agency to use, free of cost, such of the Licensee's lands and interests in lands, reservoirs, waterways and project works as may be reasonably required to complete such facilities or such improvements thereof. In addition, after notice and opportunity for hearing, the Licensee shall modify the project operation as may be reasonably prescribed by the Commission in order to permit the maintenance and operation of the fish and wildlife facilities constructed or improved by the United States under the provisions of this article. This article shall not be interpreted to place any obligation on the United States to construct or improve fish and wildlife facilities or to relieve the Licensee of any obligation under this license.

Article 17. The Licensee shall construct, maintain, and operate, or shall arrange for the construction, maintenance, and operation of such reasonable recreational facilities, including modifications thereto, such as access roads, wharves, launching ramps, beaches, picnic and camping areas, sanitary facilities, and utilities, giving consideration to the needs of the physically handicapped, and shall comply with such reasonable modifications of the project, as may be prescribed hereafter by the Commission during the term of this license upon its own motion or upon the recommendation of the Secretary of the Interior or other interested Federal or State agencies, after notice and opportunity for hearing.

Article 18. So far as is consistent with proper operation of the project, the Licensee shall allow the public free access, to a reasonable extent, to project waters and adjacent project lands owned by the Licensee for the purpose of full public utilization of such lands and waters for navigation and for outdoor recreational purposes, including fishing and hunting: Provided, That the Licensee may reserve from public access such portions of the project waters, adjacent lands, and project facilities as may be necessary for the protection of life, health, and property.

Article 19. In the construction, maintenance, or operation of the project, the Licensee shall be responsible for, and shall take reasonable measures to prevent, soil erosion on lands adjacent to streams or other waters, stream sedimentation, and any form of water or air pollution. The Commission, upon request or upon its own motion, may order the Licensee to take such measures as the Commission finds to be necessary for these purposes, after notice and opportunity for hearing.

Article 20. The Licensee shall consult with the appropriate State and Federal agencies and, within one year of the date of issuance of this license, shall submit for Commission approval a plan for clearing the reservoir area. Further, the Licensee shall clear and keep clear to an adequate width lands along open conduits and shall dispose of all temporary structures, unused timber, brush, refuse, or other material unnecessary for the purposes of the project which results from the clearing of lands or from the maintenance or alteration of the project works. In addition, all trees along the periphery of project reservoirs which may die during operations of the project shall be removed. Upon approval of the clearing plan all clearing of the lands and disposal of the unnecessary material shall be done with due diligence and to the satisfaction of the authorized representative of the Commission and in accordance with appropriate Federal, State, and local statutes and regulations.

Article 21. Material may be dredged or excavated from, or placed as fill in, project lands and/or waters only in the prosecution of work specifically authorized under the license; in the maintenance of the project; or after obtaining Commission approval, as appropriate. Any such material shall be removed and/or deposited in such manner

as to reasonably preserve the environmental values of the project and so as not to interfere with traffic on land or water. Dredging and filling in a navigable water of the United States shall also be done to the satisfaction of the District Engineer, Department of the Army, in charge of the locality.

Article 22. Whenever the United States shall desire to construct, complete, or improve navigation facilities in connection with the project, the Licensee shall convey to the United States, free of cost, such of its lands and rights-of-way and such rights of passage through its dams or other structures, and shall permit such control of its pools, as may be required to complete and maintain such navigation facilities.

Article 23. The operation of any navigation facilities which may be constructed as a part of, or in connection with, any dam or diversion structure constituting a part of the project works shall at all times be controlled by such reasonable rules and regulations in the interest of navigation, including control of the level of the pool caused by such dam or diversion structure, as may be made from time to time by the Secretary of the Army.

Article 24. The Licensee shall furnish power free of cost to the United States for the operation and maintenance of navigation facilities in the vicinity of the project at the voltage and frequency required by such facilities and at a point adjacent thereto, whether said facilities are constructed by the Licensee or by the United States.

Article 25. The Licensee shall construct, maintain, and operate at its own expense such lights and other signals for the protection of navigation as may be directed by the Secretary of the Department in which the Coast Guard is operating.

Article 26. If the Licensee shall cause or suffer essential project property to be removed or destroyed or to become unfit for use, without adequate replacement, or shall abandon or discontinue good faith operation of the project or refuse or neglect to comply with the terms of the license and the lawful orders of the Commission mailed to the record address of the Licensee

or its agent, the Commission will deem it to be the intent of the Licensee to surrender the license. The Commission, after notice and opportunity for hearing, may require the Licensee to remove any or all structures, equipment and power lines within the project boundary and to take any such other action necessary to restore the project waters, lands, and facilities remaining within the project boundary to a condition satisfactory to the United States agency having jurisdiction over its lands or the Commission's authorized representative, as appropriate, or to provide for the continued operation and maintenance of nonpower facilities and fulfill such other obligations under the license as the Commission may prescribe. In addition, the Commission in its discretion, after notice and opportunity for hearing, may also agree to the surrender of the license when the Commission, for the reasons recited herein, deems it to be the intent of the Licensee to surrender the license.

Article 27. The right of the Licensee and of its successors and assigns to use or occupy waters over which the United States has jurisdiction, or lands of the United States under the license, for the purpose of maintaining the project works or otherwise, shall absolutely cease at the end of the license period, unless the Licensee has obtained a new license pursuant to the then existing laws and regulations, or an annual license under the terms and conditions of this license.

Article 28. The terms and conditions expressly set forth in the license shall not be construed as impairing any terms and conditions of the Federal Power Act which are not expressly set forth herein.

(3) All of the structures, fixtures, equipment, or facilities used or useful in the operation or maintenance of the project, all portable property that may be employed in connection with the project, as approved by the Commission, and all riparian or other rights that are necessary or appropriate in the operation or maintenance of the project.

(C) Exhibits A, F and G designated in ordering paragraph (B) above are approved and made a part of the license.

(D) The license is also subject to the terms and conditions set forth in Form L-4 (revised October 1975) designated as Articles 1 through 6, 8 through 19, and 21 through 28 entitled "Terms and Conditions of License for Unconstructed Major Project Affecting Navigable Waters of the Unites States" attached to and made a part of this license. The license is also subject to the following additional articles.

Article 29. The fair value of the project shall be determined in accordance with Section 23(a) of the Act and the rules and regulations of the Commission, and the Licensee hereby agrees to accept such fair value so determined as being the net investment in the project as of the effective date of the license.

Article 30. The Licensee shall commence construction of project works within 2 years from the issuance date of the license and shall complete construction of the project within 4 years from the issuance date of the license.

Article 31. The Licensee shall provide to the Commission's Regional Engineer and the Director, Office of Hydropower Licensing, one copy each of the final contract drawings and specifications for pertinent features of the project, such as water retention structures, powerhouse, and water conveyance structures, at least 60 days prior to start of construction. The Director, Office of Hydropower Licensing, may require changes in the plans and specifications to assure a safe and adequate project.

Article 32. The License shall within 90 days of completion of construction file for approval by the Director, Office of Hydropower Licensing, revised Exhibits A and F to describe and show the project as-built.

Article 33. The Licensee shall pay the United States the following annual charge, effective the first day of the month in which this license is issued:

> For the purpose of reimbursing the United States for the cost of administration of Part I of the Act, a reasonable annual charge as determined by the Commission in accordance with the provisions of its regulations in effect from time to time. The authorized installed capacity for that purpose is 12,700 horsepower.

Article 34. Licensee shall operate the Sartell Dam Project in an instantaneous run-of-river mode for the protection of the fish and wildlife resources of the Mississippi River and at all times act to minimize the fluctuation of the project reservoir surface elevation, and shall maintain the reservoir surface elevation at approximately 1,014.3 feet above mean sea level by maintaining a project discharge that will produce flows measured immediately downstream from the project tailrace that approximate the instantaneous sum of inflow to the project reservoir. The instantaneous run-of-river operation may be temporarily modified if required by operating emergencies beyond the control of the Licensee, and for short periods upon mutual agreement between the Licensee and the Minnesota Department of Natural Resources.

Article 35. Licensee, prior to any future construction at the project, shall consult with the Minnesota State Historic Preservation Officer (SHPO) about the need for any cultural resource survey and salvage work. Documentation of the nature and extent of consultation, including a cultural resources management plan, a schedule to conduct any necessary investigation before construction, and a copy of a letter from the SHPO accepting the plan, shall be filed with the Commission 6 months before any construction activity. Licensee shall make available funds in a reasonable amount for any such work as required. If any previously unrecorded archeological or historical sites are discovered during the course of construction or development of any project works or other facilities at the project, construction activity in the vicinity shall be halted, a qualified archeologist shall be consulted to determine the significance of the sites, and the Licensee shall consult with the SHPO to develop a mitigative plan for the protection of significant archeological or historical resources. If Licensee and the SHPO cannot agree on the amount of money to be expended on archeological or historical work related to the project, the Commission reserves the right to require Licensee to conduct, at its own expense, any such work found necessary.

Article 36. Pursuant to Section 10(d) of the Act, after the first 20 years of operation of the project under license, a specified reasonable rate of return upon the net investment in the project shall be used for determining surplus earnings of the project for the establishment and maintenance of amortization reserves. One-half of the project surplus earnings, if any, accumulated after the first 20 years of operation under license, in excess of the specified rate of return per annum on the net investment, shall be set aside in a project amortization reserve account as of the end of each fiscal year. To the extent that there is a deficiency of project earnings below the specified rate of return per annum for any fiscal year after the first 20 years of operation under the license, the amount of the deficiency shall be deducted from the amount of any surplus earnings subsequently accumulated, until absorbed. One-half of the remaining surplus earnings, if

any, cumulatively computed, shall be set aside in the project amortization reserve account. The amounts established in the project amortization reserve account shall be maintained until further order of the Commission.

The annual specified reasonable rate of return shall be the sum of the weighted cost components of long-term debt, perferred stock, and the cost common equity, as defined herein. The weighted cost components for each element of the reasonable rate of return is the product of its capitol ratios and cost rate. The current capitol ratios for each of the above elements of the rate of return shall be calculated annually based on an average of 13 monthly balances of amounts properly includable in the Licensee's long-term debt and proprietary capital accounts as listed in the Commission's Uniform System of Accounts. The cost rates for such ratios shall be weighted average cost of long-term debt and preferred stock for the year, and the cost of common equity shall be the interest rate on 10-year government bonds (reported as the Treasury Department's 10-year constant maturity series) computed on the monthly average for the year in question plus four percentage points (400 basis points).

Article 37. (a) In accordance with the provisions of this article, the Licensee shall have the authority to grant permission for certain types of use and occupancy of project lands and waters and to convey certain interests in project lands and waters for certain other types of use and occupancy, without prior Commission approval. The Licensee may exercise the authority only if the proposed use and occupancy is consistent with the purposes of protecting and enhancing the scenic, recreational, and other environmental values of the project. For those purposes, the Licensee shall also have continuing responsibility to supervise and control the uses and occupancies for which it grants permission, and to monitor the use of, and to ensure compliance with the covenants of the instrument of conveyance for any interests that it has conveyed under this article. If a permitted use and occupancy violates any condition of this article or any other condition imposed by the Licensee for protection and enhancement of the project's scenic, recreational, or other environmental values, or if a covenant of a conveyance made under the authority of this article is violated, the Licensee shall take any lawful action necessary to correct the violation. For a permitted use or occupancy that action includes, if necessary, cancelling the permission to use and occupy the project lands and waters and requiring the removal of any non-complying structures and facilities.

(b) The types of use and occupancy of project lands and waters for which the Licensee may grant permission without prior Commission approval are: (1) landscape plantings; (2) non-commercial piers, landings, boat docks, or similar structures and facilities that can accommodate no more than 10 watercraft at a time where said facility is intended to serve single-family type dwellings; and (3) embankments, bulkheads, retaining walls, or similar structures for erosion control to protect the existing shoreline.

To the extent feasible and desirable to protect and enhance the project's scenic, recreational, and other environmental values, the Licensee shall require multiple use and occupancy of facilities for access to project lands or waters. The Licensee shall also ensure, to the satisfaction of the Commission's authorized representative, that the uses and occupancies for which it grants permission are maintained in good repair and comply with applicable State and local health and safety requirements. Before granting permission for construction of bulkheads or retaining walls, the Licensee shall: (1) inspect the site of the proposed construction, (2) consider whether the planting of vegetation or the use of riprap would be adequate to control erosion at the site, and (3) determine that the proposed construction is needed and would not change the basic contour of the reservoir shoreline. To implement this paragraph (b), the Licensee may, among other things, establish a program for issuing permits for the specified types of use and occupancy of project lands and waters, which may be subject to the payment of a reasonable fee to cover the Licensee's costs of administering the permit program. The Commission reserves the right to require the Licensee to file a description of its standards, guidelines, and procedures for implementing this paragraph (b) and to require modification of those standards, guidelines, or procedures.

(c) The Licensee may convey easements or rights-of-way across, or leases of, project lands for: (1) replacement, expansion, realignment, or maintenance of bridges and roads for which all necessary State and Federal approvals have been obtained; (2) storm drains and water mains; (3) sewers that do not discharge into project waters; (4) minor access roads; (5) telephone, gas, and electric utility distribution lines; (6) non-project overhead electric transmission lines that do not require erection of support structures within the project boundary; (7) submarine, overhead, or underground major telephone distribution cables or major electric distribution lines (69-kV or less); and (8) water intake or pumping facilities that do not extract more than one million gallons per day from a project reservoir. No later than January 31 of each year, the Licensee shall file three copies of a report briefly describing for each conveyance made under this paragraph (c) during the prior calendar year, the type of interest conveyed, the location of the lands subject to the conveyance, and the nature of the use for which the interest was conveyed.

(d) The Licensee may convey fee titles to, easements or rights-of-way across, or leases of project lands for: (1) construction of new bridges or roads for which all necessary State and Federal approvals have been obtained; (2) sewer or effluent lines that discharge into project waters for which all necessary Federal and State water quality certificates or permits have been obtained; (3) other pipelines that cross project lands or waters but do not discharge into project waters; (4) non-project overhead electric transmission lines that require erection of support structures within the project boundary for which all necessary Federal and State approvals have been obtained; (5) private or public marinas that can accommodate no more than 10 watercraft at a time and are located at least one-half mile from any other private or public marina; (6) recreational development consistent with an approved Exhibit R or approved report on recreational resources of an Exhibit E; and (7) other uses, if: (i) the amount of land conveyed for a particular use is five acres or less; (ii) all of the land conveyed is located at least 75 feet, measured horizontally, from the edge of the project reservoir at normal maximum surface elevation; and (iii) no more than 50 total acres of project lands for each project development are conveyed under this clause (d)(7) in any calendar year. At least 45 days before conveying any interest in project lands under this paragraph (d), the Licensee must file a letter to the Director, Office of Electric Power Regulation, stating its intent to convey the interest and briefly describing the type of interest and location of the lands to be conveyed (a marked Exhibit G or K map may be used), the nature of the proposed use, the identity of any Federal or State agency official consulted, and any Federal or State approvals required for the proposed use. Unless the Director, within 45 days from the filing date, requires the Licensee to file an application for prior approval, the Licensee may convey the intended interest at the end of that period.

(e) The following additional conditions apply to any intended conveyance under paragraphs (c) or (d) of this article:

(1) Before conveying the interest, the Licensee shall consult with Federal and State fish and wildlife or recreation agencies, as appropriate, and the State Historic Preservation Officer.

(2) Before conveying the interest, the Licensee shall determine that the proposed use of the lands to be conveyed is not inconsistent with any approved Exhibit R or approved report on recreational resources of an Exhibit E; or, if the project does not have an approved Exhibit R or approved report on recreational resources, that the lands to be conveyed do not have recreational value.

(3) The instrument of conveyance must include covenants running with the land adequate to ensure that: (i) the use of the lands conveyed shall not endanger health, create a nuisance, or otherwise be incompatible with overall project recreational use; and (ii) the grantee shall take all reasonable precautions to ensure that the construction, operation, and maintenance of structures or facilities on the conveyed lands will occur in a manner that will protect the scenic, recreational, and environmental values of the project.

(4) The Commission reserves the right to require the licensee to take reasonable remedial action to correct any violation of the terms and conditions of this article for the protection and enhancement of the project's scenic, recreational, and other environmental values.

(f) The conveyance of an interest in project lands under this article does not in itself change the project boundaries. The project boundaries may be changed to exclude land conveyed under this article only upon approval of revised Exhibit G or K drawings (project boundary maps) reflecting exclusion of that land. Lands conveyed under this article will be excluded from the project only upon a determination that the lands are not necessary for project purposes, such as operation and maintenance, flowage, recreation, public access, protection of environmental resources, and shoreline control, including shoreline aesthetic values. Absent extraordinary circumstances, proposals to exclude lands conveyed under this article from the project shall be consolidated for consideration when revised Exhibit G or K drawings would be filed for approval for other purposes.

(E) The Licensee's failure to file a petition appealing this order to the Commission shall constitute acceptance of this license. In acknowledgment of acceptance of this order and its terms and conditions, it shall be signed by the Licensee and returned to the Commission within 60 days from the date this order is issued.

Quentin A. Edson

Quentin A. Edson
Director, Office of
Hydropower Licensing

Project No. 8315-000

IN TESTIMONY of its acknowledgment of acceptance of all of the terms and conditions of this order, St. Regis Corporation this _____ day of _____, 19____, has caused its corporate name to be signed hereto by _____, its President, and its corporate seal to be affixed hereto and attested by _____, its Secretary, pursuant to a resolution of its Board of Directors duly adopted on the _____ day of_____ , 19____, a certified copy of the record of which is attached hereto.

St. Regis Corporation

By_____
President

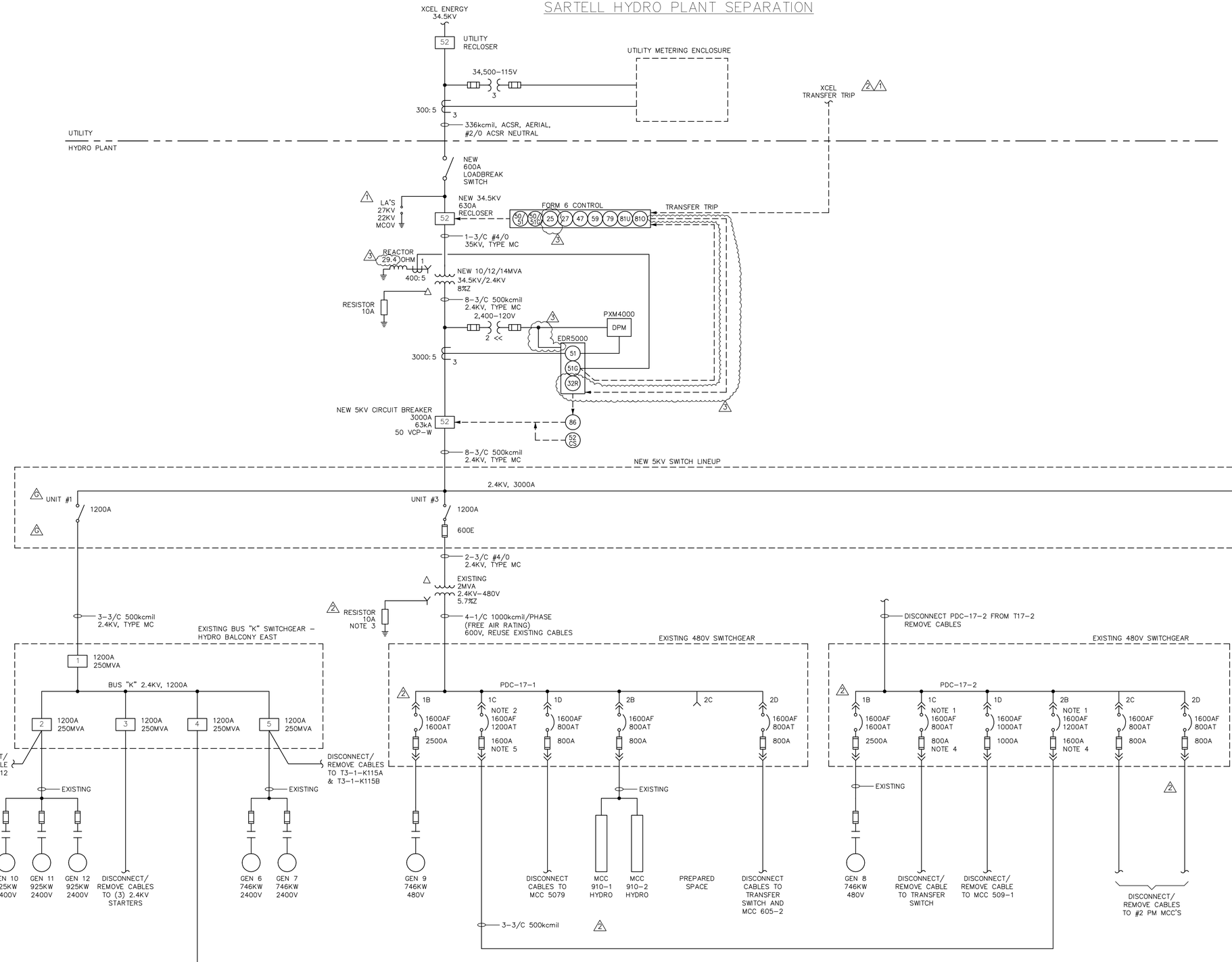
Attest:

_____
Secretary

(Executed in quadruplicate)

APPENDIX 3.2.4-1 **Sartell Project One Line Diagram of Principal Electric Circuits**

SARTELL HYDRO PLANT SEPARATION



LEGEND

52	MEDIUM VOLTAGE CIRCUIT BREAKER		TRANSFORMER
51	TIME DELAY OVERCURRENT RELAY		FUSE
51G	TIME DELAY GROUND FAULT		CURRENT TRANSFORMER
86	LOCKOUT RELAY		ZERO SEQUENCE CURRENT TRANSFORMER
52 CS	CIRCUIT BREAKER CONTROL SWITCH		GROUNDING RESISTOR
DPM	DIGITAL POWER METER		POTENTIAL TRANSFORMERS
			GROUND
	SWITCH		LIGHTING ARRESTERS
	LOW VOLTAGE CIRCUIT BREAKER		GROUNDING REACTOR

2 NOTES:

1. 1200A RATING PLUG IN PDC–17–2, CUBICLE 1C TO BE SWAPPED WITH 800A RATING PLUG IN PDC–17–2, CUBICLE 2B.
2. EXISTING 800A RATING PLUG IN PDC–17–1, CUBICLE 1C TO BE REPLACED WITH NEW 1200A RATING PLUG.
3. 2MVA TRANSFORMER NEUTRAL CONNECTED TO EXISTING HIGH RESISTANCE GROUND SYSTEM IN EXISTING PDC–17–1 480V SWITCHGEAR.
4. 1600A FUSES IN PDC–17–2, CUBICLE 1C TO BE SWAPPED WITH 800A FUSES IN PDC–17–2, CUBICLE 2B.
5. EXISTING 800A FUSES IN PDC–17–1, CUBICLE 1C TO BE REPLACED WITH NEW 1600A FUSES.

ISSUE	REV	DATE	BY	AP'D	REMARKS
3		09/12/14	JEW	PAB	REVISED REACTOR, ADDED SYNCH CHECK
2		08/07/14	JEW	PAB	ADDED 480V CB DATA, 480V HRG, REVISED 480V BUS TIE AND NOTES
1		07/25/14	JEW	PAB	ADDED FORM 6 CONTROL AND TRANSFER TRIP
0		07/14/14	JEW	PAB	FOR CONSTRUCTION
G		06/26/14	JEW	PAB	REVISED NEUTRAL CT'S, DELETED RELAYS
F		04/08/14	JEW	PAB	ADDED GSU TRANSFORMER NEUTRAL GROUNDING REACTOR
E		03/05/14	JEW	PAB	REVISED GSU TRANSFORMER & 2MVA TRANSFORMER CABLES
D		07/10/13	JEW	PAB	REVISED PDC-17-2, ADDED PDC-17-1, ADDED CABLE & METERING DATA
C		05/15/13	JEW	PAB	REVISED UTILITY METERING POINT
B		04/12/13	JEW	PAB	REVISED UTILITY METERING, CHANGED MAIN SW TO CB
A		03/14/13	JEW	PAB	ISSUED FOR CLIENT REVIEW

SCALE: NTS
NAME: JEW
CK'D: PAB
AP'D: PAB
DATE: 03/12/13

AIM DEVELOPMENT
SARTELL, MN

SARTELL HYDRO PLANT SEPARATION

ELECTRICAL
ONE LINE DIAGRAM

PÖYRY (APPLETON) LLC — APPLETON, WISCONSIN

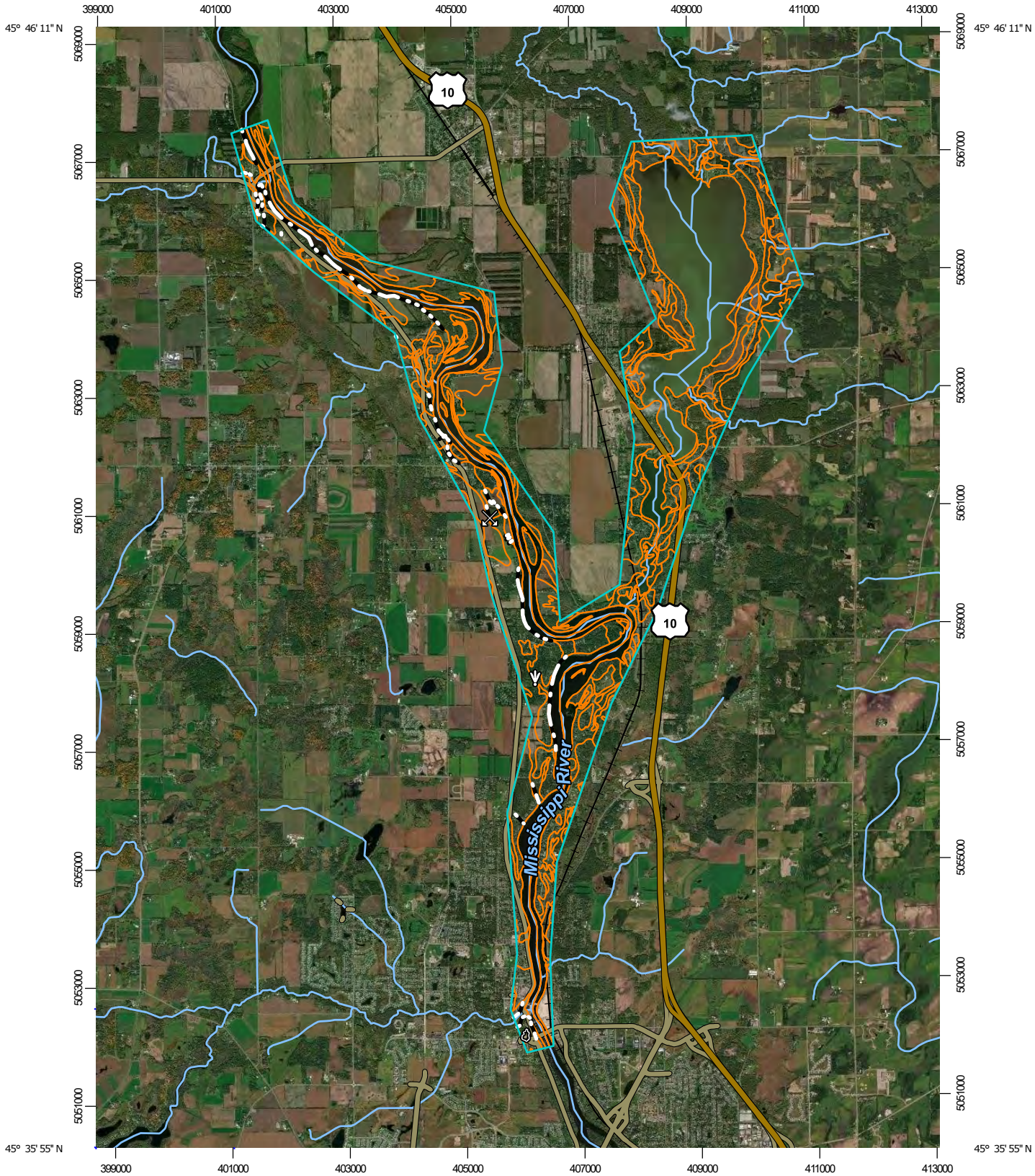
PROJ NO. 43X160634.10
DWG NO. E-1001

PLOTTED:

pa5a.dwg (24x36 Landscape)

APPENDIX 4.2.2-1 **Sartell Project Soils Report**

Soil Map—Benton County, Minnesota, and Stearns County, Minnesota
(Sartell Hydroelectric Project Vicinity)



Map Scale: 1:92,500 if printed on A portrait (8.5" x 11") sheet.

N

Meters
0 1000 2000 4000 6000

Feet
0 4000 8000 16000 24000

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 15N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at scales ranging from 1:12,000 to 1:15,800.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Benton County, Minnesota
Survey Area Data: Version 16, Sep 16, 2019

Soil Survey Area: Stearns County, Minnesota
Survey Area Data: Version 17, Sep 16, 2019

Your area of interest (AOI) includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. This may result in map unit symbols, soil properties, and interpretations that do not completely agree across soil survey area boundaries.

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Apr 19, 2014—Oct 11, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
1011A	Fordum-Winterfield complex, 0 to 2 percent slopes, frequently flooded	245.8	2.9%
1023A	Seelyeville and Markey soils, ponded, 0 to 1 percent slopes	94.0	1.1%
C60A	Bushville fine sand, 0 to 2 percent slopes	1.6	0.0%
C69B	Milaca, stony-St. Francis complex, 3 to 8 percent slopes	12.8	0.2%
D2A	Elkriver fine sandy loam, 0 to 2 percent slopes, rarely flooded	72.8	0.9%
D3A	Elkriver fine sandy loam, 0 to 2 percent slopes, occasionally flooded	17.2	0.2%
D8E	Sandberg loamy coarse sand, 6 to 30 percent slopes	76.1	0.9%
D14B	Elkriver-Mosford complex, 0 to 6 percent slopes, rarely flooded	227.9	2.7%
D17A	Duelm loamy sand, 0 to 2 percent slopes	169.6	2.0%
D20A	Isan-Isan, frequently ponded, complex, 0 to 2 percent slopes	351.9	4.2%
D30A	Seelyeville and Markey soils, depressional, 0 to 1 percent slopes	8.1	0.1%
D38A	Cantlin loamy fine sand, 0 to 3 percent slopes	13.1	0.2%
D44A	Isanti loamy fine sand, 0 to 2 percent slopes	0.4	0.0%
D46A	Lino loamy fine sand, 0 to 2 percent slopes	13.7	0.2%
D47A	Kost loamy fine sand, 0 to 2 percent slopes	15.6	0.2%
D47B	Kost loamy fine sand, 2 to 6 percent slopes	24.9	0.3%
D48A	Cantlin loamy fine sand, thick surface, 0 to 2 percent slopes	55.8	0.7%
D50A	Isanti fine sandy loam, depressional, 0 to 1 percent slopes	1.8	0.0%

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
D51A	Kost loamy fine sand, banded substratum, 0 to 2 percent slopes	40.9	0.5%
D51B	Kost loamy fine sand, banded substratum, 2 to 6 percent slopes	61.2	0.7%
D51C	Kost loamy fine sand, banded substratum, 6 to 12 percent slopes	45.0	0.5%
D52A	Glendorado loamy fine sand, 0 to 2 percent slopes	26.9	0.3%
D54B	Hubbard, bedrock substratum-Rock outcrop complex, 1 to 8 percent slopes	46.8	0.6%
D55B	Zimmerman fine sand, banded substratum, 1 to 6 percent slopes	238.8	2.8%
D55C	Zimmerman fine sand, banded substratum, 6 to 12 percent slopes	54.6	0.6%
D55E	Zimmerman fine sand, banded substratum, 12 to 35 percent slopes	165.5	2.0%
D61A	Glendorado loamy sand, 0 to 2 percent slopes	74.2	0.9%
D62A	Hubbard-Mosford complex, Mississippi River Valley, 0 to 3 percent slopes	95.6	1.1%
D67A	Hubbard loamy sand, 0 to 2 percent slopes	694.7	8.2%
D67B	Hubbard loamy sand, 1 to 6 percent slopes	599.4	7.1%
D67C	Hubbard loamy sand, 2 to 12 percent slopes	89.6	1.1%
D67E	Hubbard loamy sand, Mississippi River Valley, 18 to 35 percent slopes	56.3	0.7%
GP	Pits, gravel-Udipsamments complex	2.6	0.0%
W	Water	2,133.5	25.3%
Subtotals for Soil Survey Area		**5,828.8**	**69.2%**
Totals for Area of Interest		**8,425.8**	**100.0%**

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
25	Becker fine sandy loam	42.5	0.5%
119B	Pomroy fine sand, 1 to 6 percent slopes	40.9	0.5%

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
156B	Fairhaven loam, 2 to 6 percent slopes	16.3	0.2%
163B	Brainerd fine sandy loam, 1 to 4 percent slopes	1.0	0.0%
179B	Langola loamy sand, 1 to 4 percent slopes	28.6	0.3%
181	Litchfield loamy sand	4.3	0.1%
218	Watab loamy fine sand	20.8	0.2%
260	Duelm loamy sand, 0 to 2 percent slopes	57.2	0.7%
261	Isan-Isan, frequently ponded, complex, 0 to 2 percent slopes	7.7	0.1%
327A	Sverdrup sandy loam, Sandy Outwash, 0 to 2 percent slopes	33.5	0.4%
327B	Sverdrup sandy loam, Sandy Outwash, 2 to 6 percent slopes	7.8	0.1%
465	Kalmarville sandy loam, frequently flooded	119.2	1.4%
1018	Udifluvents, frequently flooded	84.5	1.0%
1892	Prebish fine sandy loam	1.1	0.0%
D67A	Hubbard loamy sand, 0 to 2 percent slopes	802.3	9.5%
D67B	Hubbard loamy sand, 1 to 6 percent slopes	715.7	8.5%
D67C	Hubbard loamy sand, 2 to 12 percent slopes	0.1	0.0%
W	Water	613.4	7.3%
Subtotals for Soil Survey Area		**2,597.0**	**30.8%**
Totals for Area of Interest		**8,425.8**	**100.0%**

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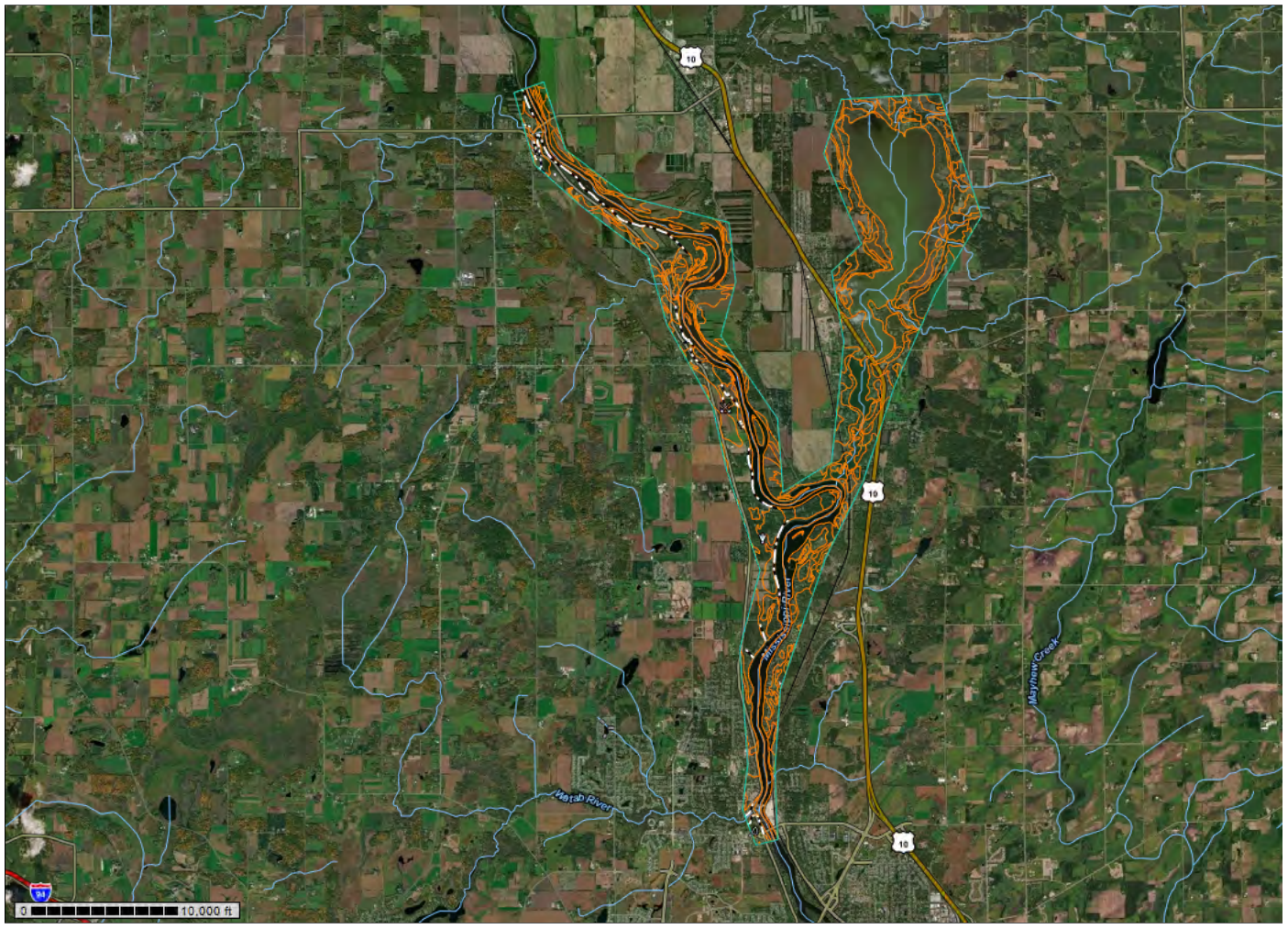
- Soil Physical Properties
- Soil Qualities and Features
- Vegetative Productivity
- Waste Management
- Water Features
- Water Management

Soil Map

Scale (not to scale)



Report — RUSLE2 Related Attributes

Soil properties and interpretations for erosion runoff calculations. The surface mineral horizon properties are displayed or the first mineral horizon below an organic surface horizon. Organic horizons are not displayed.

Benton County, Minnesota								
Map symbol and soil name	**Pct. of map unit**	**Slope length (ft)**	**Hydrologic group**	**Kf**	**T factor**	**Representative value**		
						% Sand	**% Silt**	**% Clay**
1011A—Fordum-Winterfield complex, 0 to 2 percent slopes, frequently flooded								
Fordum, frequently flooded	65	148	A/D	.28	3	65.0	27.0	8.0
Winterfield, frequently flooded	25	49	A/D	.17	5	87.3	6.7	6.0
1023A—Seelyeville and Markey soils, ponded, 0 to 1 percent slopes								
Markey, ponded	45	125	A/D	—	1	—	—	—
C60A—Bushville fine sand, 0 to 2 percent slopes								
Bushville	85	82	C/D	.10	4	94.4	0.6	5.0
C69B—Milaca, stony-St. Francis complex, 3 to 8 percent slopes								
Milaca, stony	55	79	A/D	.15	4	71.3	16.7	12.0
St. francis	35	79	B	.32	2	69.3	21.7	9.0
D2A—Elkriver fine sandy loam, 0 to 2 percent slopes, rarely flooded								
Elkriver, rarely flooded	95	125	B	.28	3	64.2	26.8	9.0
D3A—Elkriver fine sandy loam, 0 to 2 percent slopes, occasionally flooded								
Elkriver, occasionally flooded	80	125	B/D	.28	3	64.2	26.8	9.0
D8E—Sandberg loamy coarse sand, 6 to 30 percent slopes								
Sandberg	75	102	A	.15	5	80.0	14.0	6.0
D14B—Elkriver-Mosford complex, 0 to 6 percent slopes, rarely flooded								
Elkriver, rarely flooded	70	125	B	.28	3	64.2	26.8	9.0
Mosford, rarely flooded	30	125	B	.28	2	67.3	20.2	12.5
D17A—Duelm loamy sand, 0 to 2 percent slopes								
Duelm	80	151	A	.17	5	85.0	9.0	6.0
D20A—Isan-Isan, frequently ponded, complex, 0 to 2 percent slopes								
Isan	65	98	A/D	.20	2	67.0	24.0	9.0

Benton County, Minnesota								
Isan, frequently ponded	30	98	A/D	.20	2	67.0	24.0	9.0
D30A—Seelyeville and Markey soils, depressional, 0 to 1 percent slopes								
Markey, depressional	45	125	A/D	—	1	—	—	—
D38A—Cantlin loamy fine sand, 0 to 3 percent slopes								
Cantlin	85	102	A	.20	5	80.3	16.7	3.0
D44A—Isanti loamy fine sand, 0 to 2 percent slopes								
Isanti	85	49	A/D	.28	5	80.3	16.7	3.0
D46A—Lino loamy fine sand, 0 to 2 percent slopes								
Lino	85	49	A/D	.32	5	80.3	16.7	3.0
D47A—Kost loamy fine sand, 0 to 2 percent slopes								
Kost	93	82	A	.17	5	86.8	6.7	6.5
D47B—Kost loamy fine sand, 2 to 6 percent slopes								
Kost	93	102	A	.17	5	86.8	6.7	6.5
D48A—Cantlin loamy fine sand, thick surface, 0 to 2 percent slopes								
Cantlin, thick surface	90	148	A	.17	5	80.3	16.7	3.0
D50A—Isanti fine sandy loam, depressional, 0 to 1 percent slopes								
Isanti, depressional	85	49	A/D	.28	2	65.8	31.2	3.0
D51A—Kost loamy fine sand, banded substratum, 0 to 2 percent slopes								
Kost, banded substratum	90	82	A	.17	5	86.8	6.7	6.5
D51B—Kost loamy fine sand, banded substratum, 2 to 6 percent slopes								
Kost, banded substratum	90	102	A	.17	5	86.8	6.7	6.5
D51C—Kost loamy fine sand, banded substratum, 6 to 12 percent slopes								
Kost, banded substratum	90	79	A	.17	5	86.8	6.7	6.5
D52A—Glendorado loamy fine sand, 0 to 2 percent slopes								

Benton County, Minnesota								
Glendorado	85	148	A/D	.17	5	86.8	6.7	6.5
D54B—Hubbard, bedrock substratum-Rock outcrop complex, 1 to 8 percent slopes								
Hubbard, bedrock substratum	70	—	A	.10	5	83.8	9.2	7.0
D55B—Zimmerman fine sand, banded substratum, 1 to 6 percent slopes								
Zimmerman, banded substratum	85	79	A	.10	5	97.3	0.7	2.0
D55C—Zimmerman fine sand, banded substratum, 6 to 12 percent slopes								
Zimmerman, banded substratum	85	75	A	.10	5	97.3	0.7	2.0
D55E—Zimmerman fine sand, banded substratum, 12 to 35 percent slopes								
Zimmerman, banded substratum	85	75	A	.10	5	97.3	0.7	2.0
D61A—Glendorado loamy sand, 0 to 2 percent slopes								
Glendorado	85	148	A/D	.15	5	84.9	9.1	6.0
D62A—Hubbard-Mosford complex, Mississippi River Valley, 0 to 3 percent slopes								
Hubbard, terrace	60	82	A	.02	5	86.0	8.0	6.0
Mosford	35	82	A	.20	2	68.0	19.0	13.0
D67A—Hubbard loamy sand, 0 to 2 percent slopes								
Hubbard	90	151	A	.02	5	86.0	8.0	6.0
D67B—Hubbard loamy sand, 1 to 6 percent slopes								
Hubbard	85	125	A	.02	5	86.0	8.0	6.0
D67C—Hubbard loamy sand, 2 to 12 percent slopes								
Hubbard	85	151	A	.02	5	86.0	8.0	6.0
D67E—Hubbard loamy sand, Mississippi River Valley, 18 to 35 percent slopes								
Hubbard, terrace	85	102	A	.02	5	86.0	8.0	6.0
Stearns County, Minnesota								

Stearns County, Minnesota								
Map symbol and soil name	**Pct. of map unit**	**Slope length (ft)**	**Hydrologic group**	**Kf**	**T factor**	**Representative value**		
						% Sand	**% Silt**	**% Clay**
25—Becker fine sandy loam								
Becker	90	102	A	.20	3	62.5	26.0	11.5
119B—Pomroy fine sand, 1 to 6 percent slopes								
Pomroy	90	177	A	.10	4	94.4	0.6	5.0
156B—Fairhaven loam, 2 to 6 percent slopes								
Fairhaven	90	161	B	.28	3	39.8	37.7	22.5
163B—Brainerd fine sandy loam, 1 to 4 percent slopes								
Brainerd	90	253	C/D	.24	4	66.9	20.1	13.0
179B—Langola loamy sand, 1 to 4 percent slopes								
Langola	90	203	A	.15	4	84.9	9.1	6.0
181—Litchfield loamy sand								
Litchfield	90	102	A	.10	5	83.5	9.0	7.5
218—Watab loamy fine sand								
Watab	90	75	C/D	.17	4	85.9	6.6	7.5
260—Duelm loamy sand, 0 to 2 percent slopes								
Duelm	80	151	A	.17	5	85.0	9.0	6.0
261—Isan-Isan, frequently ponded, complex, 0 to 2 percent slopes								
Isan	65	98	A/D	.20	2	67.0	24.0	9.0
Isan, frequently ponded	30	98	A/D	.20	2	67.0	24.0	9.0
327A—Sverdrup sandy loam, Sandy Outwash, 0 to 2 percent slopes								
Sverdrup	70	125	A	.20	2	61.0	24.0	15.0
327B—Sverdrup sandy loam, Sandy Outwash, 2 to 6 percent slopes								
Sverdrup	70	138	A	.20	2	61.0	24.0	15.0
465—Kalmarville sandy loam, frequently flooded								
Kalmarville, frequently flooded	100	102	A/D	.24	4	65.3	23.2	11.5

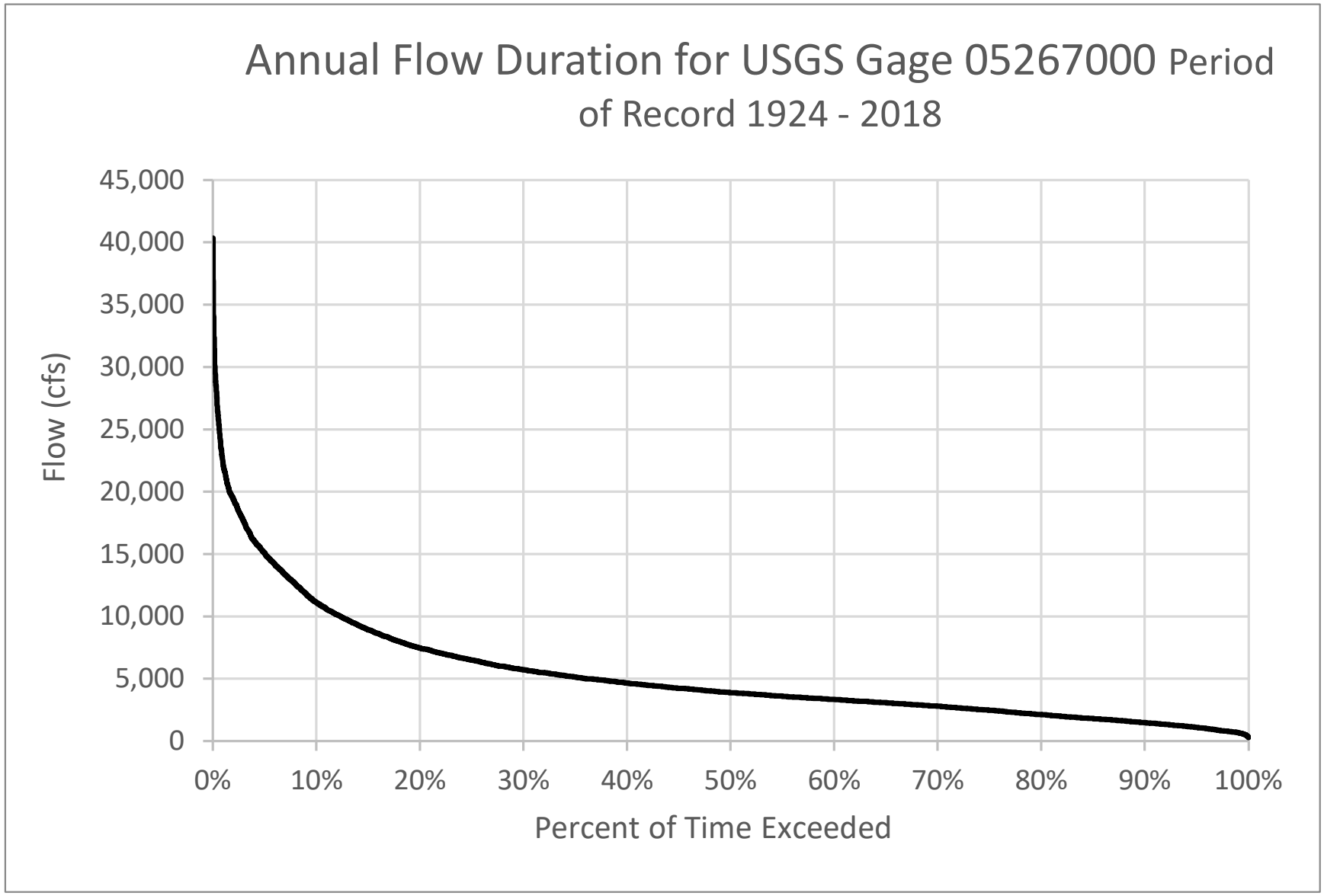
Stearns County, Minnesota								
1018—Udifluvents, frequently flooded								
Udifluvents, frequently flooded	90	102	A/D	.32	3	64.2	26.8	9.0
1892—Prebish fine sandy loam								
Prebish	95	151	B/D	.24	4	67.3	20.2	12.5
D67A—Hubbard loamy sand, 0 to 2 percent slopes								
Hubbard	90	151	A	.02	5	86.0	8.0	6.0
D67B—Hubbard loamy sand, 1 to 6 percent slopes								
Hubbard	85	125	A	.02	5	86.0	8.0	6.0
D67C—Hubbard loamy sand, 2 to 12 percent slopes								
Hubbard	85	151	A	.02	5	86.0	8.0	6.0

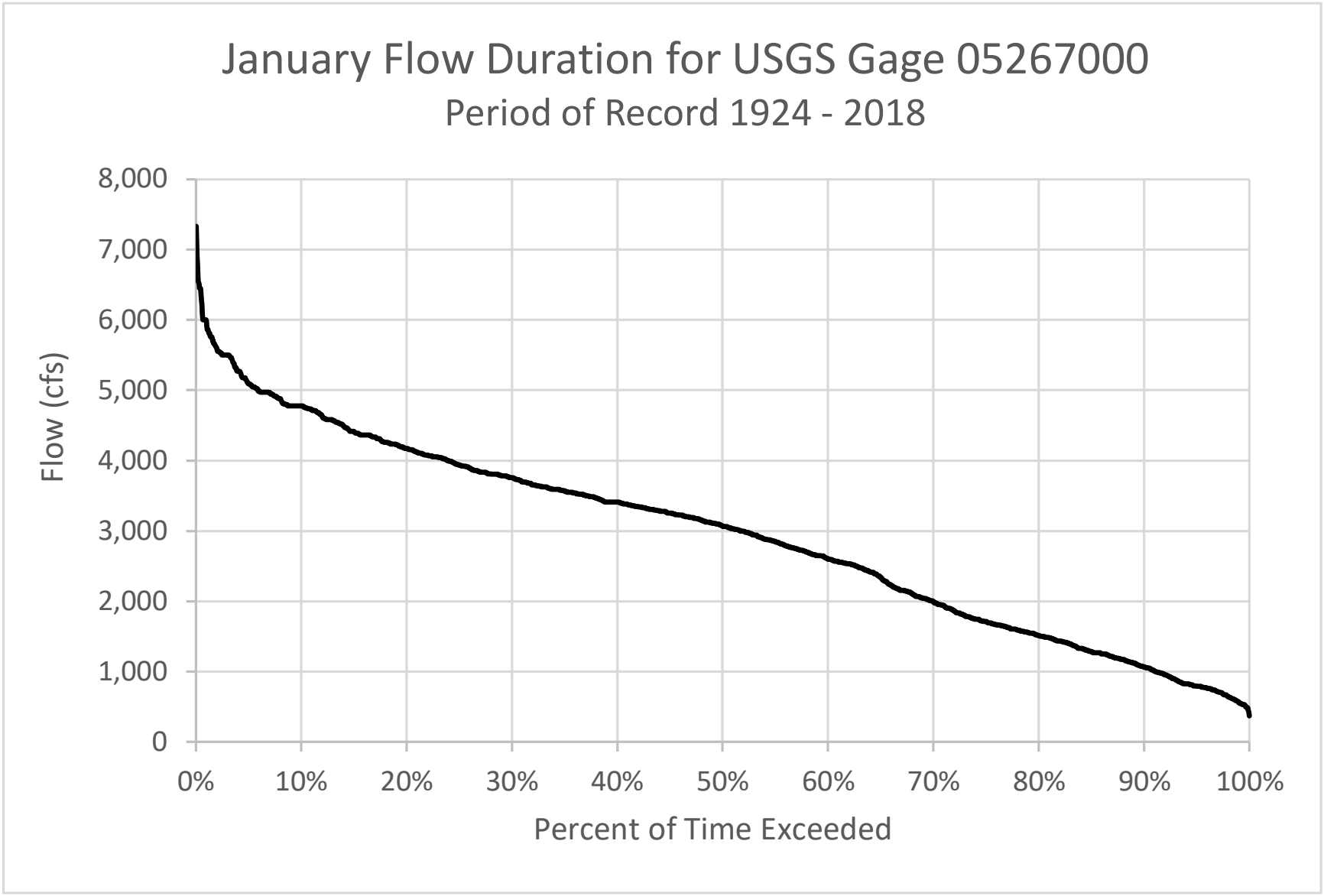
Description — RUSLE2 Related Attributes

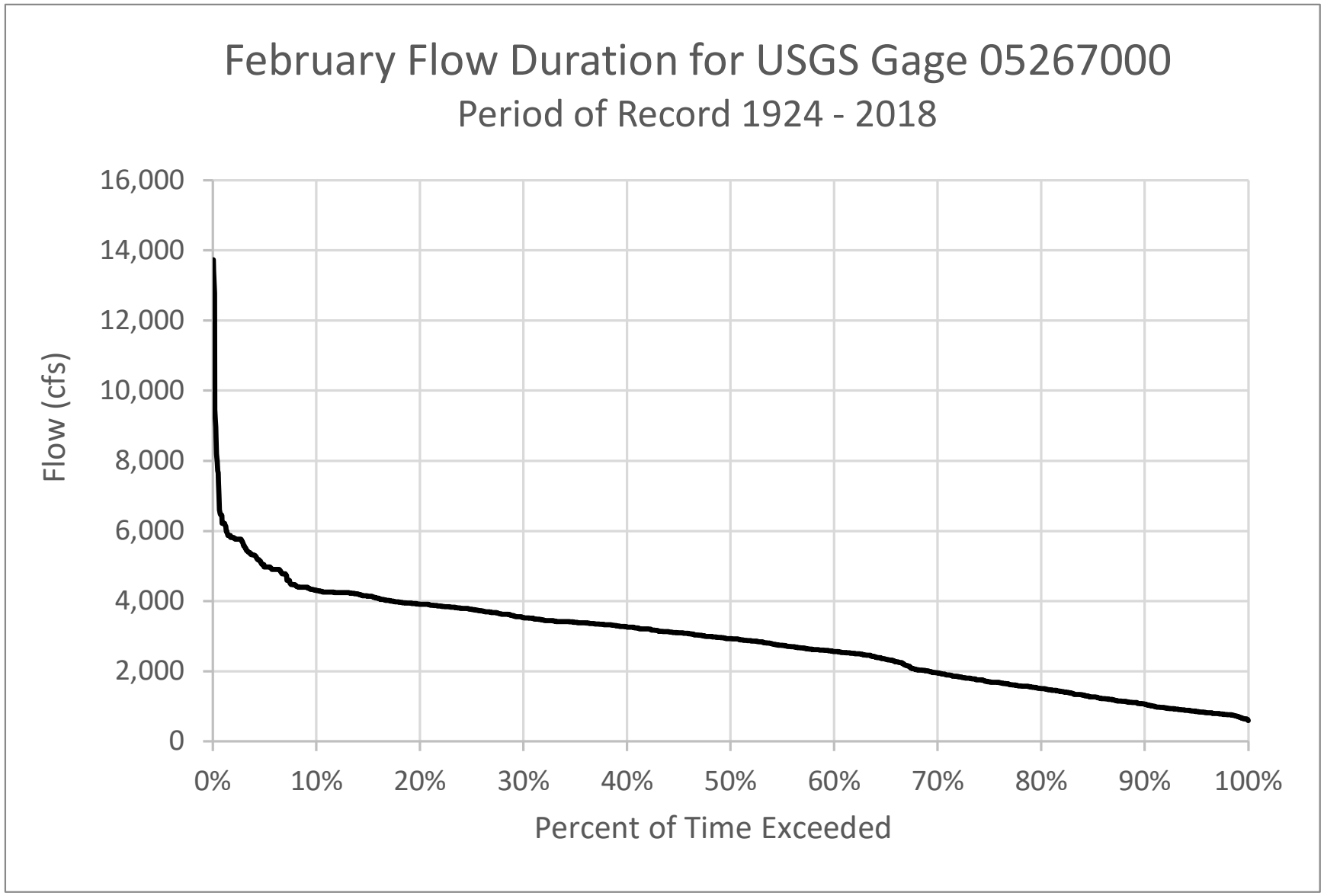
RUSLE2 Related Attributes

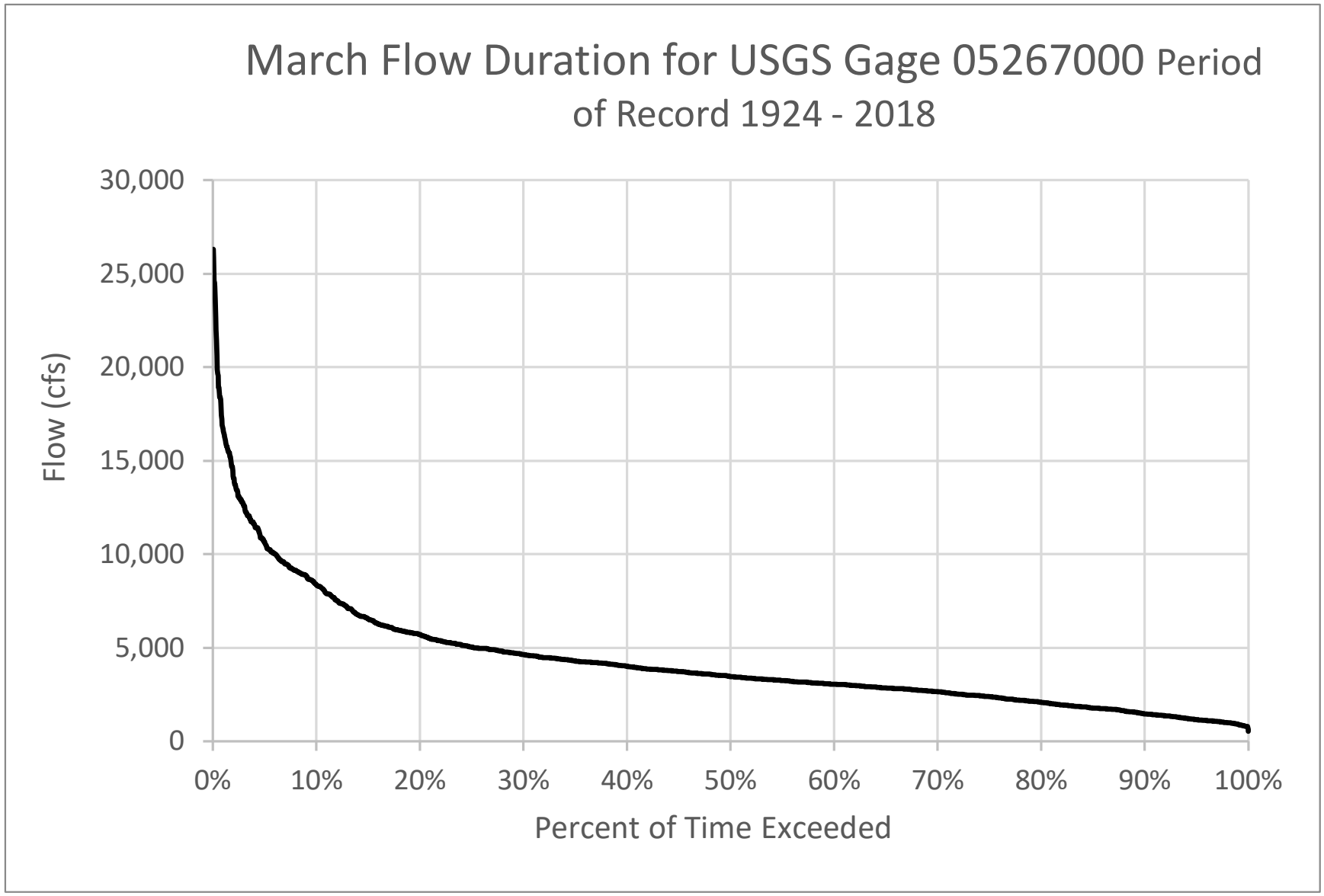
This report summarizes those soil attributes used by the Revised Universal Soil Loss Equation Version 2 (RUSLE2) for the map units in the selected area. The report includes the map unit symbol, the component name, and the percent of the component in the map unit. Soil property data for each map unit component include the hydrologic soil group, erosion factor Kf for the surface horizon, erosion factor T, and the representative percentage of sand, silt, and clay in the mineral surface horizon. Missing surface data may indicate the presence of an organic layer.

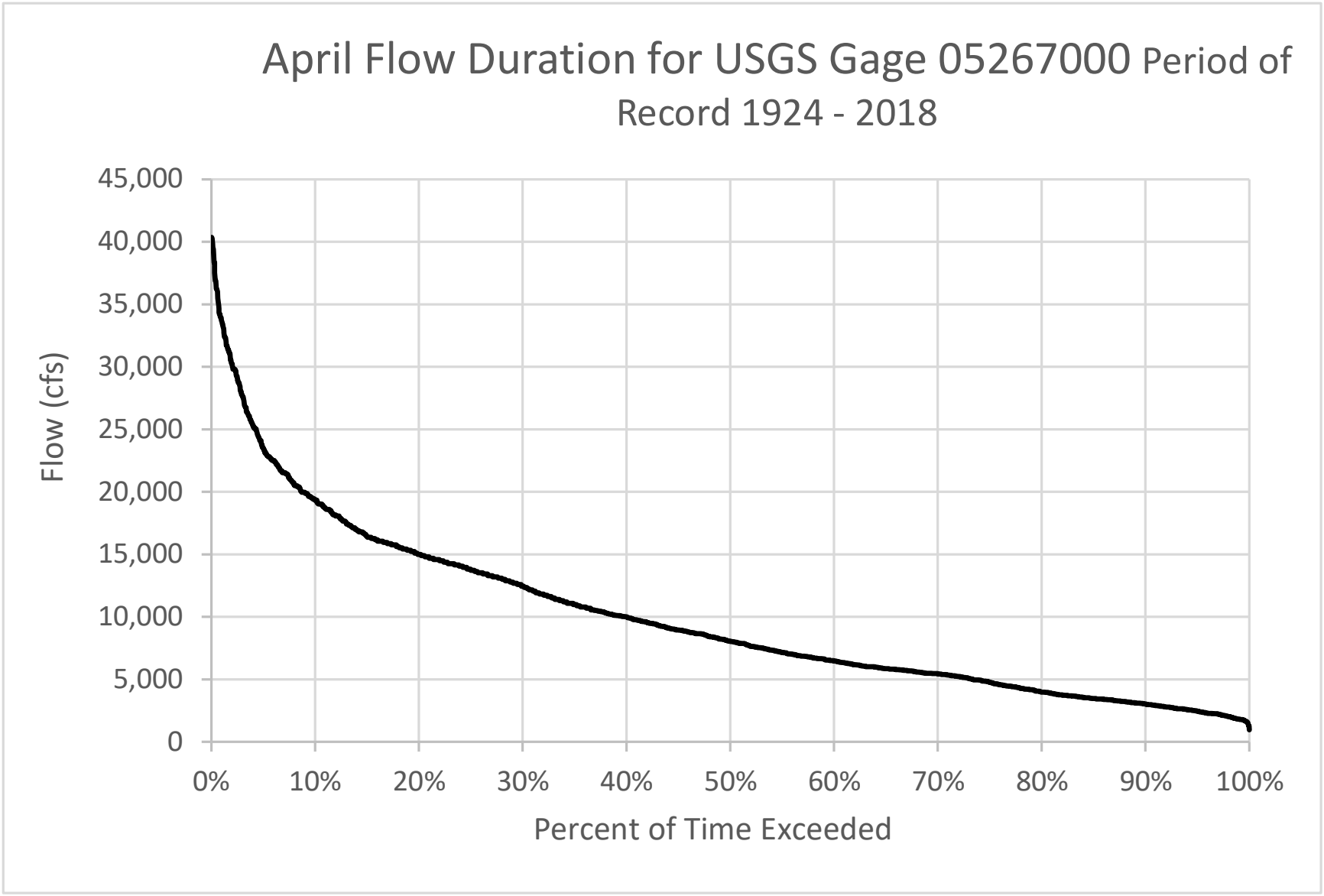
APPENDIX 4.3.2-1 **Sartell Project Flow Duration Curves and Exceedance Table**

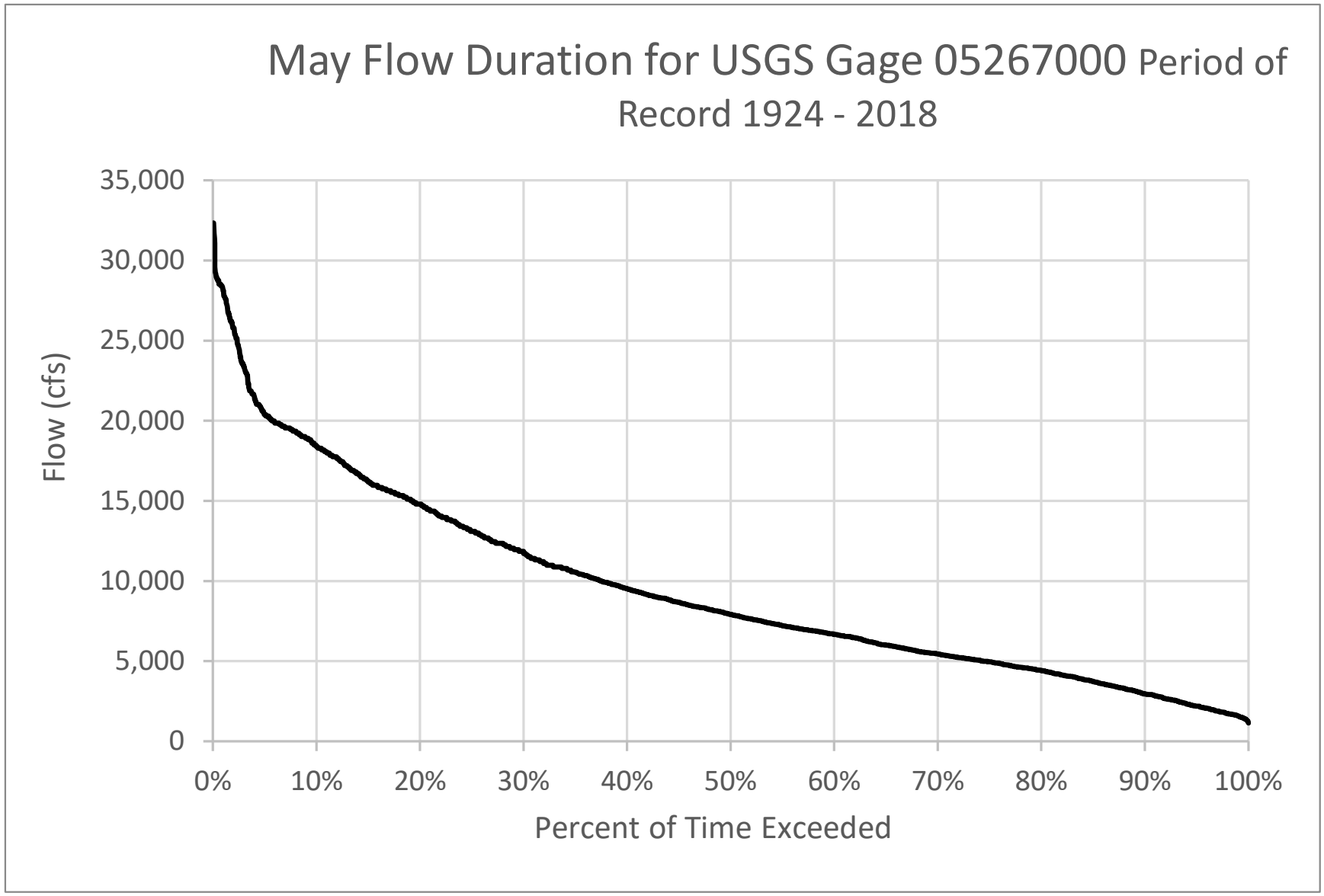

Annual Flow Duration for USGS Gage 05267000 Period of Record 1924 - 2018
Flow (cfs)
45,000
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Percent of Time Exceeded

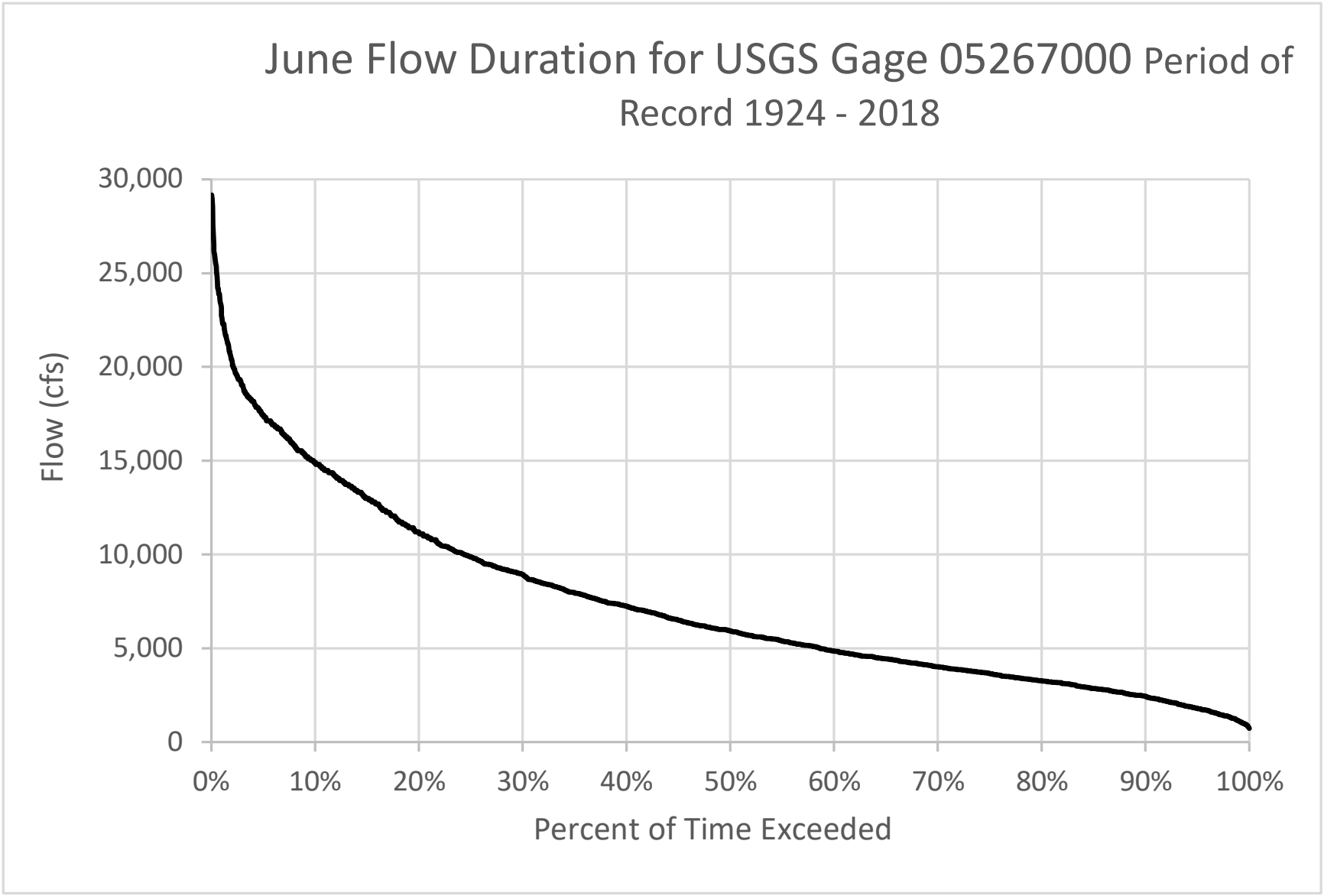

January Flow Duration for USGS Gage 05267000
Period of Record 1924 - 2018
Flow (cfs)
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Percent of Time Exceeded

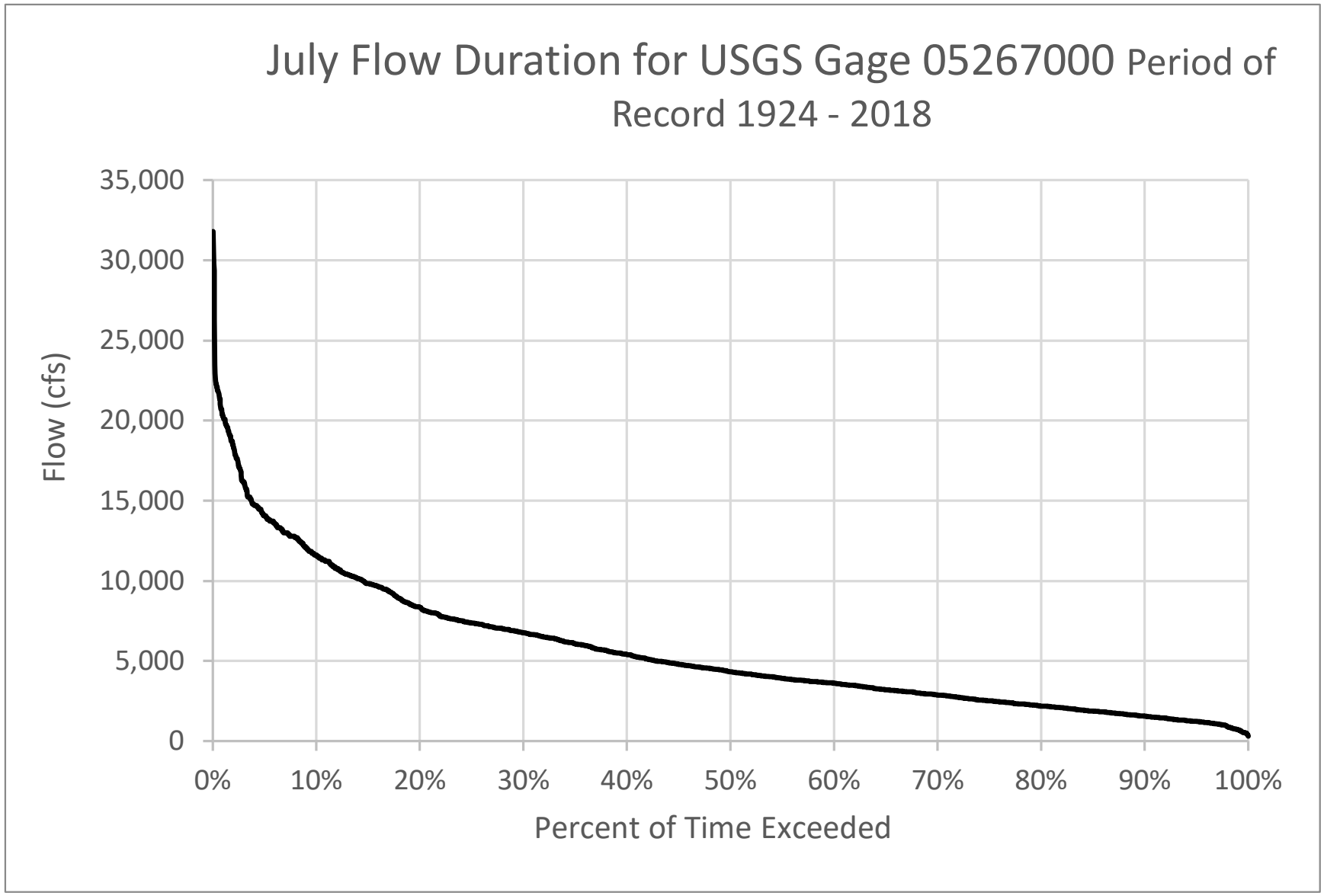

February Flow Duration for USGS Gage 05267000
Period of Record 1924 - 2018
Flow (cfs)
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Percent of Time Exceeded

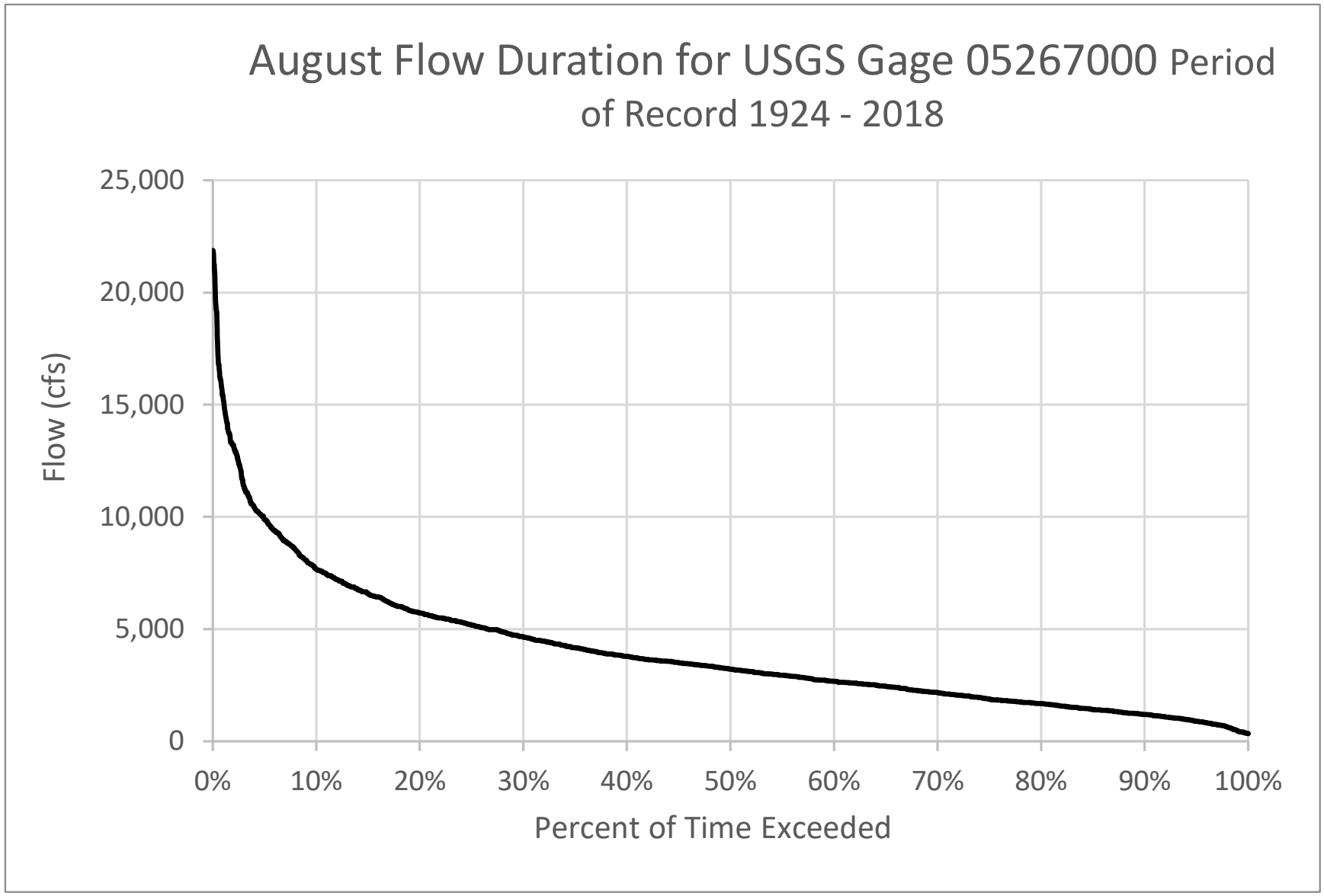

March Flow Duration for USGS Gage 05267000 Period of Record 1924 - 2018
Flow (cfs)
30,000
25,000
20,000
15,000
10,000
5,000
0
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Percent of Time Exceeded

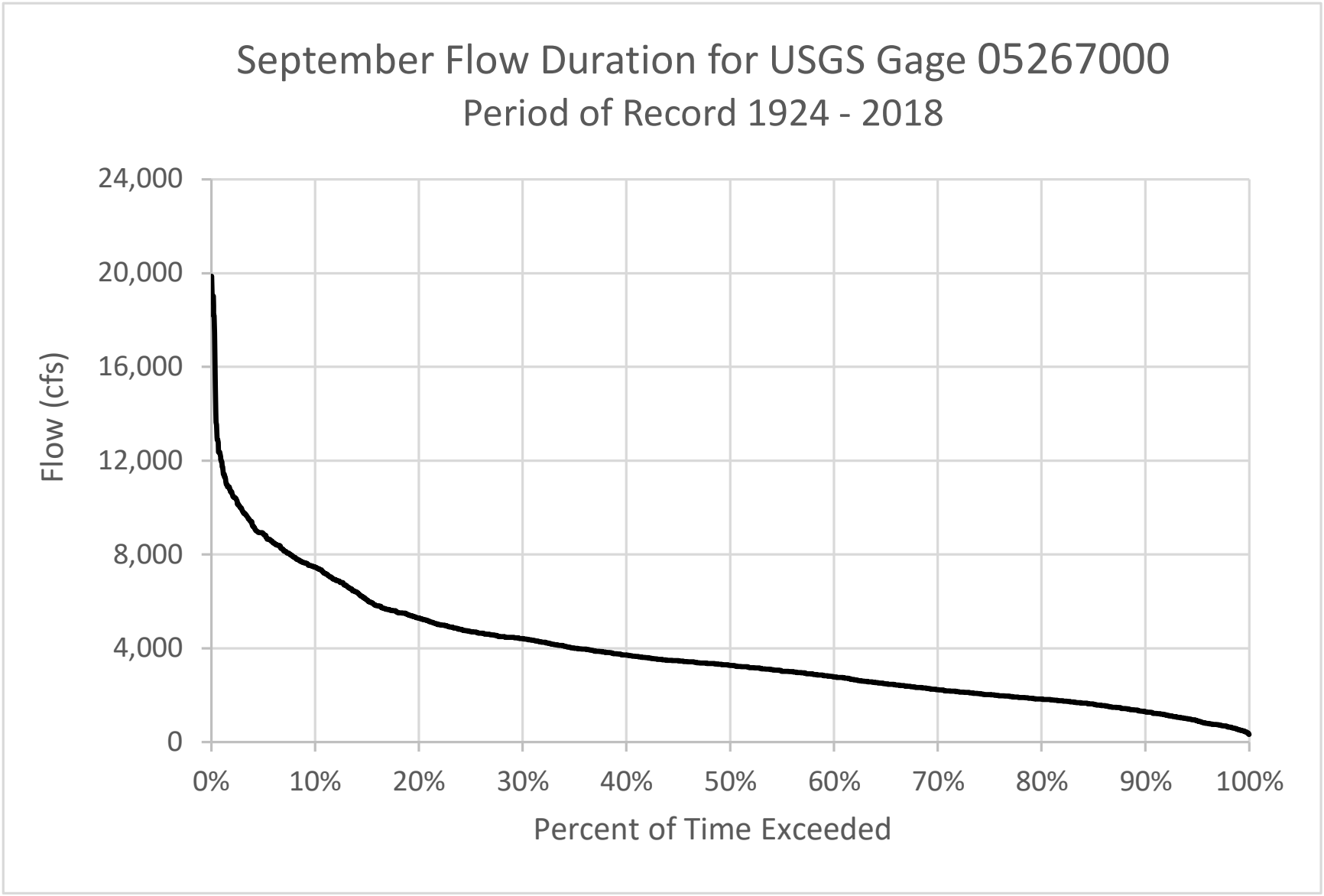

April Flow Duration for USGS Gage 05267000 Period of Record 1924 - 2018
Flow (cfs)
45,000
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Percent of Time Exceeded

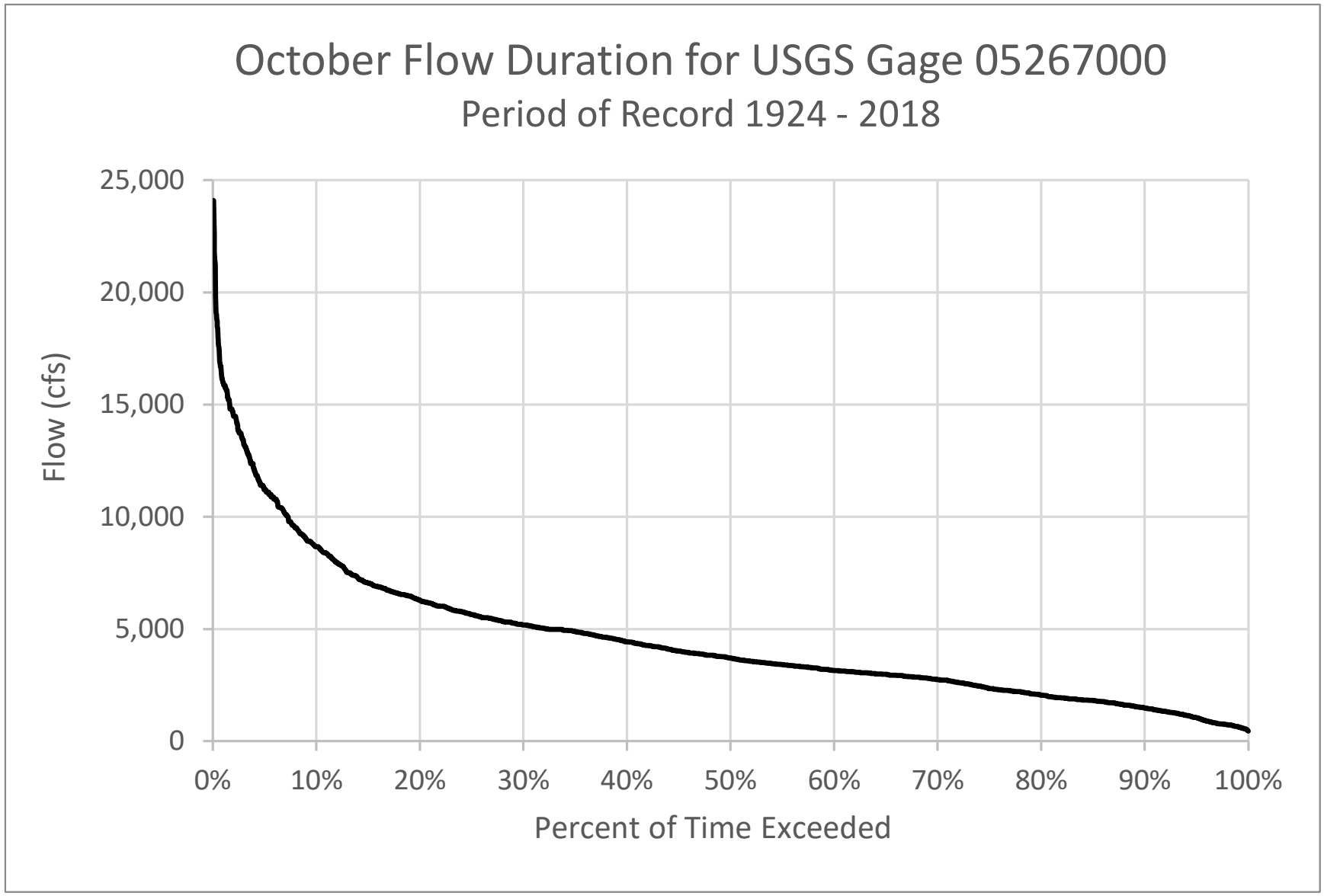

May Flow Duration for USGS Gage 05267000 Period of Record 1924 - 2018
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
Flow (cfs)
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Percent of Time Exceeded

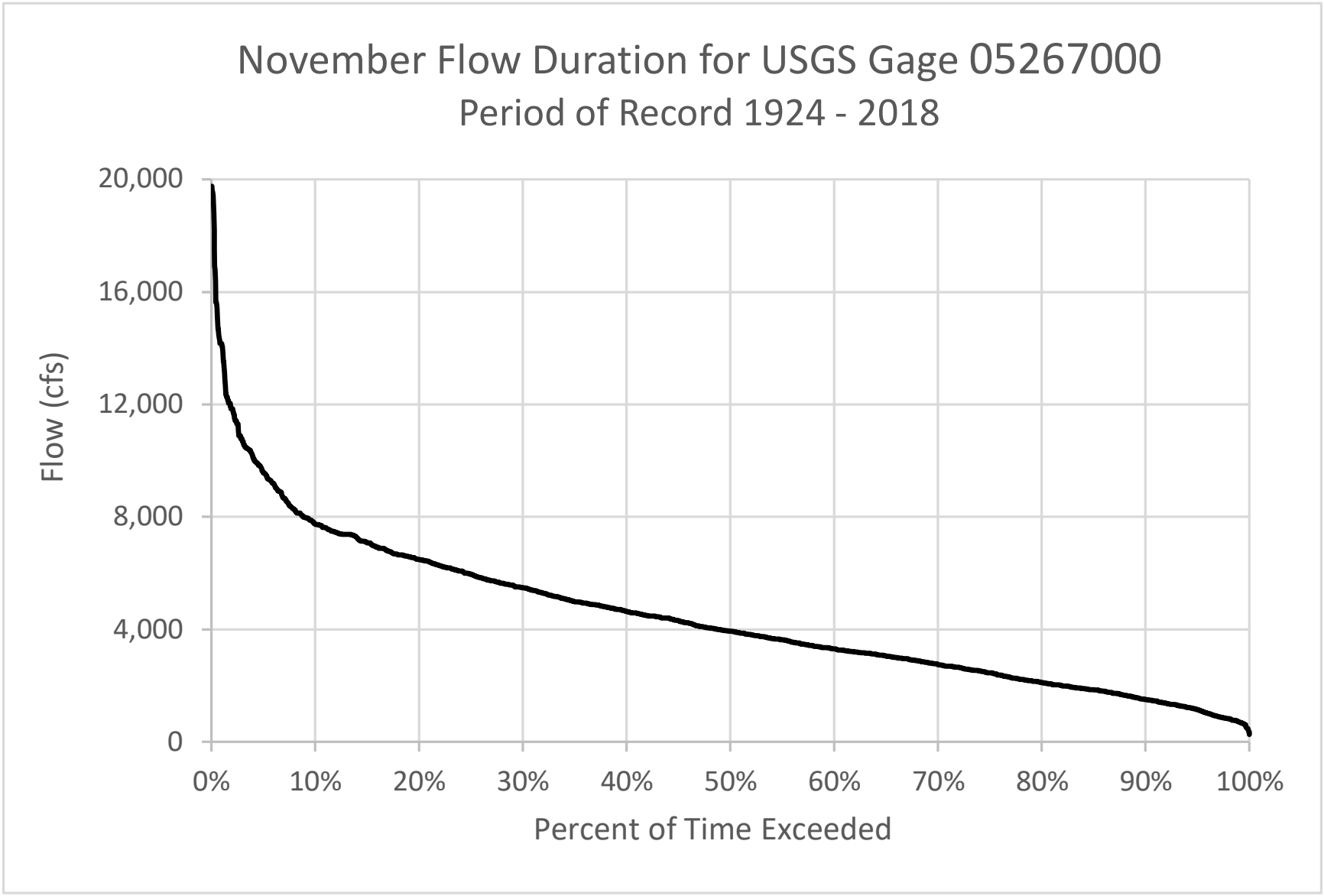

June Flow Duration for USGS Gage 05267000 Period of Record 1924 - 2018
Flow (cfs)
30,000
25,000
20,000
15,000
10,000
5,000
0
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Percent of Time Exceeded

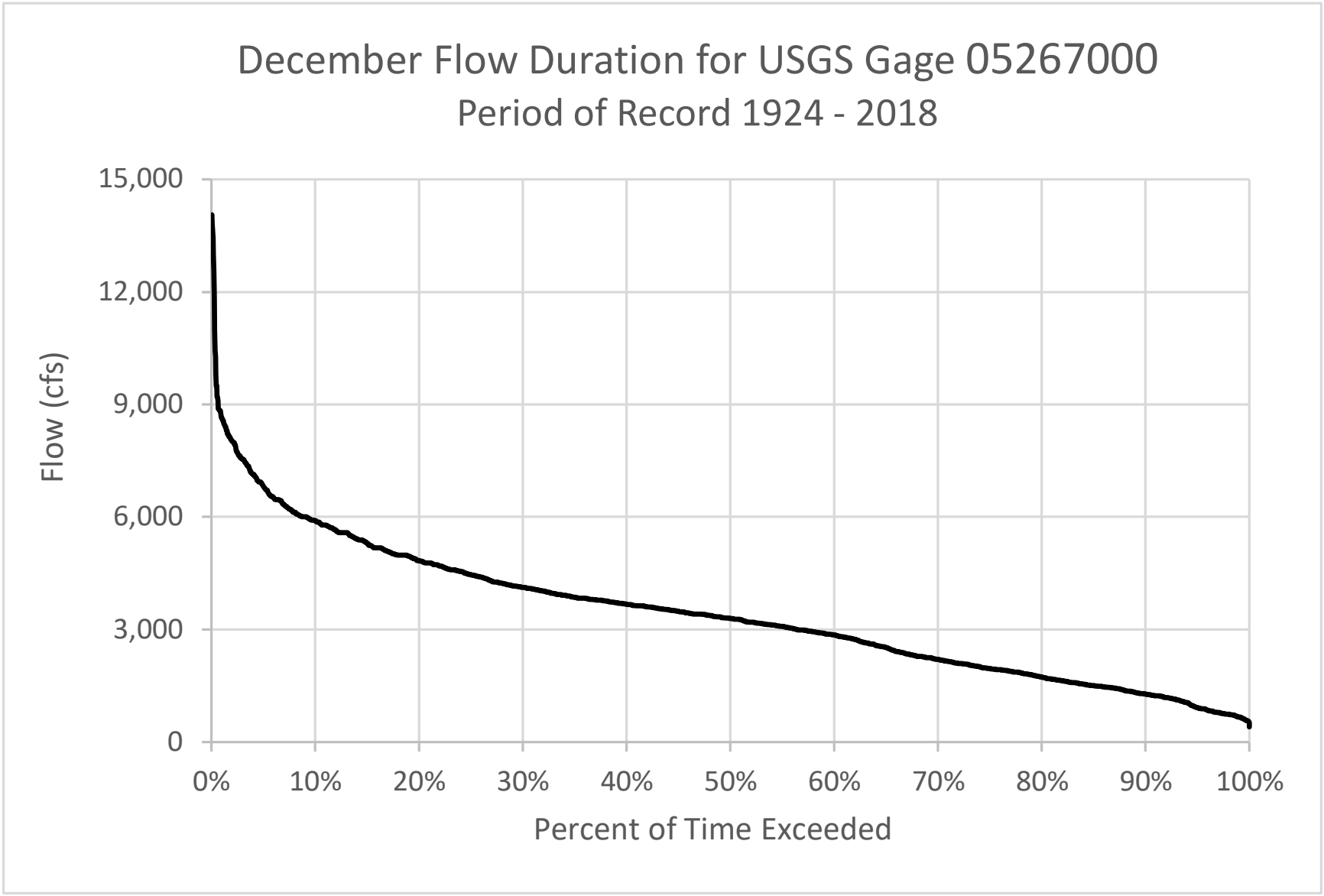

July Flow Duration for USGS Gage 05267000 Period of Record 1924 - 2018
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
Flow (cfs)
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Percent of Time Exceeded


August Flow Duration for USGS Gage 05267000 Period of Record 1924 - 2018
25,000
20,000
15,000
10,000
5,000
0
Flow (cfs)
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Percent of Time Exceeded


September Flow Duration for USGS Gage 05267000
Period of Record 1924 - 2018
Flow (cfs)
24,000
20,000
16,000
12,000
8,000
4,000
0
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Percent of Time Exceeded


October Flow Duration for USGS Gage 05267000
Period of Record 1924 - 2018
25,000
20,000
15,000
10,000
5,000
0
Flow (cfs)
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Percent of Time Exceeded


November Flow Duration for USGS Gage 05267000
Period of Record 1924 - 2018
Flow (cfs)
20,000
16,000
12,000
8,000
4,000
0
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Percent of Time Exceeded


December Flow Duration for USGS Gage 05267000
Period of Record 1924 - 2018
15,000
12,000
9,000
6,000
3,000
0
Flow (cfs)
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Percent of Time Exceeded

Flow Duration for USGS Gage 05267000 (Period of Record 1924 - 2018)

Percent of Time	January	February	March	April	May	June	July	August	September	October	November	December	Annual
95	795	854	1152	2451	2198	1796	1236	889	902	1035	1152	914	1099
90	1067	1057	1458	3032	2958	2430	1553	1204	1289	1479	1511	1278	1479
85	1289	1268	1775	3476	3740	2853	1870	1416	1617	1807	1860	1500	1807
80	1511	1500	2071	3994	4416	3265	2198	1680	1828	2060	2113	1733	2113
75	1712	1701	2377	4786	4966	3656	2515	1870	2018	2346	2451	1965	2472
70	1997	1955	2641	5441	5452	4004	2884	2166	2229	2747	2747	2198	2800
65	2335	2335	2853	5853	6001	4427	3212	2451	2483	2969	3053	2515	3075
60	2599	2557	3043	6477	6667	4839	3613	2673	2779	3159	3307	2853	3339
55	2853	2736	3254	7163	7216	5388	3920	2948	3022	3413	3624	3085	3592
50	3075	2927	3444	8051	7924	5917	4321	3212	3265	3698	3930	3286	3888
45	3254	3085	3730	8938	8664	6487	4797	3508	3465	4004	4311	3487	4237
40	3413	3254	4004	9984	9520	7237	5410	3782	3708	4438	4638	3666	4649
35	3561	3392	4290	10988	10544	7945	6086	4173	3994	4892	4987	3856	5135
30	3761	3529	4638	12467	11833	8917	6762	4649	4406	5177	5473	4121	5716
25	3941	3761	5029	13735	13101	9868	7375	5188	4712	5642	5970	4469	6498
20	4173	3909	5705	15003	14792	11199	8368	5727	5283	6276	6487	4839	7470
15	4416	4142	6551	16482	16165	12996	9836	6603	6054	7037	7100	5304	8928
10	4776	4300	8347	19335	18384	14897	11622	7681	7459	8653	7755	5896	11094

APPENDIX 4.3.6-1 Sartell Project Bathymetric Maps

Appendix

Exposed Project Area on the Mississippi River

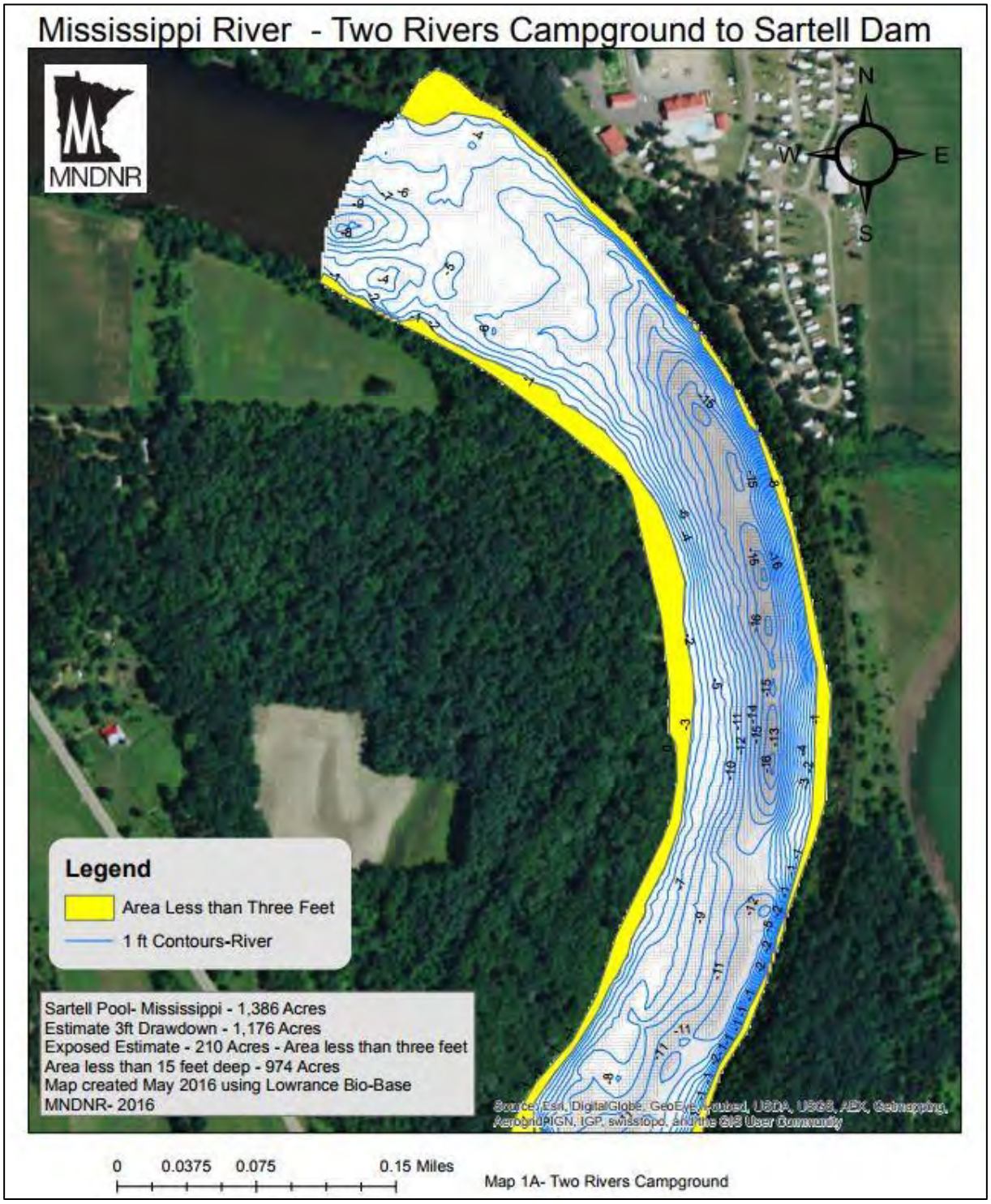


Figure 33: Exposed project area on the Mississippi River

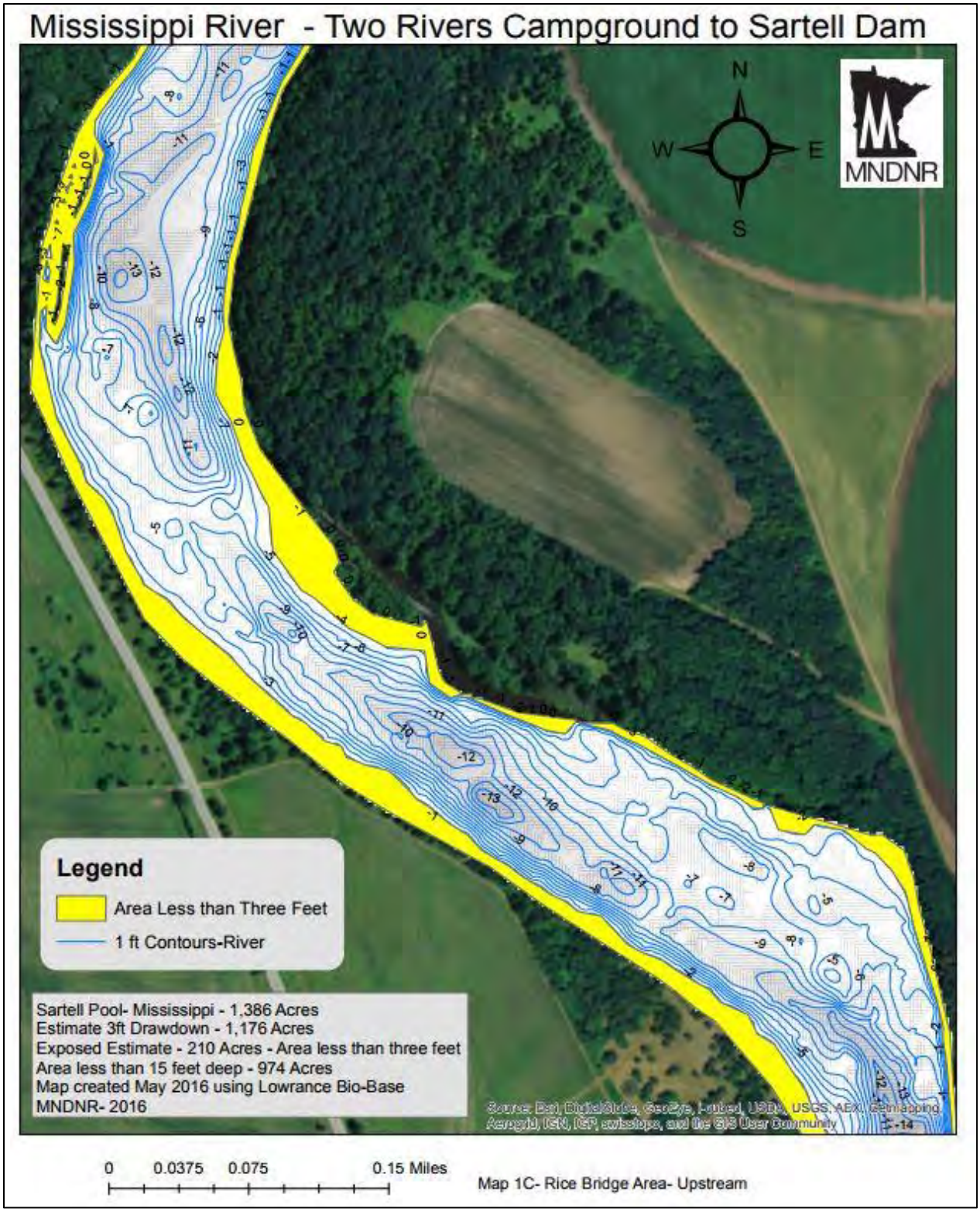


Figure 34: Exposed project area on the Mississippi River

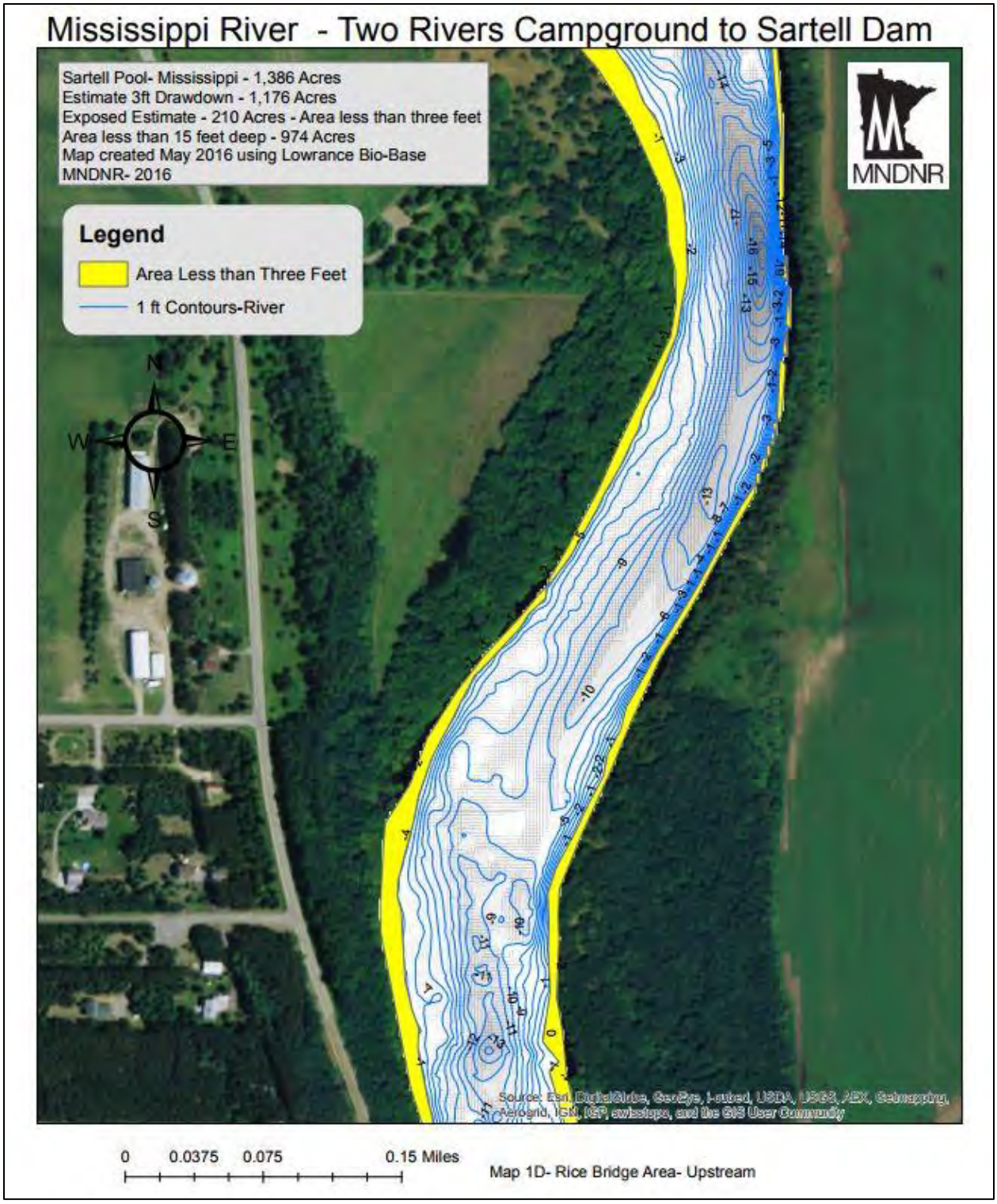


Figure 35: Exposed project area on the Mississippi River

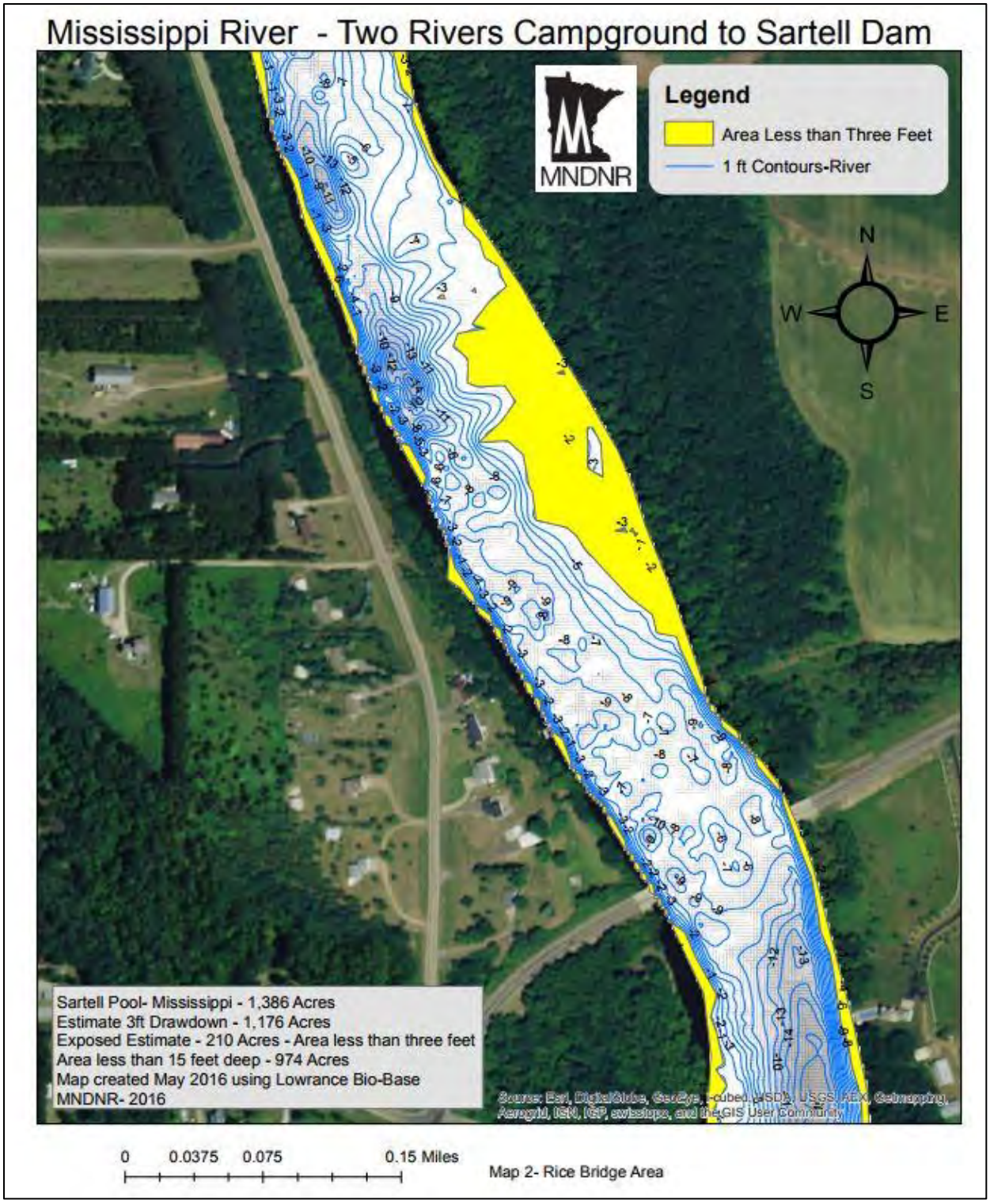


Figure 36: Exposed project area on the Mississippi River

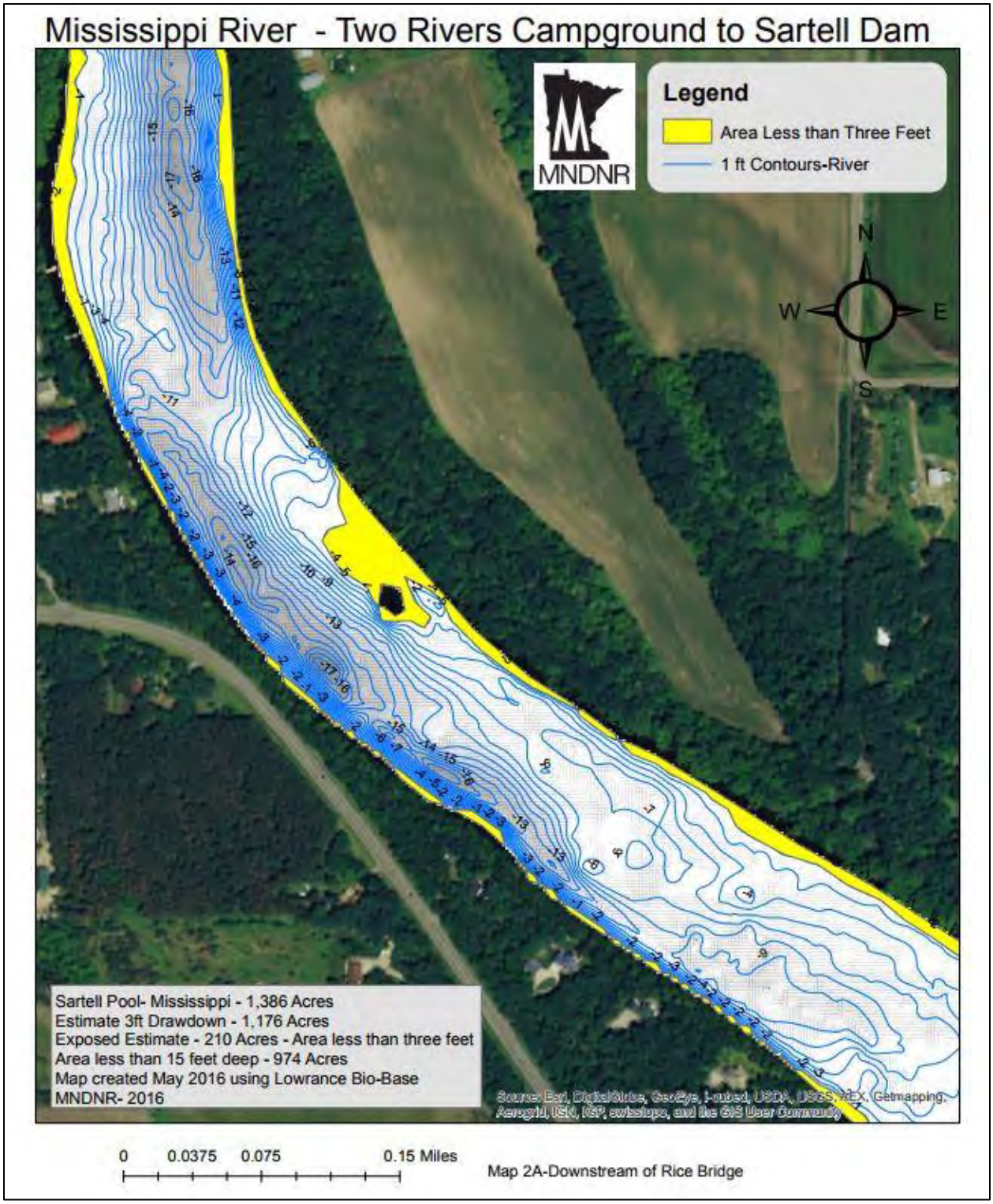


Figure 37: Exposed project area on the Mississippi River

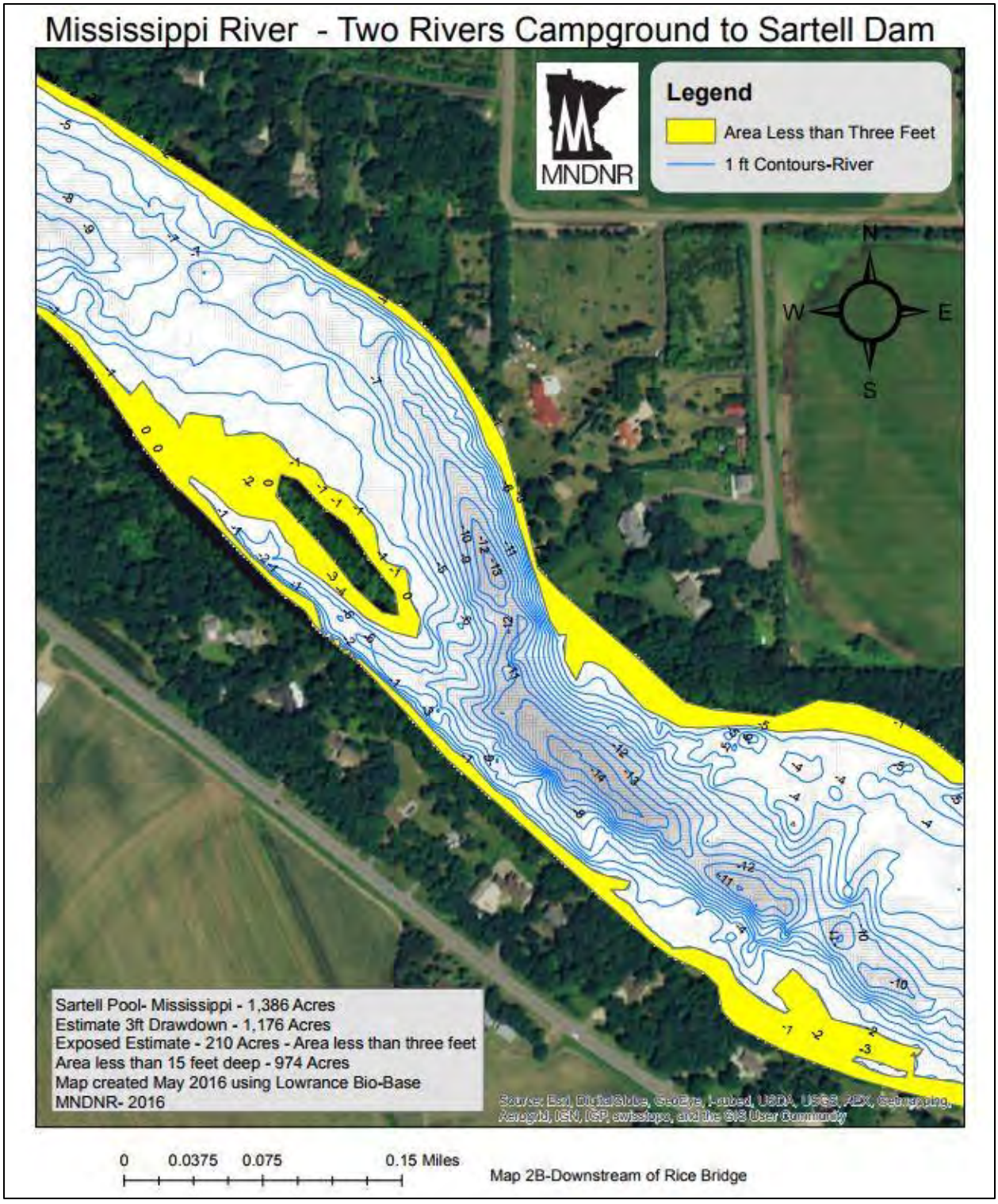


Figure 38: Exposed project area on the Mississippi River

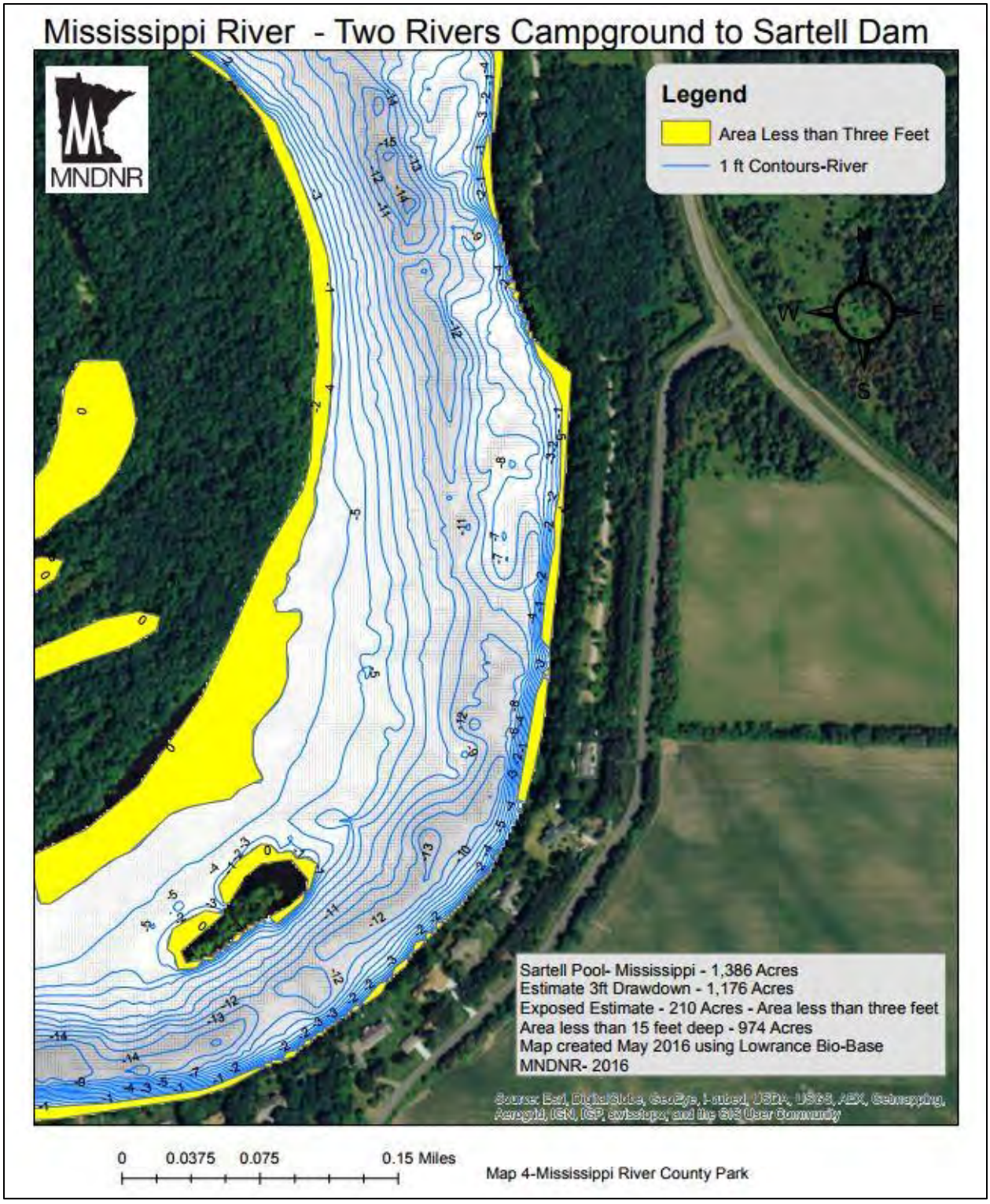


Figure 39: Exposed project area on the Mississippi River

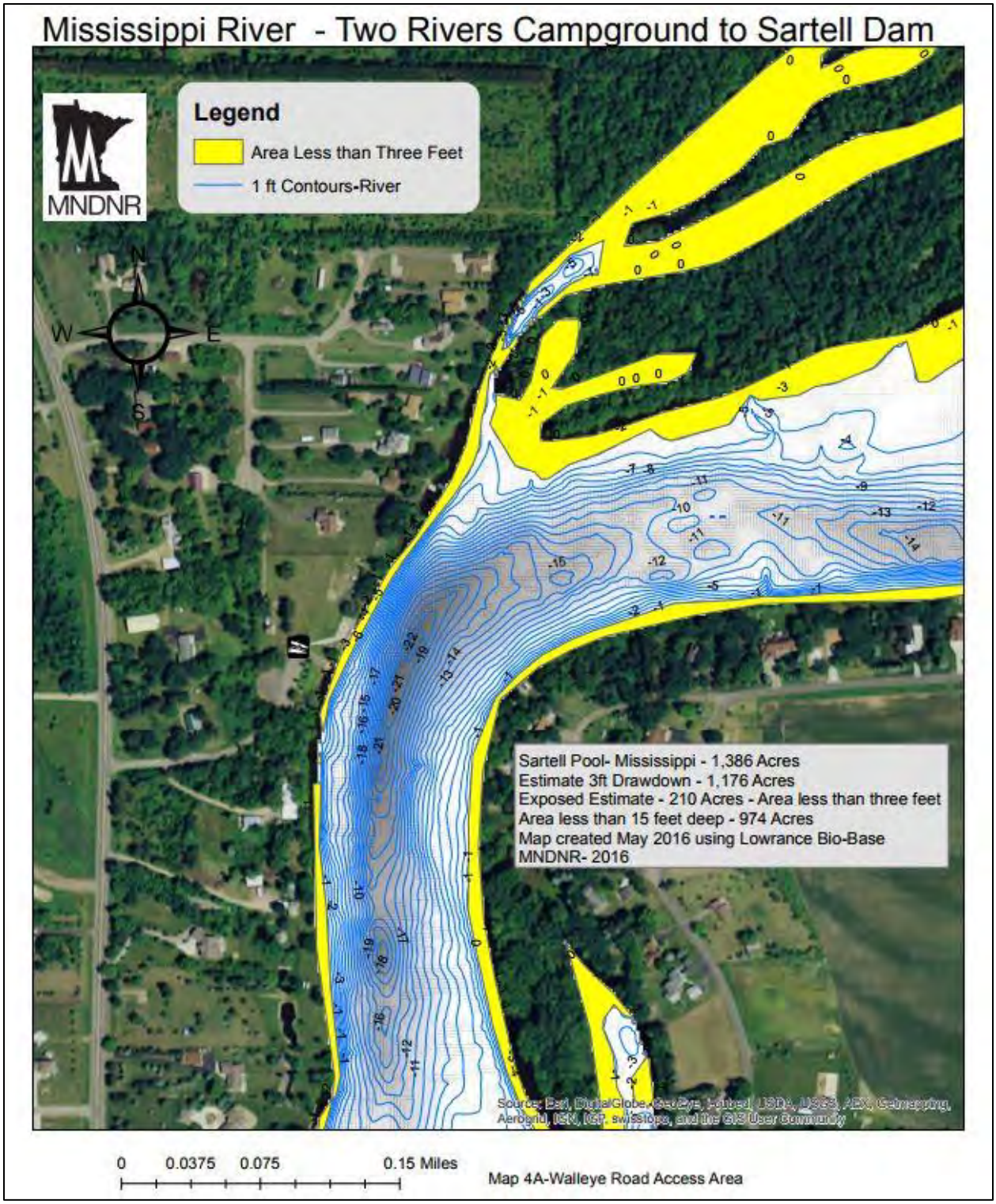


Figure 40: Exposed project area on the Mississippi River

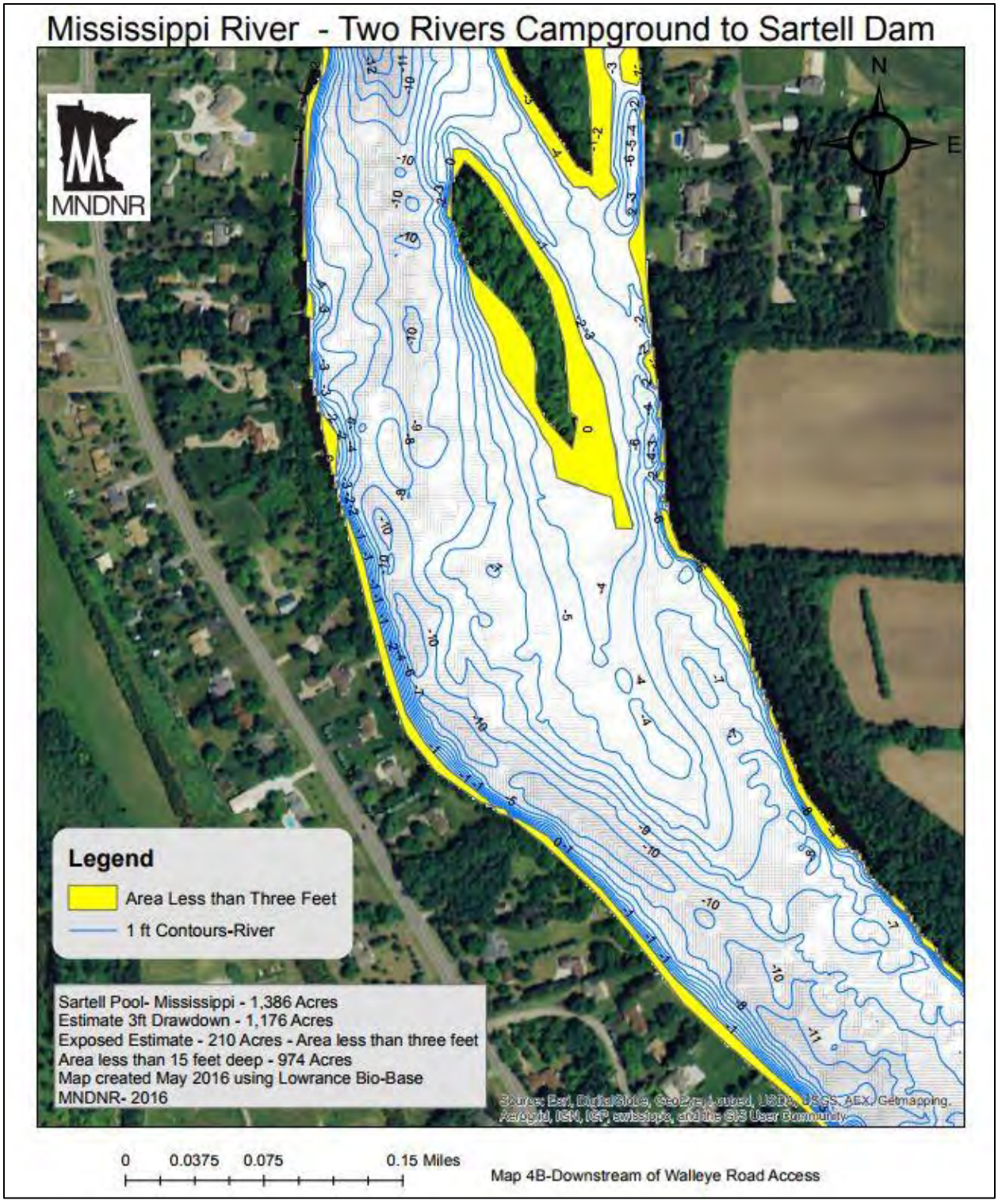


Figure 41: Exposed project area on the Mississippi River

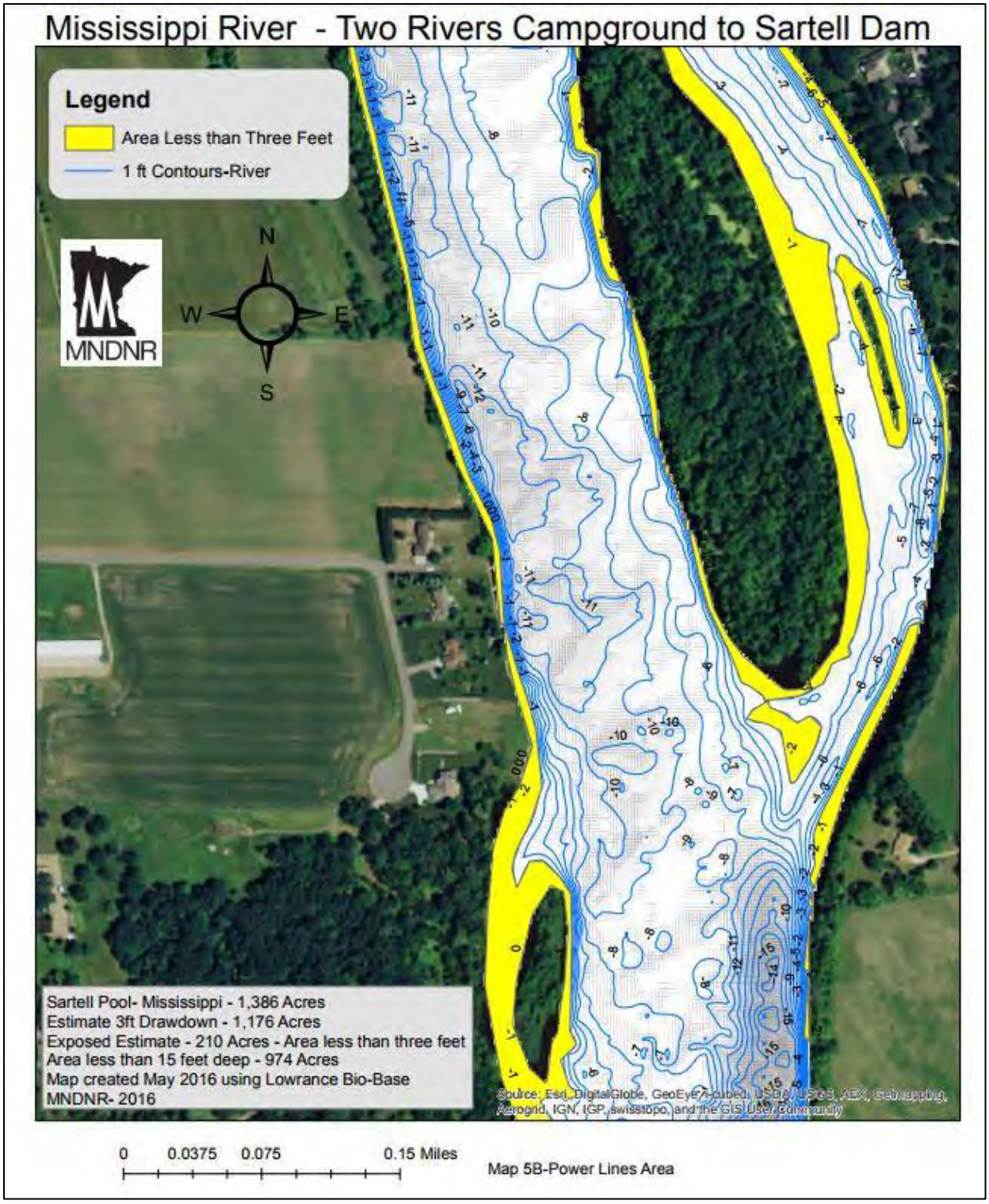


Figure 42: Exposed project area on the Mississippi River

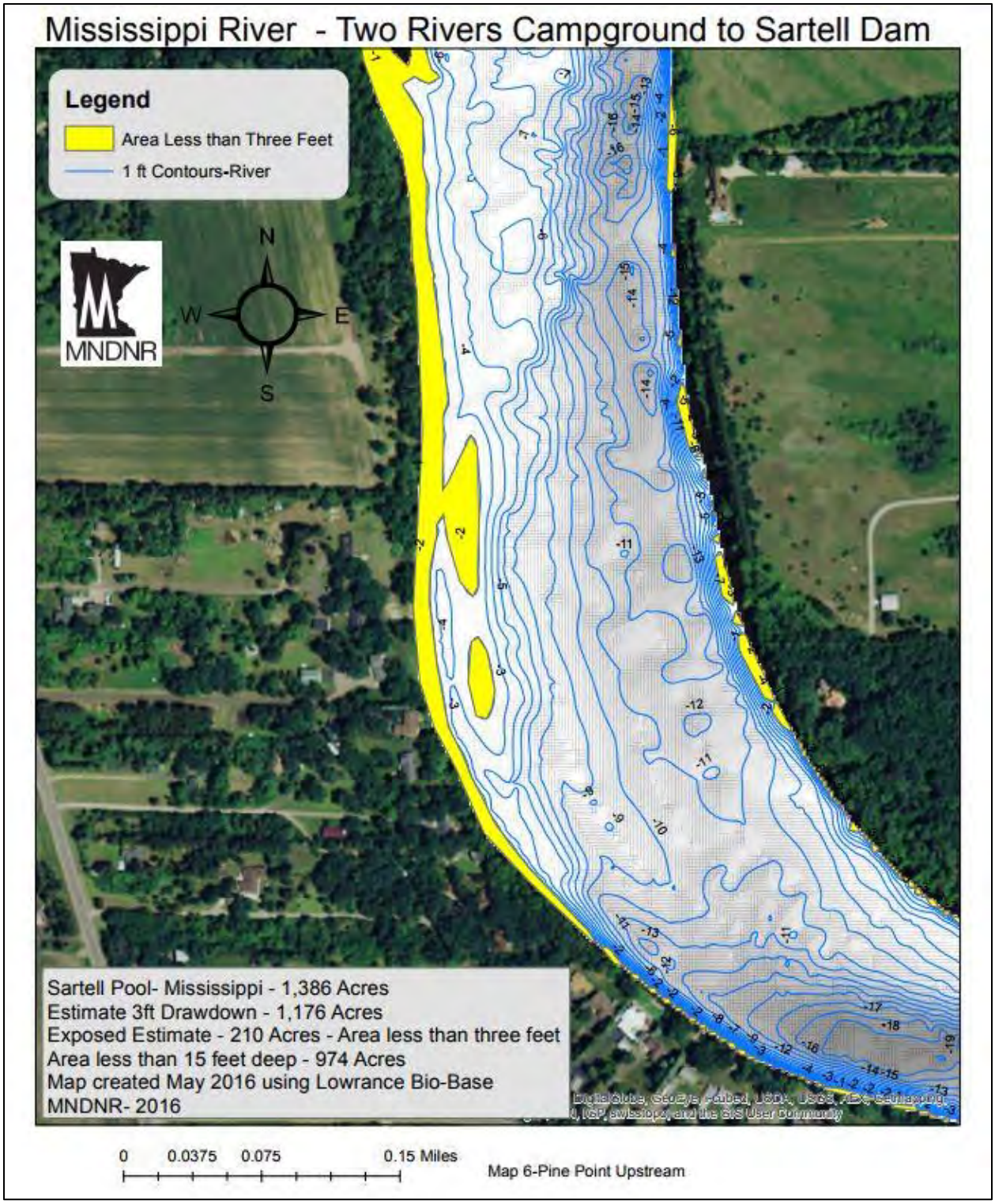


Figure 43: Exposed project area on the Mississippi River

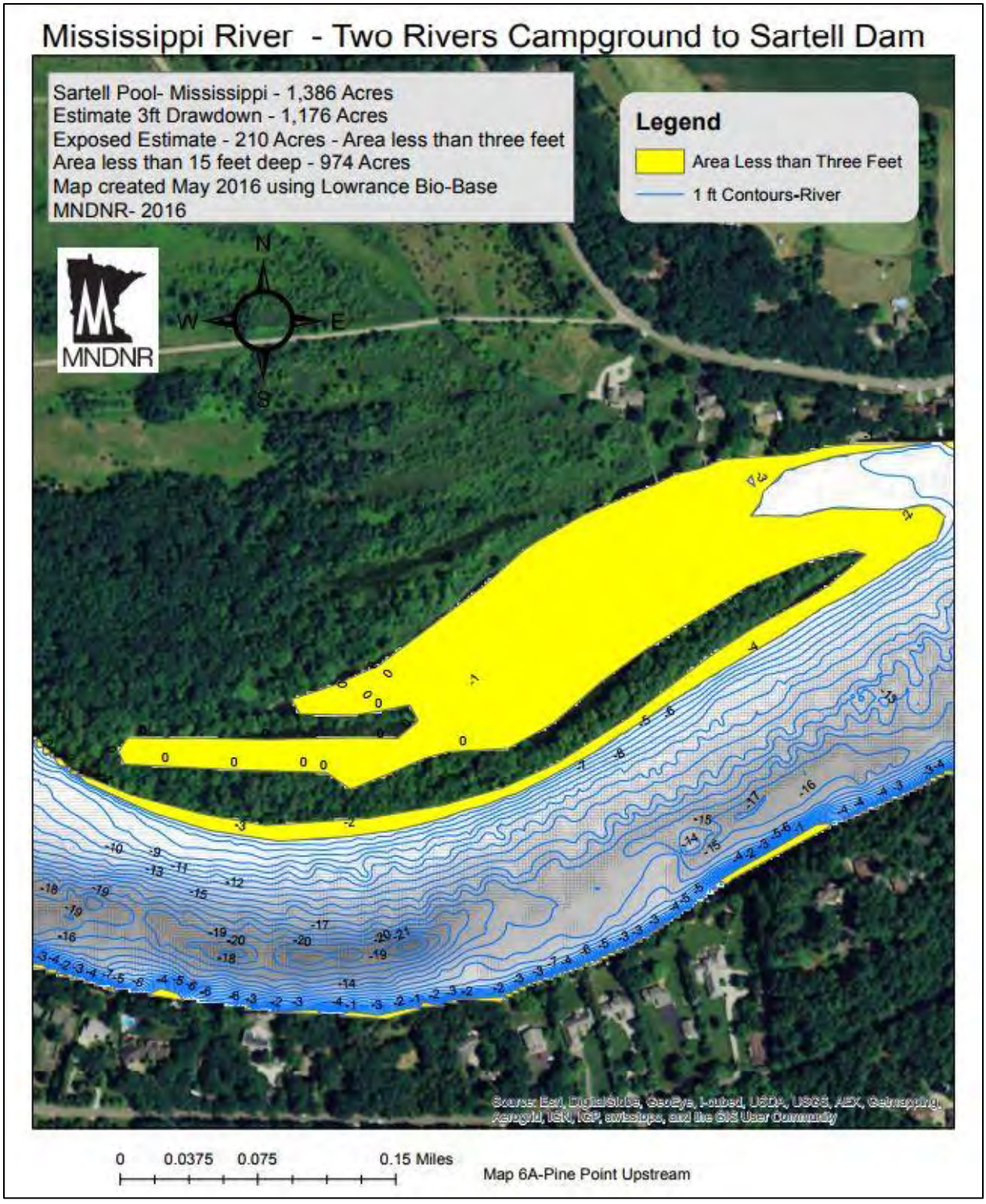


Figure 44: Exposed project area on the Mississippi River

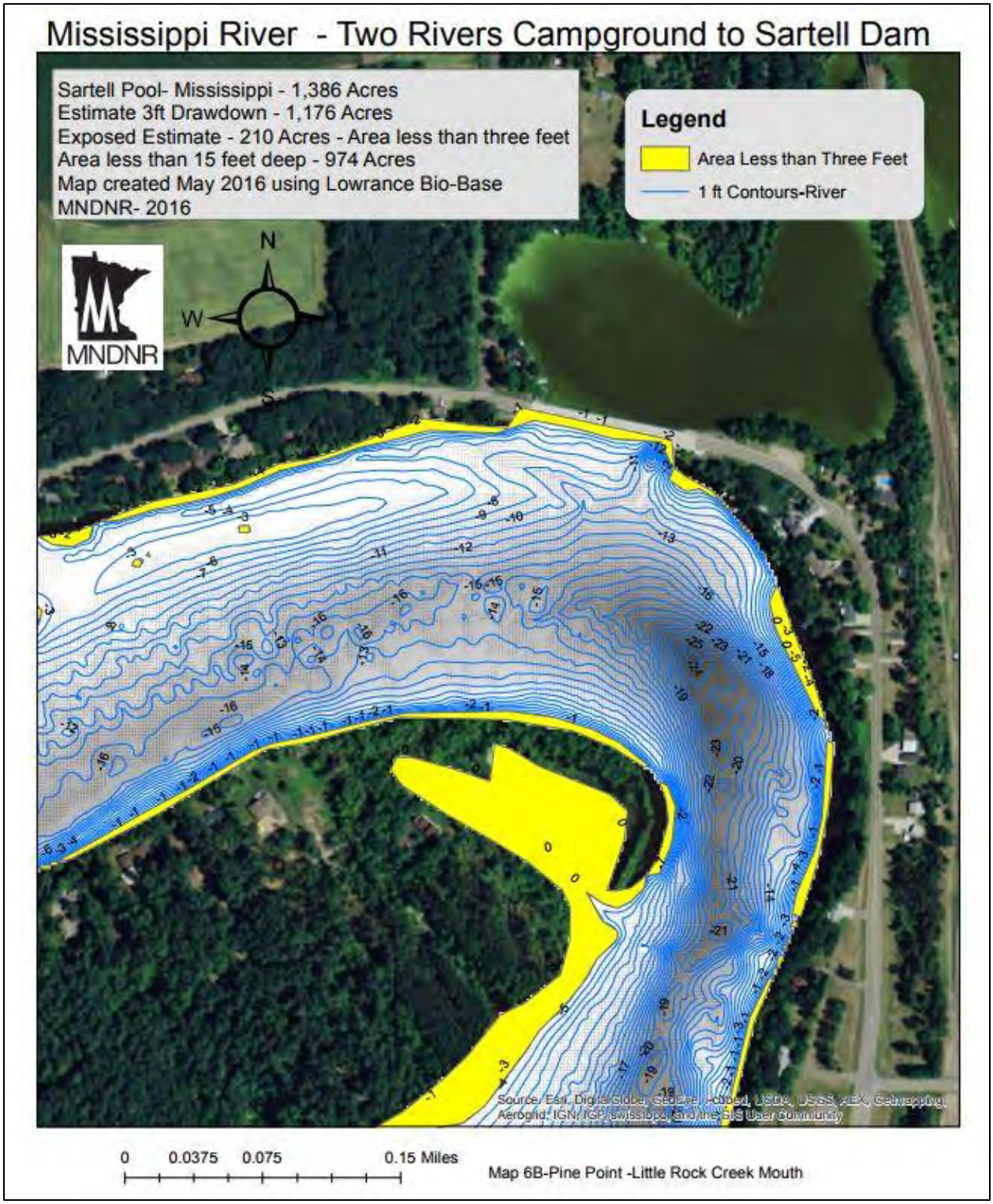


Figure 45: Exposed project area on the Mississippi River

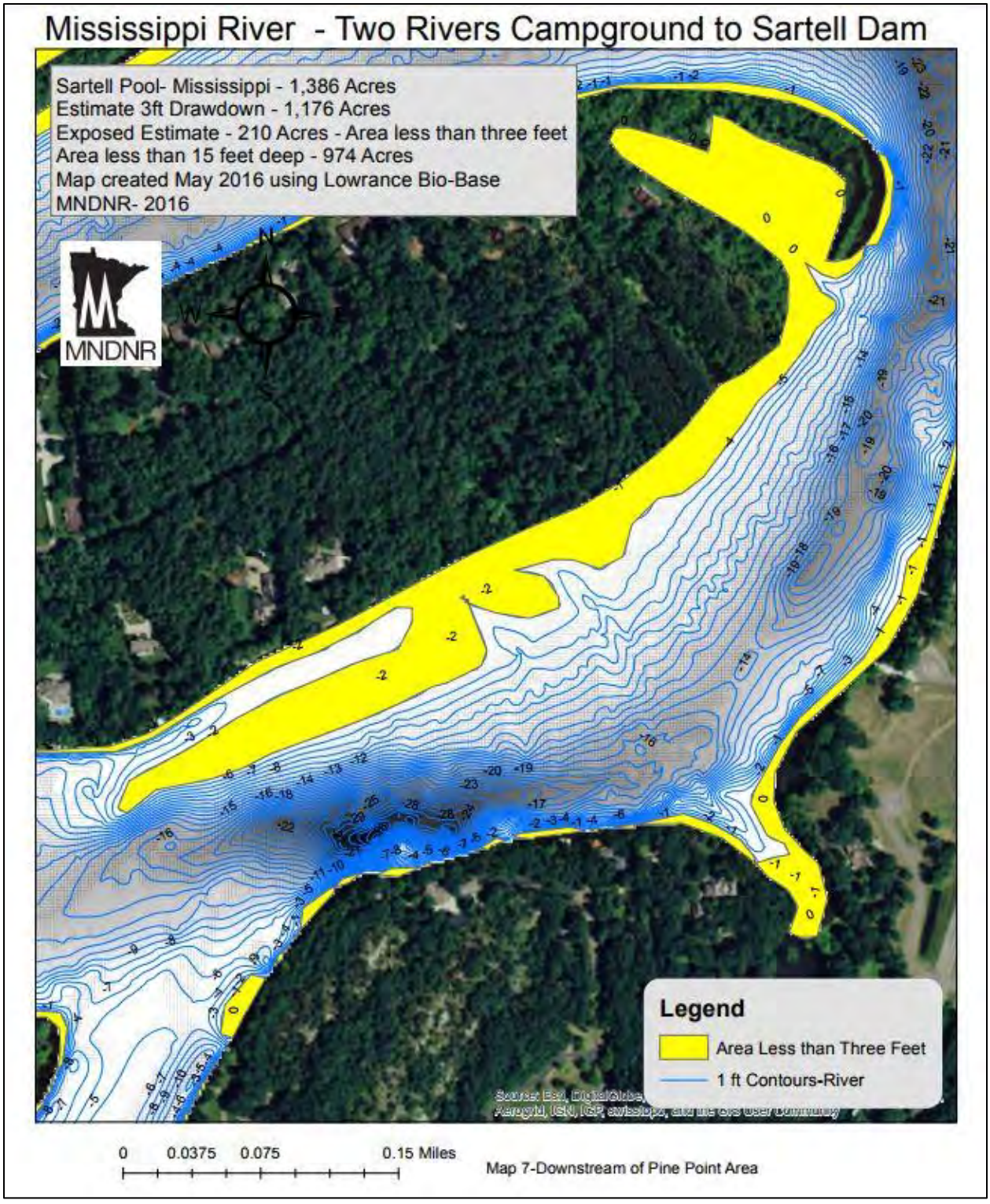


Figure 46: Exposed project area on the Mississippi River

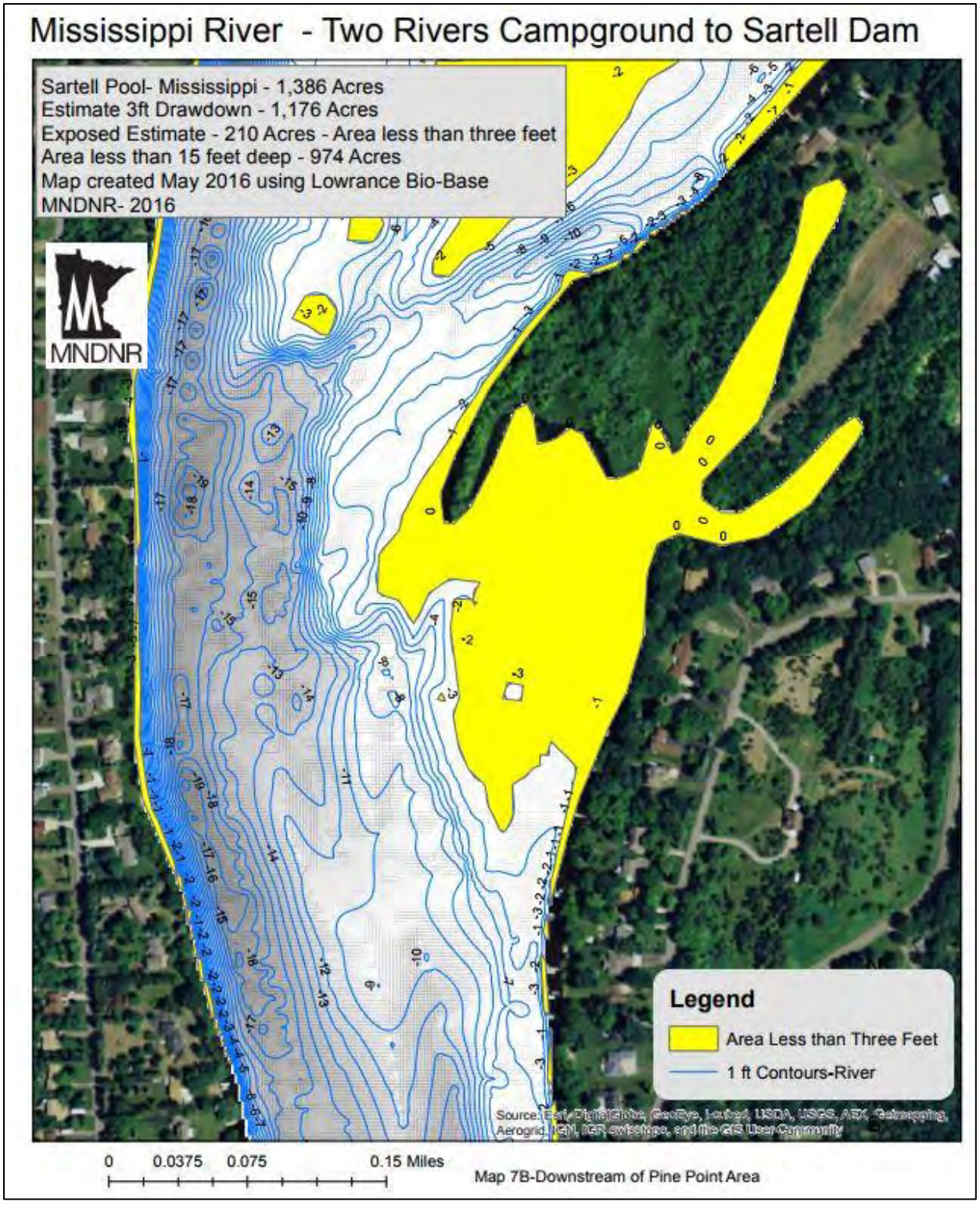


Figure 47: Exposed project area on the Mississippi River

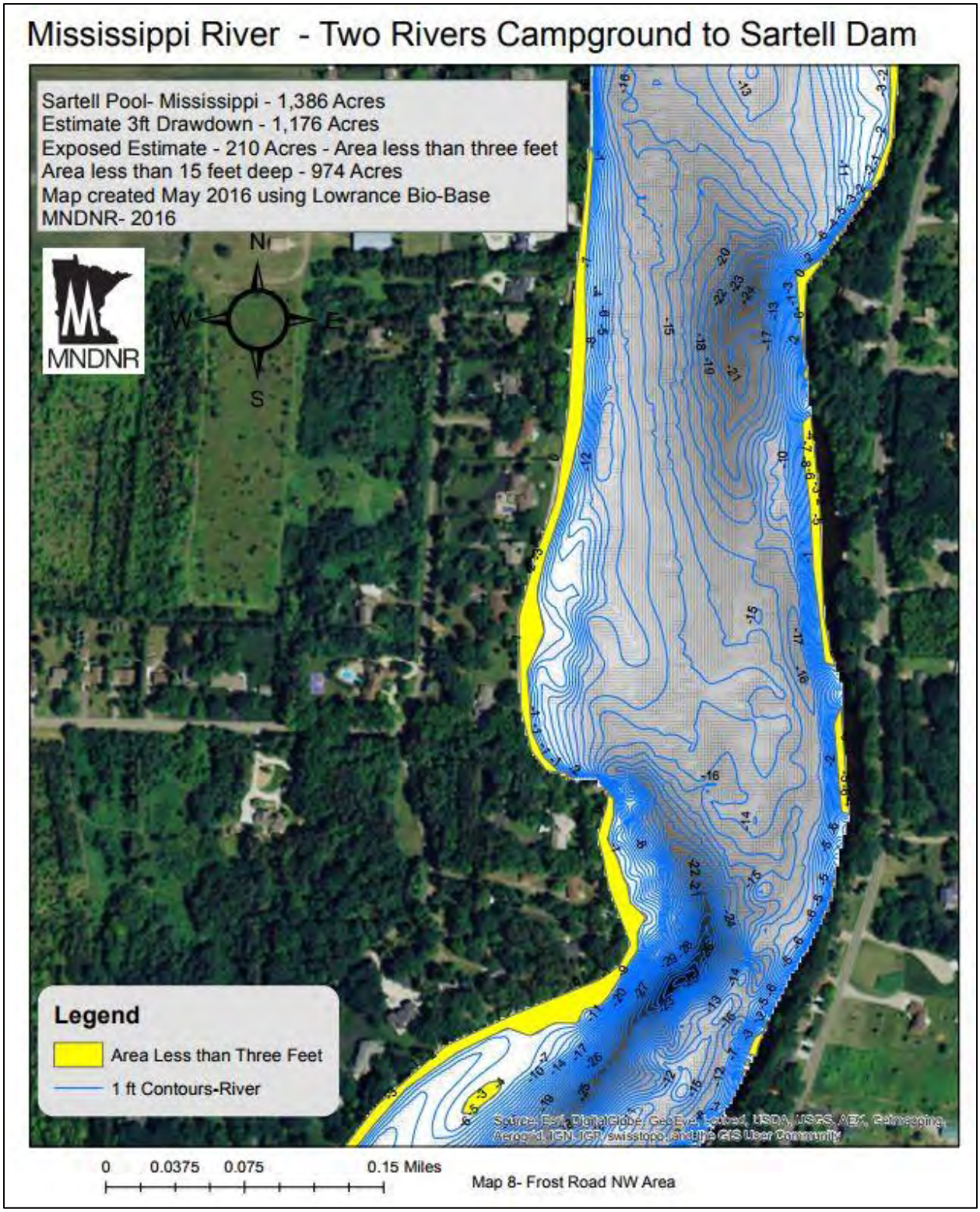


Figure 48: Exposed project area on the Mississippi River

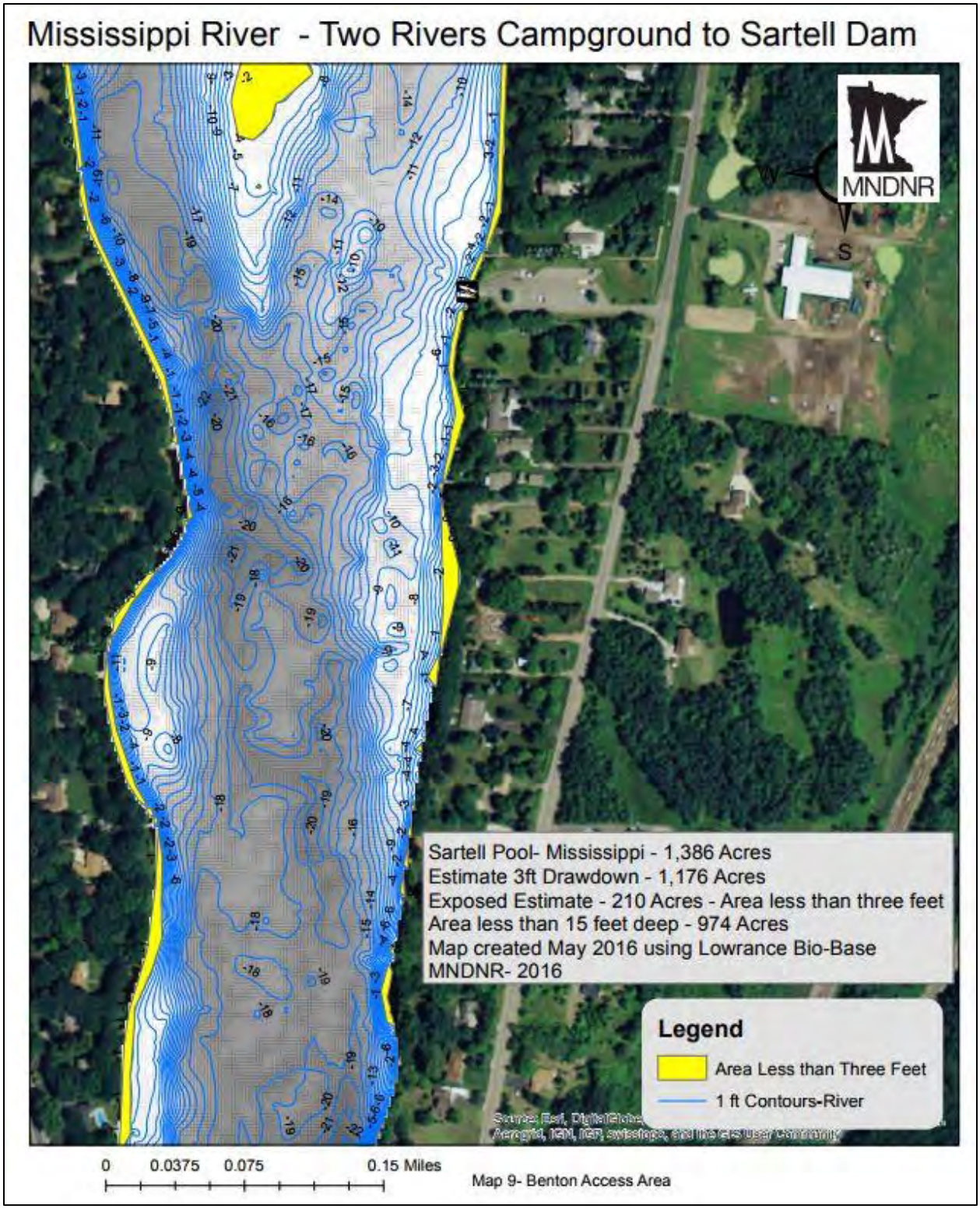


Figure 49: Exposed project area on the Mississippi River

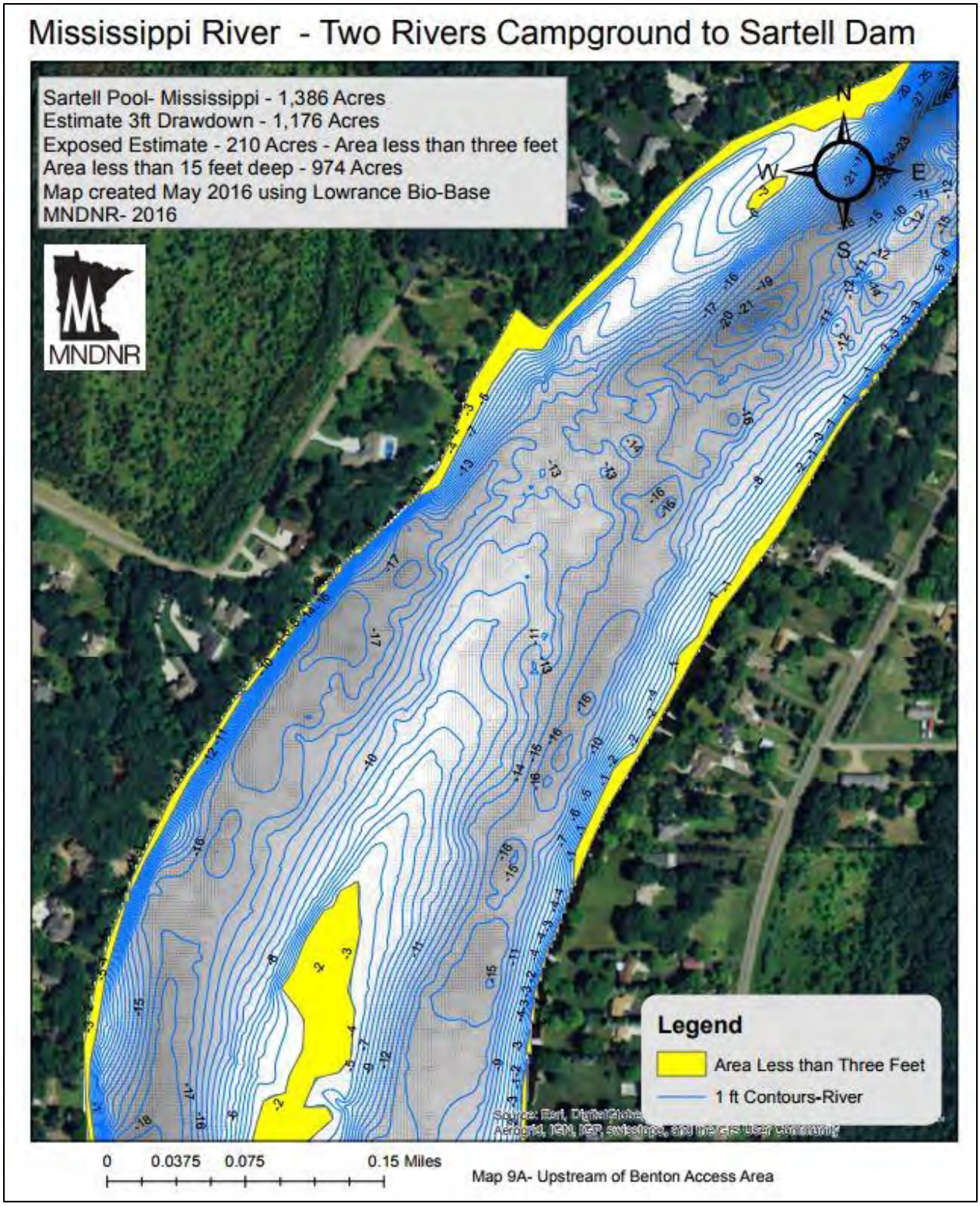


Figure 50: Exposed project area on the Mississippi River

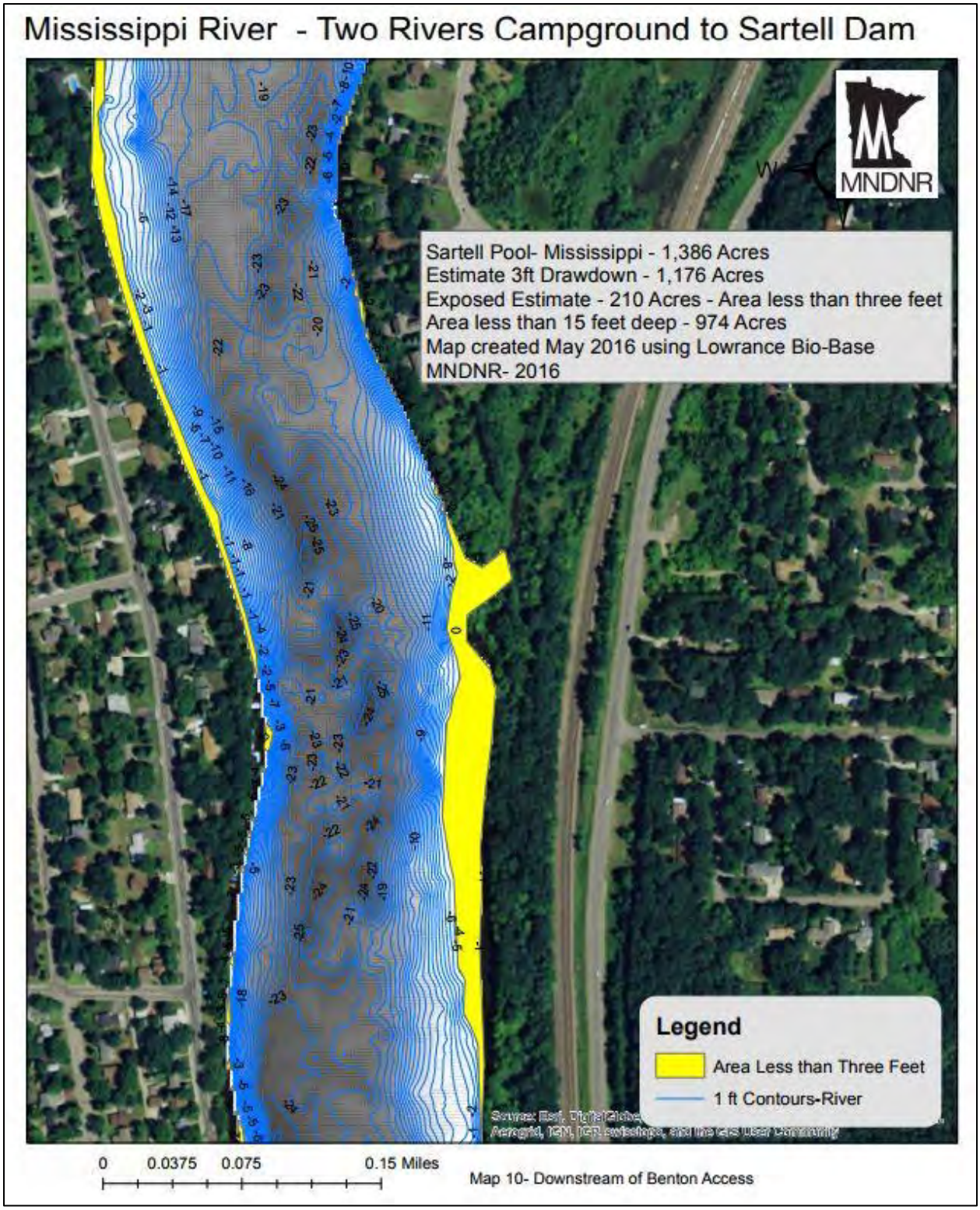


Figure 51: Exposed project area on the Mississippi River

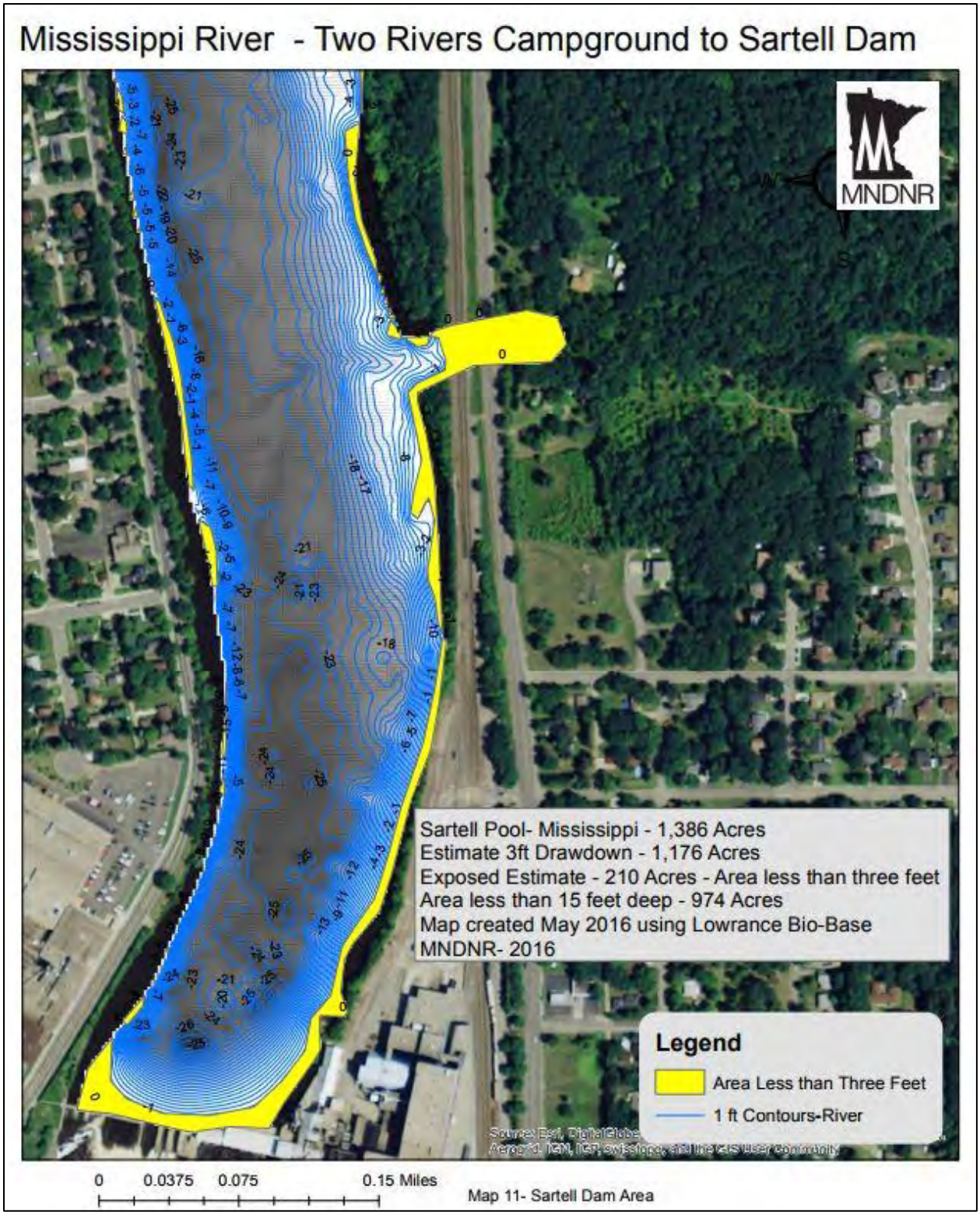


Figure 52: Exposed project area on the Mississippi River

Exposed Area on Little Rock Lake

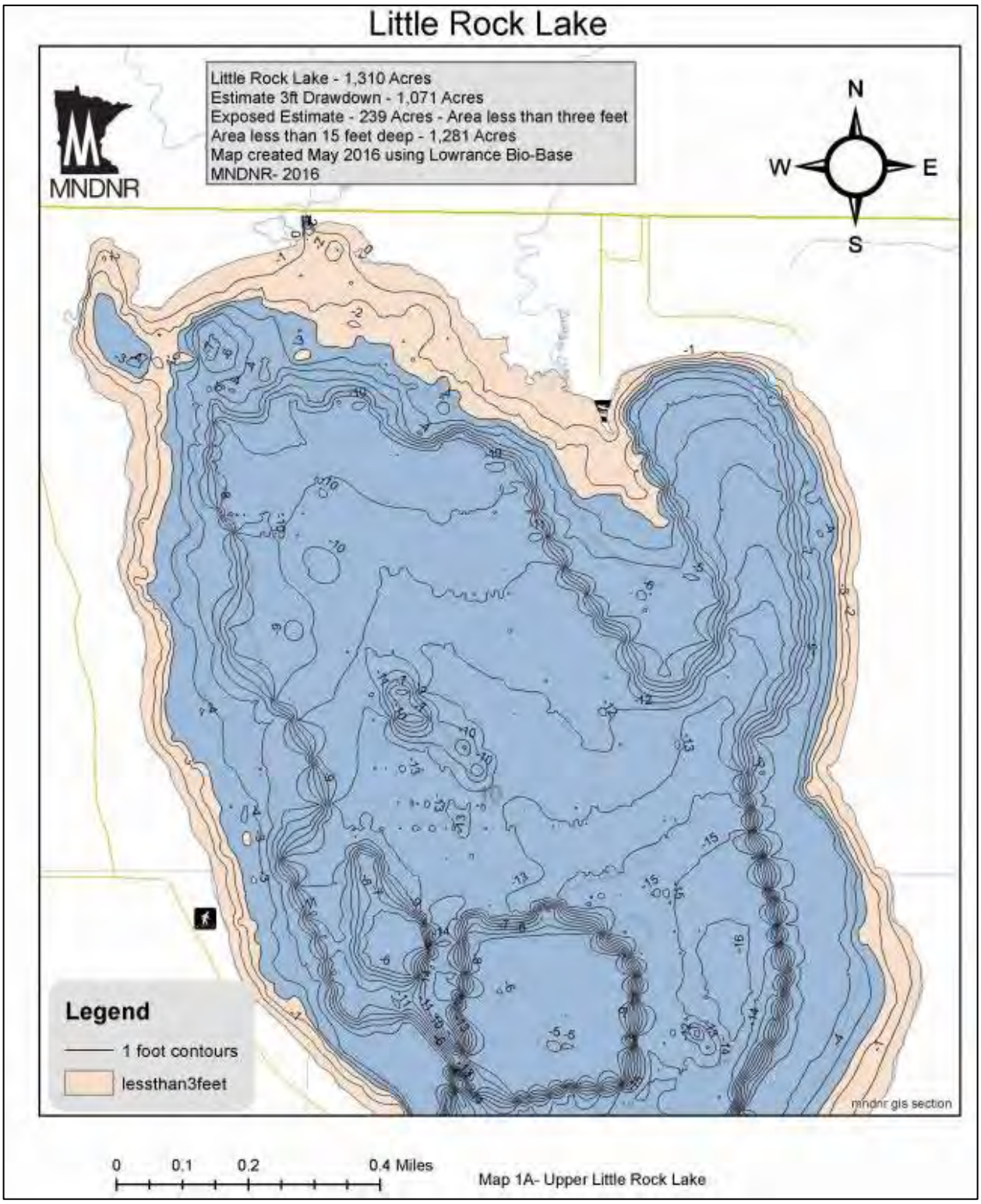


Figure 53: Exposed project area on Little Rock Lake

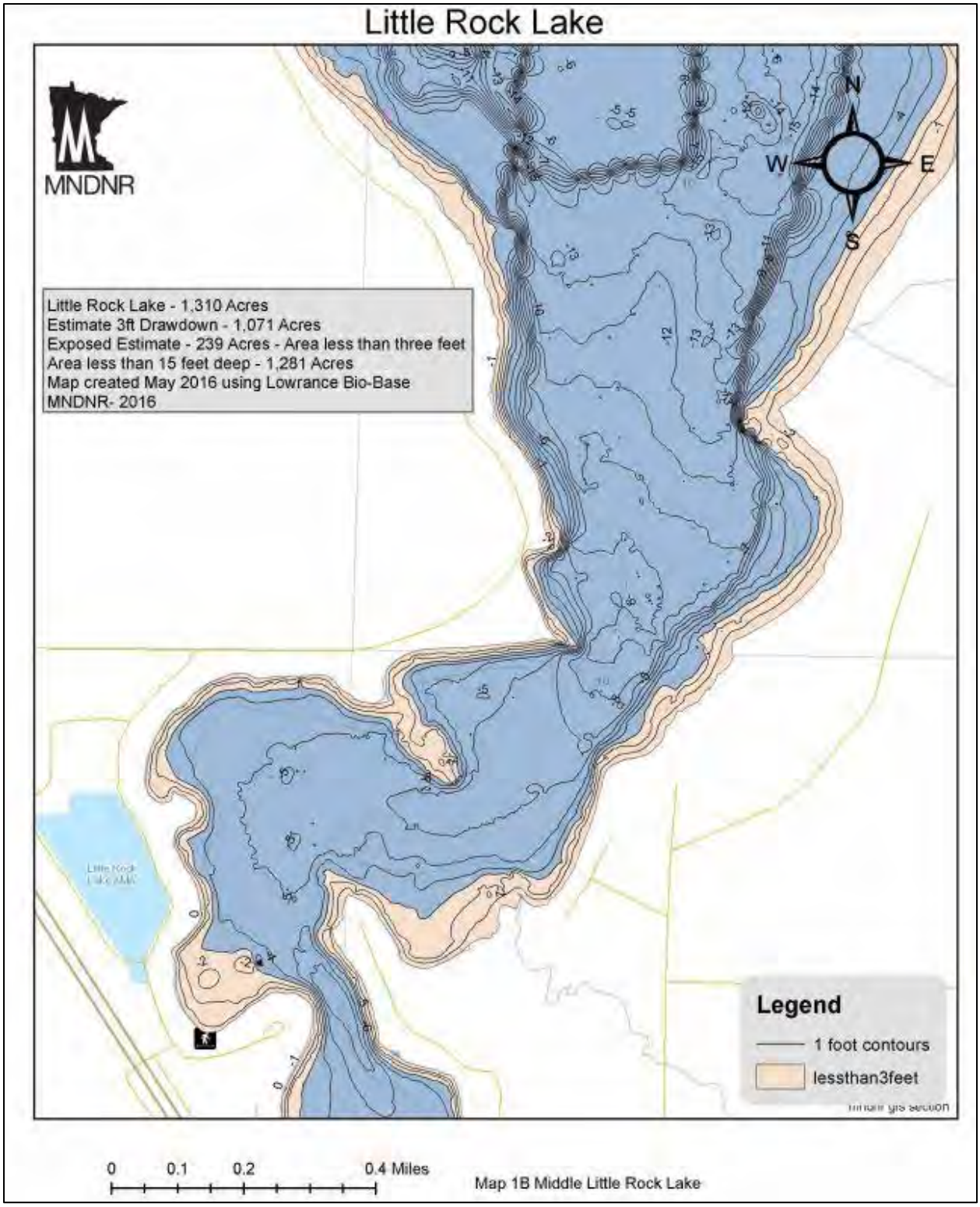


Figure 54: Exposed project area on Little Rock Lake

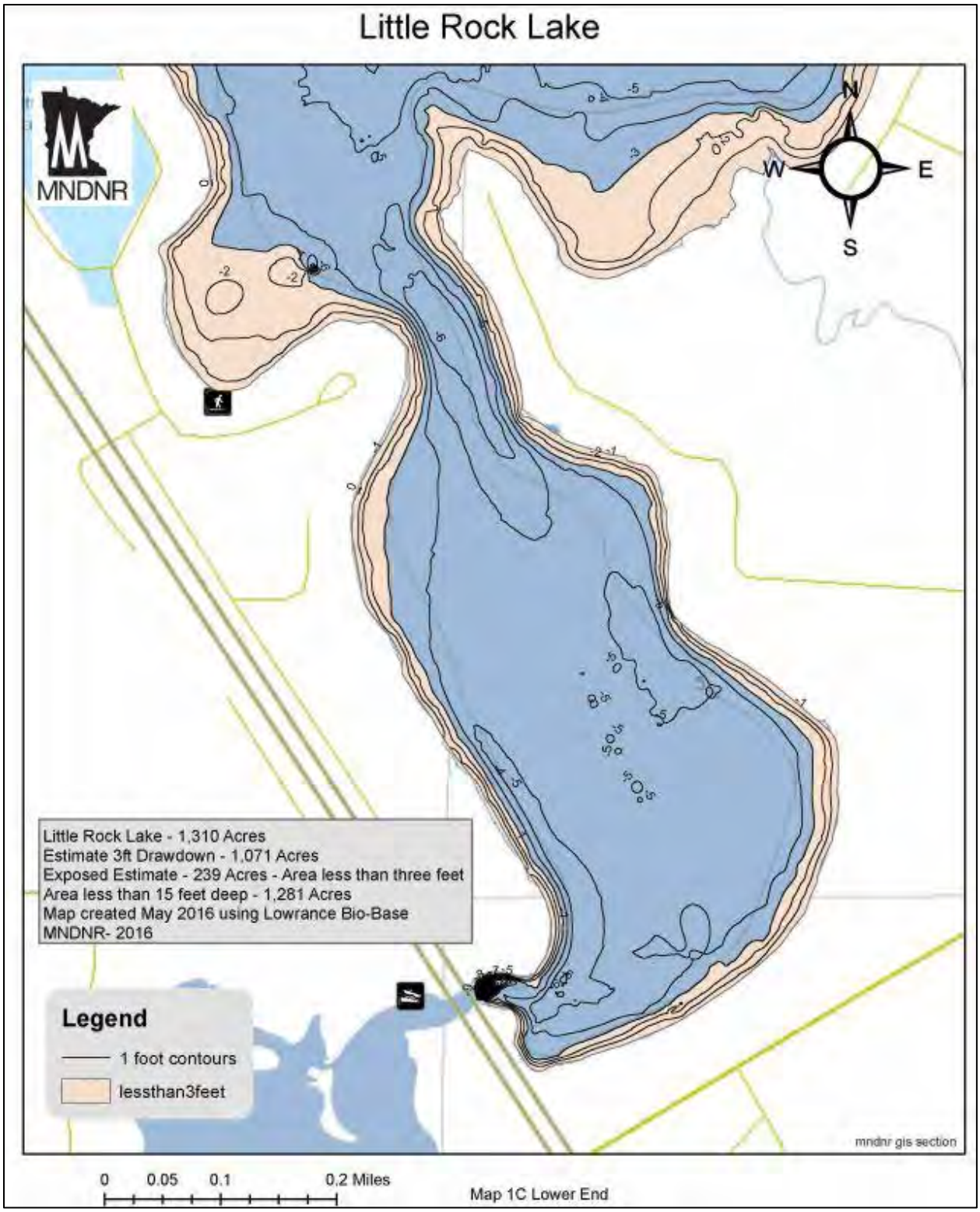


Figure 55: Exposed project area on Little Rock Lake

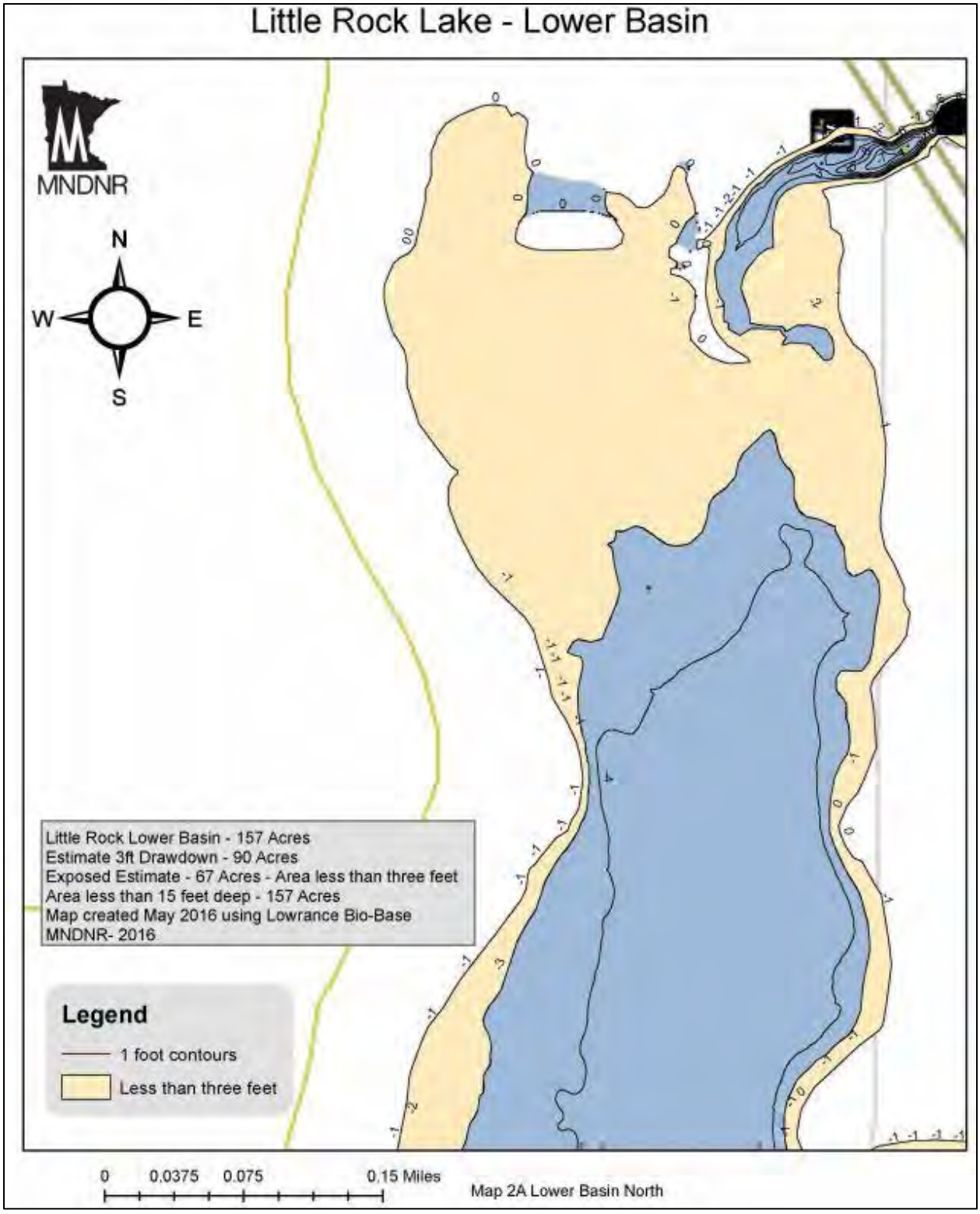


Figure 56: Exposed project area on Little Rock Lake

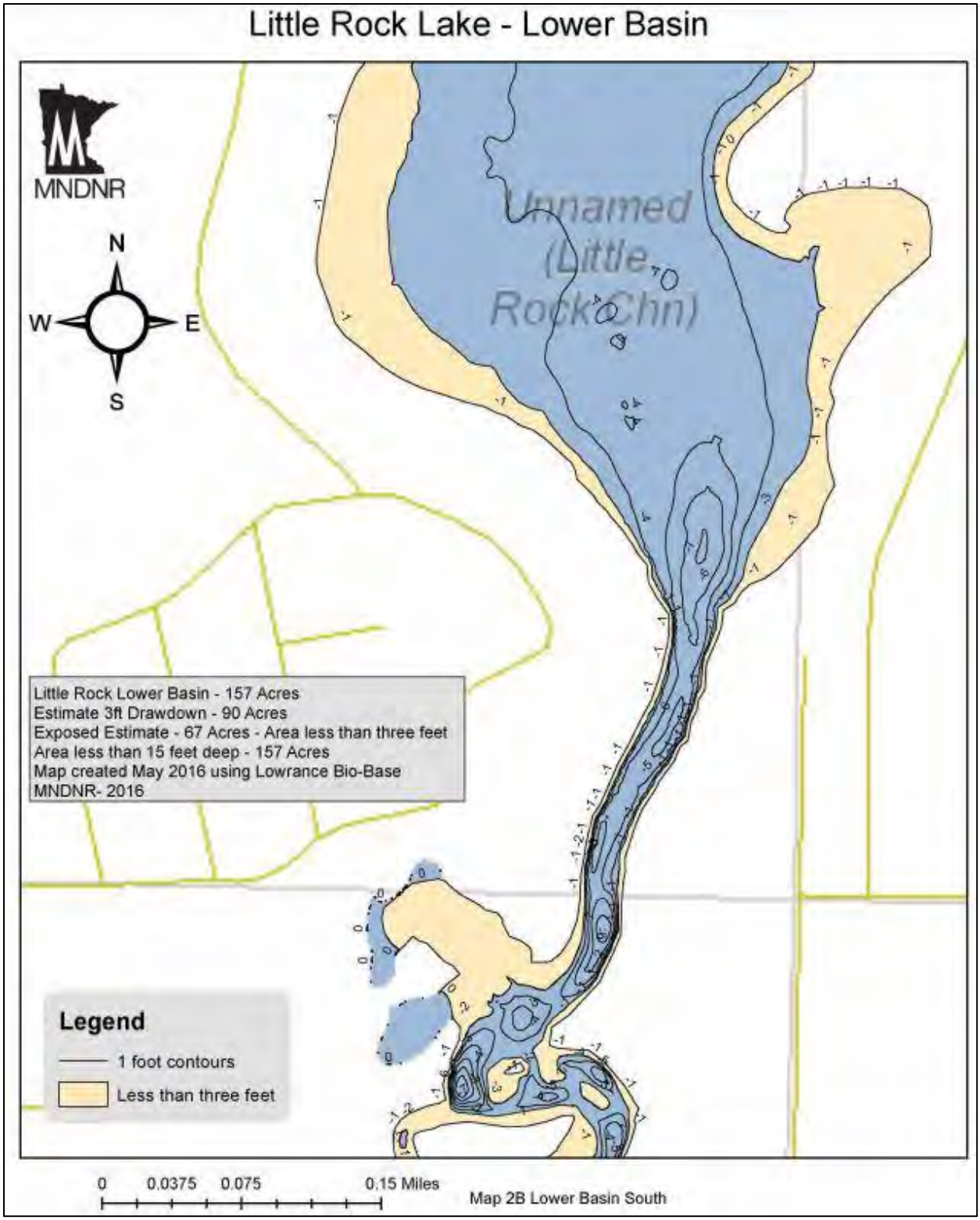


Figure 57: Exposed project area on Little Rock Lake

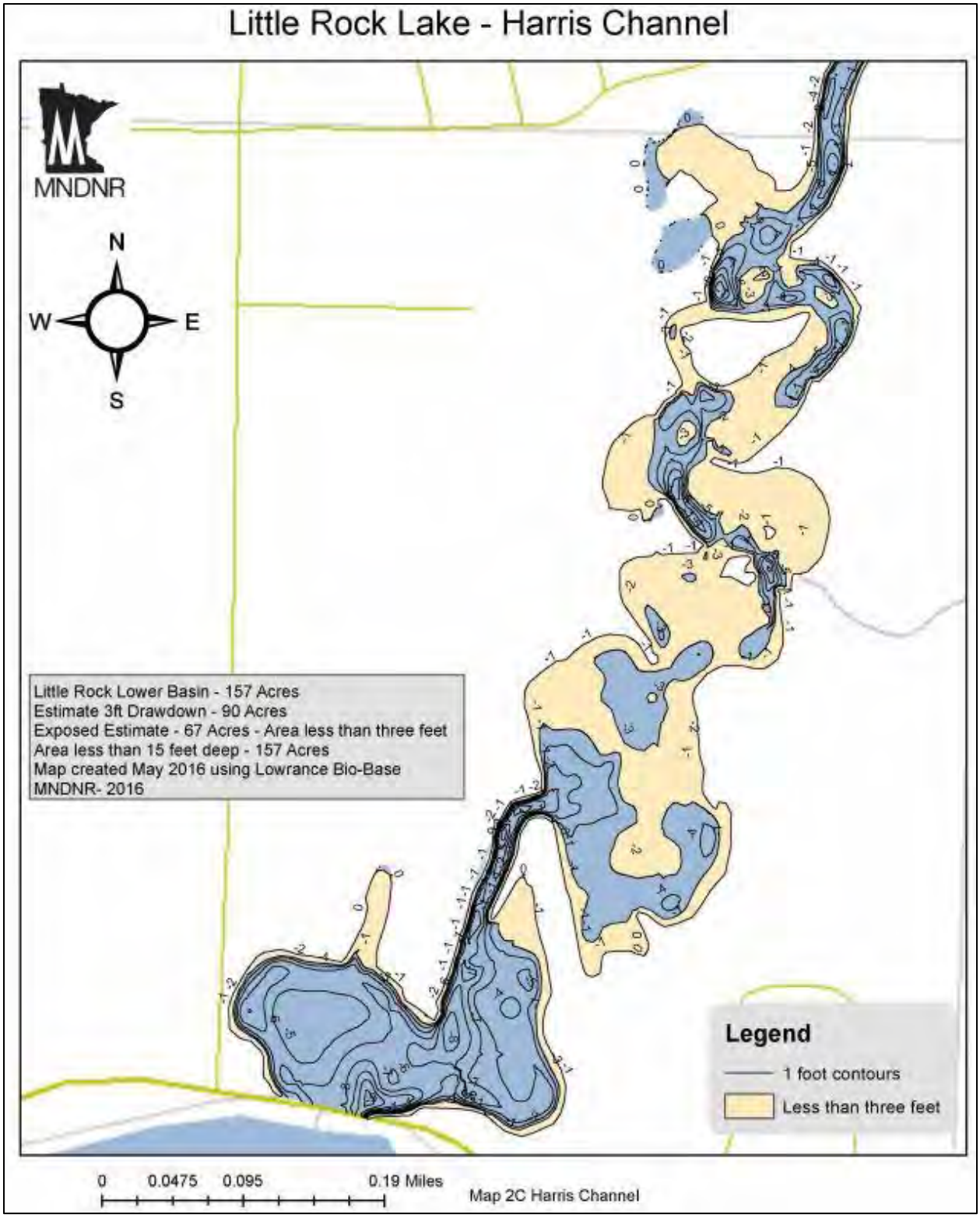


Figure 58: Exposed project area on Little Rock Lake

APPENDIX 4.3.7-1 MN Rule 7050

CHAPTER 7050

MINNESOTA POLLUTION CONTROL AGENCY

WATERS OF THE STATE

WATER QUALITY STANDARDS FOR PROTECTION OF WATERS OF THE STATE

7050.0100 [Repealed, 9 SR 913]

Published Electronically: *April 1, 2008*

WATER QUALITY STANDARDS FOR PROTECTION OF WATERS OF THE STATE

7050.0110 SCOPE.

Parts 7050.0130 to 7050.0227 apply to all waters of the state, both surface and underground. This chapter includes a classification system of beneficial uses applicable to waters of the state, narrative and numeric water quality standards that protect specific beneficial uses, antidegradation provisions, and other provisions to protect the physical, chemical, and biological integrity of waters

of the state. Parts 7050.0400 to 7050.0470 classify all surface waters within or bordering Minnesota and designate the beneficial uses for which these waters are protected. This chapter applies to point source and nonpoint source discharges and to the physical alterations of wetlands. Other water quality rules of general or specific application that include any more stringent water quality standards or prohibitions are preserved.

Effluent limits and treatment requirements for discharges of sewage, industrial wastes, and other wastes are located in chapter 7053.

Statutory Authority: *MS s 115.03; 115.44*

History: *9 SR 913; 12 SR 1810; 18 SR 2195; 32 SR 1699; 9 SR 913; 12 SR 1810; 18 SR 2195; 32 SR 1699; 41 SR 545*

Published Electronically: *December 9, 2016*

7050.0120 [Repealed, 9 SR 913]

Published Electronically: *April 1, 2008*

7050.0130 GENERAL DEFINITIONS.

Subpart 1. **Scope.** For purposes of this chapter, the following terms have the meanings given them.

Subp. 2. **Terms defined in statute.** The terms "waters of the state," "groundwater," "water pollution," and "toxic pollutants," as well as any other terms for which definitions are given in the pollution control statutes, as used herein have the meanings given to them in Minnesota Statutes, sections 115.01 and 115.41, with the exception that disposal systems or treatment works operated under permit or certificate of compliance of the agency are not "waters of the state."

Subp. 3. **Seven-day ten-year low flow or $7Q_{10}$.**

A. "Seven-day ten-year low flow" or "$7Q_{10}$" means the lowest average seven-day flow with a once in ten-year recurrence interval. A $7Q_{10}$ is derived by identifying the lowest average flow for a seven-consecutive-day period from daily flow records for each year of record, from a continuous flow gauging station. The seven-day average low flow values for each year are arrayed in order of magnitude and fitted to a probability distribution. The $7Q_{10}$ is the stream or river flow that is equal to or exceeded by 90 percent of the values in the distribution.

B. The period of record for determining the specific flow for the stated recurrence interval, where records are available, shall include at least the most recent ten years of record, including flow records obtained after establishment of flow regulation devices, if any. Where stream flow records are not available, the flow may be estimated on the basis of available information on the watershed characteristics, precipitation, runoff, and other relevant data. The calculations shall not be applied to lakes and their embayments which have no comparable flow recurrence interval.

Subp. 4. **Commissioner.** "Commissioner" means the commissioner of the Minnesota Pollution Control Agency or the commissioner's designee.

Subp. 5. **Nonpoint source.** "Nonpoint source" means a land management or land use activity that contributes or may contribute to ground and surface water pollution as a result of runoff, seepage, or percolation and that is not defined as a point source under Minnesota Statutes, section 115.01, subdivision 11.

Subp. 6. **Surface waters.** "Surface waters" means waters of the state excluding groundwater as defined in Minnesota Statutes, section 115.01, subdivision 6.

Subp. 7. **Other terms.** Other terms and abbreviations used in this chapter are defined in the part in which they are used. Terms and abbreviations used in this chapter that are not specifically defined in applicable federal or state law shall be construed in conformance with the context, and in relation to the applicable section of the statutes pertaining to the matter, and current professional usage.

Statutory Authority: *MS s 115.03; 115.44*

History: *9 SR 913; 12 SR 1810; 15 SR 1057; 18 SR 2195; 32 SR 1699*

Published Electronically: *April 1, 2008*

7050.0140 USE CLASSIFICATIONS FOR WATERS OF THE STATE.

Subpart 1. **Introduction.** Based on considerations of best usage and the need for water quality protection in the interest of the public, and in conformance with the requirements of Minnesota Statutes, section 115.44, the waters of the state are grouped into one or more of the classes in subparts 2 to 8. The classifications are listed in parts 7050.0400 to 7050.0470. The classifications should not be construed to be in order of priority, nor considered to be exclusive or prohibitory of other beneficial uses.

Subp. 2. **Class 1 waters, domestic consumption.** Domestic consumption includes all waters of the state that are or may be used as a source of supply for drinking, culinary or food processing use, or other domestic purposes and for which quality control is or may be necessary to protect the public health, safety, or welfare.

Subp. 3. **Class 2 waters, aquatic life and recreation.** Aquatic life and recreation includes all waters of the state that support or may support aquatic biota, bathing, boating, or other recreational purposes and for which quality control is or may be necessary to protect aquatic or terrestrial life or their habitats or the public health, safety, or welfare.

Subp. 4. **Class 3 waters, industrial consumption.** Industrial consumption includes all waters of the state that are or may be used as a source of supply for industrial process or cooling water, or any other industrial or commercial purposes, and for which quality control is or may be necessary to protect the public health, safety, or welfare.

Subp. 5. **Class 4 waters, agriculture and wildlife.** Agriculture and wildlife includes all waters of the state that are or may be used for any agricultural purposes, including stock watering and irrigation, or by waterfowl or other wildlife and for which quality control is or may be necessary to protect terrestrial life and its habitat or the public health, safety, or welfare.

Subp. 6. **Class 5 waters, aesthetic enjoyment and navigation.** Aesthetic enjoyment and navigation includes all waters of the state that are or may be used for any form of water transportation or navigation or fire prevention and for which quality control is or may be necessary to protect the public health, safety, or welfare.

Subp. 7. **Class 6 waters, other uses and protection of border waters.** Other uses includes all waters of the state that serve or may serve the uses in subparts 2 to 6 or any other beneficial uses not listed in this part, including without limitation any such uses in this or any other state, province, or nation of any waters flowing through or originating in this state, and for which quality control is or may be necessary for the declared purposes in this part, to conform with the requirements of the legally constituted state or national agencies having jurisdiction over such waters, or for any other considerations the agency may deem proper.

Subp. 8. **Class 7 waters, limited resource value waters.** Limited resource value waters include surface waters of the state that have been subject to a use attainability analysis and have been found to have limited value as a water resource. Water quantities in these waters are intermittent or less than one cubic foot per second at the $7Q_{10}$ flow as defined in part 7050.0130, subpart 3. These waters shall be protected so as to allow secondary body contact use, to preserve the groundwater for use as a potable water supply, and to protect aesthetic qualities of the water. It is the intent of the agency that very few waters be classified as limited resource value waters. The use attainability analysis must take into consideration those factors listed in Minnesota Statutes, section 115.44, subdivisions 2 and 3. The agency, in cooperation and agreement with the Department of Natural Resources with respect to determination of fisheries values and potential, shall use this information to determine the extent to which the waters of the state demonstrate that:

A. the existing and potential faunal and floral communities are severely limited by natural conditions as exhibited by poor water quality characteristics, lack of habitat, or lack of water;

B. the quality of the resource has been significantly altered by human activity and the effect is essentially irreversible; or

C. there are limited recreational opportunities, such as fishing, swimming, wading, or boating, in and on the water resource.

The conditions in items A and C or B and C must be established by the use attainability analysis before the waters can be classified as limited resource value waters.

Statutory Authority: *MS s 115.03; 115.44*

History: *9 SR 913; 32 SR 1699; 42 SR 441*

Published Electronically: *November 20, 2017*

7050.0150 DETERMINATION OF WATER QUALITY, BIOLOGICAL AND PHYSICAL CONDITIONS, AND COMPLIANCE WITH STANDARDS.

Subpart 1. **Policy and scope.** The intent of the state is to protect and maintain surface waters in a condition which allows for the maintenance of all existing beneficial uses. The condition of a surface water body is determined by its physical, chemical, and biological qualities. The agency

shall determine an exceedance of water quality standards or an impaired condition based on pollution of the waters of the state from point and nonpoint sources that has resulted in degradation of the physical, chemical, or biological qualities of the water body to the extent that attainable or previously existing beneficial uses are actually or potentially lost.

The narrative water quality standards in subpart 3 prescribe the qualities or properties of surface waters that are necessary for the protection of designated public uses and benefits. If the narrative standards in this part are exceeded, it is considered indicative of a polluted condition which is actually or potentially deleterious, harmful, detrimental, or injurious with respect to the designated uses of the waters of the state.

Subparts 5 to 7 list factors the commissioner will use to determine if surface waters are in compliance with applicable narrative standards in subpart 3. Determination of compliance with the narrative standards will be made for individual water bodies on a case-by-case basis.

Subp. 2. **Other standards preserved.** The requirements of this part are in addition to the application of other narrative or numeric water quality standards in this chapter. If the requirements of this part conflict with any other narrative or numeric standard in this chapter, the more stringent standard applies.

Subp. 3. **Narrative standards.** For all class 2 waters, the aquatic habitat, which includes the waters of the state and stream bed, shall not be degraded in any material manner, there shall be no material increase in undesirable slime growths or aquatic plants, including algae, nor shall there be any significant increase in harmful pesticide or other residues in the waters, sediments, and aquatic flora and fauna; the normal aquatic biota and the use thereof shall not be seriously impaired or endangered, the species composition shall not be altered materially, and the propagation or migration of aquatic biota normally present shall not be prevented or hindered by the discharge of any sewage, industrial waste, or other wastes to the waters.

Subp. 4. **Definitions.** For the purposes of this chapter and chapter 7053, the following terms have the meanings given them.

A. "122-day ten-year low flow" or "$122Q_{10}$" means the lowest average 122-day flow with a once in ten-year recurrence interval. A $122Q_{10}$ is derived using the same methods used to derive a $7Q_{10}$, and the guidelines regarding period of record for flow data and estimating a $7Q_{10}$ apply equally to determining a $122Q_{10}$, as described in part 7050.0130, subpart 3.

B. "Altered materially," "material increase," "material manner," "seriously impaired," and "significant increase," as used in subparts 3, 5, and 6, mean that pollution of the waters of the state has resulted in degradation of the physical, chemical, or biological qualities of the water body to the extent that attainable or previously existing beneficial uses are actually or potentially lost.

C. "Aquatic biota" means the aquatic community composed of game and nongame fish, minnows and other small fish, mollusks, insects, crustaceans and other invertebrates, submerged or emergent rooted vegetation, suspended or floating algae, substrate-attached algae, microscopic organisms, and other aquatic-dependent organisms that require aquatic systems for food or to fulfill any part of their life cycle, such as amphibians and certain wildlife species.

D. "Assemblage" means a taxonomic subset of a biological community such as fish in a stream community.

E. "Biological condition gradient" means a concept describing how aquatic communities change in response to increasing levels of stressors. In application, the biological condition gradient is an empirical, descriptive model that rates biological communities on a scale from natural to highly degraded.

F. "Biological criteria, narrative" or "biocriteria, narrative" means written statements describing the attributes of the structure and function of aquatic assemblages in a water body necessary to protect the designated aquatic life beneficial use. The singular form "biological criterion, narrative" or "biocriterion, narrative" may also be used.

G. "Biological criteria, numeric" or "biocriteria, numeric" means specific quantitative measures of the attributes of the structure and function of aquatic communities in a water body necessary to protect the designated aquatic life beneficial use. The singular form "biological criterion, numeric" or "biocriterion, numeric" may also be used.

H. "BOD_5" or "five-day biochemical oxygen demand" means the amount of dissolved oxygen needed by aerobic biological organisms to break down organic material present in a given water sample at a certain temperature over a five-day period.

I. "Chlorophyll-a" means a pigment in green plants including algae. The concentration of chlorophyll-a, expressed in weight per unit volume of water, is a measurement of the abundance of algae.

J. "Diel flux" means the daily change in a constituent, such as dissolved oxygen or pH, when there is a distinct daily cycle in the measurement. Diel dissolved oxygen flux means the difference between the maximum daily dissolved oxygen concentration and the minimum daily dissolved oxygen concentration.

K. "Ecoregion" means an area of relative homogeneity in ecological systems based on similar soils, land use, land surface form, and potential natural vegetation. Minnesota ecoregions are shown on the map in part 7050.0468.

L. "Eutrophication" means the increased productivity of the biological community in water bodies in response to increased nutrient loading. Eutrophication is characterized by increased growth and abundance of algae and other aquatic plants, reduced water transparency, reduction or loss of dissolved oxygen, and other chemical and biological changes. The acceleration of eutrophication due to excess nutrient loading from human sources and activities, called cultural eutrophication, causes a degradation of water quality and possible loss of beneficial uses.

M. "Eutrophication standard" means the combination of indicators of enrichment and indicators of response as described in subpart 5. The indicators upon which the eutrophication standard for specific water bodies are based are as provided under subparts 5a to 5c.

N. "Hydraulic residence time" means the time water resides in a basin or, alternately, the time it would take to fill the basin if it were empty.

O. "Impaired water" or "impaired condition" means a water body that does not meet applicable water quality standards or fully support applicable beneficial uses, due in whole or in part to water pollution from point or nonpoint sources, or any combination thereof.

P. "Index of biotic integrity," "index of biological integrity, " or "IBI" means an index developed by measuring attributes of an aquatic community that change in quantifiable and predictable ways in response to human disturbance, representing the health of that community.

Q. "Lake" means an enclosed basin filled or partially filled with standing fresh water with a maximum depth greater than 15 feet. Lakes may have no inlet or outlet, an inlet or outlet, or both an inlet and outlet.

R. "Lake morphometry" means the physical characteristics of the lake basin that are reasonably necessary to determine the shape of a lake, such as maximum length and width, maximum and mean depth, area, volume, and shoreline configuration.

S. "Lotic water" means a flowing or moving water body such as a stream, river, or ditch.

T. "Mixing status" means the frequency of complete mixing of the lake water from surface to bottom, which is determined by whether temperature gradients are established and maintained in the water column during the summer season.

U. "Measurable increase" or "measurable impact" means a change in trophic status that can be discerned above the normal variability in water quality data using a weight of evidence approach. The change in trophic status does not require a demonstration of statistical significance to be considered measurable. Mathematical models may be used as a tool in the data analysis to help predict changes in trophic status.

V. "Natural causes" means the multiplicity of factors that determine the physical, chemical, or biological conditions that would exist in a water body in the absence of measurable impacts from human activity or influence.

W. "Normal aquatic biota" and "normally present" mean a healthy aquatic community expected to be present in the water body in the absence of pollution of the water, consistent with any variability due to natural hydrological, substrate, habitat, or other physical and chemical characteristics. Expected presence is based on comparing the aquatic community in the water body of interest to the aquatic community in representative reference water bodies.

X. "Nuisance algae bloom" means an excessive population of algae that is characterized by obvious green or blue-green pigmentation in the water, floating mats of algae, reduced light transparency, aesthetic degradation, loss of recreational use, possible harm to the aquatic community, or possible toxicity to animals and humans. Algae blooms are measured through tests for chlorophyll-a, observations of Secchi disk transparency, and observations of impaired recreational and aesthetic conditions by the users of the water body, or any other reliable data that identifies the population of algae in an aquatic community.

Y. "Periphyton" means algae on the bottom of a water body. In rivers or streams, these forms are typically found attached to logs, rocks, or other substrates, but when dislodged the algae will become part of the seston.

Z. "Readily available and reliable data and information" means chemical, biological, and physical data and information determined by the commissioner to meet the quality assurance and quality control requirements in subpart 8, that are not more than ten years old from the time they are used for the assessment. A subset of data in the ten-year period, or data more than ten years old can be used if credible scientific evidence shows that these data are representative of current conditions.

AA. "Reference water body" means a water body minimally or least impacted by point or nonpoint sources of pollution that is representative of water bodies of a similar surface water body type and within a geographic region such as an ecoregion or watershed. Reference water bodies are used as a base for comparing the quality of similar water bodies in the same geographic region.

BB. "Reservoir" means a body of water in a natural or artificial basin or watercourse where the outlet or flow is artificially controlled by a structure such as a dam. Reservoirs are distinguished from river systems by having a hydraulic residence time of at least 14 days. For purposes of this item, residence time is determined using a flow equal to the $122Q_{10}$ for the months of June through September.

CC. "River nutrient region" means the geographic basis for regionalizing the river eutrophication criteria as described in Heiskary, S. and K. Parson, Regionalization of Minnesota's Rivers for Application of River Nutrient Criteria, Minnesota Pollution Control Agency (2013), which is incorporated by reference. The document is not subject to frequent change and is available through the Minitex interlibrary loan system.

DD. "Secchi disk" means a tool that is used to measure the transparency of lake water. A Secchi disk is an eight-inch weighted disk on a calibrated rope, either white or with quadrants of black and white. To measure water transparency with a Secchi disk, the disk is viewed from the shaded side of a boat. The depth of the water at the point where the disk reappears upon raising it after it has been lowered beyond visibility is recorded.

EE. "Secchi disk transparency" means the transparency of water as measured by a Secchi disk, a Secchi tube, or a transparency tube.

FF. "Secchi tube" means a tool that is used to measure the transparency of stream or river water. A Secchi tube is a clear plastic tube, one meter in length and 1-3/4 inch in diameter, with a mini-Secchi disk on a string. To measure water transparency, the tube is filled with water collected from a stream or river and, looking into the tube from the top, the weighted Secchi disk is lowered into the tube by a string until it disappears and then raised until it reappears, allowing the user to raise and lower the disk within the same water sample numerous times. The depth of the water at the midpoint between disappearance and reappearance of the disk is recorded in centimeters, which are marked on the side of the tube. If the Secchi disk is visible when it is lowered to the bottom of the tube, the transparency reading is recorded as "greater than 100 centimeters."

GG. "Seston" means particulate matter suspended in water bodies and includes plankton and organic and inorganic matter.

HH. "Shallow lake" means an enclosed basin filled or partially filled with standing fresh water with a maximum depth of 15 feet or less or with 80 percent or more of the lake area shallow enough to support emergent and submerged rooted aquatic plants (the littoral zone). It is uncommon for shallow lakes to thermally stratify during the summer. The quality of shallow lakes will permit the propagation and maintenance of a healthy indigenous aquatic community and they will be suitable for boating and other forms of aquatic recreation for which they may be usable. Shallow lakes are differentiated from wetlands and lakes on a case-by-case basis. Wetlands are defined in part 7050.0186, subpart 1a.

II. "Summer-average" means a representative average of concentrations or measurements of nutrient enrichment factors, taken over one summer season.

JJ. "Summer season" means a period annually from June 1 through September 30.

KK. "Transparency tube" means a tool that is used to measure the transparency of stream or river water. A transparency tube is a graduated clear plastic tube, 24 inches or more in length by 1-1/2 inches in diameter, with a stopper at the bottom end. The inside surface of the stopper is painted black and white. To measure water transparency, the tube is filled with water from a surface water; the water is released through a valve at the bottom end until the painted surface of the stopper is just visible through the water column when viewed from the top of the tube. The depth, in centimeters, is noted. More water is released until the screw in the middle of the painted symbol on the stopper is clearly visible; this depth is noted. The two observed depths are averaged to obtain a transparency measurement.

LL. "Trophic status or condition" means the productivity of a lake as measured by the phosphorus content, algae abundance, and depth of light penetration.

MM. "Use attainability analysis" means a structured scientific assessment of the physical, chemical, biological, and economic factors affecting attainment of the uses of water bodies. A use attainability analysis is required to remove a designated use specified in section 101(a)(2) of the Clean Water Act that is not an existing use. The allowable reasons for removing a designated use are described in Code of Federal Regulations, title 40, section 131.10 (g).

NN. "Water body" means a lake, reservoir, wetland, or a geographically defined portion of a river or stream.

OO. "Water body type" means a group of water bodies with similar natural physical, chemical, and biological attributes, where the characteristics are similar among water bodies within each type and distinct from water bodies of other types.

Subp. 5. **Impairment of waters due to excess algae or plant growth.** In evaluating whether the narrative standards in subpart 3, which prohibit any material increase in undesirable slime growths or aquatic plants including algae, are being met, the commissioner will use all readily available and reliable data and information for the following factors of use impairment:

A. representative summer-average concentrations of total phosphorus and total nitrogen measured in the water body;

B. representative summer-average concentrations of chlorophyll-a seston measured in the water body;

C. representative summer-average measurements of Secchi disk transparency in the water body;

D. representative summer-average concentrations of five-day biochemical oxygen demand measured in rivers and streams;

E. representative diel dissolved oxygen flux measurements in rivers and streams as averaged over a minimum of four consecutive days during the summer season;

F. representative measurements of pH in the water body during the summer season;

G. representative measurements of chlorophyll-a (periphyton) on substrates on the beds of rivers and streams during the summer season; and

H. any other scientifically objective, credible, and supportable factor.

Subp. 5a. **Impaired condition; lakes, shallow lakes, and reservoirs.**

A. For lakes, shallow lakes, and reservoirs, a finding of an impaired condition must be supported by data showing:

(1) elevated levels of nutrients under subpart 5, item A; and

(2) at least one factor showing impaired conditions resulting from nutrient overenrichment under subpart 5, items B and C.

B. The trophic status data described in subpart 5, items A to C and H, must be assessed in light of the magnitude, duration, and frequency of nuisance algae blooms in the water body; and documented impaired recreational and aesthetic conditions observed by the users of the water body due to excess algae or plant growth, reduced transparency, or other deleterious conditions caused by nutrient overenrichment.

C. Assessment of trophic status and the response of a given water body to nutrient enrichment will take into account the trophic status of reference water bodies; and all relevant factors that affect the trophic status of the given water body appropriate for its geographic region, such as the temperature, morphometry, hydraulic residence time, mixing status, watershed size, and location.

Subp. 5b. **Impaired condition; rivers and streams.** For rivers and streams, a finding of an impaired condition must be supported by data showing:

A. elevated levels of nutrients under subpart 5, item A, and at least one factor showing impaired conditions resulting from nutrient overenrichment under subpart 5, item B, D, E, F, or H; or

B. elevated levels of chlorophyll-a (periphyton) under subpart 5, item G.

Subp. 5c. **Impaired condition; navigational pools.** For navigational pools, a finding of impaired condition must be supported by data showing:

A. elevated levels of nutrients under subpart 5, item A; and

B. impaired conditions resulting from nutrient overenrichment under subpart 5, item B.

Subp. 6. **Impairment of biological community and aquatic habitat.** In evaluating whether the narrative standards in subpart 3, which prohibit serious impairment of the normal aquatic biota and the use thereof, material alteration of the species composition, material degradation of stream beds, and the prevention or hindrance of the propagation and migration of aquatic biota normally present, are being met, the commissioner will consider all readily available and reliable data and information for the following factors of use impairment:

A. an index of biological integrity calculated from measurements of attributes of the resident fish community, including measurements of:

(1) species diversity and composition;

(2) feeding and reproduction characteristics; and

(3) fish abundance and condition;

B. an index of biological integrity calculated from measurements of attributes of the resident aquatic invertebrate community, including measurements of:

(1) species diversity and composition;

(2) feeding characteristics; and

(3) species abundance and condition;

C. an index of biological integrity calculated from measurements of attributes of the resident aquatic plant community, including measurements of:

(1) species diversity and composition, including algae; and

(2) species abundance and condition;

D. a quantitative or qualitative assessment of habitat quality, determined by an assessment of:

(1) stream morphological features that provide spawning, nursery, and refuge areas for fish and invertebrates;

(2) bottom substrate size and variety;

(3) variations in water depth;

(4) sinuosity of the stream course;

(5) physical or hydrological alterations of the stream bed including excessive sedimentation;

(6) types of land use in the watershed; and

(7) other scientifically accepted and valid factors of habitat quality; and

E. any other scientifically objective, credible, and supportable factors.

A finding of an impaired condition must be supported by data for the factors listed in at least one of items A to C. The biological quality of any given surface water body will be assessed by comparison to the biological conditions determined by the commissioner using a biological condition gradient model or a set of reference water bodies which best represents the most natural condition for that surface water body type within a geographic region.

Subp. 7. **Impairment of waters relating to fish for human consumption.**

A. In evaluating whether the narrative standards in subpart 3, which prevent harmful pesticide or other toxic pollutant residues in aquatic flora or fauna, are being met, the commissioner must use the methods in:

(1) parts 7050.0218 and 7050.0219 for site-specific fish tissue-based chronic criterion (CC_{ft}); or

(2) parts 7050.0222 and 7052.0100 for fish tissue-based chronic standard (CS_{ft}).

B. If CS_{ft} has not been established for a pollutant with chronic standards (CS) applicable in water (CS_{dfr}, CS_{dev}, or CS_{fr}, as defined in parts 7050.0218, subpart 3, item Q, and 7050.0219, subpart 13, item B), the residue levels in fish muscle tissue established by the Minnesota Department of Health must be used to identify surface waters supporting fish for which the Minnesota Department of Health recommends a reduced frequency of fish consumption for the protection of public health. A water body will be considered impaired when the recommended consumption frequency is less than one meal per week, such as one meal per month, for any member of the population. That is, a water body will not be considered impaired if the recommended consumption frequency is one meal per week, or any less restrictive recommendation such as two meals per week, for all members of the population. The impaired condition must be supported with measured data on the contaminant levels in the resident fish.

C. When making impairment determinations in an individual water body for a pollutant with both a fish tissue-based CC_{ft} or CS_{ft} and a CS applicable in water, comparison of fish tissue data to the CC_{ft} or CS_{ft} must be the basis for the final impairment determination.

Subp. 8. **Determination of compliance.** In making tests or analyses of the waters of the state, sewage, industrial wastes, or other wastes to determine compliance with the standards and water quality condition, samples shall be collected in a manner and place, and of such type, number, and frequency as may be considered necessary by the agency from the viewpoint of adequately reflecting the condition of the waters, the composition of the effluents, and the effects of the pollutants upon the specified uses. The samples shall be collected, preserved, and analyzed following accepted

quality control and quality assurance methods, and according to the procedures in Code of Federal Regulations, title 40, part 136. The agency may accept or may develop other methods, procedures, guidelines, or criteria for collecting and analyzing samples and measuring water quality characteristics. The commissioner will retain a record of all impairment decisions using the factors in this part, including all supporting data, for a minimum of eight years.

Statutory Authority: *MS s 115.03; 115.44; L 2005 1Sp1 art 2 s 151*

History: *9 SR 913; 15 SR 1057; 18 SR 2195; 27 SR 1217; 31 SR 1168; 32 SR 1699; 39 SR 154; 39 SR 1344; 42 SR 441*

Published Electronically: *November 20, 2017*

7050.0155 PROTECTION OF DOWNSTREAM USES.

All waters must maintain a level of water quality that provides for the attainment and maintenance of the water quality standards of downstream waters, including the waters of another state.

Statutory Authority: *MS s 115.03; 115.44*

History: *42 SR 441*

Published Electronically: *November 20, 2017*

7050.0160 [Repealed, 9 SR 913]

Published Electronically: *April 1, 2008*

7050.0170 NATURAL WATER QUALITY.

The waters of the state may, in a natural condition, have water quality characteristics or chemical concentrations approaching or exceeding the water quality standards. Natural conditions exist where there is no discernible impact from point or nonpoint source pollutants attributable to human activity or from a physical alteration of wetlands. Natural background levels are defined by water quality monitoring. Where water quality monitoring data are not available, background levels can be predicted based on data from a watershed with similar characteristics.

Where natural background levels do not exceed applicable standards, the addition of pollutants from human activity and resulting point or nonpoint source discharges shall be limited such that, in total, the natural background levels and the additions from human activity shall not exceed the standards. When reasonable justification exists to preserve the higher natural quality of a water resource, the commissioner may use the natural background levels that are lower than the applicable site-specific standards to control the addition of the same pollutants from human activity. The reasonable justification must meet the requirements under parts 7050.0250 to 7050.0335.

Where background levels exceed applicable standards, the background levels may be used as the standards for controlling the addition of the same pollutants from point or nonpoint source discharges in place of the standards.

In the adoption of standards for individual waters of the state, the agency will be guided by the standards herein but may make reasonable modifications of the same on the basis of evidence

brought forth at a public hearing if it is shown to be desirable and in the public interest to do so in order to encourage the best use of the waters of the state or the lands bordering such waters.

Statutory Authority: *MS s 115.03; 115.44*

History: *9 SR 913; 12 SR 1810; 18 SR 2195; 9 SR 913; 12 SR 1810; 18 SR 2195; 41 SR 545*
Published Electronically: *December 9, 2016*

7050.0180 [Repealed, 41 SR 545]
Published Electronically: *December 9, 2016*

7050.0185 [Repealed, 41 SR 545]
Published Electronically: *December 9, 2016*

7050.0186 WETLAND STANDARDS AND MITIGATION.

Subpart 1. **Policy and wetland beneficial uses.** It is the policy of the state to protect wetlands and prevent significant adverse impacts on wetland beneficial uses caused by chemical, physical, biological, or radiological changes. The quality of wetlands shall be maintained to permit the propagation and maintenance of a healthy community of aquatic and terrestrial species indigenous to wetlands, preserve wildlife habitat, and support biological diversity of the landscape. In addition, these waters shall be suitable for boating and other forms of aquatic recreation as specified in part 7050.0222, subpart 6; general industrial use as specified in part 7050.0223, subpart 5; irrigation, use by wildlife and livestock, erosion control, groundwater recharge, low flow augmentation, storm water retention, and stream sedimentation as specified in part 7050.0224, subpart 4; and aesthetic enjoyment as specified in part 7050.0225, subpart 2.

Subp. 1a. **Definitions.**

A. "Physical alteration" means the dredging, filling, draining, or permanent inundating of a wetland. Restoring a degraded wetland by reestablishing its hydrology is not a physical alteration.

B. "Wetlands" are those areas that are inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas. Constructed wetlands designed for wastewater treatment are not waters of the state. Wetlands must have the following attributes:

(1) a predominance of hydric soils;

(2) inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support a prevalence of hydrophytic vegetation typically adapted for life in a saturated soil condition; and

(3) under normal circumstances, support a prevalence of such vegetation.

Subp. 1b. **Wetland pollution prohibited.** Wetland conditions shall be protected from chemical, physical, biological, or radiological changes to prevent significant adverse impacts to the designated

beneficial uses listed in subpart 1. The antidegradation provisions in this chapter are applicable to wetlands.

Subp. 2. **Wetland mitigation principles.** The wetland mitigative sequence incorporates the principles in items A to C in descending order of priority. Wetland mitigation maintains antidegradation of wetland designated uses:

A. avoid the impact altogether by not taking a certain action or parts of an action;

B. minimize the impact by limiting the degree or magnitude of the action and its implementation, and by taking affirmative actions to rectify the impact and reduce or eliminate the impact over time; and

C. mitigate the unavoidable impact to the designated uses of a wetland by compensation. Compensatory mitigation shall be accomplished in the following descending order of priority of replacement:

(1) restoration of a previously diminished wetland; and

(2) creation of a wetland.

Subp. 3. **Determination of wetland dependency.** A project is wetland dependent if wetland designated uses are essential to fulfill the basic purpose of the project. A wetland dependent project is exempt from subpart 4, but will follow the remainder of the mitigation sequence. Where the proposed project is not wetland dependent, the wetland mitigation sequence in subpart 2 must be followed.

Subp. 4. **Impact avoidance.** No person may cause or allow a physical alteration which has the potential for a significant adverse impact on one or more designated uses of a wetland, unless there is not a prudent and feasible alternative that would avoid impacts to the designated uses of the wetland.

A. Prudent and feasible alternatives that do not involve wetlands are presumed to be available unless clearly demonstrated otherwise by the permit or certification applicant.

B. If no prudent and feasible alternative is available for avoidance, potential significant adverse impacts to the designated uses of the wetland shall be minimized in compliance with subpart 5.

Subp. 5. **Impact minimization.**

A. The permit or certification applicant shall implement actions to minimize potential significant adverse impacts of the physical alteration.

B. In evaluating the applicant's actions to minimize impacts, the agency shall consider:

(1) the spatial requirements of the project;

(2) the location of existing structural or natural features that may dictate the placement or configuration of the project;

(3) the purpose of the project and how the purpose relates to placement, configuration, or density;

(4) the sensitivity of the site design to the natural features of the site, including topography, hydrology, and existing vegetation;

(5) the designated uses and spatial distribution of the wetlands on the site;

(6) individual and cumulative impacts; and

(7) the applicable minimization activities identified in Code of Federal Regulations, title 40, part 230, subpart H, as amended.

C. If the potential for significant adverse impacts on designated uses remains after all actions to minimize the impacts have been incorporated into the proposed project, unavoidable impacts shall be compensated for in compliance with subpart 6.

Subp. 6. **Impact compensation.** The permit or certification applicant shall provide compensatory mitigation for unavoidable impacts on the designated uses of the wetland in accordance with this subpart.

A. Compensatory mitigation must be sufficient to ensure replacement of the diminished or lost designated uses of the wetland that was physically altered.

B. Compensatory mitigation shall be accomplished in the following descending order of priority of replacement:

(1) restoration of a previously diminished wetland; and

(2) creation of a wetland.

C. If compensatory mitigation is accomplished by restoration or creation, the replacement wetland shall be of the same type and in the same watershed as the impacted wetland, to the extent prudent and feasible.

D. Compensatory mitigation shall be completed before or concurrent with the actual physical alteration of the wetland affected by the proposed project to the extent prudent and feasible.

Statutory Authority: *MS s 115.03; 115.44*

History: *18 SR 2195; 32 SR 1699; 18 SR 2195; 32 SR 1699; 41 SR 545*

Published Electronically: *December 9, 2016*

7050.0190 VARIANCE FROM STANDARDS.

Subpart 1. **Applicability.** A variance under this part is a temporary change in a state water quality standard for a specified pollutant that reflects the highest attainable conditions for a permittee during the term of the variance. This part applies to variance requests from individual point source discharges to surface waters of the state for any water quality-based effluent limit based on a water quality standard of this chapter that is included in a permit. To be eligible for a water quality

standards variance, the permittee must demonstrate to the agency that the permittee has met the following conditions:

A. the variance would not jeopardize the continued existence of an endangered or threatened species listed under chapter 6134 or section 4 of the Endangered Species Act, United States Code, title 16, section 1533, or result in destruction or adverse modification of the species' critical habitat;

B. standards will not be attained by implementing effluent limitations required under sections 301(b) and 306 of the Clean Water Act, United States Code, title 33, sections 1311(b) and 1316, and by the permittee implementing cost-effective and reasonable best management practices for nonpoint sources under the permittee's control as established under state authority; and

C. the variance would not remove an existing use.

Subp. 2. **Listing.** The agency shall advise the United States Environmental Protection Agency of variances granted by the agency under this part, together with information as to the need for the variance. By October 1 each year, the commissioner shall prepare a list of the variances currently in effect and approved by the United States Environmental Protection Agency or granted by the agency under part 7053.0195. The list must be available for public inspection and must be provided to the United States Environmental Protection Agency. The list must identify the person that received the variance, the rule from which the variance was granted, the water body affected, the year approved by the United States Environmental Protection Agency or granted by the agency under part 7053.0195, the date the variance expires, and any restrictions that apply in lieu of the rule requirement.

Subp. 3. [Repealed, 41 SR 463]

Subp. 4. **Conditions for approval.** Before a variance can become effective, the variance must be submitted to and approved by the United States Environmental Protection Agency in accordance with section 303(c) of the Clean Water Act and Code of Federal Regulations, title 40, sections 131.20 and 131.21. To be eligible for a preliminary determination by the agency to grant the variance, the permittee must:

A. demonstrate to the agency that attaining the water quality standard is not feasible because:

(1) naturally occurring pollutant concentrations prevent attainment of the water quality standard;

(2) natural, ephemeral, intermittent, or low-flow conditions or water levels prevent attainment of water quality standards, unless these conditions may be compensated for by discharging sufficient volume of effluent to enable water quality standards to be met without violating the water conservation requirements of Minnesota Statutes, chapter 103G;

(3) human-caused conditions or sources of pollution prevent attainment of water quality standards, and the conditions or sources cannot be remedied or would cause more environmental damage to correct than to leave in place;

(4) dams, diversions, or other types of hydrologic modifications preclude attainment of water quality standards, and it is not feasible to restore the water body to its original condition or to operate the modification in a way that would result in attainment of the water quality standard;

(5) physical conditions related to the natural features of the water body, such as the lack of a proper substrate cover, flow, depth, pools, riffles, and the like, unrelated to chemical water quality, preclude attainment of aquatic life protection uses; or

(6) controls more stringent than those required under sections 301(b) and 306 of the Clean Water Act, United States Code, title 33, sections 1311(b) and 1316, would result in substantial and widespread negative economic and social impacts;

B. show that the variance conforms with parts 7050.0250 to 7050.0335;

C. characterize the extent of any increased risk to human health and the environment associated with granting the variance, such that the agency is able to conclude that any increased risk is consistent with the protection of the public health, safety, and welfare; and

D. show sufficient information to allow the agency to determine the water quality currently attained and the interim numeric effluent conditions that reflect the highest attainable conditions for a permittee during the term of the variance.

Subp. 5. **Submittal and notice requirements.** Variance application submittal, public notice of the agency's preliminary determination to grant the variance, and notice requirements must conform to part 7000.7000.

Subp. 6. **Agency final decision; variance requirements.** The agency must make a final decision regarding the variance request that conforms to the procedural requirements in part 7000.7000. The agency must hold at least one meeting that meets the minimum public participation requirements in Code of Federal Regulations, title 40, section 25.5, before the agency makes a final decision on the variance request. If the agency grants the variance and the variance is approved by the United States Environmental Protection Agency, the permit issued by the agency must include and incorporate the following variance terms and conditions:

A. an effluent limitation representing currently achievable treatment conditions based on discharge monitoring or projected effluent quality that is no less stringent than that achieved under the previous permit;

B. a schedule of compliance activities to improve water quality and move toward attainment of the underlying water quality standard;

C. an effluent limitation sufficient to meet the underlying water quality standard, upon the expiration of the variance, when the duration of the variance is shorter than the duration of the permit; and

D. a provision allowing the agency to reopen and modify the permit based on agency triennial water quality standards revisions applicable to the variance.

Subp. 7. **Renewal.** To be eligible for renewal of a variance, the permittee is subject to the requirements of subparts 1 to 6.

Subp. 8. **Term and expiration.** The terms and conditions of a water quality standards variance are included and incorporated in the permit issued by the agency. The term of a variance must only be as long as necessary to achieve the highest attainable condition. For a variance with the term greater than five years, only if requested in writing by the permittee, the agency shall reevaluate the variance every five years in accordance with Code of Federal Regulations, title 40, section 131.14 (b)(1)(v) and (vi), as provided by the Federal Register, volume 80, page 51048. If the permittee does not request a reevaluation, the variance expires at the end of the five-year period.

Subp. 9. **Public notice and review.**

A. Every three years, the agency shall provide public notice of a list of variances currently in effect at the time of public notice, consistent with the triennial review of water quality standards required under Code of Federal Regulations, title 40, section 131.20. The public notice shall include a statement that a person may submit to the agency new information that has become available relevant to the list of variances.

B. If a permittee requests a renewal of a variance according to subpart 7, the agency shall consider information submitted under item A in its review for renewal of the variance. Variances from discharge effluent limits and treatment requirements are granted by the agency under parts 7000.7000 and 7053.0195.

Statutory Authority: *MS s 115.03; 115.44; 116.07*

History: *9 SR 913; 12 SR 1810; 19 SR 1310; 32 SR 1699; 41 SR 463; 41 SR 545*
Published Electronically: *December 9, 2016*

7050.0200 [Repealed, 32 SR 1699]
Published Electronically: *April 1, 2008*

7050.0210 GENERAL STANDARDS FOR WATERS OF THE STATE.

Subpart 1. [Repealed, 32 SR 1699]

Subp. 2. **Nuisance conditions prohibited.** No sewage, industrial waste, or other wastes shall be discharged from either point or nonpoint sources into any waters of the state so as to cause any nuisance conditions, such as the presence of significant amounts of floating solids, scum, visible oil film, excessive suspended solids, material discoloration, obnoxious odors, gas ebullition, deleterious sludge deposits, undesirable slimes or fungus growths, aquatic habitat degradation, excessive growths of aquatic plants, or other offensive or harmful effects.

Subp. 3. [Repealed, 32 SR 1699]

Subp. 4. **Highest levels of water quality.** The highest levels of water quality, including, but not limited to, dissolved oxygen, that are attainable in the waters of the state by continuous operation at the maximum capability of all primary and secondary units of treatment works or their equivalent,

discharging effluents into the waters of the state, must be maintained in order to enhance conditions for the specified uses.

Subp. 5. **Mixing zones.** Reasonable allowance will be made for dilution of the effluents, which are in compliance with this chapter and chapter 7053, as applicable, following discharge into waters of the state. The agency, by allowing dilution, will consider the effect on all uses of the waters of the state into which the effluents are discharged. The extent of dilution allowed regarding any specific discharge as specified in part 7053.0205, subpart 7, shall not violate the applicable water quality standards in this chapter and chapter 7052, including the antidegradation requirements contained in those chapters. This subpart also applies in cases where a class 7 water is tributary to a class 2 water.

Mixing zones must be established by the agency on an individual basis, with primary consideration being given to the following guidelines:

A. mixing zones in rivers shall permit an acceptable passageway for the movement of fish;

B. the total mixing zone or zones at any transect of the stream should contain no more than 25 percent of the cross sectional area and/or volume of flow of the stream, and should not extend over more than 50 percent of the width;

C. mixing zone characteristics shall not be lethal to aquatic organisms;

D. for contaminants other than heat, the FAV, as defined in part 7050.0218, subpart 3, item Y, for toxic pollutants should not be exceeded as a one-day mean concentration at any point in the mixing zone;

E. mixing zones should be as small as possible, and not intersect spawning or nursery areas, migratory routes, water intakes, nor mouths of rivers; and

F. overlapping of mixing zones should be minimized and measures taken to prevent adverse synergistic effects.

Subp. 6. [Renumbered 7050.0211, subpart 1]

Subp. 6a. [Renumbered 7050.0211, subpart 2]

Subp. 6b. [Renumbered 7050.0211, subpart 3]

Subp. 6c. **Other requirements preserved.** The requirements of this chapter are in addition to any requirement imposed by the Clean Water Act, United States Code, title 33, sections 1251 et seq., and its implementing regulations. In the case of a conflict between the requirements of this chapter and the requirements of the Clean Water Act or its implementing regulations, the more stringent requirement controls.

Subp. 7. **Minimum stream flow.** Point and nonpoint sources of water pollution shall be controlled so that the water quality standards will be maintained at all stream flows that are equal to or greater than the $7Q_{10}$ for the critical month or months, unless another flow condition is specifically stated as applicable in this chapter.

Subp. 8. [Renumbered 7050.0213]

Subp. 9. [Repealed, 32 SR 1699]

Subp. 10. [Repealed, 32 SR 1699]

Subp. 11. [Repealed, 12 SR 1810]

Subp. 12. [Repealed, 32 SR 1699]

Subp. 13. **Pollution prohibited.** No sewage, industrial waste, or other wastes shall be discharged from either a point or a nonpoint source into the waters of the state in such quantity or in such manner alone or in combination with other substances as to cause pollution as defined by law. In any case where the waters of the state into which sewage, industrial waste, or other waste effluents discharge are assigned different standards than the waters of the state into which the receiving waters flow, the standards applicable to the waters into which the sewage, industrial waste, or other wastes discharged shall be supplemented by the following:

The quality of any waters of the state receiving sewage, industrial waste, or other waste effluents shall be such that no violation of the standards of any waters of the state in any other class shall occur by reason of the discharge of the sewage, industrial waste, or other waste effluents.

Subp. 13a. [Repealed, 32 SR 1699]

Subp. 14. [Repealed, 15 SR 1057]

Subp. 15. [Repealed, 32 SR 1699]

Subp. 16. [Renumbered 7050.0214]

Subp. 17. [Repealed, 32 SR 1699]

Subp. 18. [Repealed, 32 SR 1699]

Statutory Authority: *MS s 115.03; 115.44*

History: *9 SR 913; 9 SR 2756; L 1987 c 186 s 15; 12 SR 1810; 15 SR 1057; 18 SR 614; 18 SR 2195; 22 SR 1466; 24 SR 1105; 27 SR 1217; 32 SR 1699; 9 SR 913; 9 SR 2756; L 1987 c 186 s 15; 12 SR 1810; 15 SR 1057; 18 SR 614; 18 SR 2195; 22 SR 1466; 24 SR 1105; 27 SR 1217; 32 SR 1699; 41 SR 545; 9 SR 913; 9 SR 2756; L 1987 c 186 s 15; 12 SR 1810; 15 SR 1057; 18 SR 614; 18 SR 2195; 22 SR 1466; 24 SR 1105; 27 SR 1217; 32 SR 1699; 41 SR 545*

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7050.0215 [Repealed, 32 SR 1699]
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7050.0216 [Repealed, 32 SR 1699]
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7050.0217 OBJECTIVES FOR PROTECTION OF SURFACE WATERS FROM TOXIC POLLUTANTS.

Subpart 1. **Purpose and applicability.** The purpose of this part is to establish the objectives for developing numeric water quality standards listed in parts 7050.0220, 7050.0222, 7050.0227, and 7052.0100 and site-specific water quality criteria for toxic pollutants or chemicals developed in the absence of numeric standards. The listed numeric standards for toxics and site-specific numeric criteria established by methods in parts 7050.0218 and 7050.0219 protect class 2 waters for the propagation and maintenance of aquatic biota, the consumption of fish and edible aquatic life by humans, the use of surface waters for public and private domestic consumption where applicable, and the consumption of aquatic organisms by wildlife. These criteria also protect the uses assigned to class 7, limited resource value, waters as described in parts 7050.0140 and 7050.0227.

Subp. 2. **Objectives.**

A. Protection of the aquatic community from the toxic effects of pollutants means the protection of no less than 95 percent of all the species in any aquatic community. Greater protection may be applied to a community if economically, recreationally, or ecologically important species are very sensitive.

B. Protection of human consumers of fish, other edible aquatic organisms, and water for drinking from surface waters means that exposure from noncarcinogenic chemicals, including nonlinear carcinogens (NLC), singly or in mixtures, must be below levels expected to produce known adverse effects; the combined risk from mixtures of noncarcinogens and NLC must not exceed the common health risk index endpoints or health endpoints described in part 7050.0222, subpart 7, item D; and the incremental cancer risk from exposure to carcinogenic chemicals, singly or in mixtures, must not exceed one in 100,000. The combined risk from mixtures of linear carcinogens (C) will be determined as described in part 7050.0222, subpart 7, item E.

C. Protection of wildlife that eat aquatic organisms means the protection of the most sensitive wildlife species or populations. Greater protection may be applied if the exposed animals include endangered or threatened wildlife species listed in chapter 6134, or in Code of Federal Regulations, title 50, part 17, under the Endangered Species Act of 1973, United States Code, title 16, sections 1531 to 1543.

Statutory Authority: *MS s 115.03; 115.44*

History: *15 SR 1057; 18 SR 2195; 32 SR 1699; 39 SR 1344; 42 SR 441*
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7050.0218 FOR TOXIC POLLUTANTS: DEFINITIONS AND METHODS FOR DETERMINATION OF HUMAN HEALTH-BASED NUMERIC STANDARDS AND SITE-SPECIFIC NUMERIC CRITERIA FOR AQUATIC LIFE, HUMAN HEALTH, AND FISH-EATING WILDLIFE.

Subpart 1. **Purpose.** The methods in this part and part 7050.0219 meet the objectives in part 7050.0217 and provide the basis for developing human health-based numeric chronic standards and site-specific numeric criteria for aquatic toxicity, human health, and fish-eating wildlife. The agency may also adopt new standards according to Minnesota Statutes, chapter 14, to replace those listed in parts 7050.0220 to 7050.0227 and 7052.0100 that are more stringent or less stringent if new scientific evidence shows that a change in the standard is justified.

Subp. 2. **Site-specific criteria.** The class 2 and class 7 numeric water quality standards for toxic pollutants in parts 7050.0220, 7050.0222, 7050.0227, and 7052.0100 do not address all pollutants that may be discharged to surface waters and cause toxic effects. Therefore, methods are established in this part and part 7050.0219 to address on a site-specific basis the discharge into surface waters of toxic pollutants not listed in parts 7050.0220, 7050.0222, 7050.0227, 7052.0100. Class 2 and class 7 site-specific numeric criteria for toxic pollutants shall be derived by the commissioner using the procedures in this part.

A. A site-specific criterion so derived is specific to the point source being addressed. Any effluent limitation derived from a site-specific criterion under this subpart shall only be required after the discharger has been given notice of the specific proposed effluent limitations and an opportunity to request a hearing as provided in part 7000.1800.

B. A site-specific criterion so derived for remedial action cleanup activities is specific to the affected surface water body.

Subp. 3. **Definitions.** For the purposes of parts 7050.0217 to 7050.0227, the following terms have the meanings given them.

A. "Acute-chronic ratio" or "ACR" means the ratio of the acute toxicity, expressed as a LC50 or EC50, of a toxicant to its chronic toxicity expressed as the chronic value. The ACR is used as a factor for estimating chronic toxicity on the basis of acute toxicity.

B. "Acute toxicity" means a stimulus severe enough to rapidly induce a response. In toxicity tests, a response is normally observed in 96 hours or less. Acute effects are often measured in terms of mortality or other debilitating effects, represented as LC50s or EC50s, and expressed as concentrations of mass per unit volume, percent effluent, or toxic units.

C. "Adjustment factor, lifetime" or "$AF_{lifetime}$" means the numeric multiplier used to modify the adult-based cancer slope factor for lifetime (70 years standard in risk characterization) exposure based on chemical-specific data.

D. "Adverse effect" means a biochemical change, functional impairment, or pathologic lesion that affects the performance of the whole organism or reduces an organism's ability to respond to an additional environmental challenge.

E. "Age-dependent adjustment factor" or "ADAF" means the default numeric modifiers to the cancer slope factor that account for the increased susceptibility to cancer from early-life exposures to linear carcinogens in the absence of chemical-specific data. For default use, there are three ADAF:

(1) $ADAF_{0<2} = 10$, for birth up to two years of age;

(2) $ADAF_{2 \text{ to } <16} = 3$, for two up to 16 years of age; and

(3) $ADAF_{16+} = 1$, for 16 years of age and older.

F. "Available and reliable scientific data" means information derived from scientific literature including: published literature in peer reviewed scientific journals, USEPA ambient water quality criteria documents, and other reports or documents published by the USEPA or other governmental agencies.

G. "Bioaccumulation factor" or "BAF" means the concentration of a pollutant in one or more tissues of an aquatic organism, exposed from any source of the pollutant but primarily from the water column, diet, and bottom sediments, divided by the average concentration in the solution in which the organism had been living, under steady state conditions.

H. "Bioaccumulative chemical of concern" or "BCC" has the meaning given in part 7052.0010, subpart 4.

I. "Bioconcentration factor" or "BCF" means the concentration of a pollutant in one or more tissues of an aquatic organism, exposed only to the water as the source of the pollutant, divided by the average concentration in the solution in which the organism had been living, under steady state conditions.

J. "Biomagnification" means the increase in tissue concentration of a pollutant in aquatic organisms at successive trophic levels through a series of predator-prey associations, primarily occurring through dietary accumulation. The expression used to quantify this increase is the biomagnification factor or "BMF." For a given water body, the BMF is calculated as:

(1) the ratio of the tissue concentration of a pollutant in a predator at a particular trophic level to the tissue concentration in its prey at the next lower trophic level; or

(2) the ratio estimated from a comparable laboratory model.

K. "Biota-sediment accumulation factor" or "BSAF" means the ratio (in kilogram of organic carbon/kilogram of lipid) of a pollutant's lipid-normalized concentration in tissue of an aquatic organism to its organic carbon-normalized concentration in surface sediment, where:

(1) the ratio does not change substantially over time;

(2) both the organism and its food are exposed; and

(3) the surface sediment is representative of average surface sediment in the vicinity of the organism.

L. "Cancer potency slope factor" or "CSF" means a factor indicative of a chemical's human cancer causing potential and an upper-bound estimate of cancer risk per increment of dose that can be used to estimate cancer risk probabilities for different exposure levels. CSF is expressed in units of cancer incidence per milligram of pollutant per kilogram of body weight-day $(mg/kg\text{-}day)^{-1}$.

M. "Cancer risk level" or "CR" means the probability that daily exposure to a carcinogen over a lifetime may induce cancer. CR refers to an incremental or additional excess cancer risk equal to 1×10^{-5} (1 in 100,000) and is applied with the cancer potency slope factor for single chemicals and for mixtures.

N. "Carcinogen, linear" or "C" means a chemical agent for which, either by a known mode of action or a conservative assumption, the associated cancer risk varies in direct proportion to the extent of exposure and for which there is no risk-free level of exposure. The toxicological value for a C is the cancer potency slope factor. Seventy years is the standard lifetime duration used by United States Environmental Protection Agency in the characterization of lifetime cancer risk.

O. "Carcinogen, nonlinear" or "NLC" means a chemical agent for which, particularly at low doses, the associated cancer risk does not rise in direct proportion to the extent of exposure and for which a threshold level of exposure exists below which there is no cancer risk. For NLC, the reference dose is the toxicological value used as the threshold for cancer risk.

P. "Chronic toxicity" means a stimulus that lingers or continues for a long period of time, often one-tenth the life span or more. A chronic effect can be mortality, reduced growth, reproduction impairment, harmful changes in behavior, and other nonlethal effects.

Q. "Chronic criterion" or "CC" and "chronic standard" or "CS" mean the highest water concentration or fish tissue concentration of a toxicant or effluent to which aquatic life, humans, or wildlife can be exposed indefinitely without causing chronic toxicity. CC represents a site-specific chronic criterion developed under this part and part 7050.0219 or part 7052.0110. CS represents a chronic standard listed in parts 7050.0220 and 7050.0222 or in part 7052.0100. CC and CS are further distinguished by the organisms they are developed to protect and medium in which they apply:

(1) CC_{tox} or CS_{tox} represent values applied in surface water developed to protect aquatic life from chronic toxicity;

(2) CC_{dfr} or CS_{dfr} represent values applied in surface water based on protecting humans from exposure to the pollutant from drinking water, eating fish, and aquatic recreation;

(3) CC_{fr} or CS_{fr} represent values applied in surface water based on protecting humans from exposure to the pollutant from eating fish and aquatic recreation;

(4) CC_{ft} or CS_{ft} represent values applied in fish tissue based on protecting humans from exposure to the pollutant from eating fish; and

(5) CC_w represents values applied in surface water based on protecting wildlife from exposure to the pollutant from eating aquatic organisms.

R. "Chronic value" means the geometric mean of the highest tested concentration that did not cause an unacceptable adverse effect and the lowest tested concentration that did cause an unacceptable adverse effect, and in which all higher test values cause an effect, in an approved chronic test.

S. "Criterion" means a number or numbers established for a pollutant derived under this part or part 7050.0219 or 7052.0110, or issued by the USEPA, to protect aquatic life, humans, or wildlife.

T. "Developmental health endpoint" or "developmental toxicity" means an adverse effect on the developing organism that may result from parental exposure prior to conception, maternal exposure during prenatal development, or direct exposure postnatally until the time of sexual maturation. Developmental toxicity may be detected at any point in the lifespan of the organism. The major manifestations of developmental toxicity include:

(1) death of the developing organism;

(2) structural abnormality;

(3) altered growth; or

(4) functional deficiency.

U. "Duration" means the time over which the instream concentration of a pollutant is averaged for comparison with the standard or criterion.

V. "Durations for human health-based algorithms" or "D" means the length of the exposure period under consideration for noncancer and linear cancer algorithms.

(1) The four default D used in developing reference doses and corresponding intake rates are:

(a) acute: a period of 24 hours or less;

(b) short-term: a period of more than 24 hours, up to 30 days;

(c) subchronic: a period of more than 30 days, up to eight years based on application of the less than ten percent standard life expectancy of 70 years for humans; or

(d) chronic: a period of more than eight years.

(2) The default durations for use in the linear cancer algorithms with age dependent adjustment factors are:

(a) two years for the birth up to two-year age group;

(b) 14 years for the two- up to 16-year age group; and

(c) 54 years for the 16- up to 70-year age group.

For any algorithm, use of chemical-specific data to define durations for noncancer or linear cancer algorithms are preferred when acceptable data are available.

W. "Effect concentration" or "EC50" means the toxicant concentration that causes equilibrium loss, immobilization, mortality, or other debilitating effects in 50 percent of the exposed organisms during a specific time of observation.

X. "Endocrine" or "E" means a change in circulating hormone levels or interactions with hormone receptors, regardless of the organ or organ system affected. Health endpoints with or without the E designation are deemed equivalent, for example, thyroid (E) = thyroid, and must be included in the same health risk index equation.

Y. "Final acute value" or "FAV" means an estimate of the concentration of a pollutant corresponding to the cumulative probability of 0.05 in the distribution of all the acute toxicity values for the genera or species from the acceptable acute toxicity tests conducted on a pollutant. The FAV is the acute toxicity limitation applied to mixing zones in part 7050.0210, subpart 5; and to dischargers in parts 7053.0215, subpart 1; 7053.0225, subpart 6; and 7053.0245, subpart 1.

Z. "Food chain multiplier" or "FCM" means the ratio of a bioaccumulation factor by trophic level to an appropriate bioconcentration factor. FCM refers to values developed using USEPA models or from available and reliable field studies.

AA. "Frequency" means the number of times a standard can be exceeded in a specified period of time without causing acute or chronic toxic effects on the aquatic community, human health, or fish-eating wildlife.

BB. "Genus mean acute value" or "GMAV" means the geometric mean of the SMAVs available for the genus.

CC. "Health risk index" means the sum of the quotients calculated by identifying all chemicals that share a common health endpoint or are based on linear carcinogenicity and dividing the water or fish tissue concentration for each chemical (measured or statistically derived) by its applicable chronic standard or chronic criterion. To meet the objectives in part 7050.0217, the health risk index must not exceed a value of one. The equations for the risk indices are found in part 7050.0222, subpart 7, items D and E.

DD. "Health risk index endpoint" or "health endpoint" means the general description of toxic effects used to group chemicals for the purpose of calculating a health risk index.

EE. "Intake rate" or "IR" means rate of ingestion, inhalation, or dermal contact, depending on the route of exposure, expressed as the amount of a media taken in, on a per body weight and daily basis, for a specified duration.

FF. "Lethal concentration" or "LC50" means the toxicant concentration killing 50 percent of the exposed organisms in a specific time of observation.

GG. "Lowest observable adverse effect level" or "LOAEL" means the lowest exposure level that caused a statistically or biologically significant increase in the frequency or severity of adverse effects observed between the exposed population and its appropriate control group.

HH. "Magnitude" means the acceptable amount of a toxic pollutant in water or fish tissue expressed as a concentration.

II. "Maximum criterion" or "MC" means the highest concentration of a toxicant in water to which aquatic organisms can be exposed for a brief time with zero to slight mortality. The MC equals the FAV divided by two.

JJ. "Maximum standard" or "MS" means the highest concentration of a toxicant in water to which aquatic organisms can be exposed for a brief time with zero to slight mortality. The MS equals the FAV divided by two. Maximum standards are listed in part 7050.0222.

KK. "MDH" means the Minnesota Department of Health.

LL. "Mode of action" or "MOA" means the sequence of key events following pollutant or chemical exposure upon which the toxic outcome depends.

MM. "National methods" means the methods the USEPA uses to develop aquatic life criteria as described in Stephan, C.E., D.J. Mount, D.J. Hansen, J.H. Gentile, G.A. Chapman, and W.A. Brungs, 1985, "Guidelines for Deriving Numerical National Water Quality Criteria for the Protection of Aquatic Organisms and Their Uses," USEPA, Office of Research and Development, Environmental Research Laboratories, Duluth MN; Narragansett, RI, Corvallis, OR. 98 p; available through the National Technical Information Service, Springfield, VA. (Publication PB85-227049).

NN. "No observable adverse effect level" or "NOAEL" means the highest exposure level at which there is no statistically or biologically significant increase in the frequency or severity of adverse effects between the exposed population and its appropriate control group.

OO. "Octanol to water partition coefficient" or "K_{ow}" means the ratio of the concentration of a chemical in the octanol phase to its concentration in the aqueous phase of a two-phase octanol to water system after equilibrium of the chemical between the two phases has been achieved. The base 10 logarithm of the K_{ow} or log K_{ow} is used in the calculation of bioaccumulation factors. The log K_{ow} has been shown to be proportional to the bioconcentration potential of lipophilic organic chemicals.

PP. "Percent effluent" means the representation of acute or chronic toxicity of an effluent as a percent of whole effluent mixed in dilution water, where acute toxicity is expressed by LC50s or EC50s and chronic toxicity is expressed by NOAEL.

QQ. "Reference dose" or "RfD" means an estimate of a dose for a given duration to the human population, including susceptible subgroups such as infants, that is likely to be without an appreciable risk of adverse effects during a lifetime. It is derived from a suitable dose level at which there are few or no statistically or biologically significant increases in the frequency or severity of an adverse effect between the dosed population and its associated control group. The RfD includes one or more divisors, applied to the suitable dose level, accounting for:

(1) uncertainty in extrapolating from mammalian laboratory animal data to humans;

(2) variation in toxicological sensitivity among individuals in the human population;

(3) uncertainty in extrapolating from effects observed in a short-term study to effects of long-term exposure;

(4) uncertainty in using a study in which health effects were found at all doses tested; and

(5) uncertainty associated with deficiencies in the available data.

The product of the divisors is not to exceed 3,000 in an RfD used for a chronic standard. The RfD is expressed in units of daily dose as milligrams of chemical per kilogram of body weight-day or mg/kg-day.

RR. "Relative source contribution factor" or "RSC" means the percentage or apportioned amount (subtraction method) of the reference dose for a pollutant allocated to surface water exposures from drinking or incidental water ingestion and fish consumption. In the absence of sufficient data to establish a pollutant- or chemical-specific RSC value, the default RSC is 0.2 or 0.5 as described in part 7050.0219, subpart 5.

SS. "Species mean acute value" or "SMAV" means the geometric mean of all the available and acceptable acute values for a species.

TT. "Standard" means a number or numbers established for a pollutant or water quality characteristic to protect a specified beneficial use as listed in parts 7050.0221 to 7050.0227. The standard for a toxic pollutant includes the CS, MS, and FAV. Some pollutants do not have an MS or an FAV due to insufficient data. For these pollutants, the CS alone is the standard.

UU. "Toxic effect" means an observable or measurable adverse biological event in an organ, tissue, or system. The designation of health endpoints does not exclude other possible observable or measurable biological events. For the purpose of grouping chemicals and creating a health risk index when multiple chemicals are present, toxic effects may be ascribed to more general health risk index endpoints or health endpoints.

VV. "Toxic pollutant" means a pollutant listed as toxic under section 307(a)(1) of the Clean Water Act, United States Code, title 33, section 1317(a)(1), or as defined by Minnesota Statutes, section 115.01, subdivision 20. Toxic pollutant is used interchangeably in this part and parts 7050.0217, 7050.0219, and 7050.0222, subpart 7, items B to G, with the terms "pollutant" and "chemical."

WW. "Toxic unit" means a measure of acute or chronic toxicity in an effluent. One acute toxic unit (TUa) is the reciprocal of the effluent concentration that causes 50 percent effect or mortality to organisms for acute exposures (100/LC50); one chronic toxic unit (TUc) is the reciprocal of the effluent concentration that causes no observable adverse effect level on test organisms for chronic exposures (100/NOAEL).

XX. "Trophic level" or "TL" means the food web level in an ecosystem that is occupied by an organism or group of organisms because of what they eat and how they are related to the rest of the food web. For example, trophic level 3 in an aquatic ecosystem consists of small fish such as bluegills, crappies, and smelt and trophic level 4 consists of larger carnivorous fish such as walleye, northern pike, and most trout species.

YY. "USEPA" means the United States Environmental Protection Agency.

ZZ. "Water quality characteristic" means a characteristic of natural waters, such as total hardness or pH. Some water quality characteristics can affect the toxicity of pollutants to aquatic organisms.

AAA. "Whole effluent toxicity test" means the aggregate toxic effect of an effluent measured directly by a toxicity test. Effects on tested organisms are measured and expressed as toxic units or percent effluent for both acute and chronic whole effluent toxicity tests.

Subp. 4. **Adoption of USEPA national criteria.** The USEPA establishes aquatic life and human health-based criteria under section 304(a)(1) of the Clean Water Act, United States Code, title 33, section 1314. The USEPA criteria, subject to modification as described in this subpart, are applicable to class 2 waters of the state. The USEPA has described the national methods for developing aquatic life criteria in "Guidelines for Deriving Numerical National Water Quality Criteria for the Protection of Aquatic Organisms and Their Uses."

USEPA criteria that vary with an ambient water quality characteristic such as total hardness or pH will be established for specific waters or reaches using data available to the commissioner. Central values such as the means or medians for the characteristic will be used unless there is evidence to support using different values. Values for water quality characteristics can be estimated for specific waters or reaches that have no data by using data from a nearby watershed with similar chemical properties.

A. The USEPA aquatic life criteria are adopted unchanged by the agency, unless modified under item C, as the criteria applicable to designated class 2A waters in parts 7050.0420 and 7050.0470.

B. The USEPA criteria are adopted, subject to modification as described in this item or item C, for application to cool and warm water habitats and wetlands. Cool and warm water habitats (class 2Bd and 2B) are defined in part 7050.0430 or listed in part 7050.0470. Wetlands (class 2D) waters are defined in part 7050.0425 or listed in part 7050.0470.

(1) Acute data, in the form of the ranked genus mean acute values used by the USEPA to determine the national criteria, are the data used to determine the class 2Bd, 2B, and 2D criteria.

(2) GMAVs for fish in the family Salmonidae are deleted from the lowest of the ranked GMAVs so that all of the lowest four GMAVs in the USEPA data set are for nonsalmonid species. Following these deletions, no other salmonid GMAVs are deleted. If none of the lowest four GMAVs in the USEPA data set are for salmonid species, no GMAVs are deleted. The minimum of eight GMAVs specified in the national methods must be met, except that nonsalmonid fish can take the

place of the salmonid requirement if the prescribed deletions eliminate all salmonids from the national data set.

(3) The number of GMAVs in the USEPA criteria data set is reduced by the number of salmonid GMAVs deleted.

(4) The FAV is determined according to the national methods as follows:

(a) for each species for which one or more acute value is available, a SMAV is calculated as the geometric mean of all the acceptable acute values;

(b) for each genus for which one or more SMAV is available, a GMAV is calculated as the geometric mean of all the SMAVs;

(c) the GMAVs are ranked from the lowest to the highest;

(d) a rank is assigned to the GMAVs from "1" for the lowest to "N" for the highest, and if two or more GMAVs are identical, successive ranks are arbitrarily assigned;

(e) the cumulative probability (P) for each GMAV is calculated as rank/(N+1);

(f) the four GMAVs that have cumulative probabilities closest to 0.05 are selected, and if there are less than 59 GMAVs, these will always be the lowest four GMAVs; and

(g) using the selected GMAVs and their respective cumulative probabilities, calculate:

$$S^2 = \frac{\Sigma((\ln GMAV)^2)-((\Sigma(\ln GMAV))^2/4)}{\Sigma(P)-((\Sigma(\text{square root of } P))^2/4)}$$

$$L = \frac{\Sigma(\ln GMAV)-S(\Sigma(\text{square root of } P))}{4}$$

$$A = S(\text{square root of } 0.05) + L$$

$$FAV = e^A$$

where: FAV = final acute value

N = number of GMAVs

P = rank/N+1

ln = natural logarithm to base e S,L, and A are intermediate steps

(5) If, as a result of the recalculation of the USEPA criterion for application to class 2Bd, 2B, and 2D waters, the FAV for these water classes is lower than the FAV for class 2A waters, the class 2Bd, 2B, or 2D FAV will be changed to equal the class 2A FAV, unless the lower class 2Bd, 2B, or 2D FAV is justified based on the available toxicological data.

(6) The MC is the FAV divided by two.

(7) The CC is determined using the national methods. If sufficient chronic data is available to determine the CC directly from chronic values, salmonid chronic values will be deleted from the national data set following the same procedures used for acute data in this item. If sufficient chronic data is not available, the USEPA ACR, subject to modification under item C, is divided into the FAV to determine the CC.

C. If the commissioner finds that the information that supports a USEPA criterion is no longer current or complete for reasons including, but not limited to, changes to the relationship between a water quality characteristic and toxicity; the ACR; the weight given to toxicity data for a commercially or recreationally important species; or the human health-based methods; then the commissioner shall evaluate all available information and modify the criterion according to the information and with the objectives in part 7050.0217 and the methods in this part and part 7050.0219. Any effluent limitation determined to be necessary based on site-specific criteria derived under this item shall only be required after the discharger has been given notice to the specific proposed effluent limitations and an opportunity to request a hearing as provided in part 7000.1800.

Subp. 5. **Toxicity-based criteria.** Toxicity-based aquatic life criteria shall be determined using the methods in this subpart when no USEPA criterion is available.

A. Criteria shall be determined using the USEPA national method if the minimum data required in this item and item B are met. Data for saltwater organisms can be used for nonionizable organic chemicals. Data for saltwater organisms cannot be used for ionizable organic or inorganic chemicals. Data for all North American species can be used. A minimum of eight GMAVs representing the following groups must be available:

(1) species in three families in the phylum Chordata, one of which must be a salmonid;

(2) a freshwater or saltwater crustacean;

(3) a freshwater cladoceran;

(4) a family in a phylum other than Chordata or Arthropoda; and

(5) two other families not in the phylum Chordata.

B. The additional acute data requirements in subitems (1) and (2) apply when developing criteria for pesticides.

(1) If the chemical is an insecticide, one of the eight GMAVs required in item A, subitem (5), must be for an insect.

(2) If the chemical is a herbicide, the eight GMAVs required in item A must be supplemented with acute data for two plant species, one of which is an algal species.

C. The FAV is calculated as described in subpart 4, item B, subitem (4). No more than two of the lowest four GMAVs may be for a saltwater species.

D. The MC is the FAV divided by two.

E. The CC_{tox} is the FAV divided by an ACR. Available chronic data are used to determine ACRs as described in item F and measured chronic values are compared to the CC_{tox}. If an approved chronic value for a commercially, recreationally, or ecologically important freshwater species is lower than the CC_{tox}, the CC_{tox} will be set to equal that chronic value.

F. The ACR is determined according to subitems (1) to (3).

(1) A measured ACR is determined by dividing the acute value by the chronic value for the same species from tests that meet the requirements for determining ACRs in the national method. If more than one ACR is available for a species, a species mean ACR is calculated as the geometric mean of the available ACRs.

(2) A minimum of three measured ACRs, each for a different species, must be available to determine a final measured ACR. The final measured ACR is the geometric mean of all the available species mean ACRs.

(3) If no measured ACRs are available, the following default ACRs shall be used:

(a) an ACR of 20 is used with nonpesticide, nonbioaccumulative organic chemicals with log K_{ow} values of three or less; and

(b) an ACR of 55 is used with pesticides, inorganic chemicals, or bioaccumulative organic chemicals with log K_{ow} values greater than three.

(4) If two or fewer measured ACRs are available, the default ACRs in subitem (3) are incorporated into the calculation of the final ACR as follows:

(a) if two measured ACRs are available, the final ACR is the geometric mean of the two measured ACRs and the appropriate default ACR; and

(b) if one measured ACR is available, the final ACR is the geometric mean of the measured ACR and two appropriate default ACRs.

G. If the acute data available do not meet the requirements in items A and B, toxicity-based criteria can be determined by the method in this item. This method is not applicable to ionizable organic chemicals, or to bioaccumulative organic chemicals and pesticides with BCF greater than 5,000 or log K_{ow} values greater than 5.19.

(1) Acute data are assembled. A minimum of two acute values in the following groups must be available:

(a) a member of the class Osteichthyes (fish); and

(b) a member of one of the following genera in the family Daphnidae: *Daphnia, Ceriodaphnia, Simocephalus*.

(2) For insecticides, a third acute value must be available for an insect species in addition to the acute values required in subitem (1).

(3) For herbicides, two acute values for plant species, one of which is an algal species, must be available in addition to the acute values required in subitem (1).

(4) Data for saltwater species shall not be used except for purposes of determining ACRs.

(5) SMAVs are calculated as the geometric mean of all the acute values for one species.

(6) GMAVs are calculated as the geometric mean of the SMAVs.

(7) The lowest GMAV from among the available GMAVs is selected.

(8) The FAV is calculated by dividing the lowest GMAV by the appropriate factor listed below, depending on the number of GMAVs available that meet the minimum data requirements in subitems (2) and (3) and in item A.

Number of GMAVs	Factor
2	13.0
3	8.0
4	7.0
5	6.1
6	5.2
7	4.3

(9) The MC is calculated by dividing the FAV by two.

(10) A final ACR is determined as described in item F, except that the default ACR shall be 18 for all chemicals for which this method is applicable as specified in this item.

(11) The CC_{tox} is calculated by dividing the FAV by the appropriate ACR.

(12) If chronic data are available, they are used to determine measured ACR as described in item F, and chronic data are compared to the CC_{tox}.

Subp. 6. [Repealed, 39 SR 1344]

Subp. 7. [Repealed, 39 SR 1344]

Subp. 8. **Taste and odor criteria.** The agency shall limit the addition of pollutants to surface waters to the extent necessary to protect fish and other edible freshwater organisms from acquiring

objectionable tastes and odors. The agency will use the USEPA national organoleptic criteria, established under section 304(a)(1) of the Clean Water Act, United States Code, title 33, section 1314, when establishing concentrations above which unacceptable tastes and odors could be imparted to aquatic organisms.

Subp. 9. **Wildlife-based criteria.** The agency shall use the procedures in this subpart to establish wildlife-based criteria. Wildlife criteria shall protect wildlife consumers of freshwater aquatic organisms from adverse effects of toxic pollutants. Wildlife criteria are applicable to all surface waters, subject to the exceptions in subpart 10, item B, subitem (1).

A. Wildlife-based criteria shall be determined using toxicological information from available sources of scientific data for wildlife or domestic animal species, exposed to toxic pollutants through ingestion including gavage.

B. Wildlife-based criteria are calculated using the following formula:

$$CC_w \text{ mg/L} = \frac{\text{NOAEL} \times \text{BWt} \times \text{SSF}}{\text{DW} + (\text{F} \times \text{BAF})}$$

where: CC_w = wildlife chronic criterion in mg/L

NOAEL = no observable adverse effect level in mg of substance per kg of body weight per day (mg/kg BWt/day) as derived from mammalian or avian toxicity studies. If the NOAEL is in mg/L, the NOAEL will be multiplied by the average daily volume of water consumed by the test animals in liters per day and divided by the average weight of the test animals in kg. If the NOAEL is in mg/kg of food consumed, the NOAEL will be multiplied by the average amount of food consumed daily by the test animals and divided by the average weight of the test animals in kg

BWt = average body weight of test organisms in kg

SSF = species sensitivity factor to account for difference in the sensitivity in test species. This factor will vary between 1 and 0.1. The appropriate factor will be determined by the commissioner based on available and reliable scientific data on the relative sensitivity of the test organism compared to other wildlife species

DW = average volume of water consumed per day by the test animals in liters

F = average amount of food consumed per day by test animals in kg

BAF = BAF in liters per kg

C. Drinking (DW) and feeding (F) rates for test organisms can be estimated using the following equations if these rates are not available from the original study:

(1) for mammalian species:

(a) $DW = 0.099 \times (BWt)^{0.90}$; and

(b) $F = 0.0687 \times (BWt)^{0.82}$; and

(2) for avian species:

(a) $DW = 0.059 \times (BWt)^{0.67}$; and

(b) $F = 0.058 \times (BWt)^{0.65}$.

D. A final BAF for calculating a wildlife chronic criterion (CC_w) is determined as in subpart 7, except that the BCFs and BAFs are adjusted to represent whole body BCFs and BAFs.

(1) Normalized BCFs and BAFs are multiplied by 12 percent lipid for CC_w applicable to class 2A waters.

(2) Normalized BCFs and BAFs are multiplied by five percent lipid for CC_w applicable to class 2Bd and 2B waters.

(3) If percent lipid data is not available, whole body BCFs and BAFs are used as reported.

(4) BCFs estimated using the relationship between BCFs and the log K_{ow} are normalized by dividing the estimated BCF by 7.6 and then multiplying by 12 for class 2A waters or by five for class 2Bd and 2B waters.

(5) Measured or estimated BCFs for lipophilic organic chemicals with log K_{ow} values in the range of three or more are multiplied by the factor from subpart 7, item B, subitem (8).

Subp. 10. **Applicable criteria or human health-based standard.** The final criteria or chronic standard for human health for toxic pollutants for surface waters must be the lowest of the applicable criteria or standards for human health derived under this part and part 7050.0219.

A. Applicable criteria or standards for human health by use for class 2A, 2Bd, 2B, and 2D surface waters are listed for each applicable population protected (aquatic life, humans, and fish-eating wildlife). The applicable criteria or standards for human health must be the lowest of the CC or CS as described in subitems (1) to (3):

(1) for aquatic life toxicity: a CC_{tox} and MC based on toxicity to aquatic organisms from subpart 4 or 5 or a CC_{tox} based on plant toxicity from subpart 4 or 5;

(2) for human health: a CC or CS by medium (water or fish) as described in part 7050.0219, subpart 2, or a concentration that will prevent unacceptable taste or odor in water, fish, or other edible aquatic organisms from subpart 8; or

(3) when available, for fish-eating wildlife: a CC_w from subpart 9.

B. Applicable criteria for class 7 waters must be the lowest of the following:

(1) a CC_w from subpart 9, if aquatic organisms can be sustained in the class 7 water so that they are subject to predation by wildlife; or

(2) other drinking water or aquatic life standards for toxic pollutants, consistent with the uses class 7 waters are protected for under part 7050.0140.

C. If the site-specific application of criteria developed in this subpart is used to establish an effluent limitation for national pollutant discharge elimination system and state disposal system permits or to establish the degree of remedial action cleanup activities, the provisions of part 7050.0222, subpart 7, items B to G, apply.

D. The CS or CC and MS or MC must be averaged over the durations described in part 7050.0222, subpart 7, item C.

Statutory Authority: *MS s 14.06; 115.03; 115.44; 116.07*

History: *15 SR 1057; 18 SR 2195; 19 SR 1310; 24 SR 1105; 32 SR 1699; 39 SR 1344; 41 SR 545; 42 SR 441*

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7050.0219 HUMAN HEALTH-BASED CRITERIA AND STANDARDS.

Subpart 1. **Objective.** Human health-based criteria and standards protect humans from potential adverse effects of eating fish and edible aquatic organisms and incidental ingestion of water while recreating in class 2 waters and from the consumption of drinking water from class 1 surface waters (includes class 2A and 2Bd waters). Human health-based criteria and standards must be determined using the methods in this part.

Subp. 2. **Applicability of methods.** Human health-based chronic criteria (CC) or chronic standards (CS) must be evaluated based on the pollutant's toxicological profile: noncarcinogen or nonlinear carcinogen (NLC), developmental susceptibility, and linear carcinogen (C).

A. Algorithms for these toxicological profiles by class 2 subclasses are described in subparts 13 to 15. Other scientifically defensible algorithms may be applied by the commissioner on a chemical-specific basis for evaluating developmental susceptibility to toxic pollutants in fish tissue based on the consideration listed in subparts 3 to 5.

B. The most stringent CC or CS by medium (water or fish tissue), class 2 subclass, and toxicological profile, or taste and odor criteria as described in part 7050.0218, subpart 8, are the final applicable human health-based CC or CS.

Subp. 3. **Available and reliable scientific data.** The data and information used to develop a site-specific CC or CS must be approved by the commissioner. The commissioner must consider measures of availability and reliability of the data and information.

Subp. 4. **Toxicological values.** The RfD used to calculate criteria for noncarcinogenic and nonlinear carcinogenic chemicals (NLC) and the CSF and $AF_{lifetime}$or CSF and ADAF used to calculate CC or CS for linear carcinogenic (C) chemicals are obtained from the MDH or developed according to parts 4717.7820, subparts 5 and 21, and 7050.0218, subpart 3.

Subp. 5. **Exposure values.** Drinking water intake rates are obtained from the MDH. RSC uses a default value of 0.2 for most pollutants, unless:

A. there are no significant known or potential sources other than those addressed for the designated use, then 0.5 must be used; or

B. sufficient exposure data are available to support an alternative pollutant-specific value between 0.2 and 0.8.

Subp. 6. **Bioaccumulation factors.** This subpart describes the process and data for deriving bioaccumulation factors (BAF) used in the calculation of the human health-based chronic criteria (CC) or chronic standards (CS).

A. Information used for defining BAF must be consistent with the pollutant form used to derive the RfD or CSF. BAF development must also consider other forms that bioaccumulate in fish tissue. The preferred bioaccumulation data are available and reliable field and laboratory studies.

B. A general description of the steps and data used to determine final state or site BAF are listed in subitems (1) to (6) and described in detail in subparts 7 to 12.

(1) Categorize the pollutant based on certain properties into one of three broadly defined chemical categories: nonionic organic, ionic organic, or inorganic and organometallic chemicals as described in subpart 7.

(2) Define the methods for developing baseline BAF as described in subpart 8. A baseline BAF is the expression of the BAF based on the bioavailable or freely dissolved fraction of a pollutant in the ambient water and normalized concentration of the pollutant within the organism.

(3) Determine the relevant procedure (1 to 6) for identifying the acceptable baseline BAF methods (maximum of four) and their hierarchy for developing individual or aquatic species-specific baseline BAF as described in subpart 9.

(4) Calculate species mean baseline BAF from acceptable individual baseline BAF as described in subpart 10.

(5) Determine final baseline BAF for TL_3 and TL_4 as described in subpart 11.

(6) Develop final state or site BAF for TL_3 and TL_4 based on default parameters by class 2 subclass or site-specific data as described in subpart 12.

Subp. 7. **Chemical categorization.** For BAF purposes, organic chemicals that have no or negligible ionization at the pH range of ambient surface waters are categorized as nonionic organic chemicals; organic chemicals that undergo ionization at the pH range of ambient surface waters are categorized as ionic organic chemicals and further delineated for BAF development based on subpart 9, item C; organometallic chemicals and other chemicals or elements are categorized as organometallic and inorganic chemicals.

Subp. 8. **Methods for baseline BAF.** The four methods for developing baseline BAF in items A to D are listed in a hierarchy from most preferred to least preferred, except as noted in subpart 9: use of field-measured BAF studies (field BAF); use of field-measured BSAF studies (field BSAF); use of laboratory-measured BCF studies with food chain multipliers (lab BCF*FCM); and

use of octanol-water partition coefficients with food chain multipliers (K_{ow}*FCM). Where relevant, differences in the baseline BAF methods are described by chemical categorization.

A. Method 1: Field BAF. The field-measured BAF for a nonionic organic chemical is calculated based on the total concentration of the chemical in the appropriate tissue of the aquatic organism (on a wet tissue basis) and the total concentration of chemical in ambient surface water at the site of sampling (BAF^t_T).

$$\text{measured } BAF^t_T = C_t/C_w$$

where: BAF^t_T = field-measured BAF based on total concentration in tissue and water (L/kg)

C_t = total concentration of the chemical in the specified wet tissue (µg/kg)

C_w = total concentration of the chemical in water (µg/L)

The measured BAF^t_T is converted to a baseline BAF or $BAF_1{}^{fd}$ by the following equation:

$$\text{baseline } BAF_l^{fd} = \left[\frac{\text{measured } BAF_T^t}{f_{fd}}\right]\left(\frac{1}{f_l}\right)$$

where: baseline $BAF_1{}^{fd}$ = BAF expressed on a freely dissolved and lipid-normalized basis (L/kg)

f_l = fraction of the tissue that is lipid

f_{fd} = fraction of the total chemical that is freely dissolved in ambient surface water

The freely dissolved fraction or f_{fd} is the portion of the nonionic organic chemical that is not bound to particulate organic carbon or dissolved organic carbon and is calculated:

$$f_{fd} = \frac{1}{[1 + (POC \times K_{OW}) + (DOC \times 0.08 \times K_{OW})]}$$

where: POC = concentration of particulate organic carbon (kg/L)

DOC = concentration of dissolved organic carbon (kg/L)

K_{OW} = n-octanol water partition coefficient for the chemical

POC and DOC concentrations are obtained from the original study from which the field-measured BAF is determined. If POC and DOC concentrations are not reported in the BAF study, reliable estimates of POC and DOC are obtained from other studies at closely related sites within the same

water body. If no study data are available, the USEPA national default DOC and POC values are used, as they are representative of average ambient surface water conditions. The USEPA national default values are DOC of 2.9 mg/L and POC of 0.5 mg/L, converted to kg/L by dividing by 1,000,000.

For the field-measured BAF for a chemical classified as inorganic and organometallic, the field BAF is equal to the baseline BAF and is not expressed on a lipid or freely dissolved fraction basis. Normalization on other characteristics must be supported by chemical-specific data.

B. Method 2: Field BSAF. For nonionic organic chemicals, the field-measured BSAF is determined by relating lipid-normalized concentration of the chemical in the appropriate tissue of the aquatic organism to organic carbon-normalized concentrations of the chemical in surface sediment.

$$BSAF = \frac{C_l}{C_{soc}}$$

where: BSAF = biota-sediment accumulation factor for the chemical (kg of sediment organic carbon/kg of lipid)

C_l = lipid-normalized concentration of the chemical in the specified wet tissue (µg/g lipid), calculated as:

$$C_l = \frac{C_t}{f_l}$$

where: f_l = fraction lipid content in the tissue

Other variables as defined under item A

C_{soc} = organic-carbon normalized concentration of a chemical in surface sediment samples (µg/g sediment organic carbon), calculated as:

$$C_{soc} = \frac{C_s}{f_{oc}}$$

where: C_s = concentration of chemical in dry sediment (µg/g sediment)

f_{oc} = fraction organic carbon in dry sediment

The measured BSAF is converted to a baseline BAF or BAF_1^{fd} by the following equation:

$$(\text{baseline } BAF_1^{fd})_i = (BSAF)_i \frac{(\Pi_{socw})_r (D_{i/r}) (K_{OW})_i}{(K_{ow})_r}$$

where: $(\text{baseline } BAF_1^{fd})_i$ = BAF expressed on a freely dissolved and lipid-normalized basis for chemical of interest "i" or the chemical that is the basis of the criteria (L/kg)

$BSAF_i$ = measured BSAF for the chemical "i" (kg organic carbon/kg of lipid)

$(\Pi_{socw})_r$ = sediment to water partition coefficient or sediment organic carbon to freely dissolved concentration ratio of the reference chemical "r." Reference chemicals with $(\Pi_{socw})_r/(K_{ow})$ similar to that of the chemical of interest are preferred for this method (L/kg sediment organic carbon)

$$\left(\prod_{socw}\right)_r = \frac{(C_{soc})_r}{(C_w^{fd})_r}$$

where: $(C_{soc})_r$ = concentration of the reference chemical "r" in dry sediment normalized to sediment organic carbon (µg/kg sediment organic carbon)

$(C^{fd}_w)_r$ = concentration of the reference chemical "r" freely dissolved in water (µg/L)

$(D_{i/r})$ = ratio between Π_{socw}/K_{ow} for chemicals "i" and reference chemical "r"; a ratio equal to or close to one is preferred

$(K_{ow})_i$ = octanol-water partition coefficient for the chemical "i"

$(K_{ow})_r$ = octanol-water partition coefficient for the reference chemical "r"

Other variables as defined under item A

C. Method 3: Lab BCF*FCM. The laboratory-measured BCF for nonionic organic chemicals is calculated based on the total concentration of the chemical in the appropriate tissue of the aquatic organism (on a wet tissue basis) and the total concentration of chemical in the study water (BCF^t_T).

$$\text{measured } BCF^t_T = \frac{C_t}{C_w}$$

where: C_w = total concentration of chemical in the laboratory test water (µg/L)

Other variables as defined under item A

Baseline BAF_1^{fd} equation:

$$\text{baseline } BAF_l^{fd} = (FCM)\left[\frac{\text{measured } BCF_T^l}{f_{fd}} - 1\right] x \left(\frac{1}{f_l}\right)$$

where: f_{fd} = fraction of the total chemical in the test water that is freely dissolved, where POC and DOC or reasonable estimates based on total organic carbon (TOC) values measured in the test water are used, unless not available, then the following defaults are used based on typical lab water characteristics: DOC of 2.5 mg/L and POC at 0 mg/L, converted to kg/L by dividing by 1,000,000

FCM = food chain multiplier

Other variables as defined under item A

For ionic organic, inorganic, and organometallic chemicals, based on available data, the laboratory BCF is equal to the baseline BAF and is not expressed on a lipid or freely dissolved fraction basis. Normalization on other characteristics must be supported by chemical-specific data. FCM must come from field BAF studies.

D. Method 4: K_{ow}*FCM. In this method, K_{ow} is assumed to be equal to the baseline BAF_1^{fd} for certain nonionic organic chemicals described in the procedures.

$$\text{baseline } BAF_1^{fd} = (FCM) \text{ x } (K_{ow})$$

where: Variables as defined under items A and C

Subp. 9. **Hierarchy of acceptable baseline BAF methods.** Determine the hierarchy of acceptable baseline BAF methods available under subpart 8 for appropriate use based on the chemical categorization of the pollutant and other relevant properties as described under Procedures 1 to 6.

A. Procedures 1 to 6 are used for defining the hierarchy and use of the four baseline BAF methods based on chemical categorization and a chemical's ionization state in ambient surface waters, hydrophobicity, biomagnification, and metabolism in aquatic organisms, primarily freshwater fish species. Table 1 provides the basic information for identifying the acceptable procedures and hierarchy for baseline BAF methods as described under items B to D:

Table 1.

Chemical Categorization

Nonionic Organic and Ionic (negligible ionization) Organic Chemicals				Inorganic, Organometallic, and Ionic Chemicals	
Hydrophobicity				Biomagnification Factor (BMF)	
$\log K_{ow} \geq 4$		$\log K_{ow} < 4$		BMF ≤ 1,000	BMF > 1,000
Metabolism in Aquatic Organisms (Fish)					
Low or Unknown	High	Low or Unknown	High		
Procedures:					
Procedure 1	Procedure 2	Procedure 3	Procedure 4	Procedure 5	Procedure 6
1) Field BAF 2) Field BSAF 3) Lab BCF*FCM 4) K_{ow}*FCM	1) Field BAF 2) Field BSAF 3) Lab BCF	1) Field BAF or Lab BCF 2) K_{ow}	Field BAF or Lab BCF	Field BAF or Lab BCF	1) Field BAF 2) Lab BCF*FCM

B. For nonionic (neutral) organic chemicals, defined as chemicals that have no or negligible ionization in ambient surface water, Procedures 1 to 4 describe the hierarchy of acceptable baseline BAF methods to use.

(1) Procedure 1 applies to nonionic organic chemicals with moderate to high hydrophobicity defined as log K_{ow} greater than or equal to (≥) 4 and either a low level of documented metabolism in aquatic organisms or lack of sufficient data to characterize metabolism. All four baseline BAF methods are available for use based on the stated hierarchy in table 1 and availability of acceptable data.

(2) Procedure 2 applies to nonionic organic chemicals with moderate to high hydrophobicity defined as log $K_{ow} \geq 4$ and a high level of documented metabolism in aquatic organisms. The acceptable methods are field BAF, BSAF, and lab BCF*FCM, where FCM is equal to one.

(3) Procedure 3 applies to nonionic organic chemicals with low hydrophobicity defined as log K_{ow} less than (<) 4 and either a low level of documented metabolism in aquatic organisms or lack of sufficient data to characterize metabolism. The acceptable methods are field BAF or lab BCF*FCM, with equal preference given, and K_{ow}*FCM, where FCM is equal to one in both methods.

(4) Procedure 4 applies to nonionic organic chemicals with low hydrophobicity defined as log $K_{ow} < 4$ and high levels of documented metabolism in aquatic organisms. Equal preference is given to both acceptable methods: field BAF or lab BCF*FCM, where FCM is equal to one.

C. For ionic organic chemicals (defined as chemicals that can readily accept or donate protons) the procedures that define the available hierarchy and appropriate baseline BAF methods depend on further characteristics of the chemical. The main characteristics relate to exhibiting

primarily nonionic (neutral) characteristics (ionization is negligible) or ionic characteristic in average surface water pH ranges based on its acid dissociation constant (K_a) expressed as the negative base 10 log (pK_a) and functional group or groups:

(1) When ionization is negligible, the chemical is categorized as a nonionic organic chemical and baseline BAF procedures are applied based on hydrophobicity and metabolism characteristics described for Procedures 1 to 4 under item B, subitems (1) to (4).

(2) In all other cases, the chemical is categorized with inorganic and organometallic chemicals and addressed with Procedure 5 or 6 under item D, subitem (1) or (2).

Available chemical-specific data that supports more defensible baseline BAF methods must be used in place of these default assignments.

D. Inorganic and organometallic chemicals are defined as inorganic minerals, other inorganic chemicals, and elements: metals and metalloids and organometallic chemicals, and Procedures 5 and 6 define the use of acceptable baseline BAF methods. Procedures 5 and 6 are distinguished by the determination of whether the chemical demonstrates biomagnifications through field BAF or laboratory BCF studies, with BAF or BMF greater than 1,000 being the cut-off for this purpose. BMF is calculated using chemical concentrations in the tissue of aquatic organisms at two successive trophic levels as:

$$BMF_{(TL,\,n)} = C_{t\,(TL,\,n)} / C_{t\,(TL,\,n-1)}$$

where: $C_{t\,(TL,\,n)}$ = total concentration of relevant chemical form or forms in appropriate tissue of predator organism at trophic level "n" (may be either wet weight or dry weight concentration so long as both the predator and prey concentrations are expressed in the same manner) (µg/kg)

$C_{t\,(TL,\,n-1)}$ = total concentration of relevant chemical form or forms in appropriate tissue of prey organism at the next lower trophic level from the predator (may be either wet weight or dry weight concentration so long as both the predator and prey concentrations are expressed in the same manner) (µg/kg)

(1) Procedure 5 applies when geometric mean BAF or BMF is less than or equal to 1,000 when comparing successive trophic level ratios up through trophic level 4. Equal preference is given to field BAF or lab BCF*FCM, where FCM is equal to one. For this procedure, field BAF or lab BCF is applied as the baseline BAF.

measured $BAF^t_T = C_t/C_w$ or $BCF^t_T = C_t/C_w$ are applied as the baseline BAF.

where: Variables as defined under subpart 8

(2) Procedure 6 applies when geometric mean BAF or BMF is greater than 1,000 when comparing successive trophic level ratios up through trophic level 4. The acceptable methods are

field BAF or lab BCF*FCM, with preference for field BAF. For this procedure, field BAF or lab BCF is applied as the baseline BAF.

measured $BAF^{t}_{T} = C_t/C_w$ or $BCF^{t}_{T} = C_t/C_w$ are applied as the baseline BAF.

where: Variables as defined under subpart 8

Subp. 10. **Species mean baseline BAF.** Calculate species and mean baseline BAF from acceptable individual baseline BAF.

A. For each appropriate baseline BAF method, calculate species-mean baseline BAF using the geometric mean.

B. Any baseline BAF with large differences between species (greater than ten percent) needs additional justification for use in a species-mean baseline BAF.

C. Evaluate data uncertainties for consideration in method hierarchy application for calculating trophic level baseline BAF.

Subp. 11. **Final baseline BAF by trophic level.** Determine the final baseline BAF by trophic level (TL):

A. Calculate geometric mean baseline BAF for TL_3 and TL_4 using available species-means for each baseline BAF method. For class 2A water, preference is given for *Salmonidae* data and developed as a single representative TL_4 baseline BAF.

B. Combine species-means for methods that have equal preference in procedural hierarchies and have similarly reliable baseline BAF based on evaluation of data uncertainties for a final baseline BAF for TL_3 where applicable, and final baseline BAF for TL_4.

C. For some pollutants, TL_3 and TL_4 baseline BAF may be identical when not dependent on trophic level factors, such as lipid partitioning.

Subp. 12. **Final state or site BAF by trophic level.** Calculate final state or site BAF for TL_3 where applicable and TL_4 for use in developing human health-based chronic criteria or standards.

A. For nonionic organic chemicals and ionic organic chemicals with no or negligible ionization as defined under subpart 7, for each TL_3 and TL_4, calculate a state or site BAF using the following equation:

$$\text{state or site } BAF_{(TL\ n)} = \left[\left(\text{final baseline } BAF_{l}^{fd}\right)_{TL\ n} \times (f_l)_{TL\ n} + l\right] \times (f_{fd})$$

where: (final baseline $BAF_l^{fd})_{TL\ n}$ = final trophic-level-mean baseline BAF expressed on a freely dissolved and lipid-normalized basis for trophic level "n" (L/kg)

$(f_l)_{TL\ n}$ = lipid fraction of aquatic species consumed at trophic level "n" by class 2 subclass: class 2A = 0.06; class 2Bd/2B/2C/2D = 0.02 for TL_3 and 0.015 for TL_4

f_{fd} = fraction of the total chemical in water that is freely dissolved in ambient waters

The default DOC and POC values for the state ambient class 2 surface waters are 7.5×10^{-6} kg/L (7.5 mg/L) and 5×10^{-7} kg/L (0.5 mg/L), respectively. For a site BAF for use in site-specific criteria development, the DOC and POC values are from the site monitoring data, if available; in all other cases, the state defaults are used.

B. For inorganic and organometallic chemicals and ionic organic chemicals with ionization in natural waters, the baseline BAF^t_T using total chemical concentrations or bioavailable forms are directly applied as the state or site BAF:

state $BAF_{(TL\ n)}$ or site BAF = final baseline $BAF_{(TL\ n)}$

Subp. 13. **Algorithms for class 2A or 2Bd surface waters.** This subpart describes human health-based criteria or standards for classes of surface waters designated for drinking water, fish consumption, and recreational use. To develop a final chronic criteria (CC_{dfr}) or standard (CS_{dfr}) applicable to surface waters designated class 2A or 2Bd, items A to D must be evaluated for use based on the pollutant's toxicological profile: noncarcinogen or nonlinear carcinogen (NLC); developmental susceptibility; or linear carcinogen (C).

A. Algorithm for noncarcinogenic or NLC chemicals applicable to surface waters designated class 2A or 2Bd to calculate: CC_{dfr} or CS_{dfr}=

$$\frac{RfD_{chronic}\ (mg/kg\text{-}d) \times RSC\ (no\ units) \times 1{,}000\ \mu g/mg}{\{DWIR_{chronic}\ (L/kg\text{-}d) + FCR_{adult}\ (kg/kg\text{-}d)[(0.24 \times BAF_{TL3}\ (L/kg)) + (0.76 \times BAF_{TL4}\ (L/kg)]\}}$$

where: CC_{dfr} or CS_{dfr} = drinking water plus fish consumption and recreation chronic criterion or standard in µg/L

$RfD_{chronic}$ = reference dose for chronic duration in mg/kg-day

RSC = relative source contribution factor

1,000 µg/mg = a factor used to convert milligram (mg) to microgram (µg);

there are 1,000 micrograms per milligram

$DWIR_{chronic}$ = drinking water intake rate for the chronic duration based on a 95th percentile time-weighted average from MDH; rate may be chemical-specific with sufficient data or use the default rate of 0.043 L/kg-d

FCR_{adult} = fish consumption intake rate of 0.00043 kg/kg-d based on 0.030 kg/day of amount of fish assumed to be consumed per day and 70 kg adult body weight or rate may be chemical-specific with sufficient data

BAF_{TL3} = final BAF for TL_3 fish in L/kg; accounts for 24 percent of fish consumed

BAF_{TL4} = final BAF for TL_4 fish in L/kg; accounts for 76 percent of fish consumed; for class 2A, the BAF_{TL4} is applied to 100 percent of the FCR

B. Supplemental algorithm for developmental susceptibility for noncarcinogenic or NLC chemicals applicable to surface waters designated class 2A or 2Bd to calculate: CC_{dev} or CS_{dev} =

$$\frac{RfD_{duration\_(acute,\ short\text{-}term,\ or\ subchronic)}\ (mg/kg\text{-}d) \times RSC\ (no\ units) \times 1{,}000\ \mu g/mg}{DWIR_{duration\_(acute,\ short\text{-}term,\ or\ subchronic)}\ (L/kg\text{-}d)}$$

where: CC_{dev} or CS_{dev} = developmental-based drinking water chronic criterion or standard in µg/L applied when shorter duration adverse effects and exposure parameters result in a more stringent chronic criterion or standard than calculated from item A

$RfD_{duration}$ = reference dose for acute, short-term, or subchronic duration in mg/kg-day

$DWIR_{duration}$ = drinking water intake rate for acute, short-term, or subchronic duration in L/kg-d; drinking water intake rate for the acute, short-term, and subchronic durations based on a 95th percentile time-weighted average from MDH; rate may be chemical-specific with sufficient data or use default rates of 0.289, 0.289, and 0.077 L/kg-d, respectively

Other variables as defined under item A

C. Algorithm for linear carcinogenic chemicals with lifetime adjustment factors ($AF_{lifetime}$) applicable to surface waters designated class 2A or 2Bd to calculate: CC_{dfr}or CS_{dfr} =

$$\frac{CR\ (1 \times 10^{-5})}{CSF(mg/kg\text{-}d)^{-1} \times AF_{Lifetime}} \times \frac{1000\ \mu g/mg}{\{DWIR_{Lifetime}(L/kg\text{-}d) + FCR_{Adult}(kg/kg\text{-}d)[(0.24 \times BAF_{TL3}(L/kg)) + (0.76 \times BAF_{TL4}(L/kg))]\}}$$

where: CC_{dfr} or CS_{dfr} = drinking water plus fish consumption and recreation chronic criterion or standard in µg/L

CR = cancer risk level or an additional excess cancer risk equal to 1×10^{-5} (1 in 100,000)

CSF = cancer potency slope factor in $(mg/kg\text{-}d)^{-1}$

$AF_{lifetime}$ = adjustment factor, lifetime (no units)

$DWIR_{lifetime}$ = drinking water intake rate for lifetime duration; drinking water intake rate for the lifetime duration based on a 95th percentile time-weighted average from MDH; rate may be chemical-specific with sufficient data or use default rate of 0.043 L/kg-d

Other variables as defined under item A

D. Algorithm for linear carcinogenic chemicals with age-dependent adjustment factors (ADAF) applicable to surface waters designated class 2A or 2Bd to calculate: CC_{dfr} or CS_{dfr} =

$$\frac{CR\,(1\times10^{-5})\times1000}{\left(\begin{array}{l}\left\{CSF\times ADAF_{<2}\times D_{<2}\times[DWIR_{<2}+FCR_{<2}\times(0.24BAF_{TL3}+0.76BAF_{TL4})]\right\}+\\ \left\{CSF\times ADAF_{2\,to\,<16}\times D_{2to<16}\times[DWIR_{2\,to<16}+FCR_{2\,to<16}\times(0.24BAF_{TL3}+0.76BAF_{TL4})]\right\}+\\ \left\{CSF\times ADAF_{16to70}\times D_{16to70}\times[DWIR_{16to70}+FCR_{Adult}\times(0.24BAF_{TL3}+0.76BAF_{TL4})]\right\}\end{array}\right)/70yrs}$$

where: CC_{dfr} or CS_{dfr} = drinking water plus fish consumption and recreation chronic criterion or standard in µg/L

ADAF = age-dependent adjustment factor by age groups

D = duration corresponding to the three age groups: birth up to two years of age (two-year duration), two years of age up to 16 years of age (14-year duration), and 16 years of age up to 70 years of age (54-year duration)

DWIR = drinking water intake rate for age groups; drinking water intake rate for the lifetime duration based on a 95th percentile time-weighted average from MDH; rate may be chemical-specific with sufficient data or use default rates for:

$DWIR_{0<2}$ = 0.137 L/kg-d, birth up to two years of age

$DWIR_{2\,to\,<16}$ = 0.047 L/kg-d, two up to 16 years of age

$DWIR_{16\,to\,70}$ = 0.039 L/kg-d, 16 up to 70 years of age

FCR = fish consumption intake rate by age groups:

$FCR_{0<2}$ = 0.00086 kg/kg-d

$FCR_{2\,to\,<16}$ = 0.00055 kg/kg-d

$FCR_{16\,to\,70}$ = 0.00043 kg/kg-d

Subp. 14. **Algorithm for class 2B, 2C, or 2D surface waters.** This subpart describes human health-based criteria or standards for classes of surface waters designated for fish consumption and

recreational use (nondrinking water use). To develop a final chronic criteria (CC_{fr}) or standard (CS_{fr}) applicable to surface waters designated class 2B, 2C, or 2D, items A to C must be evaluated for use based on the pollutant's toxicological profile: noncarcinogen or nonlinear carcinogen (NLC) or linear carcinogen (C).

A. Algorithm for noncarcinogenic or NLC chemicals applicable to class 2B, 2C, or 2D surface waters to calculate: CC_{fr} or CS_{fr} =

$$RfD_{chronic}\ (mg/kg\text{-}d) \times RSC\ (no\ units) \times 1{,}000\ \mu g/mg$$

$$\{IWR_{chronic}\ (L/kg\text{-}d) + FCR_{adult}\ (kg/kg\text{-}d)[(0.24 \times BAF_{TL3}\ (L/kg)) + (0.76 \times BAF_{TL4}\ (L/kg)]\}$$

where: CC_{fr} or CS_{fr} = fish consumption and recreation chronic criterion or standard in µg/L

$IWR_{chronic}$ = 0.0013 L/kg-d; assumed incidental water intake rate based on minimum chronic duration

Other variables as defined under subpart 13

B. Algorithm for linear carcinogenic chemicals with lifetime adjustment factors ($AF_{lifetime}$) applicable to surface waters designated class 2B, 2C, or 2D to calculate: CC_{fr}or CS_{fr} =

$$\frac{CR\ (1 \times 10^{-5})}{CSF(mg/kg\text{-}d)^{-1} \times AF_{Lifetime}} \times \frac{1000\ \mu g/mg}{\{IWR_{chronic}\ (L/kg\text{-}d) + FCR_{Adult}\ (kg/kg\text{-}d)\left[(0.24 \times BAF_{TL3}\ (L/kg)) + (0.76 \times BAF_{TL4}(L/kg))\right]\}}$$

where: CC_{fr} or CS_{fr} = fish consumption and recreation chronic criterion or standard in µg/L

Other variables as defined under item A and subpart 13

C. Algorithm for linear carcinogenic chemicals with age-dependent adjustment factors (ADAF) applicable to surface waters designated class 2B, 2C, or 2D to calculate: CC_{fr} or CS_{fr} =

$$\frac{CR\ (1 \times 10^{-5}) \times 1000}{\left(\begin{array}{l}\left\{CSF \times ADAF_{<2} \times D_{<2} \times [IWR + FCR_{<2} \times (0.24BAF_{TL3} + 0.76BAF_{TL4})]\right\} + \\ \left\{CSF \times ADAF_{2\ to\ <16} \times D_{2\ to\ <16} \times [IWR + FCR_{2\ to\ <16} \times (0.24BAF_{TL3} + 0.76BAF_{TL4})]\right\} + \\ \left\{CSF \times ADAF_{16\ to\ 70} \times D_{16\ to\ 70} \times [IWR + FCR_{Adult} \times (0.24BAF_{TL3} + 0.76BAF_{TL4})]\right\}\end{array}\right) / 70yrs}$$

where: CC_{fr} or CS_{fr} = fish consumption and recreation chronic criterion or standard in µg/L

Other variables as defined under item A and subpart 13

Subp. 15. **Algorithms for class 2 fish tissue.** This subpart describes algorithms and fish tissue criteria (CC_{ft}) and standards (CS_{ft}) for chemical with BAF greater than 1,000 (BCC threshold) applicable to class 2 surface waters. Items A to C must be evaluated for use based on the pollutant's toxicological profile: noncarcinogen or nonlinear carcinogen (NLC) or linear carcinogen (C).

A. Algorithm for noncarcinogenic or NLC chemicals applicable to class 2 surface waters to calculate: CC_{ft} or CS_{ft} =

$$\frac{RfD_{chronic}\ (mg/kg\text{-}d) \times RSC\ (no\ units)\ or\ -\ RSC\ (mg/kg\text{-}d)}{FCR_{adult}\ (kg/kg\text{-}d)}$$

where: CC_{ft} or CS_{ft} = fish tissue-based chronic criterion or standard in mg/kg

Other variables as defined under subpart 13

B. Algorithm for linear carcinogenic chemicals with lifetime adjustment factors ($AF_{lifetime}$) applicable to class 2 surface waters to calculate: CC_{ft} or CS_{ft} =

$$\frac{CR\ (1 \times 10^{-5})}{CSF\ (mg/kg\text{-}d)^{-1} \times AF_{lifetime}\ (no\ units)} \times \frac{1}{FCR_{Adult}\ (kg/kg\text{-}d)}$$

where: CC_{ft} or CS_{ft} = fish tissue-based chronic criterion or standard in mg/kg

Other variables as defined under subpart 13

C. Algorithm for linear carcinogenic chemicals with age-dependent adjustment factors (ADAFs) applicable to class 2 surface waters to calculate: CC_{ft} or CS_{ft} =

$$\frac{CR\ (1 \times 10^{-5})}{\left[\frac{(CSF \times ADAF_{<2} \times D_{0\text{-}2} \times FCR_{<2}) + (CSF \times ADAF_{2\text{-}16} \times D_{2\text{-}16} \times FCR_{2\text{-}16}) + (CSF \times ADAF_{16\text{-}70} \times D_{16\text{-}70} \times FCR_{16\text{-}70})}{70\ years}\right]}$$

where: CC_{ft} or CS_{ft} = fish tissue-based chronic criterion or standard in mg/kg

Other variables as defined under subpart 13

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7050.0220 SPECIFIC WATER QUALITY STANDARDS BY ASSOCIATED USE CLASSES.

Subpart 1. **Purpose and scope.** The numeric and narrative water quality standards in this chapter prescribe the qualities or properties of the waters of the state that are necessary for the designated public uses and benefits. If the standards in this chapter are exceeded, it is considered indicative of a polluted condition which is actually or potentially deleterious, harmful, detrimental, or injurious with respect to designated uses or established classes of the waters of the state.

All surface waters are protected for multiple beneficial uses. Numeric water quality standards are tabulated in this part for all uses applicable to four common categories of surface waters, so that all applicable standards for each category are listed together in subparts 3a to 6a. The four categories are:

A. cold water aquatic life and habitat, also protected for drinking water: classes 1B; 2A, 2Ae, or 2Ag; 3A or 3B; 4A and 4B; and 5 (subpart 3a);

B. cool and warm water aquatic life and habitat, also protected for drinking water: classes 1B or 1C; 2Bd, 2Bde, 2Bdg, or 2Bdm; 3A or 3B; 4A and 4B; and 5 (subpart 4a);

C. cool and warm water aquatic life and habitat and wetlands: classes 2B, 2Be, 2Bg, 2Bm, or 2D; 3A, 3B, 3C, or 3D; 4A and 4B or 4C; and 5 (subpart 5a); and

D. limited resource value waters: classes 3C; 4A and 4B; 5; and 7 (subpart 6a).

Subp. 2. **Explanation of tables.**

A. Class 1 domestic consumption (DC) standards are the United States Environmental Protection Agency primary (maximum contaminant levels) and secondary drinking water standards, as contained in Code of Federal Regulations, title 40, parts 141 and 143, as amended through July 1, 2006. The DC standards are listed in subparts 3a and 4a, except that individual pollutants, substances, or organisms in the treatment technological, disinfectants, microbiological, and radiological categories are not listed unless they are listed because a secondary drinking water standard or a standard for another use class exists.

B. Certain drinking water standards are not applicable to class 1 waters. The following are not applicable to class 1 surface waters: the primary drinking water standards for acrylamide, epichlorohydrin, copper, lead, and turbidity (treatment technique standards) and the standards in the disinfectants and microbiological organisms categories. The drinking water standards not applicable to class 1 groundwaters are listed in part 7050.0221.

C. Class 2 standards for metals are expressed as total metal in subparts 3a to 5a, but must be converted to dissolved metal standards for application to surface waters. Conversion factors for converting total metal standards to dissolved metal standards are listed in part 7050.0222, subpart 9. The conversion factor for metals not listed in part 7050.0222, subpart 9, is one. The dissolved metal standard equals the total metal standard times the conversion factor. Water quality-based effluent limits for metals are expressed as total metal.

D. The tables of standards in subparts 3a to 6a include the following abbreviations and acronyms:

AN	means aesthetic enjoyment and navigation, class 5 waters
*	an asterisk following the FAV and MS values or double dashes (–) means part 7050.0222, subpart 7, item G, applies
(c)	means the chemical is assumed to be a human carcinogen
CS	means chronic standard, defined in part 7050.0218, subpart 3
DC	means domestic consumption (drinking water), class 1 waters
–	double dashes means there is no standard
exp. ()	means the natural antilogarithm (base e) of the expression in parenthesis
FAV	means final acute value, defined in part 7050.0218, subpart 3
IC	means industrial consumption, class 3 waters
IR	means agriculture irrigation use, class 4A waters
LS	means agriculture livestock and wildlife use, class 4B waters
MS	means maximum standard, defined in part 7050.0218, subpart 3
NA	means not applicable
(S)	means the associated value is a secondary drinking water standard
su	means standard unit. It is the reporting unit for pH
TH	means total hardness in mg/L, which is the sum of the calcium and magnesium concentrations expressed as $CaCO_3$
TON	means threshold odor number

E. Important synonyms or acronyms for some chemicals are listed in parentheses below the primary name.

F. When two or more use classes have standards for the same pollutant, the most stringent standard applies pursuant to part 7050.0450. All surface waters are protected for class 6, but this class has no numeric standards so it is not included in the tables.

Subp. 3. [Repealed, 24 SR 1105]

Subp. 3a. **Cold water aquatic life and habitat, drinking water, and associated use classes.** Water quality standards applicable to use classes 1B; 2A, 2Ae, or 2Ag; 3A or 3B; 4A and 4B; and 5 surface waters. The water quality standards in part 7050.0222, subpart 2, that apply to class 2A also apply to classes 2Ae and 2Ag. In addition to the water quality standards in part

7050.0222, subpart 2, the biological criteria defined in part 7050.0222, subpart 2d, apply to classes 2Ae and 2Ag.

A. MISCELLANEOUS SUBSTANCE, CHARACTERISTIC, OR POLLUTANT

2A CS	**2A MS**	**2A FAV**	**1B DC**	**3A/3B IC**	**4A IR**	**4B IR**	**5 AN**
(1) Ammonia, un-ionized as N, µg/L							
16	--	--	--	--	--	--	--
(2) Asbestos, >10 µm (c), fibers/L							
--	--	--	7.0e+06	--	--	--	--
(3) Bicarbonates (HCO_3), meq/L							
--	--	--	--	--	5	--	--
(4) Bromate, µg/L							
--	--	--	10	--	--	--	--
(5) Chloride, mg/L							
230	860	1,720	250(S)	50/100	--	--	--

2A CS	**2A MS**	**2A FAV**	**1B DC**	**3A/3B IC**	**4A IR**	**4B IR**	**5 AN**
(6) Chlorine, total residual, µg/L							
11	19	38	--	--	--	--	--
(7) Chlorite, µg/L							
--	--	--	1,000	--	--	--	--
(8) Color, Pt-Co							
30	--	--	15(S)	--	--	--	--

(9) Cyanide, free, µg/L

5.2	22	45	200	--	--	--	--

(10) *Escherichia (E.) coli* bacteria, organisms/100 mL

See item D	--	--	--	--	--	--	--
2A CS	**2A MS**	**2A FAV**	**1B DC**	**3A/3B IC**	**4A IR**	**4B IR**	**5 AN**

---

(11) Eutrophication standards for lakes and reservoirs (phosphorus, total, µg/L; chlorophyll-a, µg/L; Secchi disk transparency, meters)

See part 7050.0222, subparts 2 and 2a	--	--	--	--	--	--	--

(12) Eutrophication standards for rivers, streams, and navigational pools (phosphorus, total µg/L; chlorophyll-a (seston), µg/L; five-day biochemical oxygen demand (BOD_5), mg/L; diel dissolved oxygen flux, mg/L; chlorophyll-a (periphyton), mg/m^2)

See part 7050.0222, subparts 2 and 2b	--	--	--	--	--	--	--

(13) Fluoride, mg/L

--	--	--	4	--	--	--	--

(14) Fluoride, mg/L

--	--	--	2(S)	--	--	--	--

(15) Foaming agents, µg/L

--	--	--	500(S)	--	--	--	--

(16) Hardness, Ca+Mg as $CaCO_3$, mg/L

--	--	--	--	50/250	--	--	--

2A CS	2A MS	2A FAV	1B DC	3A/3B IC	4A IR	4B IR	5 AN
(17) Hydrogen sulfide, mg/L							
--	--	--	--	--	--	--	0.02
(18) Nitrate as N, mg/L							
--	--	--	10	--	--	--	--
(19) Nitrite as N, mg/L							
--	--	--	1	--	--	--	--
(20) Nitrate + Nitrite as N, mg/L							
--	--	--	10	--	--	--	--
(21) Odor, TON							
--	--	--	3(S)	--	--	--	--

2A CS	2A MS	2A FAV	1B DC	3A/3B IC	4A IR	4B IR	5 AN
(22) Oil, µg/L							
500	5,000	10,000	--	--	--	--	--
(23) Oxygen, dissolved, mg/L							
7, as a daily minimum	--	--	--	--	--	--	--
(24) pH minimum, su							
6.5	--	--	6.5(S)	6.5/6.0	6.0	6.0	6.0
(25) pH maximum, su							

8.5	--	--	8.5(S)	8.5/9.0	8.5	9.0	9.0

(26) Radioactive materials

See item E	--	--	See item E	--	See item E	See item E	--

2A CS	**2A MS**	**2A FAV**	**1B DC**	**3A/3B IC**	**4A IR**	**4B IR**	**5 AN**

(27) Salinity, total, mg/L

--	--	--	--	--	--	1,000	--

(28) Sodium, meq/L

--	--	--	--	--	60% of total cations	--	--

(29) Specific conductance at 25°C, µmhos/cm

--	--	--	--	--	1,000	--	--

(30) Sulfate, mg/L

--	--	--	250(S)	--	--	--	--

(31) Sulfates, wild rice present, mg/L

--	--	--	--	--	10	--	--

2A CS	**2A MS**	**2A FAV**	**1B DC**	**3A/3B IC**	**4A IR**	**4B IR**	**5 AN**

(32) Temperature, °F

No material increase	--	--	--	--	--	--	--

(33) Total dissolved salts, mg/L

--	--	--	--	--	700	--	--

(34) Total dissolved solids, mg/L

--	--	--	500(S)	--	--	--	--

(35) Total suspended solids (TSS), mg/L

See part 7050.0222, subpart 2	--	--	--	--	--	--	--

B. METALS AND ELEMENTS

2A CS	**2A MS**	**2A FAV**	**1B DC**	**3A/3B IC**	**4A IR**	**4B LS**	**5 AN**

(1) Aluminum, total, µg/L

87	748	1,496	50-200(S)	--	--	--	--

(2) Antimony, total, µg/L

5.5	90	180	6	--	--	--	--

(3) Arsenic, total, µg/L

2.0	360	720	10	--	--	--	--

(4) Barium, total, µg/L

--	--	--	2,000	--	--	--	--

(5) Beryllium, total, µg/L

--	--	--	4.0	--	--	--	--

2A CS	**2A MS**	**2A FAV**	**1B DC**	**3A/3B IC**	**4A IR**	**4B LS**	**5 AN**

(6) Boron, total, µg/L

--	--	--	--	--	500	--	--

(7) Cadmium, total, µg/L

1.1	3.9	7.8	5	--	--	--	--

Class 2A cadmium standards are hardness dependent. Cadmium values shown are for a total hardness of 100 mg/L only. See part 7050.0222, subpart 2, for examples at other hardness values and equations to calculate cadmium standards for any hardness value not to exceed 400 mg/L.

(8) Chromium +3, total, µg/L

207	1,737	3,469	--	--	--	--	--

Class 2A trivalent chromium standards are hardness dependent. Chromium +3 values shown are for a total hardness of 100 mg/L only. See part 7050.0222, subpart 2, for examples at other hardness values and equations to calculate trivalent chromium standards for any hardness value not to exceed 400 mg/L.

(9) Chromium +6, total, µg/L

11	16	32	--	--	--	--	--

(10) Chromium, total, µg/L

--	--	--	100	--	--	--	--

2A CS	**2A MS**	**2A FAV**	**1B DC**	**3A/3B IC**	**4A IR**	**4B LS**	**5 AN**

(11) Cobalt, total, µg/L

2.8	436	872	--	--	--	--	--

(12) Copper, total, µg/L

9.8	18	35	1,000 (S)	--	--	--	--

Class 2A copper standards are hardness dependent. Copper values shown are for a total hardness of 100 mg/L only. See part 7050.0222, subpart 2, for examples at other hardness values and equations to calculate copper standards for any hardness value not to exceed 400 mg/L.

(13) Iron, total, µg/L

--	--	--	300(S)	--	--	--	--

(14) Lead, total, µg/L

3.2	82	164	NA	--	--	--	--

Class 2A lead standards are hardness dependent. Lead values shown are for a total hardness of 100 mg/L only. See part 7050.0222, subpart 2, for examples at other hardness values and equations to calculate lead standards for any hardness value not to exceed 400 mg/L.

(15) Manganese, total, µg/L

--	--	--	50(S)	--	--	--	--

2A CS	**2A MS**	**2A FAV**	**1B DC**	**3A/3B IC**	**4A IR**	**4B LS**	**5 AN**

---

(16) Mercury, total, in water, ng/L

6.9	2,400*	4,900*	2,000	--	--	--	--

(17) Mercury, total in edible fish tissue, mg/kg or parts per million

0.2	--	--	--	--	--	--	--

(18) Nickel, total, µg/L

158	1,418	2,836	--	--	--	--	--

Class 2A nickel standards are hardness dependent. Nickel values shown are for a total hardness of 100 mg/L only. See part 7050.0222, subpart 2, for examples at other hardness values and equations to calculate nickel standards for any hardness value not to exceed 400 mg/L.

(19) Selenium, total, µg/L

5.0	20	40	50	--	--	--	--

(20) Silver, total, µg/L

0.12	2.0	4.1	100(S)	--	--	--	--

Class 2A silver MS and FAV are hardness dependent. Silver values shown are for a total hardness of 100 mg/L only. See part 7050.0222, subpart 2, for examples at other hardness values and equations to calculate silver standards for any hardness value not to exceed 400 mg/L.

2A CS	2A MS	2A FAV	1B DC	3A/3B IC	4A IR	4B LS	5 AN
(21) Thallium, total, µg/L							
0.28	64	128	2	--	--	--	--
(22) Zinc, total, µg/L							
106	117	234	5,000 (S)	--	--	--	--

Class 2A zinc standards are hardness dependent. Zinc values shown are for a total hardness of 100 mg/L only. See part 7050.0222, subpart 2, for examples at other hardness values and equations to calculate zinc standards for any hardness value not to exceed 400 mg/L.

C. ORGANIC POLLUTANTS OR CHARACTERISTICS

2A CS	2A MS	2A FAV	1B DC	3A/3B IC	4A IR	4B LS	5 AN
(1) Acenaphthene, µg/L							
20	56	112	--	--	--	--	--
(2) Acetochlor, µg/L							
3.6	86	173	--	--	--	--	--
(3) Acrylonitrile (c), µg/L							
0.38	1,140*	2,281*	--	--	--	--	--
(4) Alachlor (c), µg/L							
3.8	800*	1,600*	2	--	--	--	--
(5) Aldicarb, µg/L							
--	--	--	3	--	--	--	--

2A CS	2A MS	2A FAV	1B DC	3A/3B IC	4A IR	4B LS	5 AN
(6) Aldicarb sulfone, µg/L							
--	--	--	2	--	--	--	--
(7) Aldicarb sulfoxide, µg/L							
--	--	--	4	--	--	--	--
(8) Anthracene, µg/L							
0.035	0.32	0.63	--	--	--	--	--
(9) Atrazine (c), µg/L							
3.4	323	645	3	--	--	--	--
(10) Benzene (c), µg/L							
5.1	4,487*	8,974*	5	--	--	--	--

2A CS	2A MS	2A FAV	1B DC	3A/3B IC	4A IR	4B LS	5 AN
(11) Benzo(a)pyrene, µg/L							
--	--	--	0.2	--	--	--	--
(12) Bromoform, µg/L							
33	2,900	5,800	See sub-item (73)	--	--	--	--
(13) Carbofuran, µg/L							
--	--	--	40	--	--	--	--
(14) Carbon tetrachloride (c), µg/L							
1.9	1,750*	3,500*	5	--	--	--	--

(15) Chlordane (c), ng/L

0.073	1,200*	2,400*	2,000	--	--	--	--
2A CS	**2A MS**	**2A FAV**	**1B DC**	**3A/3B IC**	**4A IR**	**4B LS**	**5 AN**

(16) Chlorobenzene, µg/L (Monochlorobenzene)

20	423	846	100	--	--	--	--

(17) Chloroform (c), µg/L

53	1,392	2,784	See sub-item (73)	--	--	--	--

(18) Chlorpyrifos, µg/L

0.041	0.083	0.17	--	--	--	--	--

(19) Dalapon, µg/L

--	--	--	200	--	--	--	--

(20) DDT (c), ng/L

0.11	550*	1,100*	--	--	--	--	--
2A CS	**2A MS**	**2A FAV**	**1B DC**	**3A/3B IC**	**4A IR**	**4B LS**	**5 AN**

(21) 1,2-Dibromo-3-chloropropane (c), µg/L

--	--	--	0.2	--	--	--	--

(22) Dichlorobenzene (ortho), µg/L

--	--	--	600	--	--	--	--

(23) 1,4-Dichlorobenzene (para) (c), µg/L

--	--	--	75	--	--	--	--

(24) 1,2-Dichloroethane (c), µg/L

3.5	45,050*	90,100*	5	--	--	--	--

(25) 1,1-Dichloroethylene, µg/L

--	--	--	7	--	--	--	--
2A CS	**2A MS**	**2A FAV**	**1B DC**	**3A/3B IC**	**4A IR**	**4B LS**	**5 AN**

---

(26) 1,2-Dichloroethylene (cis), µg/L

--	--	--	70	--	--	--	--

(27) 1,2-Dichloroethylene (trans), µg/L

--	--	--	100	--	--	--	--

(28) 2,4-Dichlorophenoxyacetic acid (2,4-D), µg/L

--	--	--	70	--	--	--	--

(29) 1,2-Dichloropropane (c), µg/L

--	--	--	5	--	--	--	--

(30) Dieldrin (c), ng/L

0.0065	1,300*	2,500*	--	--	--	--	--
2A CS	**2A MS**	**2A FAV**	**1B DC**	**3A/3B IC**	**4A IR**	**4B LS**	**5 AN**

---

(31) Di-2-ethylhexyl adipate, µg/L

--	--	--	400	--	--	--	--

(32) Di-2-ethylhexyl phthalate (c), µg/L

1.9	--*	--*	6	--	--	--	--

(33) Di-n-Octyl phthalate, µg/L

30	825	1,650	--	--	--	--	--

(34) Dinoseb, µg/L

--	--	--	7	--	--	--	--

(35) Diquat, µg/L

--	--	--	20	--	--	--	--

2A CS	**2A MS**	**2A FAV**	**1B DC**	**3A/3B IC**	**4A IR**	**4B LS**	**5 AN**

---

(36) Endosulfan, µg/L

0.0076	0.084	0.17	--	--	--	--	--

(37) Endothall, µg/L

--	--	--	100	--	--	--	--

(38) Endrin, µg/L

0.0039	0.090	0.18	2	--	--	--	--

(39) Ethylbenzene (c), µg/L

68	1,859	3,717	700	--	--	--	--

(40) Ethylene dibromide, µg/L

--	--	--	0.05	--	--	--	--

2A CS	**2A MS**	**2A FAV**	**1B DC**	**3A/3B IC**	**4A IR**	**4B LS**	**5 AN**

---

(41) Fluoranthene, µg/L

1.9	3.5	6.9	--	--	--	--	--

(42) Glyphosate, µg/L

--	--	--	700	--	--	--	--

(43) Haloacetic acids (c), µg/L (Bromoacetic acid, Dibromoacetic acid, Dichloroacetic acid, Monochloroacetic acid, and Trichloroacetic acid)

--	--	--	60	--	--	--	--

(44) Heptachlor (c), ng/L

0.10	260*	520*	400	--	--	--	--

(45) Heptachlor epoxide (c), ng/L

0.12	270*	530*	200	--	--	--	--

2A CS	**2A MS**	**2A FAV**	**1B DC**	**3A/3B IC**	**4A IR**	**4B LS**	**5 AN**

---

(46) Hexachlorobenzene (c), ng/L

0.061	--*	--*	1,000	--	--	--	--

(47) Hexachlorocyclopentadiene, µg/L

--	--	--	50	--	--	--	--

(48) Lindane (c), µg/L (Hexachlorocyclohexane, gamma-)

0.0087	1.0*	2.0*	0.2	--	--	--	--

(49) Methoxychlor, µg/L

--	--	--	40	--	--	--	--

(50) Methylene chloride (c), µg/L (Dichloromethane)

45	13,875*	27,749*	5	--	--	--	--

2A CS	**2A MS**	**2A FAV**	**1B DC**	**3A/3B IC**	**4A IR**	**4B LS**	**5 AN**

---

(51) Metolachlor

23	271	543	--	--	--	--	--

(52) Naphthalene, µg/L

65	409	818	--	--	--	--	--

(53) Oxamyl, µg/L (Vydate)

--	--	--	200	--	--	--	--

(54) Parathion, µg/L

0.013	0.07	0.13	--	--	--	--	--

(55) Pentachlorophenol, µg/L

0.93	15	30	1	--	--	--	--

Class 2A MS and FAV are pH dependent. Pentachlorophenol values shown are for a pH of 7.5 only. See part 7050.0222, subpart 2, for examples at other pH values and equations to calculate pentachlorophenol standards for any pH value.

2A CS	**2A MS**	**2A FAV**	**1B DC**	**3A/3B IC**	**4A IR**	**4B LS**	**5 AN**

(56) Phenanthrene, µg/L

3.6	32	64	--	--	--	--	--

(57) Phenol, µg/L

123	2,214	4,428	--	--	--	--	--

(58) Picloram, µg/L

--	--	--	500	--	--	--	--

(59) Polychlorinated biphenyls (c), ng/L (PCBs, total)

0.014	1,000*	2,000*	500	--	--	--	--

(60) Simazine, µg/L

--	--	--	4	--	--	--	--

2A CS	2A MS	2A FAV	1B DC	3A/3B IC	4A IR	4B LS	5 AN
(61) Styrene (c), µg/L							
--	--	--	100	--	--	--	--
(62) 2,3,7,8-Tetrachlorodibenzo-p-dioxin, ng/L (TCDD-dioxin)							
--	--	--	0.03	--	--	--	--
(63) 1,1,2,2-Tetrachloroethane (c), µg/L							
1.1	1,127*	2,253*	--	--	--	--	--
(64) Tetrachloroethylene (c), µg/L							
3.8	428*	857*	5	--	--	--	--
(65) Toluene, µg/L							
253	1,352	2,703	1,000	--	--	--	--

2A CS	2A MS	2A FAV	1B DC	3A/3B IC	4A IR	4B LS	5 AN
(66) Toxaphene (c), ng/L							
0.31	730*	1,500*	3,000	--	--	--	--
(67) 2,4,5-TP, µg/L (Silvex)							
--	--	--	50	--	--	--	--
(68) 1,2,4-Trichlorobenzene, µg/L							
--	--	--	70	--	--	--	--
(69) 1,1,1-Trichloroethane, µg/L							
329	2,957	5,913	200	--	--	--	--
(70) 1,1,2-Trichloroethane, µg/L							

--	--	--	5	--	--	--	--
2A CS	**2A MS**	**2A FAV**	**1B DC**	**3A/3B IC**	**4A IR**	**4B LS**	**5 AN**

(71) 1,1,2-Trichloroethylene (c), µg/L

25	6,988	13,976*	5	--	--	--	--

(72) 2,4,6-Trichlorophenol, µg/L

2.0	102	203	--	--	--	--	--

(73) Trihalomethanes, total (c), µg/L (Bromodichloromethane, Bromoform, Chlorodibromomethane, and Chloroform)

--	--	--	80	--	--	--	--

(74) Vinyl chloride (c), µg/L

0.17	--*	--*	2	--	--	--	--

(75) Xylenes, total, µg/L

166	1,407	2,814	10,000	--	--	--	--

D. *Escherichia (E.) coli* bacteria shall not exceed 126 organisms per 100 milliliters as a geometric mean of not less than five samples representative of conditions within any calendar month, nor shall more than ten percent of all samples taken during any calendar month individually exceed 1,260 organisms per 100 milliliters. The standard applies only between April 1 and October 31.

E. For radioactive materials, see parts 7050.0221, subpart 2; 7050.0222, subpart 2; and 7050.0224, subparts 2 and 3.

Subp. 4. [Repealed, 24 SR 1105]

Subp. 4a. **Cool and warm water aquatic life and habitat, drinking water, and associated use classes.** Water quality standards applicable to use classes 1B or 1C; 2Bd, 2Bde, 2Bdg, or 2Bdm; 3A or 3B; 4A and 4B; and 5 surface waters. The water quality standards in part 7050.0222, subpart 3, that apply to class 2Bd also apply to classes 2Bde, 2Bdg, and 2Bdm. In addition to the water quality standards in part 7050.0222, subpart 3, the biological criteria defined in part 7050.0222, subpart 3d, apply to classes 2Bde, 2Bdg, and 2Bdm.

A. MISCELLANEOUS SUBSTANCE, CHARACTERISTIC, OR POLLUTANT

2Bd CS	2Bd MS	2Bd FAV	1B/1C DC	3A/3B IC	4A IR	4B LS	5 AN
(1) Ammonia, un-ionized as N, µg/L							
40	--	--	--	--	--	--	--
(2) Asbestos, >10 µm (c), fibers/L							
--	--	--	7.0e+06	--	--	--	--
(3) Bicarbonates (HCO_3), meq/L							
--	--	--	--	--	5	--	--
(4) Bromate, µg/L							
--	--	--	10	--	--	--	--
(5) Chloride, mg/L							
230	860	1,720	250(S)	50/100	--	--	--

2Bd CS	2Bd MS	2Bd FAV	1B/1C DC	3A/3B IC	4A IR	4B LS	5 AN
(6) Chlorine, total residual, µg/L							
11	19	38	--	--	--	--	--
(7) Chlorite, µg/L							
--	--	--	1,000	--	--	--	--
(8) Color, Pt-Co							
--	--	--	15(S)	--	--	--	--
(9) Cyanide, free, µg/L							
5.2	22	45	200	--	--	--	--
(10) *Escherichia (E.) coli* bacteria, organisms/100 mL							

See item D	--	--	--	--	--	--	--
2Bd CS	**2Bd MS**	**2Bd FAV**	**1B/1C DC**	**3A/3B IC**	**4A IR**	**4B LS**	**5 AN**

(11) Eutrophication standards for lakes, shallow lakes, and reservoirs (phosphorus, total, µg/L; chlorophyll-a, µg/L; Secchi disk transparency, meters)

See part 7050.0222, subparts 3 and 3a	--	--	--	--	--	--	--

(12) Eutrophication standards for rivers, streams, and navigational pools (phosphorus, total µg/L; chlorophyll-a (seston), µg/L; five-day biochemical oxygen demand (BOD_5), mg/L; diel dissolved oxygen flux, mg/L; chlorophyll-a (periphyton), mg/m^2)

See part 7050.0222, subparts 3 and 3b	--	--	--	--	--	--	--

(13) Fluoride, mg/L

--	--	--	4	--	--	--	--

(14) Fluoride, mg/L

--	--	--	2(S)	--	--	--	--

(15) Foaming agents, µg/L

--	--	--	500(S)	--	--	--	--

(16) Hardness, Ca+Mg as $CaCO_3$, mg/L

--	--	--	--	50/250	--	--	--

2Bd CS	2Bd MS	2Bd FAV	1B/1C DC	3A/3B IC	4A IR	4B LS	5 AN
(17) Hydrogen sulfide, mg/L							
--	--	--	--	--	--	--	0.02
(18) Nitrate as N, mg/L							
--	--	--	10	--	--	--	--
(19) Nitrite as N, mg/L							
--	--	--	1	--	--	--	--
(20) Nitrate + Nitrite as N, mg/L							
--	--	--	10	--	--	--	--
(21) Odor, TON							
--	--	--	3(S)	--	--	--	--

2Bd CS	2Bd MS	2Bd FAV	1B/1C DC	3A/3B IC	4A IR	4B LS	5 AN
(22) Oil, µg/L							
500	5,000	10,000	--	--	--	--	--
(23) Oxygen, dissolved, mg/L							
See part 7050.0222, subpart 3	--	--	--	--	--	--	--
(24) pH minimum, su							
6.5	--	--	6.5(S)	6.5/6.0	6.0	6.0	6.0
(25) pH maximum, su							

9.0	--	--	8.5(S)	8.5/9.0	8.5	9.0	9.0

(26) Radioactive materials

See item E	--	--	See item E	--	See item E	See item E	--

2Bd CS	**2Bd MS**	**2Bd FAV**	**1B/1C DC**	**3A/3B IC**	**4A IR**	**4B LS**	**5 AN**

(27) Salinity, total, mg/L

--	--	--	--	--	--	1,000	--

(28) Sodium, meq/L

--	--	--	--	--	60% of total cations	--	--

(29) Specific conductance at 25°C, µmhos/cm

--	--	--	--	--	1,000	--	--

(30) Sulfate, mg/L

--	--	--	250(S)	--	--	--	--

(31) Sulfates, wild rice present, mg/L

--	--	--	--	--	10	--	--

2Bd CS	**2Bd MS**	**2Bd FAV**	**1B/1C DC**	**3A/3B IC**	**4A IR**	**4B LS**	**5 AN**

(32) Temperature, °F

See item F	--	--	--	--	--	--	--

(33) Total dissolved salts, mg/L

--	--	--	--	--	700	--	--

(34) Total dissolved solids, mg/L

--	--	--	500(S)	--	--	--	--

(35) Total suspended solids (TSS), mg/L

See part 7050.0222, subpart 3	--	--	--	--	--	--	--

B. METALS AND ELEMENTS

2Bd CS	**2Bd MS**	**2Bd FAV**	**1B/1C DC**	**3A/3B IC**	**4A IR**	**4B LS**	**5 AN**

(1) Aluminum, total, µg/L

125	1,072	2,145	50-200(S)	--	--	--	--

(2) Antimony, total, µg/L

5.5	90	180	6	--	--	--	--

(3) Arsenic, total, µg/L

2.0	360	720	10	--	--	--	--

(4) Barium, total, µg/L

--	--	--	2,000	--	--	--	--

(5) Beryllium, total, µg/L

--	--	--	4.0	--	--	--	--

2Bd CS	**2Bd MS**	**2Bd FAV**	**1B/1C DC**	**3A/3B IC**	**4A IR**	**4B LS**	**5 AN**

(6) Boron, total, µg/L

--	--	--	--	--	500	--	--

(7) Cadmium, total, µg/L

1.1	33	67	5	--	--	--	--

Class 2Bd cadmium standards are hardness dependent. Cadmium values shown are for a total hardness of 100 mg/L only. See part 7050.0222, subpart 3, for examples at other hardness values and equations to calculate cadmium standards for any hardness value not to exceed 400 mg/L.

(8) Chromium +3, total, µg/L

207	1,737	3,469	--	--	--	--	--

Class 2Bd trivalent chromium standards are hardness dependent. Chromium +3 values shown are for a total hardness of 100 mg/L only. See part 7050.0222, subpart 3, for examples at other hardness values and equations to calculate trivalent chromium standards for any hardness value not to exceed 400 mg/L.

(9) Chromium +6, total, µg/L

11	16	32	--	--	--	--	--

(10) Chromium, total, µg/L

--	--	--	100	--	--	--	--

2Bd CS	**2Bd MS**	**2Bd FAV**	**1B/1C DC**	**3A/3B IC**	**4A IR**	**4B LS**	**5 AN**

(11) Cobalt, total, µg/L

2.8	436	872	--	--	--	--	--

(12) Copper, total, µg/L

9.8	18	35	1,000 (S)	--	--	--	--

Class 2Bd copper standards are hardness dependent. Copper values shown are for a total hardness of 100 mg/L only. See part 7050.0222, subpart 3, for examples at other hardness values and equations to calculate copper standards for any hardness value not to exceed 400 mg/L.

(13) Iron, total, µg/L

--	--	--	300(S)	--	--	--	--

(14) Lead, total, µg/L

3.2	82	164	NA	--	--	--	--

Class 2Bd lead standards are hardness dependent. Lead values shown are for a total hardness of 100 mg/L only. See part 7050.0222, subpart 3, for examples at other hardness values and equations to calculate lead standards for any hardness value not to exceed 400 mg/L.

(15) Manganese, total, µg/L

--	--	--	50(S)	--	--	--	--

2Bd CS	**2Bd MS**	**2Bd FAV**	**1B/1C DC**	**3A/3B IC**	**4A IR**	**4B LS**	**5 AN**

(16) Mercury, total in water, ng/L

6.9	2,400*	4,900*	2,000	--	--	--	--

(17) Mercury, total in edible fish tissue, mg/kg or parts per million

0.2	--	--	--	--	--	--	--

(18) Nickel, total, µg/L

158	1,418	2,836	--	--	--	--	--

Class 2Bd nickel standards are hardness dependent. Nickel values shown are for a total hardness of 100 mg/L only. See part 7050.0222, subpart 3, for examples at other hardness values and equations to calculate nickel standards for any hardness value not to exceed 400 mg/L.

(19) Selenium, total, µg/L

5.0	20	40	50	--	--	--	--

(20) Silver, total, µg/L

1.0	2.0	4.1	100(S)	--	--	--	--

Class 2Bd silver MS and FAV are hardness dependent. Silver values shown are for a total hardness of 100 mg/L only. See part 7050.0222, subpart 3, for examples at other hardness values and equations to calculate silver standards for any hardness value not to exceed 400 mg/L.

2Bd CS	2Bd MS	2Bd FAV	1B/1C DC	3A/3B IC	4A IR	4B LS	5 AN
(21) Thallium, total, µg/L							
0.28	64	128	2	--	--	--	--
(22) Zinc, total, µg/L							
106	117	234	5,000 (S)	--	--	--	--

Class 2Bd zinc standards are hardness dependent. Zinc values shown are for a total hardness of 100 mg/L only. See part 7050.0222, subpart 3, for examples at other hardness values and equations to calculate zinc standards for any hardness value not to exceed 400 mg/L.

C. ORGANIC POLLUTANTS OR CHARACTERISTICS

2Bd CS	2Bd MS	2Bd FAV	1B/1C DC	3A/3B ICIC	4A IR	4B LS	5 AN
(1) Acenaphthene, µg/L							
20	56	112	--	--	--	--	--
(2) Acetochlor, µg/L							
3.6	86	173	--	--	--	--	--
(3) Acrylonitrile (c), µg/L							
0.38	1,140*	2,281*	--	--	--	--	--
(4) Alachlor (c), µg/L							
4.2	800*	1,600*	2	--	--	--	--
(5) Aldicarb, µg/L							
--	--	--	3	--	--	--	--

2Bd CS	2Bd MS	2Bd FAV	1B/1C DC	3A/3B ICIC	4A IR	4B LS	5 AN
(6) Aldicarb sulfone, µg/L							
--	--	--	2	--	--	--	--
(7) Aldicarb sulfoxide, µg/L							
--	--	--	4	--	--	--	--
(8) Anthracene, µg/L							
0.035	0.32	0.63	--	--	--	--	--
(9) Atrazine (c), µg/L							
3.4	323	645	3	--	--	--	--
(10) Benzene (c), µg/L							
6.0	4,487*	8,974*	5	--	--	--	--

2Bd CS	2Bd MS	2Bd FAV	1B/1C DC	3A/3B ICIC	4A IR	4B LS	5 AN
(11) Benzo(a)pyrene, µg/L							
--	--	--	0.2	--	--	--	--
(12) Bromoform, µg/L							
41	2,900	5,800	See subitem (73)	--	--	--	--
(13) Carbofuran, µg/L							
--	--	--	40	--	--	--	--
(14) Carbon tetrachloride (c), µg/L							

1.9	1,750*	3,500*	5	--	--	--	--

(15) Chlordane (c), ng/L

0.29	1,200*	2,400*	2,000	--	--	--	--
2Bd CS	**2Bd MS**	**2Bd FAV**	**1B/1C DC**	**3A/3B ICIC**	**4A IR**	**4B LS**	**5 AN**

---

(16) Chlorobenzene, µg/L (Monochlorobenzene)

20	423	846	100	--	--	--	--

(17) Chloroform (c), µg/L

53	1,392	2,784	See subitem (73)	--	--	--	--

(18) Chlorpyrifos, µg/L

0.041	0.083	0.17	--	--	--	--	--

(19) Dalapon, µg/L

--	--	--	200	--	--	--	--

(20) DDT (c), ng/L

1.7	550*	1,100*	--	--	--	--	--
2Bd CS	**2Bd MS**	**2Bd FAV**	**1B/1C DC**	**3A/3B ICIC**	**4A IR**	**4B LS**	**5 AN**

---

(21) 1,2-Dibromo-3-chloropropane (c), µg/L

--	--	--	0.2	--	--	--	--

(22) Dichlorobenzene (ortho), µg/L

--	--	--	600	--	--	--	--

(23) 1,4-Dichlorobenzene (para) (c), µg/L

--	--	--	75	--	--	--	--

(24) 1,2-Dichloroethane (c), µg/L

3.8	45,050*	90,100*	5	--	--	--	--

(25) 1,1-Dichloroethylene, µg/L

--	--	--	7	--	--	--	--

2Bd CS	**2Bd MS**	**2Bd FAV**	**1B/1C DC**	**3A/3B ICIC**	**4A IR**	**4B LS**	**5 AN**

---

(26) 1,2-Dichloroethylene (cis), µg/L

--	--	--	70	--	--	--	--

(27) 1,2-Dichloroethylene (trans), µg/L

--	--	--	100	--	--	--	--

(28) 2,4-Dichlorophenoxyacetic acid (2,4-D), µg/L

--	--	--	70	--	--	--	--

(29) 1,2-Dichloropropane (c), µg/L

--	--	--	5	--	--	--	--

(30) Dieldrin (c), ng/L

0.026	1,300*	2,500*	--	--	--	--	--

2Bd CS	**2Bd MS**	**2Bd FAV**	**1B/1C DC**	**3A/3B ICIC**	**4A IR**	**4B LS**	**5 AN**

---

(31) Di-2-ethylhexyl adipate, µg/L

--	--	--	400	--	--	--	--

(32) Di-2-ethylhexyl phthalate (c), µg/L

1.9	--*	--*	6	--	--	--	--

(33) Di-n-Octyl phthalate, µg/L

30	825	1,650	--	--	--	--	--

(34) Dinoseb, µg/L

--	--	--	7	--	--	--	--

(35) Diquat, µg/L

--	--	--	20	--	--	--	--

2Bd CS	**2Bd MS**	**2Bd FAV**	**1B/1C DC**	**3A/3B ICIC**	**4A IR**	**4B LS**	**5 AN**

(36) Endosulfan, µg/L

0.029	0.28	0.56	--	--	--	--	--

(37) Endothall, µg/L

--	--	--	100	--	--	--	--

(38) Endrin, µg/L

0.016	0.090	0.18	2	--	--	--	--

(39) Ethylbenzene (c), µg/L

68	1,859	3,717	700	--	--	--	--

(40) Ethylene dibromide, µg/L

--	--	--	0.05	--	--	--	--

2Bd CS	**2Bd MS**	**2Bd FAV**	**1B/1C DC**	**3A/3B ICIC**	**4A IR**	**4B LS**	**5 AN**

(41) Fluoranthene, µg/L

1.9	3.5	6.9	--	--	--	--	--

(42) Glyphosate, µg/L

--	--	--	700	--	--	--	--

(43) Haloacetic acids (c), µg/L (Bromoacetic acid, Dibromoacetic acid, Dichloroacetic acid, Monochloroacetic acid, and Trichloroacetic acid)

--	--	--	60	--	--	--	--

(44) Heptachlor (c), ng/L

0.39	260*	520*	400	--	--	--	--

(45) Heptachlor epoxide (c), ng/L

0.48	270*	530*	200	--	--	--	--

2Bd CS	**2Bd MS**	**2Bd FAV**	**1B/1C DC**	**3A/3B ICIC**	**4A IR**	**4B LS**	**5 AN**

(46) Hexachlorobenzene (c), ng/L

0.24	--*	--*	1,000	--	--	--	--

(47) Hexachlorocyclopentadiene, µg/L

--	--	--	50	--	--	--	--

(48) Lindane (c), µg/L (Hexachlorocyclohexane, gamma-)

0.032	4.4*	8.8*	0.2	--	--	--	--

(49) Methoxychlor, µg/L

--	--	--	40	--	--	--	--

(50) Methylene chloride (c), µg/L (Dichloromethane)

46	13,875*	27,749*	5	--	--	--	--

2Bd CS	2Bd MS	2Bd FAV	1B/1C DC	3A/3B ICIC	4A IR	4B LS	5 AN
(51) Metolachlor							
23	271	543	--	--	--	--	--
(52) Naphthalene, µg/L							
81	409	818	--	--	--	--	--
(53) Oxamyl, µg/L (Vydate)							
--	--	--	200	--	--	--	--
(54) Parathion, µg/L							
0.013	0.07	0.13	--	--	--	--	--
(55) Pentachlorophenol, µg/L							
1.9	15	30	1	--	--	--	--

Class 2Bd MS and FAV are pH dependent. Pentachlorophenol values shown are for a pH of 7.5 only. See part 7050.0222, subpart 3, for examples at other pH values and equations to calculate pentachlorophenol standards for any pH value.

2Bd CS	2Bd MS	2Bd FAV	1B/1C DC	3A/3B ICIC	4A IR	4B LS	5 AN
(56) Phenanthrene, µg/L							
3.6	32	64	--	--	--	--	--
(57) Phenol, µg/L							
123	2,214	4,428	--	--	--	--	--
(58) Picloram, µg/L							
--	--	--	500	--	--	--	--
(59) Polychlorinated biphenyls (c), ng/L (PCBs, total)							

0.029	1,000*	2,000*	500	--	--	--	--

(60) Simazine, µg/L

--	--	--	4	--	--	--	--

2Bd CS	**2Bd MS**	**2Bd FAV**	**1B/1C DC**	**3A/3B ICIC**	**4A IR**	**4B LS**	**5 AN**

(61) Styrene (c), µg/L

--	--	--	100	--	--	--	--

(62) 2,3,7,8-Tetrachlorodibenzo-p-dioxin, ng/L (TCDD-dioxin)

--	--	--	0.03	--	--	--	--

(63) 1,1,2,2-Tetrachloroethane (c), µg/L

1.5	1,127*	2,253*	--	--	--	--	--

(64) Tetrachloroethylene (c), µg/L

3.8	428*	857*	5	--	--	--	--

(65) Toluene, µg/L

253	1,352	2,703	1,000	--	--	--	--

2Bd CS	**2Bd MS**	**2Bd FAV**	**1B/1C DC**	**3A/3B ICIC**	**4A IR**	**4B LS**	**5 AN**

(66) Toxaphene (c), ng/L

1.3	730*	1,500*	3,000	--	--	--	--

(67) 2,4,5-TP, µg/L (Silvex)

--	--	--	50	--	--	--	--

(68) 1,2,4-Trichlorobenzene, µg/L

--	--	--	70	--	--	--	--

(69) 1,1,1-Trichloroethane, µg/L

329	2,957	5,913	200	--	--	--	--

(70) 1,1,2-Trichloroethane, µg/L

--	--	--	5	--	--	--	--

2Bd CS	**2Bd MS**	**2Bd FAV**	**1B/1C DC**	**3A/3B ICIC**	**4A IR**	**4B LS**	**5 AN**

(71) 1,1,2-Trichloroethylene (c), µg/L

25	6,988*	13,976*	5	--	--	--	--

(72) 2,4,6-Trichlorophenol, µg/L

2.0	102	203	--	--	--	--	--

(73) Trihalomethanes, total (c), µg/L (Bromodichloromethane, Bromoform, Chlorodibromomethane, and Chloroform)

--	--	--	80	--	--	--	--

(74) Vinyl chloride (c), µg/L

0.18	--*	--*	2	--	--	--	--

(75) Xylenes, total, µg/L

166	1,407	2,814	10,000	--	--	--	--

D. *Escherichia (E.) coli* bacteria shall not exceed 126 organisms per 100 milliliters as a geometric mean of not less than five samples representative of conditions within any calendar month, nor shall more than ten percent of all samples taken during any calendar month individually exceed 1,260 organisms per 100 milliliters. The standard applies only between April 1 and October 31.

E. For radioactive materials, see parts 7050.0221, subpart 3; 7050.0222, subpart 3; and 7050.0224, subparts 2 and 3.

F. Temperature must not exceed five degrees Fahrenheit above natural in streams and three degrees Fahrenheit above natural in lakes, based on monthly average of maximum daily temperature, except in no case shall it exceed the daily average temperature of 86 degrees Fahrenheit.

Subp. 5. [Repealed, 24 SR 1105]

Subp. 5a. **Cool and warm water aquatic life and habitat and associated use classes.** Water quality standards applicable to use classes 2B, 2Be, 2Bg, 2Bm, or 2D; 3A, 3B, or 3C; 4A and 4B; and 5 surface waters. See parts 7050.0223, subpart 5; 7050.0224, subpart 4; and 7050.0225, subpart 2, for class 3D, 4C, and 5 standards applicable to wetlands, respectively. The water quality standards in part 7050.0222, subpart 4, that apply to class 2B also apply to classes 2Be, 2Bg, and 2Bm. In addition to the water quality standards in part 7050.0222, subpart 4, the biological criteria defined in part 7050.0222, subpart 4d, apply to classes 2Be, 2Bg, and 2Bm.

A. MISCELLANEOUS SUBSTANCE, CHARACTERISTIC, OR POLLUTANT

2B&D CS	**2B&D MS**	**2B&D FAV**	**3A/3B/3C IC**	**4A IR**	**4B LS**	**5 AN**
(1) Ammonia, un-ionized as N, µg/L						
40	--	--	--	--	--	--
(2) Bicarbonates (HCO_3), meq/L						
--	--	--	--	5	--	--
(3) Chloride, mg/L						
230	860	1,720	50/100/250	--	--	--
(4) Chlorine, total residual, µg/L						
11	19	38	--	--	--	--
(5) Cyanide, free, µg/L						
5.2	22	45	--	--	--	--

2B&D CS	**2B&D MS**	**2B&D FAV**	**3A/3B/3C IC**	**4A IR**	**4B LS**	**5 AN**
(6) *Escherichia (E.) coli* bacteria, organisms/100 mL						

See item D	--	--	--	--	--	--

(7) Eutrophication standards for lakes, shallow lakes, and reservoirs (phosphorus, total, µg/L; chlorophyll-a, µg/L; Secchi disk transparency, meters)

See part 7050.0222, subparts 4 and 4a	--	--	--	--	--	--

(8) Eutrophication standards for rivers, streams, and navigational pools (phosphorus, total µg/L; chlorophyll-a (seston), µg/L; five-day biochemical oxygen demand (BOD_5), mg/L; diel dissolved oxygen flux, mg/L; chlorophyll-a (periphyton), mg/m^2)

See part 7050.0222, subparts 4 and 4b	--	--	--	--	--	--

(9) Hardness, Ca+Mg as $CaCO_3$, mg/L

--	--	--	50/250/500	--	--	--

(10) Hydrogen sulfide, mg/L

--	--	--	--	--	--	0.02

(11) Oil, µg/L

500	5,000	10,000	--	--	--	--
2B&D CS	**2B&D MS**	**2B&D FAV**	**3A/3B/3C IC**	**4A IR**	**4B LS**	**5 AN**

(12) Oxygen, dissolved, mg/L

See part 7050.0222, subparts 4 and 6	--	--	--	--	--	--

(13) pH minimum, su

6.5 See item E	--	--	6.5/6.0/6.0	6.0	6.0	6.0

(14) pH maximum, su

9.0 See item E	--	--	8.5/9.0/9.0	8.5	9.0	9.0

(15) Radioactive materials

See item F	--	--	--	See item F	See item F	--

(16) Salinity, total, mg/L

--	--	--	--	--	1,000	--

2B&D CS	**2B&D MS**	**2B&D FAV**	**3A/3B/3C IC**	**4A IR**	**4B LS**	**5 AN**

(17) Sodium, meq/L

--	--	--	--	60% of total cations	--	--

(18) Specific conductance at 25°C, μ mhos/cm

--	--	--	--	1,000	--	--

(19) Sulfates, wild rice present, mg/L

--	--	--	--	10	--	--

(20) Temperature, °F

See item G	--	--	--	--	--	--

(21) Total dissolved salts, mg/L

--	--	--	--	700	--	--

(22) Total suspended solids (TSS), mg/L

See part 7050.0222, subpart 4	--	--	--	--	--	--

B. METALS AND ELEMENTS

2B&D CS	**2B&D MS**	**2B&D FAV**	**3A/3B/3C IC**	**4A IR**	**4B LS**	**5 AN**
(1) Aluminum, total, µg/L						
125	1,072	2,145	--	--	--	--
(2) Antimony, total, µg/L						
31	90	180	--	--	--	--
(3) Arsenic, total, µg/L						
53	360	720	--	--	--	--
(4) Boron, total, µg/L						
--	--	--	--	500	--	--
(5) Cadmium, total, µg/L						
1.1	33	67	--	--	--	--

Class 2B and 2D cadmium standards are hardness dependent. Cadmium values shown are for a total hardness of 100 mg/L only. See part 7050.0222, subpart 4, for examples at other hardness values and equations to calculate cadmium standards for any hardness value not to exceed 400 mg/L.

2B&D CS	**2B&D MS**	**2B&D FAV**	**3A/3B/3C IC**	**4A IR**	**4B LS**	**5 AN**
(6) Chromium +3, total, µg/L						
207	1,737	3,469	--	--	--	--

Class 2B and 2D trivalent chromium standards are hardness dependent. Chromium +3 values shown are for a total hardness of 100 mg/L only. See part 7050.0222, subpart 4, for examples at other hardness values and equations to calculate trivalent chromium standards for any hardness value not to exceed 400 mg/L.

(7) Chromium +6, total, µg/L

11	16	32	--	--	--	--

(8) Cobalt, total, µg/L

5.0	436	872	--	--	--	--

(9) Copper, total, µg/L

9.8	18	35	--	--	--	--

Class 2B and 2D copper standards are hardness dependent. Copper values shown are for a total hardness of 100 mg/L only. See part 7050.0222, subpart 4, for examples at other hardness values and equations to calculate copper standards for any hardness value not to exceed 400 mg/L.

(10) Lead, total, µg/L

3.2	82	164	--	--	--	--

Class 2B and 2D lead standards are hardness dependent. Lead values shown are for a total hardness of 100 mg/L only. See part 7050.0222, subpart 4, for examples at other hardness values and equations to calculate lead standards for any hardness value not to exceed 400 mg/L.

2B&D CS	**2B&D MS**	**2B&D FAV**	**3A/3B/3C IC**	**4A IR**	**4B LS**	**5 AN**

(11) Mercury, total in water, ng/L

6.9	2,400*	4,900*	--	--	--	--

(12) Mercury, total in edible fish tissue, mg/kg or parts per million

0.2	--	--	--	--	--	--

(13) Nickel, total, µg/L

158	1,418	2,836	--	--	--	--

Class 2B and 2D nickel standards are hardness dependent. Nickel values shown are for a total hardness of 100 mg/L only. See part 7050.0222, subpart 4, for examples at other hardness values and equations to calculate nickel standards for any hardness value not to exceed 400 mg/L.

(14) Selenium, total, µg/L

5.0	20	40	--	--	--	--

(15) Silver, total, µg/L

1.0	2.0	4.1	--	--	--	--

Class 2B and 2D silver MS and FAV are hardness dependent. Silver values shown are for a total hardness of 100 mg/L only. See part 7050.0222, subpart 4, for examples at other hardness values and equations to calculate silver standards for any hardness value not to exceed 400 mg/L.

2B&D CS	**2B&D MS**	**2B&D FAV**	**3A/3B/3C IC**	**4A IR**	**4B LS**	**5 AN**

(16) Thallium, total, µg/L

0.56	64	128	--	--	--	--

(17) Zinc, total, µg/L

106	117	234	--	--	--	--

Class 2B and 2D zinc standards are hardness dependent. Zinc values shown are for a total hardness of 100 mg/L only. See part 7050.0222, subpart 4, for examples at other hardness values and equations to calculate zinc standards for any hardness value not to exceed 400 mg/L.

C. ORGANIC POLLUTANTS OR CHARACTERISTICS

2B&D CS	**2B&D MS**	**2B&D FAV**	**3A/3B/3C IC**	**4A IR**	**4B LS**	**5 AN**

(1) Acenaphthene, µg/L

20	56	112	--	--	--	--

(2) Acetochlor, µg/L

3.6	86	173	--	--	--	--

(3) Acrylonitrile (c), µg/L

0.89	1,140*	2,281*	--	--	--	--

(4) Alachlor (c), µg/L

59	800	1,600	--	--	--	--

(5) Anthracene, µg/L

0.035	0.32	0.63	--	--	--	--

2B&D CS	**2B&D MS**	**2B&D FAV**	**3A/3B/3C IC**	**4A IR**	**4B LS**	**5 AN**

(6) Atrazine (c), µg/L

10	323	645	--	--	--	--

(7) Benzene (c), µg/L

98	4,487	8,974	--	--	--	--

(8) Bromoform, µg/L

466	2,900	5,800	--	--	--	--

(9) Carbon tetrachloride (c), µg/L

5.9	1,750*	3,500*	--	--	--	--

(10) Chlordane (c), ng/L

0.29	1,200*	2,400*	--	--	--	--

2B&D CS	**2B&D MS**	**2B&D FAV**	**3A/3B/3C IC**	**4A IR**	**4B LS**	**5 AN**

(11) Chlorobenzene, µg/L (Monochlorobenzene)

20	423	846	--	--	--	--

(12) Chloroform (c), µg/L

155	1,392	2,78	--	--	--	--

(13) Chlorpyrifos, µg/L

0.041	0.083	0.17	--	--	--	--

(14) DDT (c), ng/L

1.7	550*	1,100*	--	--	--	--

(15) 1,2-Dichloroethane (c), µg/L

190	45,050*	90,100*	--	--	--	--

2B&D CS	**2B&D MS**	**2B&D FAV**	**3A/3B/3C IC**	**4A IR**	**4B LS**	**5 AN**

(16) Dieldrin (c), ng/L

0.026	1,300*	2,500*	--	--	--	--

(17) Di-2-ethylhexyl phthalate (c), µg/L

2.1	--*	--*	--	--	--	--

(18) Di-n-Octyl phthalate, µg/L

30	825	1,650	--	--	--	--

(19) Endosulfan, µg/L

0.031	0.28	0.56	--	--	--	--

(20) Endrin, µg/L

0.016	0.090	0.18	--	--	--	--

2B&D CS	**2B&D MS**	**2B&D FAV**	**3A/3B/3C IC**	**4A IR**	**4B LS**	**5 AN**

(21) Ethylbenzene (c), µg/L

68	1,859	3,717	--	--	--	--

(22) Fluoranthene, µg/L

1.9	3.5	6.9	--	--	--	--

(23) Heptachlor (c), ng/L

0.39	260*	520*	--	--	--	--

(24) Heptachlor epoxide (c), ng/L

0.48	270*	530*	--	--	--	--

(25) Hexachlorobenzene (c), ng/L

0.24	--*	--*	--	--	--	--

2B&D CS	**2B&D MS**	**2B&D FAV**	**3A/3B/3C IC**	**4A IR**	**4B LS**	**5 AN**

(26) Lindane (c), µg/L (Hexachlorocyclohexane, gamma-)

0.036	4.4*	8.8*	--	--	--	--

(27) Methylene chloride (c), µg/L (Dichloromethane)

1,940	13,875	27,749	--	--	--	--

(28) Metolachlor

23	271	543	--	--	--	--

(29) Naphthalene, µg/L

81	409	818	--	--	--	--

(30) Parathion, µg/L

0.013	0.07	0.13	--	--	--	--

2B&D CS	2B&D MS	2B&D FAV	3A/3B/3C IC	4A IR	4B LS	5 AN
(31) Pentachlorophenol, µg/L						
5.5	15	30	--	--	--	--

Class 2B and 2D standards are pH dependent, except that the CS will not exceed 5.5 µg/L. Pentachlorophenol values shown are for a pH of 7.5 only. See part 7050.0222, subpart 4, for examples at other pH values and equations to calculate pentachlorophenol standards for any pH value.

(32) Phenanthrene, µg/L						
3.6	32	64	--	--	--	--
(33) Phenol, µg/L						
123	2,214	4,428	--	--	--	--
(34) Polychlorinated biphenyls (c), ng/L (PCBs, total)						
0.029	1,000*	2,000*	--	--	--	--
(35) 1,1,2,2-Tetrachloroethane (c), µg/L						
13	1,127	2,253	--	--	--	--

2B&D CS	2B&D MS	2B&D FAV	3A/3B/3C IC	4A IR	4B LS	5 AN

(36) Tetrachloroethylene (c), µg/L						
8.9	428	857	--	--	--	--
(37) Toluene, µg/L						
253	1,352	2,703	--	--	--	--
(38) Toxaphene (c), ng/L						
1.3	730*	1,500*	--	--	--	--

(39) 1,1,1-Trichloroethane, µg/L

329	2,957	5,913	--	--	--	--

(40) 1,1,2-Trichloroethylene (c), µg/L

120	6,988	13,976	--	--	--	--
2B&D CS	**2B&D MS**	**2B&D FAV**	**3A/3B/3C IC**	**4A IR**	**4B LS**	**5 AN**

---

(41) 2,4,6-Trichlorophenol, µg/L

2.0	102	203	--	--	--	--

(42) Vinyl chloride (c), µg/L

9.2	--*	--*	--	--	--	--

(43) Xylenes, total, µg/L

166	1,407	2,814	--	--	--	--

D. *Escherichia (E.) coli* bacteria shall not exceed 126 organisms per 100 milliliters as a geometric mean of not less than five samples representative of conditions within any calendar month, nor shall more than ten percent of all samples taken during any calendar month individually exceed 1,260 organisms per 100 milliliters. The standard applies only between April 1 and October 31.

E. For pH, maintain background. See part 7050.0222, subpart 6.

F. For radioactive materials, see parts 7050.0222, subpart 4; and 7050.0224, subparts 2 and 3.

G. Temperature must not exceed:

(1) Class 2B standard: five degrees Fahrenheit above natural in streams and three degrees Fahrenheit above natural in lakes, based on monthly average of maximum daily temperature, except in no case shall it exceed the daily average temperature of 86 degrees Fahrenheit; and

(2) Class 2D standard: maintain background as defined in part 7050.0222, subpart 6.

Subp. 6. [Repealed, 24 SR 1105]

Subp. 6a. **Limited resource value waters and associated use classes.**

A. WATER QUALITY STANDARDS APPLICABLE TO USE CLASSES 3C, 4A, 4B, 5, AND 7 SURFACE WATERS

7 LIMITED RESOURCE VALUE	**3C 1C**	**4A 1R**	**4B LS**	**5 AN**
(1) Bicarbonates (HCO_3), meq/L				
--	--	5	--	--
(2) Boron, µg/L				
--	--	500	--	--
(3) Chloride, mg/L				
--	250	--	--	--
(4) *Escherichia (E.) coli* bacteria, organisms/100 mL				
See item B	--	--	--	--
(5) Hardness, Ca+Mg as $CaCO_3$, mg/L				
--	500	--	--	--

7 LIMITED RESOURCE VALUE	**3C 1C**	**4A 1R**	**4B LS**	**5 AN**
(6) Hydrogen sulfide, mg/L				
--	--	--	--	0.02
(7) Oxygen, dissolved, mg/L				
See item C	--	--	--	--

(8) pH minimum, su

6.0	6.0	6.0	6.0	6.0

(9) pH maximum, su

9.0	9.0	8.5	9.0	9.0

(10) Radioactive materials

--	--	See item D	See item D	--

7 **LIMITED RESOURCE VALUE**	**3C** **1C**	**4A** **1R**	**4B** **LS**	**5** **AN**

(11) Salinity, total, mg/L

--	--	--	1,000	--

(12) Sodium, meq/L

--	--	60% of total cations	--	--

(13) Specific conductance at 25°C, µmhos/cm

--	--	1,000	--	--

(14) Sulfates, wild rice present, mg/L

--	--	10	--	--

(15) Total dissolved salts, mg/L

--	--	700	--	--

(16) Toxic pollutants

See item E	--	--	--	--

B. *Escherichia (E.) coli* bacteria shall not exceed 630 organisms per 100 milliliters as a geometric mean of not less than five samples representative of conditions within any calendar month, nor shall more than ten percent of all samples taken during any calendar month individually exceed 1,260 organisms per 100 milliliters. The standard applies only between May 1 and October 31.

C. The level of dissolved oxygen must be maintained at concentrations:

(1) that will avoid odors or putrid conditions in the receiving water;

(2) at not less than one milligram per liter (daily average); and

(3) above zero milligrams per liter at all times.

D. For radioactive materials, see part 7050.0224, subparts 2 and 3.

E. Toxic pollutants shall not be allowed in such quantities or concentrations that will impair the specified uses.

Subp. 7. **Site-specific modifications of standards.**

A. The standards in this part and in parts 7050.0221 to 7050.0227 are subject to review and modification as applied to a specific surface water body, reach, or segment. If site-specific information is available that shows that a site-specific modification is more appropriate than the statewide or ecoregion standard for a particular water body, reach, or segment, the site-specific information shall be applied.

B. The information supporting a site-specific modification can be provided by the commissioner or by any person outside the agency. The commissioner shall evaluate all relevant data in support of a modified standard and determine whether a change in the standard for a specific water body or reach is justified.

C. Any effluent limit determined to be necessary based on a modified standard shall only be required after the discharger has been given notice of the specific proposed effluent limits and an opportunity to request a hearing as provided in part 7000.1800.

D. Through the procedures established in items A to C, the following site-specific reservoir eutrophication standards apply to Lake Pepin (25-0001-00) in lieu of the water quality standards listed in this part and part 7050.0222:

(1) Phosphorus, total	µg/L	less than or equal to 100
(2) Chlorophyll-a (seston)	µg/L	less than or equal to 28

Statutory Authority: *MS s 115.03; 115.44*

History: *9 SR 913; 12 SR 1810; 15 SR 1057; 18 SR 2195; 24 SR 1105; 24 SR 1133; 32 SR 1699; 39 SR 154; 42 SR 441*

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7050.0221 SPECIFIC WATER QUALITY STANDARDS FOR CLASS 1 WATERS OF THE STATE; DOMESTIC CONSUMPTION.

Subpart 1. **General.**

A. The numeric and narrative water quality standards in this part prescribe the qualities or properties of the waters of the state that are necessary for the domestic consumption designated public uses and benefits. If the standards in this part are exceeded in waters of the state that have the class 1 designation, it is considered indicative of a polluted condition which is actually or potentially deleterious, harmful, detrimental, or injurious with respect to the designated uses.

B. The class 1 standards in this part are the United States Environmental Protection Agency primary (maximum contaminant levels) and secondary drinking water standards, as contained in Code of Federal Regulations, title 40, parts 141 and 143, as amended. These Environmental Protection Agency drinking water standards are adopted and incorporated by reference with the exceptions in this item. The following standards are not applicable to class 1 groundwaters: the primary drinking water standards for acrylamide, epichlorohydrin, copper, and lead (treatment technique standards) and standards in the disinfectants and disinfection by-products categories. The following standards are not applicable to class 1 surface waters: the primary drinking water standards for acrylamide, epichlorohydrin, copper, lead, and turbidity (treatment technique standards) and the standards in the disinfectants and microbiological organisms categories.

Subp. 2. **Class 1A waters; domestic consumption.** The quality of class 1A waters of the state shall be such that without treatment of any kind the raw waters will meet in all respects both the primary (maximum contaminant levels) and secondary drinking water standards issued by the United States Environmental Protection Agency as referenced in subpart 1. The Environmental Protection Agency drinking water standards are adopted and incorporated by reference, except as noted in subpart 1. These standards will ordinarily be restricted to underground waters with a high degree of natural protection.

Subp. 3. **Class 1B waters.** The quality of class 1B waters of the state shall be such that with approved disinfection, such as simple chlorination or its equivalent, the treated water will meet both the primary (maximum contaminant levels) and secondary drinking water standards issued by the United States Environmental Protection Agency as referenced in subpart 1. The Environmental Protection Agency drinking water standards are adopted and incorporated by reference, except as noted in subpart 1.

These standards will ordinarily be restricted to surface and underground waters with a moderately high degree of natural protection and apply to these waters in the untreated state.

Subp. 4. **Class 1C waters.** The quality of class 1C waters of the state shall be such that with treatment consisting of coagulation, sedimentation, filtration, storage, and chlorination, or other equivalent treatment processes, the treated water will meet both the primary (maximum contaminant levels) and secondary drinking water standards issued by the United States Environmental Protection Agency as referenced in subpart 1. The Environmental Protection Agency drinking water standards are adopted and incorporated by reference, except as noted in subpart 1.

These standards will ordinarily be restricted to surface waters, and groundwaters in aquifers not considered to afford adequate protection against contamination from surface or other sources of pollution. Such aquifers normally would include fractured and channeled limestone, unprotected impervious hard rock where water is obtained from mechanical fractures or joints with surface connections, and coarse gravels subjected to surface water infiltration. These standards shall also apply to these waters in the untreated state.

Subp. 5. [Repealed, 32 SR 1699]

Subp. 6. **Additional standards.** In addition to the standards in subparts 2 to 5, no sewage, industrial waste, or other wastes from point or nonpoint sources, treated or untreated, shall be discharged into or permitted by any person to gain access to any waters of the state classified for domestic consumption so as to cause any material undesirable increase in the taste, hardness, temperature, chronic toxicity, corrosiveness, or nutrient content, or in any other manner to impair the natural quality or value of the waters for use as a source of drinking water.

Statutory Authority: *MS s 115.03; 115.44*

History: *18 SR 2195; 24 SR 1105; 32 SR 1699; 39 SR 154*

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7050.0222 SPECIFIC WATER QUALITY STANDARDS FOR CLASS 2 WATERS OF THE STATE; AQUATIC LIFE AND RECREATION.

Subpart 1. **General.**

A. The numeric and narrative water quality standards in this part prescribe the qualities or properties of the waters of the state that are necessary for the aquatic life and recreation designated public uses and benefits. If the standards in this part are exceeded in waters of the state that have the class 2 designation, it is considered indicative of a polluted condition which is actually or potentially deleterious, harmful, detrimental, or injurious with respect to the designated uses.

B. Standards for metals are expressed as total metal in this part, but must be converted to dissolved metal standards for application to surface waters. Conversion factors for converting total to dissolved metal standards are listed in subpart 9. The conversion factor for metals not listed in subpart 9 is one. The dissolved metal standard equals the total metal standard times the conversion factor. Water quality-based effluent limits for metals are expressed as total metal.

C. The tables of standards in this part include the following abbreviations and acronyms:

*	an asterisk following the FAV and MS values or double dashes (--) means subpart 7, item E, applies
(c)	means the chemical is assumed to be a human carcinogen
°C	means degrees Celsius
CS	means chronic standard, defined in part 7050.0218, subpart 3

--	double dashes means there is no standard
°F	means degrees Fahrenheit
FAV	means final acute value, defined in part 7050.0218, subpart 3
HH	in the "basis" column means the standard is human health-based
MS	means maximum standard, defined in part 7050.0218, subpart 3
NA	means not applicable
su	means standard unit. It is the reporting unit for pH
TH	means total hardness in milligrams per liter, which is the sum of the calcium and magnesium concentrations expressed as $CaCO_3$
Tox	in the "basis" column means the standard is toxicity-based

D. Important synonyms or acronyms for some chemicals are listed in parentheses below the primary name.

Subp. 2. **Class 2A waters; aquatic life and recreation.** The quality of class 2A surface waters shall be such as to permit the propagation and maintenance of a healthy community of cold water aquatic biota, and their habitats according to the definitions in subpart 2c. These waters shall be suitable for aquatic recreation of all kinds, including bathing, for which the waters may be usable. This class of surface waters is also protected as a source of drinking water. Abbreviations, acronyms, and symbols are explained in subpart 1.

Substance, Characteristic, or Pollutant (Class 2A)	**Units**	**CS**	**Basis for CS**	**MS**	**FAV**	**Basis for MS, FAV**
Acenaphthene	µg/L	20	HH	56	112	Tox
Acetochlor	µg/L	3.6	Tox	86	173	Tox
Acrylonitrile (c)	µg/L	0.38	HH	1,140*	2,281*	Tox
Alachlor (c)	µg/L	3.8	HH	800*	1,600*	Tox
Aluminum, total	µg/L	87	Tox	748	1,496	Tox
Ammonia un-ionized as N	µg/L	16	Tox	--	--	NA

The percent un-ionized ammonia can be calculated for any temperature and pH by using the following equation taken from Emerson, K., R.C. Russo, R.E. Lund, and R.V. Thurston, Aqueous

ammonia equilibrium calculations; effect of pH and temperature. Journal of the Fisheries Research Board of Canada 32: 2379-2383 (1975):

$$f = \frac{1}{10^{(pk_a - pH)} + 1} \times 100$$

where: f = the percent of total ammonia in the un-ionized state

$pk_a = 0.09 + (2730/T)$ (dissociation constant for ammonia)

T = temperature in degrees Kelvin (273.16° Kelvin = 0° Celsius)

Substance, Characteristic, or Pollutant (Class 2A)	**Units**	**CS**	**Basis for CS**	**MS**	**FAV**	**Basis for MS, FAV**
Anthracene	µg/L	0.035	Tox	0.32	0.63	Tox
Antimony, total	µg/L	5.5	HH	90	180	Tox
Arsenic, total	µg/L	2.0	HH	360	720	Tox
Atrazine (c)	µg/L	3.4	HH	323	645	Tox
Benzene (c)	µg/L	5.1	HH	4,487*	8,974*	Tox
Bromoform	µg/L	33	HH	2,900	5,800	Tox
Cadmium, total	µg/L	equation	Tox	equation	equation	Tox

The CS, MS, and FAV vary with total hardness and are calculated using the following equations:

The CS in µg/L shall not exceed: exp.(0.7852[ln(total hardness mg/L)]-3.490)

The MS in µg/L shall not exceed: exp.(1.128[ln(total hardness mg/L)]-3.828)

The FAV in µg/L shall not exceed: exp.(1.128[ln(total hardness mg/L)]-3.1349)

Where: exp. is the natural antilogarithm (base e) of the expression in parenthesis.

For hardness values greater than 400 mg/L, 400 mg/L shall be used to calculate the standard.

Example of total cadmium standards for five hardness values:

TH in mg/L	50	100	200	300	400
Cadmium, total					
CS µg/L	0.66	1.1	2.0	2.7	3.4
MS µg/L	1.8	3.9	8.6	14	19
FAV µg/L	3.6	7.8	17	27	37

Substance, Characteristic, or Pollutant (Class 2A)	**Units**	**CS**	**Basis for CS**	**MS**	**FAV**	**Basis for MS, FAV**
Carbon tetrachloride (c)	µg/L	1.9	HH	1750*	3500*	Tox
Chlordane (c)	ng/L	0.073	HH	1200*	2400*	Tox
Chloride	mg/L	230	Tox	860	1720	Tox
Chlorine, total residual	µg/L	11	Tox	19	38	Tox

Chlorine standard applies to conditions of continuous exposure, where continuous exposure refers to chlorinated effluents that are discharged for more than a total of two hours in any 24-hour period.

Chlorobenzene (Monochlorobenzene)	µg/L	20	HH	423	846	Tox
Chloroform (c)	µg/L	53	HH	1,392	2,784	Tox
Chlorpyrifos	µg/L	0.041	Tox	0.083	0.17	Tox
Chromium +3, total	µg/L	equation	Tox	equation	equation	Tox

The CS, MS, and FAV vary with total hardness and are calculated using the following equations:

The CS in µg/L shall not exceed: exp.(0.819[ln(total hardness mg/L)]+1.561)

The MS in µg/L shall not exceed: exp.(0.819[ln(total hardness mg/L)]+3.688)

The FAV in µg/L shall not exceed: exp.(0.819[ln(total hardness mg/L)]+4.380)

Where: exp. is the natural antilogarithm (base e) of the expression in parenthesis.

For hardness values greater than 400 mg/L, 400 mg/L shall be used to calculate the standard.

Example of total chromium +3 standards for five total hardness values:

TH in mg/L	50	100	200	300	400
Chromium +3, total					
CS µg/L	117	207	365	509	644
MS µg/L	984	1,737	3,064	4,270	5,405
FAV µg/L	1,966	3,469	6,120	8,530	10,797

Substance, Characteristic, or Pollutant (Class 2A)	**Units**	**CS**	**Basis for CS**	**MS**	**FAV**	**Basis for MS, FAV**
Chromium +6, total	µg/L	11	Tox	16	32	Tox
Cobalt, total	µg/L	2.8	HH	436	872	Tox
Color value	Pt/Co	30	NA	--	--	NA
Copper, total	µg/L	equation	Tox	equation	equation	Tox

The CS, MS, and FAV vary with total hardness and are calculated using the following equations:

The CS in µg/L shall not exceed: exp.(0.620[ln(total hardness mg/L)]-0.570)

The MS in µg/L shall not exceed: exp.(0.9422[ln(total hardness mg/L)]-1.464)

The FAV in µg/L shall not exceed: exp.(0.9422[ln(total hardness mg/L)]-0.7703)

Where: exp. is the natural antilogarithm (base e) of the expression in parenthesis.

For hardness values greater than 400 mg/L, 400 mg/L shall be used to calculate the standard.

Example of total copper standards for five total hardness values:

TH in mg/L	50	100	200	300	400
Copper, total					
CS µg/L	6.4	9.8	15	19	23

MS µg/L	9.2	18	34	50	65
FAV µg/L	18	35	68	100	131

Substance, Characteristic, or Pollutant (Class 2A)	Units	CS	Basis for CS	MS	FAV	Basis for MS, FAV
Cyanide, free	µg/L	5.2	Tox	22	45	Tox
DDT (c)	ng/L	0.11	HH	550*	1100*	Tox
1,2-Dichloroethane (c)	µg/L	3.5	HH	45,050*	90,100*	Tox
Dieldrin (c)	ng/L	0.0065	HH	1,300*	2,500*	Tox
Di-2-ethylhexyl phthalate (c)	µg/L	1.9	HH	--*	--*	NA
Di-n-octyl phthalate	µg/L	30	Tox	825	1,650	Tox
Endosulfan	µg/L	0.0076	HH	0.084	0.17	Tox
Endrin	µg/L	0.0039	HH	0.090	0.18	Tox
Escherichia (E.) coli	See below	See below	HH	See below	See below	NA

Not to exceed 126 organisms per 100 milliliters as a geometric mean of not less than five samples representative of conditions within any calendar month, nor shall more than ten percent of all samples taken during any calendar month individually exceed 1,260 organisms per 100 milliliters. The standard applies only between April 1 and October 31.

Ethylbenzene	µg/L	68	Tox	1,859	3,717	Tox

Substance, Characteristic, or Pollutant (Class 2A)	Units	CS	Basis for CS	MS	FAV	Basis for MS, FAV

Eutrophication standards for class 2A lakes and reservoirs.

Designated lake trout lakes in all ecoregions (lake trout lakes support natural populations of lake trout, *Salvelinus namaycush*):

Phosphorus, total	µg/L	12	NA	--	--	NA
Chlorophyll-a	µg/L	3	NA	--	--	NA
Secchi disk transparency	meters	No less than 4.8	NA	--	--	NA

Designated trout lakes in all ecoregions, except lake trout lakes:

Phosphorus, total	µg/L	20	NA	--	--	NA
Chlorophyll-a	µg/L	6	NA	--	--	NA
Secchi disk transparency	meters	No less than 2.5	NA	--	--	NA

Additional narrative eutrophication standards for class 2A lakes and reservoirs are found under subpart 2a.

Eutrophication standards for class 2A rivers and streams.

North River Nutrient Region:

Phosphorus, total	µg/L	less than or equal to 50
Chlorophyll-a (seston)	µg/L	less than or equal to 7
Diel dissolved oxygen flux	mg/L	less than or equal to 3.0
Biochemical oxygen demand (BOD_5)	mg/L	less than or equal to 1.5

Central River Nutrient Region:

Phosphorus, total	µg/L	less than or equal to 100
Chlorophyll-a (seston)	µg/L	less than or equal to 18
Diel dissolved oxygen flux	mg/L	less than or equal to 3.5
Biochemical oxygen demand (BOD_5)	mg/L	less than or equal to 2.0

South River Nutrient Region:

Phosphorus, total	µg/L	less than or equal to 150
Chlorophyll-a (seston)	µg/L	less than or equal to 35

Diel dissolved oxygen flux	mg/L	less than or equal to 4.5
Biochemical oxygen demand (BOD_5)	mg/L	less than or equal to 3.0

Additional narrative eutrophication standards for class 2A rivers and streams are found under subpart 2b.

Substance, Characteristic, or Pollutant (Class 2A)	**Units**	**CS**	**Basis for CS**	**MS**	**FAV**	**Basis for MS, FAV**
Fluoranthene	µg/L	1.9	Tox	3.5	6.9	Tox
Heptachlor (c)	ng/L	0.10	HH	260*	520*	Tox
Heptachlor epoxide (c)	ng/L	0.12	HH	270*	530*	Tox
Hexachlorobenzene (c)	ng/L	0.061	HH	--*	--*	Tox
Lead, total	µg/L	equation	Tox	equation	equation	Tox

The CS, MS, and FAV vary with total hardness and are calculated using the following equations:

The CS in µg/L shall not exceed: exp.(1.273[ln(total hardness mg/L)]-4.705)

The MS in µg/L shall not exceed: exp.(1.273[ln(total hardness mg/L)]-1.460)

The FAV in µg/L shall not exceed: exp.(1.273[ln(total hardness mg/L)]-0.7643)

Where: exp. is the natural antilogarithm (base e) of the expression in parenthesis.

For hardness values greater than 400 mg/L, 400 mg/L shall be used to calculate the standard.

Example of total lead standards for five total hardness values:

TH in mg/L	50	100	200	300	400
Lead, total					
CS µg/L	1.3	3.2	7.7	13	19
MS µg/L	34	82	197	331	477
FAV µg/L	68	164	396	663	956

Substance, Characteristic, or Pollutant (Class 2A)	Units	CS	Basis for CS	MS	FAV	Basis for MS, FAV
Lindane (c) (Hexachlorocyclohexane, gamma-)	µg/L	0.0087	HH	1.0*	2.0*	Tox
Mercury, total in water	ng/L	6.9	HH	2,400*	4,900*	Tox
Mercury, total in edible fish	mg/kg ppm	0.2	HH	NA	NA	NA
Methylene chloride (c) Dichloromethane)	µg/L	45	HH	13,875*	27,749*	Tox
Metolachlor	µg/L	23	Tox	271	543	Tox
Naphthalene	µg/L	65	HH	409	818	Tox
Nickel, total	µg/L	equation	Tox/HH	equation	equation	Tox

The CS, MS, and FAV vary with total hardness and are calculated using the following equations:

The CS shall not exceed the human health-based standard of 297 µg/L. For waters with total hardness values less than 212 mg/L, the CS in µg/L is toxicity-based and shall not exceed: exp.(0.846[ln(total hardness mg/L)]+1.1645)

The MS in µg/L shall not exceed: exp.(0.846[ln(total hardness mg/L)]+3.3612)

The FAV in µg/L shall not exceed: exp.(0.846[ln(total hardness mg/L)]+4.0543)

Where: exp. is the natural antilogarithm (base e) of the expression in parenthesis.

For hardness values greater than 400 mg/L, 400 mg/L shall be used to calculate the standard.

Example of total nickel standards for five total hardness values:

TH in mg/L	50	100	200	300	400
Nickel, total					
CS µg/L	88	158	283	297	297

MS µg/L	789	1,418	2,549	3,592	4,582
FAV µg/L	1,578	2,836	5,098	7,185	9,164

Substance, Characteristic, or Pollutant (Class 2A)	**Units**	**CS**	**Basis for CS**	**MS**	**FAV**	**Basis for MS, FAV**
Oil	µg/L	500	NA	5,000	10,000	NA
Oxygen, dissolved	mg/L	See below	NA	--	--	NA

7.0 mg/L as a daily minimum. This dissolved oxygen standard requires compliance with the standard 50 percent of the days at which the flow of the receiving water is equal to the $7Q_{10}$.

Parathion	µg/L	0.013	Tox	0.07	0.13	Tox
Pentachlorophenol	µg/L	0.93	HH	equation	equation	Tox

The MS and FAV vary with pH and are calculated using the following equations:

The MS in µg/L shall not exceed: exp.(1.005[pH]-4.830)

The FAV in µg/L shall not exceed: exp.(1.005[pH]-4.1373)

Where: exp. is the natural antilogarithm (base e) of the expression in parenthesis.

For pH values less than 6.0, 6.0 shall be used to calculate the standard and for pH values greater than 9.0, 9.0 shall be used to calculate the standard.

Example of pentachlorophenol standards for five pH values:

pH su	6.5	7.0	7.5	8.0	8.5
Pentachlorophenol					
CS µg/L	0.93	0.93	0.93	0.93	0.93
MS µg/L	5.5	9.1	15	25	41
FAV µg/L	11	18	30	50	82

Substance, Characteristic, or Pollutant (Class 2A)	Units	CS	Basis for CS	MS	FAV	Basis for MS, FAV
pH, minimum	su	6.5	NA	--	--	NA
pH, maximum	su	8.5	NA	--	--	NA
Phenanthrene	µg/L	3.6	Tox	32	64	Tox
Phenol	µg/L	123	Tox	2,214	4,428	Tox
Polychlorinated biphenyls, total (c)	ng/L	0.014	HH	1,000*	2,000*	Tox
Radioactive materials	NA	See below	NA	See below	See below	NA

Not to exceed the lowest concentrations permitted to be discharged to an uncontrolled environment as permitted by the appropriate authority having control over their use.

Selenium, total	µg/L	5.0	Tox	20	40	Tox
Silver, total	µg/L	0.12	Tox	equation	equation	Tox

The MS and FAV vary with total hardness and are calculated using the following equations:

The MS in µg/L shall not exceed: exp.(1.720[ln(total hardness mg/L)]-7.2156)

The FAV in µg/L shall not exceed: exp.(1.720[ln(total hardness mg/L)]-6.520)

Where: exp. is the natural antilogarithm (base e) of the expression in parenthesis.

For hardness values greater than 400 mg/L, 400 mg/L shall be used to calculate the standard.

Example of silver standards for five total hardness values:

TH in mg/L	50	100	200	300	400
Silver, total					
CS µg/L	0.12	0.12	0.12	0.12	0.12
MS µg/L	1.0	2.0	6.7	13	22
FAV µg/L	1.2	4.1	13	27	44

Substance, Characteristic, or Pollutant (Class 2A)	Units	CS	Basis for CS	MS	FAV	Basis for MS, FAV
Temperature	°C or °F	No material increase	NA	--	--	NA
1,1,2,2-Tetrachloroethane (c)	µg/L	1.1	HH	1,127*	2,253*	Tox
Tetrachloroethylene (c)	µg/L	3.8	HH	428*	857*	Tox
Thallium, total	µg/L	0.28	HH	64	128	Tox
Toluene	µg/L	253	Tox	1,352	2,703	Tox
Toxaphene (c)	ng/L	0.31	HH	730*	1,500*	Tox
1,1,1-Trichloroethane	µg/L	329	Tox	2,957	5,913	Tox
1,1,2-Trichloroethylene (c)	µg/L	25	HH	6,988*	13,976*	Tox
2,4,6-Trichlorophenol	µg/L	2.0	HH	102	203	Tox
Total suspended solids (TSS)	mg/L	10	NA	--	--	NA
TSS standards for class 2A may be exceeded for no more than ten percent of the time. This standard applies April 1 through September 30						
Vinyl chloride (c)	µg/L	0.17	HH	--*	--*	NA
Xylene, total m,p,o	µg/L	166	Tox	1,407	2,814	Tox
Zinc, total	µg/L	equation	Tox	equation	equation	Tox

The CS, MS, and FAV vary with total hardness and are calculated using the following equations:

The CS in µg/L shall not exceed: exp.(0.8473[ln(total hardness mg/L)]+0.7615)

The MS in µg/L shall not exceed: exp.(0.8473[ln(total hardness mg/L)]+0.8604)

The FAV in µg/L shall not exceed: exp.(0.8473[ln(total hardness mg/L)]+1.5536

Where: exp. is the natural antilogarithm (base e) of the expression in parenthesis.

For hardness values greater than 400 mg/L, 400 mg/L shall be used to calculate the standard.

Example of zinc standards for five total hardness values:

TH in mg/L	50	100	200	300	400
Zinc, total					
CS µg/L	59	106	191	269	343
MS µg/L	65	117	211	297	379
FAV µg/L	130	234	421	594	758

Subp. 2a. **Narrative eutrophication standards for lakes and reservoirs.**

A. Eutrophication standards for lakes and reservoirs are compared to summer-average data. Exceedance of the total phosphorus and either the chlorophyll-a or Secchi disk transparency standard is required to indicate a polluted condition.

B. It is the policy of the agency to protect all lakes and reservoirs from the undesirable effects of cultural eutrophication. Lakes and reservoirs with a baseline quality better than the numeric eutrophication standards in subpart 2 must be maintained in that condition through the strict application of all relevant federal, state, and local requirements governing antidegradation, the discharge of nutrients from point and nonpoint sources, and the protection of lake or reservoir resources, including, but not limited to:

(1) the antidegradation requirements in parts 7050.0250 to 7050.0335;

(2) the phosphorus effluent limits for point sources, where applicable in chapter 7053;

(3) the requirements for feedlots in chapter 7020;

(4) the requirements for individual sewage treatment systems in chapter 7080;

(5) the requirements for control of storm water in chapter 7090;

(6) county shoreland ordinances; and

(7) implementation of mandatory and voluntary best management practices to minimize point and nonpoint sources of nutrients.

C. Lakes and reservoirs with a baseline quality that is poorer than the numeric eutrophication standards in subpart 2 must be considered to be in compliance with the standards if the baseline quality is the result of natural causes. The commissioner shall determine baseline quality and compliance with these standards using data and the procedures in part 7050.0150, subpart 5.

D. When applied to reservoirs, the eutrophication standards in this subpart and subpart 2 may be modified on a site-specific basis to account for characteristics unique to reservoirs that can affect trophic status, such as water temperature, variations in hydraulic residence time, watershed size, and the fact that reservoirs may receive drainage from more than one ecoregion. Information

supporting a site-specific standard can be provided by the commissioner or by any person outside the agency. The commissioner shall evaluate all data in support of a modified standard and determine whether a change in the standard for a specific reservoir is justified. Any total phosphorus effluent limit determined to be necessary based on a modified standard shall only be required after the discharger has been given notice of the specific proposed effluent limits and an opportunity to request a hearing as provided in part 7000.1800.

E. Eutrophication standards applicable to lakes and reservoirs that lie on the border between two ecoregions or that are in the Red River Valley (also referred to as Lake Agassiz Plains), Northern Minnesota Wetlands, or Driftless Area Ecoregion must be applied on a case-by-case basis. The commissioner shall use the standards applicable to adjacent ecoregions as a guide.

Subp. 2b. **Narrative eutrophication standards for rivers and streams.**

A. Eutrophication standards for rivers and streams are compared to summer-average data or as specified in subpart 2. Exceedance of the total phosphorus levels and chlorophyll-a (seston), five-day biochemical oxygen demand (BOD_5), diel dissolved oxygen flux, or pH levels is required to indicate a polluted condition.

B. Rivers and streams that exceed the phosphorus levels but do not exceed the chlorophyll-a (seston), five-day biochemical oxygen demand (BOD_5), diel dissolved oxygen flux, or pH levels meet the eutrophication standard.

C. For chlorophyll-a (periphyton), the standard is exceeded if concentrations exceed 150 mg/m^2 more than one year in ten.

D. It is the policy of the agency to protect all rivers and streams from the undesirable effects of cultural eutrophication. Rivers and streams with a baseline quality better than the numeric eutrophication standards in subpart 3 must be maintained in that condition through the strict application of all relevant federal, state, and local requirements governing antidegradation, the discharge of nutrients from point and nonpoint sources, including:

(1) the antidegradation requirements in parts 7050.0250 to 7050.0335;

(2) the phosphorus effluent limits for point sources, where applicable, in chapter 7053;

(3) the requirements for feedlots in chapter 7020;

(4) the requirements for individual sewage treatment systems in chapter 7080;

(5) the requirements for control of storm water in chapter 7090;

(6) county shoreland ordinances; and

(7) implementation of mandatory and voluntary best management practices to minimize point and nonpoint sources of nutrients.

E. Rivers and streams with a baseline quality that does not meet the numeric eutrophication standards in part 7050.0150, subpart 5b, are in compliance with the standards if the baseline quality

is the result of natural causes. The commissioner must determine baseline quality and compliance with these standards using data and the procedures in part 7050.0150, subpart 5.

Subp. 2c. **Beneficial use definitions for lotic cold water aquatic life and habitats (class 2A).**

A. Subitems (1) to (5) apply to the beneficial uses in items B and C:

(1) The designation and attainment of beneficial uses are based on the biological criteria in subpart 2d.

(2) The attributes of species composition, diversity, and functional organization are measured using:

(a) the fish IBI as defined in Fish Data Collection Protocols for Lotic Waters in Minnesota (2017); or

(b) the macroinvertebrate IBI as defined in Macroinvertebrate Data Collection Protocols for Lotic Waters in Minnesota (2017).

(3) Water body types for streams and rivers are defined in the documents referenced in subitem (2).

(4) The following documents are incorporated by reference and are not subject to frequent change:

(a) Calibration of the Biological Condition Gradient for Streams of Minnesota, Gerritsen et al. (2012). The document is available on the agency's website at www.pca.state.mn.us/regulations/minnesota-rulemaking;

(b) Fish Data Collection Protocols for Lotic Waters in Minnesota, Minnesota Pollution Control Agency (2017). The document is available on the agency's website at www.pca.state.mn.us/regulations/minnesota-rulemaking;

(c) Macroinvertebrate Data Collection Protocols for Lotic Waters in Minnesota, Minnesota Pollution Control Agency (2017). The document is available on the agency's website at www.pca.state.mn.us/regulations/minnesota-rulemaking; and

(d) Development of Biological Criteria for Tiered Aquatic Life Uses, Minnesota Pollution Control Agency (2016). The document is available on the agency's website at www.pca.state.mn.us/regulations/minnesota-rulemaking.

(5) The beneficial use subclass designators "e" and "g" are added to the class 2A designator as specific additional designators. The additional subclass designators do not replace the class 2A designator. All requirements for class 2A cold water stream and river habitats in parts 7050.0222 and 7052.0100 continue to apply in addition to requirements for class 2Ae or class 2Ag cold water stream and river habitats in part 7050.0222. These subclass designators are applied to lotic waters only.

B. "Exceptional cold water aquatic life and habitat" or "class 2Ae" is a beneficial use that means waters capable of supporting and maintaining an exceptional and balanced, integrated,

adaptive community of cold water aquatic organisms having a species composition, diversity, and functional organization comparable to the 75th percentile of biological condition gradient level 3 as established in Calibration of the Biological Condition Gradient for Streams of Minnesota, Gerritsen et al. (2012).

C. "General cold water aquatic life and habitat" or "class 2Ag" is a beneficial use that means waters capable of supporting and maintaining a balanced, integrated, adaptive community of cold water aquatic organisms having a species composition, diversity, and functional organization comparable to the median of biological condition gradient level 4 as established in Calibration of the Biological Condition Gradient for Streams of Minnesota, Gerritsen et al. (2012).

Subp. 2d. **Biological criteria for lotic cold water aquatic life and habitats (class 2A).**

Water Body Type	Tier	Class	Assemblage	Biocriterion
Southern cold water streams	Exceptional	2Ae	Fish	82
	General	2Ag	Fish	50
Northern cold water streams	Exceptional	2Ae	Fish	60
	General	2Ag	Fish	35
Northern cold water streams	Exceptional	2Ae	Macroinvertebrates	52
	General	2Ag	Macroinvertebrates	32
Southern cold water streams	Exceptional	2Ae	Macroinvertebrates	72
	General	2Ag	Macroinvertebrates	43

The biological criteria for lotic cold water aquatic life and habitats (class 2A) are applicable to perennial and intermittent waters that allow for colonization of fish or macroinvertebrates.

Subp. 3. **Class 2Bd waters.** The quality of class 2Bd surface waters shall be such as to permit the propagation and maintenance of a healthy community of cool or warm water aquatic biota and their habitats according to the definitions in subpart 3c. These waters shall be suitable for aquatic recreation of all kinds, including bathing, for which the waters may be usable. This class of surface waters is also protected as a source of drinking water. The applicable standards are given below. Abbreviations, acronyms, and symbols are explained in subpart 1.

Substance, Characteristic, or Pollutant (Class 2Bd)	Units	CS	Basis for CS	MS	FAV	Basis for MS, FAV

Acenaphthene	µg/L	20	HH	56	112	Tox
Acetochlor	µg/L	3.6	Tox	86	173	Tox
Acrylonitrile (c)	µg/L	0.38	HH	1,140*	2,281*	Tox
Alachlor (c)	µg/L	4.2	HH	800*	1,600*	Tox
Aluminum, total	µg/L	125	Tox	1,072	2,145	Tox
Ammonia un-ionized as N	µg/L	40	Tox	--	--	NA

The percent un-ionized ammonia can be calculated for any temperature and pH by using the following equation taken from Emerson, K., R.C. Russo, R.E. Lund, and R.V. Thurston, Aqueous ammonia equilibrium calculations; effect of pH and temperature. Journal of the Fisheries Research Board of Canada 32: 2379-2383 (1975):

$$f = 1/(10^{(pka-pH)} + 1) \times 100$$

where: f = the percent of total ammonia in the un-ionized state

$pk_a = 0.09 + (2730/T)$ (dissociation constant for ammonia)

T = temperature in degrees Kelvin (273.16° Kelvin = 0° Celsius)

Substance, Characteristic, or Pollutant (Class 2Bd)	**Units**	**CS**	**Basis for CS**	**MS**	**FAV**	**Basis for MS, FAV**
Anthracene	µg/L	0.035	Tox	0.32	0.63	Tox
Antimony, total	µg/L	5.5	HH	90	180	Tox
Arsenic, total	µg/L	2.0	HH	360	720	Tox
Atrazine (c)	µg/L	3.4	HH	323	645	Tox
Benzene (c)	µg/L	6.0	HH	4,487*	8,974*	Tox
Bromoform	µg/L	41	HH	2,900	5,800	Tox
Cadmium, total	µg/L	equation	Tox	equation	equation	Tox

The CS, MS, and FAV vary with total hardness and are calculated using the following equations:

The CS in µg/L shall not exceed: exp.(0.7852[ln(total hardness mg/L)]-3.490)

The MS in µg/L shall not exceed: exp.(1.128[ln(total hardness mg/L)]-1.685)

The FAV in µg/L shall not exceed: exp.(1.128[ln(total hardness mg/L)]-0.9919)

Where: exp. is the natural antilogarithm (base e) of the expression in parenthesis.

For hardness values greater than 400 mg/L, 400 mg/L shall be used to calculate the standard.

Example of total cadmium standards for five hardness values:

TH in mg/L	50	100	200	300	400
Cadmium, total					
CS µg/L	0.66	1.1	2.0	2.7	3.4
MS µg/L	15	33	73	116	160
FAV µg/L	31	67	146	231	319

Substance, Characteristic, or Pollutant (Class 2Bd)	**Units**	**CS**	**Basis for CS**	**MS**	**FAV**	**Basis for MS, FAV**
Carbon tetrachloride (c)	µg/L	1.9	HH	1,750*	3,500*	Tox
Chlordane (c)	ng/L	0.29	HH	1,200*	2,400*	Tox
Chloride	mg/L	230	Tox	860	1,720	Tox
Chlorine, total residual	µg/L	11	Tox	19	38	Tox

Chlorine standard applies to conditions of continuous exposure, where continuous exposure refers to chlorinated effluents that are discharged for more than a total of two hours in any 24-hour period.

Chlorobenzene (Monochlorobenzene)	µg/L	20	HH	423	846	Tox
Chloroform (c)	µg/L	53	HH	1,392	2,784	Tox
Chlorpyrifos	µg/L	0.041	Tox	0.083	0.17	Tox
Chromium +3, total	µg/L	equation	Tox	equation	equation	Tox

The CS, MS, and FAV vary with total hardness and are calculated using the following equations:

The CS in µg/L shall not exceed: exp.(0.819[ln(total hardness mg/L)]+1.561)

The MS in µg/L shall not exceed: exp.(0.819[ln(total hardness mg/L)]+3.688)

The FAV in µg/L shall not exceed: exp.(0.819[ln(total hardness mg/L)]+4.380)

Where: exp. is the natural antilogarithm (base e) of the expression in parenthesis.

For hardness values greater than 400 mg/L, 400 mg/L shall be used to calculate the standard.

Example of total chromium +3 standards for five total hardness values:

TH in mg/L	50	100	200	300	400
Chromium +3, total					
CS µg/L	117	207	365	509	644
MS µg/L	984	1,737	3,064	4,270	5,405
FAV µg/L	1,966	3,469	6,120	8,530	10,797

Substance, Characteristic, or Pollutant (Class 2Bd)	**Units**	**CS**	**Basis for CS**	**MS**	**FAV**	**Basis for MS, FAV**
Chromium +6, total	µg/L	11	Tox	16	32	Tox
Cobalt, total	µg/L	2.8	HH	436	872	Tox
Copper, total	µg/L	equation	Tox	equation	equation	Tox

The CS, MS, and FAV vary with total hardness and are calculated using the following equations:

The CS in µg/L shall not exceed: exp.(0.620[ln(total hardness mg/L)]-0.570)

The MS in µg/L shall not exceed: exp.(0.9422[ln(total hardness mg/L)]-1.464)

The FAV in µg/L shall not exceed: exp.(0.9422[ln(total hardness mg/L)]-0.7703)

Where: exp. is the natural antilogarithm (base e) of the expression in parenthesis.

For hardness values greater than 400 mg/L, 400 mg/L shall be used to calculate the standard.

Example of total copper standards for five total hardness values:

TH in mg/L	50	100	200	300	400
Copper, total					
CS µg/L	6.4	9.8	15	19	23
MS µg/L	9.2	18	34	50	65
FAV µg/L	18	35	68	100	131

Substance, Characteristic, or Pollutant (Class 2Bd)	**Units**	**CS**	**Basis for CS**	**MS**	**FAV**	**Basis for MS, FAV**
Cyanide, free	µg/L	5.2	Tox	22	45	Tox
DDT (c)	ng/L	1.7	HH	550*	1,100*	Tox
1,2-Dichloroethane (c)	µg/L	3.8	HH	45,050*	90,100*	Tox
Dieldrin (c)	ng/L	0.026	HH	1,300*	2,500*	Tox
Di-2-ethylhexyl phthalate (c)	µg/L	1.9	HH	--*	--*	NA
Di-n-octyl phthalate	µg/L	30	Tox	825	1,650	Tox
Endosulfan	µg/L	0.029	HH	0.28	0.56	Tox
Endrin	µg/L	0.016	HH	0.090	0.18	Tox
Escherichia (E.) coli	See below	See below	HH	See below	See below	NA

Not to exceed 126 organisms per 100 milliliters as a geometric mean of not less than five samples representative of conditions within any calendar month, nor shall more than ten percent of all samples taken during any calendar month individually exceed 1,260 organisms per 100 milliliters. The standard applies only between April 1 and October 31.

Ethylbenzene	µg/L	68	Tox	1,859	3,717	Tox

Substance, Characteristic, or Pollutant (Class 2Bd)	**Units**	**CS**	**Basis for CS**	**MS**	**FAV**	**Basis for**

						MS, FAV

Eutrophication standards for class 2Bd lakes, shallow lakes, and reservoirs.

Lakes, Shallow Lakes, and Reservoirs in Northern Lakes and Forest Ecoregion

Phosphorus, total	µg/L	30	NA	--	--	NA
Chlorophyll-a	µg/L	9	NA	--	--	NA
Secchi disk transparency	meters	Not less than 2.0	NA	--	--	NA

Lakes and Reservoirs in North Central Hardwood Forest Ecoregion

Phosphorus, total	µg/L	40	NA	--	--	NA
Chlorophyll-a	µg/L	14	NA	--	--	NA
Secchi disk transparency	meters	Not less than 1.4	NA	--	--	NA

Lakes and Reservoirs in Western Corn Belt Plains and Northern Glaciated Plains Ecoregions

Phosphorus, total	µg/L	65	NA	--	--	NA
Chlorophyll-a	µg/L	22	NA	--	--	NA
Secchi disk transparency	meters	Not less than 0.9	NA	--	--	NA

Shallow Lakes in North Central Hardwood Forest Ecoregion

Phosphorus, total	µg/L	60	NA	--	--	NA
Chlorophyll-a	µg/L	20	NA	--	--	NA
Secchi disk transparency	meters	Not less than 1.0	NA	--	--	NA

Shallow Lakes in Western Corn Belt Plains and Northern Glaciated Plains Ecoregions

Phosphorus, total	µg/L	90	NA	--	--	NA
Chlorophyll-a	µg/L	30	NA	--	--	NA
Secchi disk transparency	meters	Not less than 0.7	NA	--	--	NA

Additional narrative eutrophication standards for class 2Bd lakes, shallow lakes, and reservoirs are found under subpart 3a.

Eutrophication standards for class 2Bd rivers and streams.

North River Nutrient Region

Phosphorus, total	µg/L	less than or equal to 50
Chlorophyll-a (seston)	µg/L	less than or equal to 7
Diel dissolved oxygen flux	mg/L	less than or equal to 3.0
Biochemical oxygen demand (BOD_5)	mg/L	less than or equal to 1.5

Central River Nutrient Region

Phosphorus, total	µg/L	less than or equal to 100
Chlorophyll-a (seston)	µg/L	less than or equal to 18
Diel dissolved oxygen flux	mg/L	less than or equal to 3.5
Biochemical oxygen demand (BOD_5)	mg/L	less than or equal to 2.0

South River Nutrient Region

Phosphorus, total	µg/L	less than or equal to 150
Chlorophyll-a (seston)	µg/L	less than or equal to 35
Diel dissolved oxygen flux	mg/L	less than or equal to 4.5
Biochemical oxygen demand (BOD_5)	mg/L	less than or equal to 3.0

Additional narrative eutrophication standards for class 2Bd rivers and streams are found under subpart 3b.

Substance, Characteristic,	**Units**	**CS**	**Basis for CS**	**MS**	**FAV**	**Basis for**

or Pollutant (Class 2Bd)						**MS, FAV**
Fluoranthene	µg/L	1.9	Tox	3.5	6.9	Tox
Heptachlor (c)	ng/L	0.39	HH	260*	520*	Tox
Heptachlor epoxide (c)	ng/L	0.48	HH	270*	530*	Tox
Hexachlorobenzene (c)	ng/L	0.24	HH	--*	--*	Tox
Lead, total	µg/L	equation	Tox	equation	equation	Tox

The CS, MS, and FAV vary with total hardness and are calculated using the following equations:

The CS in µg/L shall not exceed: exp.(1.273[ln(total hardness mg/L)]-4.705)

The MS in µg/L shall not exceed: exp.(1.273[ln(total hardness mg/L)]-1.460)

The FAV in µg/L shall not exceed: exp.(1.273[ln(total hardness mg/L)]-0.7643)

Where: exp. is the natural antilogarithm (base e) of the expression in parenthesis.

For hardness values greater than 400 mg/L, 400 mg/L shall be used to calculate the standard.

Example of total lead standards for five total hardness values:

TH in mg/L	50	100	200	300	400
Lead, total					
CS µg/L	1.3	3.2	7.7	13	19
MS µg/L	34	82	197	331	477
FAV µg/L	68	164	396	663	956

Substance, Characteristic, or Pollutant (Class 2Bd)	**Units**	**CS**	**Basis for CS**	**MS**	**FAV**	**Basis for MS, FAV**

Lindane (c) (Hexachlorocyclohexane, gamma-)	µg/L	0.032	HH	4.4*	8.8*	Tox
Mercury, total in water	ng/L	6.9	HH	2,400*	4,900*	Tox
Mercury, total in edible fish tissue	mg/kg ppm	0.2	HH	NA	NA	NA
Methylene chloride (c) (Dichloromethane)	µg/L	46	HH	13,875*	27,749*	Tox
Metolachlor	µg/L	23	Tox	271	543	Tox
Naphthalene	µg/L	81	Tox	409	818	Tox
Nickel, total	µg/L	equation	Tox/HH	equation	equation	Tox

The CS, MS, and FAV vary with total hardness and are calculated using the following equations:

The CS shall not exceed the human health-based standard of 297 µg/L. For waters with total hardness values less than 212 mg/L, the CS in µg/L is toxicity-based and shall not exceed: exp.(0.846[ln(total hardness mg/L)]+1.1645)

The MS in µg/L shall not exceed: exp.(0.846[ln(total hardness mg/L)]+3.3612)

The FAV in µg/L shall not exceed: exp.(0.846[ln(total hardness mg/L)]+4.0543)

Where: exp. is the natural antilogarithm (base e) of the expression in parenthesis.

For hardness values greater than 400 mg/L, 400 mg/L shall be used to calculate the standard.

Example of total nickel standards for five total hardness values:

TH in mg/L	50	100	200	300	400
Nickel, total					
CS µg/L	88	158	283	297	297
MS µg/L	789	1,418	2,549	3,592	4,582
FAV µg/L	1,578	2,836	5,098	7,185	9,164

Substance, Characteristic, or Pollutant (Class 2Bd)	**Units**	**CS**	**Basis for CS**	**MS**	**FAV**	**Basis for**

						MS, FAV
Oil	µg/L	500	NA	5,000	10,000	NA
Oxygen, dissolved	mg/L	See below	NA	--	--	NA

5.0 mg/L as a daily minimum. This dissolved oxygen standard may be modified on a site-specific basis according to part 7050.0220, subpart 7, except that no site-specific standard shall be less than 5 mg/L as a daily average and 4 mg/L as a daily minimum. Compliance with this standard is required 50 percent of the days at which the flow of the receiving water is equal to the $7Q_{10}$.

Parathion	µg/L	0.013	Tox	0.07	0.13	Tox
Pentachlorophenol	µg/L	1.9	HH	equation	equation	Tox

The MS and FAV vary with pH and are calculated using the following equations:

The MS in µg/L shall not exceed: exp.(1.005[pH]-4.830)

The FAV in µg/L shall not exceed: exp.(1.005[pH]-4.1373)

Where: exp. is the natural antilogarithm (base e) of the expression in parenthesis.

For pH values less than 6.0, 6.0 shall be used to calculate the standard and for pH values greater than 9.0, 9.0 shall be used to calculate the standard.

Example of pentachlorophenol standards for five pH values:

pH su	6.5	7.0	7.5	8.0	8.5
Pentachlorophenol					
CS µg/L	1.9	1.9	1.9	1.9	1.9
MS µg/L	5.5	9.1	15	25	41
FAV µg/L	11	18	30	50	82

Substance, Characteristic, or Pollutant (Class 2Bd)	**Units**	**CS**	**Basis for CS**	**MS**	**FAV**	**Basis for**

				MS, FAV		
pH, minimum	su	6.5	NA	--	--	NA
pH, maximum	su	9.0	NA	--	--	NA
Phenanthrene	µg/L	3.6	Tox	32	64	Tox
Phenol	µg/L	123	Tox	2,214	4,428	Tox
Polychlorinated biphenyls, total (c)	ng/L	0.029	HH	1,000*	2,000*	Tox
Radioactive materials	NA	See below	NA	See below	See below	NA

Not to exceed the lowest concentrations permitted to be discharged to an uncontrolled environment as permitted by the appropriate authority having control over their use.

Selenium, total	µg/L	5.0	Tox	20	40	Tox
Silver, total	µg/L	1.0	Tox	equation	equation	Tox

The MS and FAV vary with total hardness and are calculated using the following equations:

The MS in µg/L shall not exceed: exp.(1.720[ln(total hardness mg/L)]-7.2156)

The FAV in µg/L shall not exceed: exp.(1.720[ln(total hardness mg/L)]-6.520)

Where: exp. is the natural antilogarithm (base e) of the expression in parenthesis.

For hardness values greater than 400 mg/L, 400 mg/L shall be used to calculate the standard.

Example of total silver standards for five total hardness values:

TH in mg/L	50	100	200	300	400
Silver, total					
CS µg/L	1.0	1.0	1.0	1.0	1.0
MS µg/L	1.0	2.0	6.7	13	22
FAV µg/L	1.2	4.1	13	27	44

Substance, Characteristic, or Pollutant (Class 2Bd)	Units	CS	Basis for CS	MS	FAV	Basis for MS, FAV
Temperature	°F	See below	NA	--	--	NA
5°F above natural in streams and 3°F above natural in lakes, based on monthly average of the maximum daily temperatures, except in no case shall it exceed the daily average temperature of 86°F.						
1,1,2,2-Tetrachloroethane (c)	µg/L	1.5	HH	1,127*	2,253*	Tox
Tetrachloroethylene (c)	µg/L	3.8	HH	428*	857*	Tox
Thallium, total	µg/L	0.28	HH	64	128	Tox
Toluene	µg/L	253	Tox	1,352	2,703	Tox
Toxaphene (c)	ng/L	1.3	HH	730*	1,500*	Tox
1,1,1-Trichloroethane	µg/L	329	Tox	2,957	5,913	Tox
1,1,2-Trichloroethylene (c)	µg/L	25	HH	6,988*	13,976*	Tox
2,4,6-Trichlorophenol	µg/L	2.0	HH	102	203	Tox
Total suspended solids (TSS)						
North River Nutrient Region	mg/L	15	NA	-	-	NA
Central River Nutrient Region	mg/L	30	NA	-	-	NA
South River Nutrient Region	mg/L	65	NA	-	-	NA
Red River mainstem - headwaters to border	mg/L	100	NA	-	-	NA
TSS standards for the class 2Bd North, Central, and South River Nutrient Regions and the Red River mainstem may be exceeded for no more than ten percent of the time. This standard applies April 1 through September 30						

Total suspended solids (TSS), summer average						
Lower Mississippi River mainstem - Pools 2 through 4	mg/L	32	NA	-	-	NA
Lower Mississippi River mainstem below Lake Pepin	mg/L	30	NA	-	-	NA
TSS standards for the class 2Bd Lower Mississippi River may be exceeded for no more than 50 percent of the time. This standard applies June 1 through September 30						

Substance, Characteristic, or Pollutant (Class 2Bd)	**Units**	**CS**	**Basis for CS**	**MS**	**FAV**	**Basis for MS, FAV**
Vinyl chloride (c)	µg/L	0.18	HH	--*	--*	NA
Xylene, total m,p,o	µg/L	166	Tox	1,407	2,814	Tox
Zinc, total	µg/L	equation	Tox	equation	equation	Tox

The CS, MS, and FAV vary with total hardness and are calculated using the following equations:

The CS in µg/L shall not exceed: exp.(0.8473[ln(total hardness mg/L)]+0.7615)

The MS in µg/L shall not exceed: exp.(0.8473[ln(total hardness mg/L)]+0.8604)

The FAV in µg/L shall not exceed: exp.(0.8473[ln(total hardness mg/L)]+1.5536)

Where: exp. is the natural antilogarithm (base e) of the expression in parenthesis.

For hardness values greater than 400 mg/L, 400 mg/L shall be used to calculate the standard.

Example of total zinc standards for five total hardness values:

TH in mg/L	50	100	200	300	400
Zinc, total					

CS µg/L	59	106	191	269	343
MS µg/L	65	117	211	297	379
FAV µg/L	130	234	421	594	758

Subp. 3a. **Narrative eutrophication standards for class 2Bd lakes, shallow lakes, and reservoirs.**

A. Eutrophication standards applicable to lakes, shallow lakes, and reservoirs that lie on the border between two ecoregions or that are in the Red River Valley (also referred to as Lake Agassiz Plains), Northern Minnesota Wetlands, or Driftless Area Ecoregion must be applied on a case-by-case basis. The commissioner shall use the standards applicable to adjacent ecoregions as a guide.

B. Eutrophication standards are compared to summer-average data. Exceedance of the total phosphorus and either the chlorophyll-a or Secchi disk transparency standard is required to indicate a polluted condition.

C. It is the policy of the agency to protect all lakes, shallow lakes, and reservoirs from the undesirable effects of cultural eutrophication. Lakes, shallow lakes, and reservoirs with a baseline quality better than the numeric eutrophication standards in subpart 3 must be maintained in that condition through the strict application of all relevant federal, state, and local requirements governing antidegradation, the discharge of nutrients from point and nonpoint sources, and the protection of lake, shallow lake, and reservoir resources, including, but not limited to:

(1) the antidegradation requirements in parts 7050.0250 to 7050.0335;

(2) the phosphorus effluent limits for point sources, where applicable in chapter 7053;

(3) the requirements for feedlots in chapter 7020;

(4) the requirements for individual sewage treatment systems in chapter 7080;

(5) the requirements for control of storm water in chapter 7090;

(6) county shoreland ordinances; and

(7) implementation of mandatory and voluntary best management practices to minimize point and nonpoint sources of nutrients.

D. Lakes, shallow lakes, and reservoirs with a baseline quality that is poorer than the numeric eutrophication standards in subpart 3 must be considered to be in compliance with the standards if the baseline quality is the result of natural causes. The commissioner shall determine baseline quality and compliance with these standards using data and the procedures in part 7050.0150, subpart 5.

E. When applied to reservoirs, the eutrophication standards in this subpart and subpart 3 may be modified on a site-specific basis to account for characteristics of reservoirs that can affect trophic status, such as water temperature, variations in hydraulic residence time, watershed size,

and the fact that reservoirs may receive drainage from more than one ecoregion. Information supporting a site-specific standard can be provided by the commissioner or by any person outside the agency. The commissioner shall evaluate all data in support of a modified standard and determine whether a change in the standard for a specific reservoir is justified. Any total phosphorus effluent limit determined to be necessary based on a modified standard shall only be required after the discharger has been given notice of the specific proposed effluent limits and an opportunity to request a hearing as provided in part 7000.1800.

Subp. 3b. **Narrative eutrophication standards for rivers, streams, and navigational pools.**

A. Eutrophication standards for rivers, streams, and navigational pools are compared to summer-average data or as specified in subpart 3. Exceedance of the total phosphorus levels and chlorophyll-a (seston), five-day biochemical oxygen demand (BOD_5), diel dissolved oxygen flux, or pH levels is required to indicate a polluted condition.

B. Rivers, streams, and navigational pools that exceed the phosphorus levels but do not exceed the chlorophyll-a (seston), five-day biochemical oxygen demand (BOD_5), diel dissolved oxygen flux, or pH levels meet the eutrophication standard.

C. A polluted condition also exists when the chlorophyll-a (periphyton) concentration exceeds 150 mg/m^2 more than one year in ten.

D. It is the policy of the agency to protect all rivers, streams, and navigational pools from the undesirable effects of cultural eutrophication. Rivers, streams, and navigational pools with a baseline quality better than the numeric eutrophication standards in subpart 3 must be maintained in that condition through the strict application of all relevant federal, state, and local requirements governing antidegradation, the discharge of nutrients from point and nonpoint sources including:

(1) the antidegradation requirements in parts 7050.0250 to 7050.0335;

(2) the phosphorus effluent limits for point sources, where applicable, in chapter 7053;

(3) the requirements for feedlots in chapter 7020;

(4) the requirements for individual sewage treatment systems in chapter 7080;

(5) the requirements for control of storm water in chapter 7090;

(6) county shoreland ordinances; and

(7) implementation of mandatory and voluntary best management practices to minimize point and nonpoint sources of nutrients.

E. Rivers, streams, and navigational pools with a baseline quality that does not meet the numeric eutrophication standards in part 7050.0150, subpart 5b, are in compliance with the standards if the baseline quality is the result of natural causes. The commissioner must determine baseline quality and compliance with these standards using data and the procedures in part 7050.0150, subpart 5.

Subp. 3c. **Beneficial use definitions for lotic warm or cool water aquatic life and habitats (class 2Bd).**

A. Subitems (1) to (5) apply to the beneficial uses in items B to D:

(1) The designation and attainment of beneficial uses are based on the biological criteria in subpart 3d.

(2) The attributes of species composition, diversity, and functional organization are measured using:

(a) the fish IBI as defined in Fish Data Collection Protocols for Lotic Waters in Minnesota (2017); or

(b) the macroinvertebrate IBI as defined in Macroinvertebrate Data Collection Protocols for Lotic Waters in Minnesota (2017).

(3) Water body types for streams and rivers are defined in the documents referenced in subitem (2).

(4) The following documents are incorporated by reference and are not subject to frequent change:

(a) Calibration of the Biological Condition Gradient for Streams of Minnesota, Gerritsen et al. (2012). The document is available on the agency's website at www.pca.state.mn.us/regulations/minnesota-rulemaking;

(b) Fish Data Collection Protocols for Lotic Waters in Minnesota, Minnesota Pollution Control Agency (2017). The document is available on the agency's website at www.pca.state.mn.us/regulations/minnesota-rulemaking;

(c) Macroinvertebrate Data Collection Protocols for Lotic Waters in Minnesota, Minnesota Pollution Control Agency (2017). The document is available on the agency's website at www.pca.state.mn.us/regulations/minnesota-rulemaking; and

(d) Development of Biological Criteria for Tiered Aquatic Life Uses, Minnesota Pollution Control Agency (2016). The document is available on the agency's website at www.pca.state.mn.us/regulations/minnesota-rulemaking.

(5) The beneficial use subclass designators "e," "g," and "m" are added to the class 2Bd designator as specific additional designators. The additional subclass designators do not replace the class 2Bd designator. All requirements for class 2Bd warm or cool water stream and river habitats in parts 7050.0222 and 7052.0100 continue to apply in addition to requirements for class 2Bde, class 2Bdg, or class 2Bdm warm or cool water stream and river habitats in part 7050.0222. These subclass designators are applied to lotic waters only.

B. "Exceptional cool and warm water aquatic life and habitat, also protected as a source for drinking water" or "class 2Bde" is a beneficial use that means waters capable of supporting and maintaining an exceptional and balanced, integrated, adaptive community of warm or cool water

aquatic organisms having a species composition, diversity, and functional organization comparable to the 75th percentile of biological condition gradient level 3 as established in Calibration of the Biological Condition Gradient for Streams of Minnesota, Gerritsen et al. (2012).

C. "General cool and warm water aquatic life and habitat, also protected as a source for drinking water" or "class 2Bdg" is a beneficial use that means waters capable of supporting and maintaining a balanced, integrated, adaptive community of warm or cool water aquatic organisms having a species composition, diversity, and functional organization comparable to the median of biological condition gradient level 4 as established in Calibration of the Biological Condition Gradient for Streams of Minnesota, Gerritsen et al. (2012).

D. "Modified cool and warm water aquatic life and habitat, also protected as a source for drinking water" or "class 2Bdm" is a beneficial use that means waters capable of supporting and maintaining a balanced, integrated, adaptive community of warm or cool water aquatic organisms having a species composition, diversity, and functional organization comparable to the median of biological condition gradient level 5 as established in Calibration of the Biological Condition Gradient for Streams of Minnesota, Gerritsen et al. (2012).

(1) To meet the definition in this item, waters must have been the subject of a use attainability analysis where it is determined that attainment of the class 2Bdg beneficial use is not feasible because of human-induced modifications of the physical habitat. These modifications must be the result of direct alteration to the channel, such as drainageway maintenance, bank stabilization, and impoundments.

(2) Examples of class 2Bdm waters are the stream channel modification activities regulated under:

(a) sections 401 and 404 of the Clean Water Act; or

(b) Minnesota Statutes, chapter 103E.

Subp. 3d. **Biological criteria for lotic warm or cool water aquatic life and habitats (class 2Bd).**

Water Body Type	Tier	Class	Assemblage	Biocriterion
Southern rivers	Exceptional	2Bde	Fish	71
	General	2Bdg	Fish	49
Southern streams	Exceptional	2Bde	Fish	66
	General	2Bdg	Fish	50
	Modified	2Bdm	Fish	35
Southern headwaters	Exceptional	2Bde	Fish	74

	General	2Bdg	Fish	55
	Modified	2Bdm	Fish	33
Northern rivers	Exceptional	2Bde	Fish	67
	General	2Bdg	Fish	38
Northern streams	Exceptional	2Bde	Fish	61
	General	2Bdg	Fish	47
	Modified	2Bdm	Fish	35
Northern headwaters	Exceptional	2Bde	Fish	68
	General	2Bdg	Fish	42
	Modified	2Bdm	Fish	23
Low gradient	Exceptional	2Bde	Fish	70
	General	2Bdg	Fish	42
	Modified	2Bdm	Fish	15
Northern forest rivers	Exceptional	2Bde	Macroinvertebrates	77
	General	2Bdg	Macroinvertebrates	49
Prairie and southern forest rivers	Exceptional	2Bde	Macroinvertebrates	63
	General	2Bdg	Macroinvertebrates	31
High-gradient northern forest streams	Exceptional	2Bde	Macroinvertebrates	82
	General	2Bdg	Macroinvertebrates	53
Low-gradient northern forest streams	Exceptional	2Bde	Macroinvertebrates	76
	General	2Bdg	Macroinvertebrates	51
	Modified	2Bdm	Macroinvertebrates	37
High-gradient southern streams	Exceptional	2Bde	Macroinvertebrates	62
	General	2Bdg	Macroinvertebrates	37
	Modified	2Bdm	Macroinvertebrates	24

Low-gradient southern forest streams	Exceptional	2Bde	Macroinvertebrates	66
	General	2Bdg	Macroinvertebrates	43
	Modified	2Bdm	Macroinvertebrates	30
Low-gradient prairie streams	Exceptional	2Bde	Macroinvertebrates	69
	General	2Bdg	Macroinvertebrates	41
	Modified	2Bdm	Macroinvertebrates	22

The biological criteria for lotic warm or cool water aquatic life and habitats (class 2Bd) are applicable to perennial and intermittent waters that allow for colonization of fish or macroinvertebrates.

Subp. 4. **Class 2B waters.** The quality of class 2B surface waters shall be such as to permit the propagation and maintenance of a healthy community of cool or warm water aquatic biota, and their habitats according to the definitions in subpart 4c. These waters shall be suitable for aquatic recreation of all kinds, including bathing, for which the waters may be usable. This class of surface water is not protected as a source of drinking water. The applicable standards are given below. Abbreviations, acronyms, and symbols are explained in subpart 1.

Substance, Characteristic, or Pollutant (Class 2B)	**Units**	**CS**	**Basis for CS**	**MS**	**FAV**	**Basis for MS, FAV**
Acenaphthene	µg/l	20	HH	56	112	Tox
Acetochlor	µg/L	3.6	Tox	86	173	Tox
Acrylonitrile (c)	µg/l	0.89	HH	1,140*	2,281*	Tox
Alachlor (c)	µg/L	59	Tox	800	1,600	Tox
Aluminum, total	µg/L	125	Tox	1,072	2,145	Tox
Ammonia un-ionized as N	µg/L	40	Tox	--	--	NA

The percent un-ionized ammonia can be calculated for any temperature and pH by using the following equation taken from Emerson, K., R.C. Russo, R.E. Lund, and R.V. Thurston, Aqueous ammonia equilibrium calculations; effect of pH and temperature. Journal of the Fisheries Research Board of Canada 32: 2379-2383 (1975):

$$f = 1/(10^{(pka-pH)} + 1) \times 100$$

where: f = the percent of total ammonia in the un-ionized state

$pk_a = 0.09 + (2730/T)$ (dissociation constant for ammonia)

T = temperature in degrees Kelvin (273.16° Kelvin = 0° Celsius)

Substance, Characteristic, or Pollutant (Class 2B)	Units	CS	Basis for CS	MS	FAV	Basis for MS, FAV
Anthracene	µg/L	0.035	Tox	0.32	0.63	Tox
Antimony, total	µg/L	31	Tox	90	180	Tox
Arsenic, total	µg/L	53	HH	360	720	Tox
Atrazine (c)	µg/L	10	Tox	323	645	Tox
Benzene (c)	µg/L	98	HH	4,487	8,974	Tox
Bromoform	µg/L	466	HH	2,900	5,800	Tox
Cadmium, total	µg/L	equation	Tox	equation	equation	Tox

The CS, MS, and FAV vary with total hardness and are calculated using the following equations:

The CS in µg/L shall not exceed: exp.(0.7852[ln(total hardness mg/L)]-3.490)

The MS in µg/L shall not exceed: exp.(1.128[ln(total hardness mg/L)]-1.685)

The FAV in µg/L shall not exceed: exp.(1.128[ln(total hardness mg/L)]-0.9919)

Where: exp. is the natural antilogarithm (base e) of the expression in parenthesis.

For hardness values greater than 400 mg/L, 400 mg/L shall be used to calculate the standard.

Example of total cadmium standards for five hardness values:

TH in mg/L	50	100	200	300	400
Cadmium, total					
CS µg/L	0.66	1.1	2.0	2.7	3.4
MS µg/L	15	33	73	116	160
FAV µg/L	31	67	146	231	319

Substance, Characteristic, or Pollutant (Class 2B)	Units	CS	Basis for CS	MS	FAV	Basis for MS, FAV
Carbon tetrachloride (c)	µg/L	5.9	HH	1,750*	3,500*	Tox
Chlordane (c)	ng/L	0.29	HH	1,200*	2,400*	Tox
Chloride	mg/L	230	Tox	860	1,720	Tox
Chlorine, total residual	µg/L	11	Tox	19	38	Tox

Chlorine standard applies to conditions of continuous exposure, where continuous exposure refers to chlorinated effluents that are discharged for more than a total of two hours in any 24-hour period.

Chlorobenzene (Monochlorobenzene)	µg/L	20	HH	423	846	Tox
Chloroform (c)	µg/L	155	Tox	1,392	2,784	Tox
Chlorpyrifos	µg/L	0.041	Tox	0.083	0.17	Tox
Chromium +3, total	µg/L	equation	Tox	equation	equation	Tox

The CS, MS, and FAV vary with total hardness and are calculated using the following equations

The CS in µg/L shall not exceed: exp.(0.819[ln(total hardness mg/L)]+1.561)

The MS in µg/L shall not exceed: exp.(0.819[ln(total hardness mg/L)]+3.688)

The FAV in µg/L shall not exceed: exp.(0.819[ln(total hardness mg/L)]+4.380)

Where: exp. is the natural antilogarithm (base e) of the expression in parenthesis.

For hardness values greater than 400 mg/L, 400 mg/L shall be used to calculate the standard.

Example of total chromium +3 standards for five total hardness values:

TH in mg/L	50	100	200	300	400
Chromium +3, total					
CS µg/L	117	207	365	509	644

MS µg/L	984	1,737	3,064	4,270	5,405
FAV µg/L	1,966	3,469	6,120	8,530	10,797

Substance, Characteristic, or Pollutant (Class 2B)	Units	CS	Basis for CS	MS	FAV	Basis for MS, FAV
Chromium +6, total	µg/L	11	Tox	16	32	Tox
Cobalt, total	µg/L	5.0	Tox	436	872	Tox
Copper, total	µg/L	equation	Tox	equation	equation	Tox

The CS, MS, and FAV vary with total hardness and are calculated using the following equations:

The CS in µg/L shall not exceed: exp.(0.6200[ln(total hardness mg/L)]-0.570)

The MS in µg/L shall not exceed: exp.(0.9422[ln(total hardness mg/L)]-1.464)

The FAV in µg/L shall not exceed: exp.(0.9422[ln(total hardness mg/L)]-0.7703)

Where: exp. is the natural antilogarithm (base e) of the expression in parenthesis.

For hardness values greater than 400 mg/L, 400 mg/L shall be used to calculate the standard.

Example of total copper standards for five total hardness values:

TH in mg/L	50	100	200	300	400
Copper, total					
CS µg/L	6.4	9.8	15	19	23
MS µg/L	9.2	18	34	50	65
FAV µg/L	18	35	68	100	131

Substance, Characteristic, or Pollutant (Class 2B)	Units	CS	Basis for CS	MS	FAV	Basis for MS, FAV

Cyanide, free	µg/L	5.2	Tox	22	45	Tox
DDT (c)	ng/L	1.7	HH	550*	1,100*	Tox
1,2-Dichloroethane (c)	µg/L	190	HH	45,050*	90,100*	Tox
Dieldrin (c)	ng/L	0.026	HH	1,300*	2,500*	Tox
Di-2-ethylhexyl phthalate (c)	µg/L	2.1	HH	--*	--*	NA
Di-n-octyl phthalate	µg/L	30	Tox	825	1,650	Tox
Endosulfan	µg/L	0.031	HH	0.28	0.56	Tox
Endrin	µg/L	0.016	HH	0.090	0.18	Tox
Escherichia (E.) coli	See below	See below	HH	See below	See below	NA

Not to exceed 126 organisms per 100 milliliters as a geometric mean of not less than five samples representative of conditions within any calendar month, nor shall more than ten percent of all samples taken during any calendar month individually exceed 1,260 organisms per 100 milliliters. The standard applies only between April 1 and October 31.

Ethylbenzene	µg/L	68	Tox	1,859	3,717	Tox

Substance, Characteristic, or Pollutant (Class 2B)	**Units**	**CS**	**Basis for CS**	**MS**	**FAV**	**Basis for MS, FAV**

Eutrophication standards for class 2B lakes, shallow lakes, and reservoirs.

Lakes, Shallow Lakes, and Reservoirs in Northern Lakes and Forest Ecoregions

Phosphorus, total	µg/L	30	NA	--	--	NA
Chlorophyll-a	µg/L	9	NA	--	--	NA
Secchi disk transparency	meters	Not less than 2.0	NA	--	--	NA

Lakes and Reservoirs in North Central Hardwood Forest Ecoregion

Phosphorus, total	µg/L	40	NA	--	--	NA
Chlorophyll-a	µg/L	14	NA	--	--	NA
Secchi disk transparency	meters	Not less than 1.4	NA	--	--	NA

Lakes and Reservoirs in Western Corn Belt Plains and Northern Glaciated Plains Ecoregions

Phosphorus, total	µg/L	65	NA	--	--	NA
Chlorophyll-a	µg/L	22	NA	--	--	NA
Secchi disk transparency	meters	Not less than 0.9	NA	--	--	NA

Shallow Lakes in North Central Hardwood Forest Ecoregion

Phosphorus, total	µg/L	60	NA	--	--	NA
Chlorophyll-a	µg/L	20	NA	--	--	NA
Secchi disk transparency	meters	Not less than 1.0	NA	--	--	NA

Shallow Lakes in Western Corn Belt Plains and Northern Glaciated Plains Ecoregions

Phosphorus, total	µg/L	90	NA	--	--	NA
Chlorophyll-a	µg/L	30	NA	--	--	NA
Secchi disk transparency	meters	Not less than 0.7	NA	--	--	NA

Additional narrative eutrophication standards for class 2B lakes, shallow lakes, and reservoirs are found in subpart 4a.

Substance, Characteristic, or Pollutant (Class 2B)	**Units**	**CS**	**Basis for CS**	**MS**	**FAV**	**Basis for MS, FAV**

Eutrophication standards for class 2B rivers and streams.

North River Nutrient Region

Phosphorus, total	µg/L	less than or equal to 50
Chlorophyll-a (seston)	µg/L	less than or equal to 7
Diel dissolved oxygen flux	mg/L	less than or equal to 3.0
Biochemical oxygen demand (BOD_5)	mg/L	less than or equal to 1.5

Central River Nutrient Region

Phosphorus, total	µg/L	less than or equal to 100
Chlorophyll-a (seston)	µg/L	less than or equal to 18
Diel dissolved oxygen flux	mg/L	less than or equal to 3.5
Biochemical oxygen demand (BOD_5)	mg/L	less than or equal to 2.0

South River Nutrient Region

Phosphorus, total	µg/L	less than or equal to 150
Chlorophyll-a (seston)	µg/L	less than or equal to 40
Diel dissolved oxygen flux	mg/L	less than or equal to 5.0
Biochemical oxygen demand (BOD_5)	mg/L	less than or equal to 3.5

Site-specific standards for specified river reaches or other waters are:

Mississippi River Navigational Pool 1 (river miles 854.1 to 847.7 reach from Fridley to Ford Dam in St. Paul)

Phosphorus, total	µg/L	less than or equal to 100
Chlorophyll-a (seston)	µg/L	less than or equal to 35

Mississippi River Navigational Pool 2 (river miles 847.7 to 815.2 reach from Ford Dam to Hastings Dam)

Phosphorus, total	µg/L	less than or equal to 125
Chlorophyll-a (seston)	µg/L	less than or equal to 35

Mississippi River Navigational Pool 3 (river miles 815.2 to 796.9 reach from Hastings Dam to Red Wing Dam)

Phosphorus, total	µg/L	less than or equal to 100
Chlorophyll-a (seston)	µg/L	less than or equal to 35

Mississippi River Navigational Pool 4 (river miles 796.9 to 752.8 reach from Red Wing Dam to Alma Dam). Lake Pepin occupies majority of Pool 4 and Lake Pepin site-specific standards are used for this pool.

Mississippi River Navigational Pools 5 to 8 (river miles 752.8 to 679.1 Alma Dam to Genoa Dam)

Phosphorus, total	µg/L	less than or equal to 100
Chlorophyll-a (seston)	µg/L	less than or equal to 35

Lake Pepin

Phosphorus, total	µg/L	less than or equal to 100
Chlorophyll-a (seston)	µg/L	less than or equal to 28

Crow Wing River from confluence of Long Prairie River to the mouth of the Crow Wing River at the Mississippi River

Phosphorus, total	µg/L	less than or equal to 75
Chlorophyll-a (seston)	µg/L	less than or equal to 13
Diel dissolved oxygen flux	mg/L	less than or equal to 3.5
Biochemical oxygen demand (BOD_5)	mg/L	less than or equal to 1.7

Crow River from the confluence of the North Fork of the Crow River and South Fork of the Crow River to the mouth of the Crow River at the Mississippi River

Phosphorus, total	µg/L	less than or equal to 125
Chlorophyll-a (seston)	µg/L	less than or equal to 27
Diel dissolved oxygen flux	mg/L	less than or equal to 4.0
Biochemical oxygen demand (BOD_5)	mg/L	less than or equal to 2.5

Additional narrative eutrophication standards for class 2B rivers and streams are found in subpart 4b.

Substance, Characteristic, or Pollutant (Class 2B)	Units	CS	Basis for CS	MS	FAV	Basis for MS, FAV
Fluoranthene	µg/L	1.9	Tox	3.5	6.9	Tox
Heptachlor (c)	ng/L	0.39	HH	260*	520*	Tox
Heptachlor epoxide (c)	ng/L	0.48	HH	270*	530*	Tox
Hexachlorobenzene (c)	ng/L	0.24	HH	--*	--*	Tox
Lead, total	µg/L	equation	Tox	equation	equation	Tox

The CS, MS, and FAV vary with total hardness and are calculated using the following equations:

The CS in µg/L shall not exceed: exp.(1.273[ln(total hardness mg/L)]-4.705)

The MS in µg/L shall not exceed: exp.(1.273[ln(total hardness mg/L)]-1.460)

The FAV in µg/L shall not exceed: exp.(1.273[ln(total hardness mg/L)]-0.7643)

Where: exp. is the natural antilogarithm (base e) of the expression in parenthesis.

For hardness values greater than 400 mg/L, 400 mg/L shall be used to calculate the standard.

Example of total lead standards for five total hardness values:

TH in mg/L	50	100	200	300	400
Lead, total					
CS µg/L	1.3	3.2	7.7	13	19
MS µg/L	34	82	197	331	477
FAV µg/L	68	164	396	663	956

Substance, Characteristic, or Pollutant (Class 2B)	Units	CS	Basis for CS	MS	FAV	Basis for MS, FAV

Lindane (c) (Hexachlorocyclobenzene, gamma-)	µg/L	0.036	HH	4.4*	8.8*	Tox
Mercury, total in water	ng/L	6.9	HH	2,400*	4,900*	Tox
Mercury, total in edible fish tissue	mg/kg ppm	0.2	HH	NA	NA	NA
Methylene chloride (c) (Dichloromethane)	µg/L	1,940	HH	13,875	27,749	Tox
Metolachlor	µg/L	23	Tox	271	543	Tox
Naphthalene	µg/L	81	Tox	409	818	Tox
Nickel, total	µg/L	equation	Tox	equation	equation	Tox

The CS, MS, and FAV vary with total hardness and are calculated using the following equations:

The CS in µg/L shall not exceed: exp.(0.846[ln(total hardness mg/L)]+1.1645)

The MS in µg/L shall not exceed: exp.(0.846[ln(total hardness mg/L)]+3.3612)

The FAV in µg/L shall not exceed: exp.(0.846[ln(total hardness mg/l)]+4.0543)

Where: exp. is the natural antilogarithm (base e) of the expression in parenthesis.

For hardness values greater than 400 mg/L, 400 mg/L shall be used to calculate the standard.

Example of total nickel standards for five total hardness values:

TH in mg/L	50	100	200	300	400
Nickel, total					
CS µg/L	88	158	283	399	509
MS µg/L	789	1,418	2,549	3,592	4,582
FAV µg/L	1,578	2,836	5,098	7,185	9,164

Substance, Characteristic, or Pollutant (Class 2B)	**Units**	**CS**	**Basis for CS**	**MS**	**FAV**	**Basis for MS, FAV**

Oil	µg/l	500	NA	5,000	10,000	NA
Oxygen, dissolved	mg/L	See below	NA	--	--	NA

5.0 mg/L as a daily minimum. This dissolved oxygen standard may be modified on a site-specific basis according to part 7050.0220, subpart 7, except that no site-specific standard shall be less than 5 mg/L as a daily average and 4 mg/L as a daily minimum. Compliance with this standard is required 50 percent of the days at which the flow of the receiving water is equal to the $7Q_{10}$. This standard applies to all class 2B waters except for:

(1) those portions of the Mississippi River from the outlet of the Metro Wastewater Treatment Works in Saint Paul (River Mile 835) to Lock and Dam No. 2 at Hastings (River Mile 815). For this reach of the Mississippi River, the standard is not less than 5 mg/L as a daily average from April 1 through November 30, and not less than 4 mg/L at other times; and

(2) the portion of the Minnesota River from the outlet of the Blue Lake wastewater treatment works (River Mile 21) to the mouth at Fort Snelling. For the specified reach of the Minnesota River, the standard is not less than 5 mg/L as a daily average year round.

Parathion	µg/L	0.013	Tox	0.07	0.13	Tox
Pentachlorophenol	µg/L	equation	Tox/HH	equation	equation	Tox

The CS, MS, and FAV vary with pH and are calculated using the following equations:

For waters with pH values greater than 6.95, the CS shall not exceed the human health-based standard of 5.5 µg/L.

For waters with pH values less than 6.96, the CS in µg/L shall not exceed the toxicity-based standard of exp.(1.005[pH]-5.290)

The MS in µg/L shall not exceed: exp.(1.005[pH]-4.830)

The FAV in µg/L shall not exceed: exp.(1.005[pH]-4.1373)

Where: exp. is the natural antilogarithm (base e) of the expression in parenthesis.

For pH values less than 6.0, 6.0 shall be used to calculate the standard and for pH values greater than 9.0, 9.0 shall be used to calculate the standard.

Example of pentachlorophenol standards for five pH values:

pH su	6.5	7.0	7.5	8.0	8.5
Pentachlorophenol					
CS µg/L	3.5	5.5	5.5	5.5	5.5

MS µg/L	5.5	9.1	15	25	41
FAV µg/L	11	18	30	50	82

Substance, Characteristic, or Pollutant (Class 2B)	Units	CS	Basis for CS	MS	FAV	Basis for MS, FAV
pH, minimum	su	6.5	NA	--	--	NA
pH, maximum	su	9.0	NA	--	--	NA
Phenanthrene	µg/L	3.6	Tox	32	64	Tox
Phenol	µg/L	123	Tox	2,214	4,428	Tox
Polychlorinated biphenyls, total (c)	ng/L	0.029	HH	1,000*	2,000*	Tox
Radioactive materials	NA	See below	NA	See below	See below	NA

Not to exceed the lowest concentrations permitted to be discharged to an uncontrolled environment as permitted by the appropriate authority having control over their use.

Selenium, total	µg/L	5.0	Tox	20	40	Tox
Silver, total	µg/L	1.0	Tox	equation	equation	Tox

The MS and FAV vary with total hardness and are calculated using the following equations:

The MS in µg/L shall not exceed: exp.(1.720[ln(total hardness mg/L)]-7.2156)

The FAV in µg/L shall not exceed: exp.(1.720[ln(total hardness mg/L)]-6.520

Where: exp. is the natural antilogarithm (base e) of the expression in parenthesis.

For hardness values greater than 400 mg/L, 400 mg/L shall be used to calculate the standard.

Example of total silver standards for five total hardness values:

TH in mg/L	50	100	200	300	400
Silver, total					

CS µg/L	1.0	1.0	1.0	1.0	1.0
MS µg/L	1.0	2.0	6.7	13	22
FAV µg/L	1.2	4.1	13	27	44

Substance, Characteristic, or Pollutant (Class 2B)	**Units**	**CS**	**Basis for CS**	**MS**	**FAV**	**Basis for MS, FAV**
Temperature	°F	See below	NA	--	--	NA

5°F above natural in streams and 3°F above natural in lakes, based on monthly average of the maximum daily temperatures, except in no case shall it exceed the daily average temperature of 86°F.

1,1,2,2-Tetrachloroethane (c)	µg/L	13	HH	1,127	2,253	Tox
Tetrachloroethylene (c)	µg/L	8.9	HH	428	857	Tox
Thallium, total	µg/L	0.56	HH	64	128	Tox
Toluene	µg/L	253	Tox	1,352	2,703	Tox
Toxaphene (c)	ng/L	1.3	HH	730*	1,500*	Tox
1,1,1-Trichloroethane	µg/L	329	Tox	2,957	5,913	Tox
1,1,2-Trichloroethylene (c)	µg/L	120	HH	6,988	13,976	Tox
2,4,6-Trichlorophenol	µg/L	2.0	HH	102	203	Tox
Total suspended solids (TSS)						
North River Nutrient Region	mg/L	15	NA	--	--	NA
Central River Nutrient Region	mg/L	30	NA	--	--	NA
South River Nutrient Region	mg/L	65	NA	--	--	NA
Red River mainstem - headwaters to border	mg/L	100	NA	--	--	NA
TSS standards for the class 2B North, Central, and South River						

Nutrient Regions and the Red River mainstem may be exceeded for no more than ten percent of the time. This standard applies April 1 through September 30						
Total suspended solids (TSS), summer average						
Lower Mississippi River mainstem - Pools 2 through 4	mg/L	32	NA	--	--	NA
Lower Mississippi River mainstem below Lake Pepin	mg/L	30	NA	--	--	NA
TSS standards for the class 2B Lower Mississippi River may be exceeded for no more than 50 percent of the time. This standard applies June 1 through September 30						

Substance, Characteristic, or Pollutant (Class 2B)	**Units**	**CS**	**Basis for CS**	**MS**	**FAV**	**Basis for MS, FAV**
Vinyl chloride (c)	µg/L	9.2	HH	--*	--*	NA
Xylene, total m,p,o	µg/L	166	Tox	1,407	2,814	Tox
Zinc, total	µg/L	equation	Tox	equation	equation	Tox

The CS, MS, and FAV vary with total hardness and are calculated using the following equations:

The CS in µg/L shall not exceed: exp.(0.8473[ln(total hardness mg/L)]+0.7615)

The MS in µg/L shall not exceed: exp.(0.8473[ln(total hardness mg/L)]+0.8604)

The FAV in µg/L shall not exceed: exp.(0.8473[ln(total hardness mg/L)]+1.5536)

Where: exp. is the natural antilogarithm (base e) of the expression in parenthesis.

For hardness values greater than 400 mg/L, 400 mg/L shall be used to calculate the standard.

Example of total zinc standards for five total hardness values:

TH in mg/L	50	100	200	300	400
Zinc, total					
CS µg/L	59	106	191	269	343
MS µg/L	65	117	211	297	379
FAV µg/L	130	234	421	594	758

Subp. 4a. **Narrative eutrophication standards for class 2B lakes, shallow lakes, and reservoirs.**

A. Eutrophication standards applicable to lakes, shallow lakes, and reservoirs that lie on the border between two ecoregions or that are in the Red River Valley (also referred to as Lake Agassiz Plains), Northern Minnesota Wetlands, or Driftless Area Ecoregion must be applied on a case-by-case basis. The commissioner shall use the standards applicable to adjacent ecoregions as a guide.

B. Eutrophication standards are compared to summer-average data. Exceedance of the total phosphorus and either the chlorophyll-a or Secchi disk transparency standard is required to indicate a polluted condition.

C. It is the policy of the agency to protect all lakes, shallow lakes, and reservoirs from the undesirable effects of cultural eutrophication. Lakes, shallow lakes, and reservoirs with a baseline quality better than the numeric eutrophication standards in subpart 4 must be maintained in that condition through the strict application of all relevant federal, state, and local requirements governing antidegradation, the discharge of nutrients from point and nonpoint sources, and the protection of lake, shallow lake, and reservoir resources, including, but not limited to:

(1) the antidegradation requirements in parts 7050.0250 to 7050.0335;

(2) the phosphorus effluent limits for point sources, where applicable in chapter 7053;

(3) the requirements for feedlots in chapter 7020;

(4) the requirements for individual sewage treatment systems in chapter 7080;

(5) the requirements for control of storm water in chapter 7090;

(6) county shoreland ordinances; and

(7) implementation of mandatory and voluntary best management practices to minimize point and nonpoint sources of nutrients.

D. Lakes, shallow lakes, and reservoirs with a baseline quality that is poorer than the numeric eutrophication standards in subpart 4 must be considered to be in compliance with the standards if the baseline quality is the result of natural causes. The commissioner shall determine

baseline quality and compliance with these standards using data and the procedures in part 7050.0150, subpart 5.

E. When applied to reservoirs, the eutrophication standards in this subpart and subpart 4 may be modified on a site-specific basis to account for characteristics of reservoirs that can affect trophic status, such as water temperature, variations in hydraulic residence time, watershed size, and the fact that reservoirs may receive drainage from more than one ecoregion. Information supporting a site-specific standard can be provided by the commissioner or by any person outside the agency. The commissioner shall evaluate all data in support of a modified standard and determine whether a change in the standard for a specific reservoir is justified. Any total phosphorus effluent limit determined to be necessary based on a modified standard shall only be required after the discharger has been given notice of the specific proposed effluent limits and an opportunity to request a hearing as provided in part 7000.1800.

Subp. 4b. **Narrative eutrophication standards for class 2B rivers and streams.**

A. Eutrophication standards for rivers and streams are compared to summer-average data or as specified in subpart 4. Exceedance of the total phosphorus levels and chlorophyll-a (seston), five-day biochemical oxygen demand (BOD_5), diel dissolved oxygen flux, or pH levels is required to indicate a polluted condition.

B. Rivers and streams that exceed the phosphorus levels but do not exceed the chlorophyll-a (seston), five-day biochemical oxygen demand (BOD_5), diel dissolved oxygen flux, or pH levels meet the eutrophication standard.

C. A polluted condition also exists when the chlorophyll-a (periphyton) concentration exceeds 150 mg/m^2 more than one year in ten

D. It is the policy of the agency to protect all rivers, streams, and navigational pools from the undesirable effects of cultural eutrophication. Rivers, streams, and navigational pools with a baseline quality better than the numeric eutrophication standards in subpart 4 must be maintained in that condition through the strict application of all relevant federal, state, and local requirements governing antidegradation, the discharge of nutrients from point and nonpoint sources, including:

(1) the antidegradation requirements in parts 7050.0250 to 7050.0335;

(2) the phosphorus effluent limits for point sources, where applicable in chapter 7053;

(3) the requirements for feedlots in chapter 7020;

(4) the requirements for individual sewage treatment systems in chapter 7080;

(5) the requirements for control of storm water in chapter 7090;

(6) county shoreland ordinances; and

(7) implementation of mandatory and voluntary best management practices to minimize point and nonpoint sources of nutrients.

E. Rivers, streams, and navigational pools with a baseline quality that does not meet the numeric eutrophication standards in subpart 4 are in compliance with the standards if the baseline quality is the result of natural causes. The commissioner must determine baseline quality and compliance with these standards using data and the procedures in part 7050.0150, subpart 5.

Subp. 4c. **Beneficial use definitions for lotic warm or cool water aquatic life and habitats (class 2B).**

A. Subitems (1) to (5) apply to the beneficial uses in items B to D:

(1) The designation and attainment of beneficial uses are based on the criteria in subpart 4d.

(2) The attributes of species composition, diversity, and functional organization are measured using:

(a) the fish IBI as defined in Fish Data Collection Protocols for Lotic Waters in Minnesota (2017); or

(b) the macroinvertebrate IBI as defined in Macroinvertebrate Data Collection Protocols for Lotic Waters in Minnesota (2017).

(3) Water body types for streams and rivers are defined in the documents referenced in subitem (2).

(4) The following documents are incorporated by reference and are not subject to frequent change:

(a) Calibration of the Biological Condition Gradient for Streams of Minnesota, Gerritsen et al. (2012). The document is available on the agency's website at www.pca.state.mn.us/regulations/minnesota-rulemaking;

(b) Fish Data Collection Protocols for Lotic Waters in Minnesota, Minnesota Pollution Control Agency (2017). The document is available on the agency's website at www.pca.state.mn.us/regulations/minnesota-rulemaking;

(c) Macroinvertebrate Data Collection Protocols for Lotic Waters in Minnesota, Minnesota Pollution Control Agency (2017). The document is available on the agency's website at www.pca.state.mn.us/regulations/minnesota-rulemaking; and

(d) Development of Biological Criteria for Tiered Aquatic Life Uses, Minnesota Pollution Control Agency (2016). The document is available on the agency's website at www.pca.state.mn.us/regulations/minnesota-rulemaking.

(5) The beneficial use subclass designators "e," "g," and "m" are added to the class 2B designator as specific additional designators. The additional subclass designators do not replace the class 2B designator. All requirements for class 2B warm or cool water stream and river habitats in parts 7050.0222 and 7052.0100 continue to apply in addition to requirements for class 2Be, class

2Bg, or class 2Bm warm or cool water stream and river habitats in part 7050.0222. These subclass designators are applied to lotic waters only.

B. "Exceptional cool and warm water aquatic life and habitat" or "class 2Be" is a beneficial use that means waters capable of supporting and maintaining an exceptional and balanced, integrated, adaptive community of warm or cool water aquatic organisms having a species composition, diversity, and functional organization comparable to the 75th percentile of biological condition gradient level 3 as established in Calibration of the Biological Condition Gradient for Streams of Minnesota, Gerritsen et al. (2012).

C. "General cool and warm water aquatic life and habitat" or "class 2Bg" is a beneficial use that means waters capable of supporting and maintaining a balanced, integrated, adaptive community of warm or cool water aquatic organisms having a species composition, diversity, and functional organization comparable to the median of biological condition gradient level 4 as established in Calibration of the Biological Condition Gradient for Streams of Minnesota, Gerritsen et al. (2012).

D. "Modified cool and warm water aquatic life and habitat" or "class 2Bm" is a beneficial use that means waters capable of supporting and maintaining a balanced, integrated, adaptive community of warm or cool water aquatic organisms having a species composition, diversity, and functional organization comparable to the median of biological condition gradient level 5 as established in Calibration of the Biological Condition Gradient for Streams of Minnesota, Gerritsen et al. (2012).

(1) To meet the definition in this item, waters must have been the subject of a use attainability analysis where it is determined that attainment of the class 2Bg beneficial use is not feasible because of human-induced modifications of the physical habitat. These modifications must be the result of direct alteration to the channel, such as drainageway maintenance, bank stabilization, and impoundments.

(2) Examples of class 2Bm waters are the stream channel modification activities regulated under:

(a) sections 401 and 404 of the Clean Water Act; or

(b) Minnesota Statutes, chapter 103E.

Subp. 4d. **Biological criteria for lotic warm or cool water aquatic life and habitats (class 2B).**

Water Body Type	Tier	Class	Assemblage	Biocriterion
Southern rivers	Exceptional	2Be	Fish	71
	General	2Bg	Fish	49
Southern streams	Exceptional	2Be	Fish	66

	General	2Bg	Fish	50
	Modified	2Bm	Fish	35
Southern headwaters	Exceptional	2Be	Fish	74
	General	2Bg	Fish	55
	Modified	2Bm	Fish	33
Northern rivers	Exceptional	2Be	Fish	67
	General	2Bg	Fish	38
Northern streams	Exceptional	2Be	Fish	61
	General	2Bg	Fish	47
	Modified	2Bm	Fish	35
Northern headwaters	Exceptional	2Be	Fish	68
	General	2Bg	Fish	42
	Modified	2Bm	Fish	23
Low gradient	Exceptional	2Be	Fish	70
	General	2Bg	Fish	42
	Modified	2Bm	Fish	15
Northern forest rivers	Exceptional	2Be	Macroinvertebrates	77
	General	2Bg	Macroinvertebrates	49
Prairie and southern forest rivers	Exceptional	2Be	Macroinvertebrates	63
	General	2Bg	Macroinvertebrates	31
High-gradient northern forest streams	Exceptional	2Be	Macroinvertebrates	82
	General	2Bg	Macroinvertebrates	53
Low-gradient northern forest streams	Exceptional	2Be	Macroinvertebrates	76
	General	2Bg	Macroinvertebrates	51
	Modified	2Bm	Macroinvertebrates	37

High-gradient southern streams	Exceptional	2Be	Macroinvertebrates	62
	General	2Bg	Macroinvertebrates	37
	Modified	2Bm	Macroinvertebrates	24
Low-gradient southern forest streams	Exceptional	2Be	Macroinvertebrates	66
	General	2Bg	Macroinvertebrates	43
	Modified	2Bm	Macroinvertebrates	30
Low-gradient prairie streams	Exceptional	2Be	Macroinvertebrates	69
	General	2Bg	Macroinvertebrates	41
	Modified	2Bm	Macroinvertebrates	22

The biological criteria for lotic warm or cool water aquatic life and habitats (class 2B) are applicable to perennial and intermittent waters that allow for colonization of fish or macroinvertebrates.

Subp. 5. [Repealed, 42 SR 441]

Subp. 6. **Class 2D waters; wetlands.**

A. The quality of class 2D wetlands shall be such as to permit the propagation and maintenance of a healthy community of aquatic and terrestrial species indigenous to wetlands, and their habitats. Wetlands also add to the biological diversity of the landscape. These waters shall be suitable for boating and other forms of aquatic recreation for which the wetland may be usable. The standards for class 2B waters listed under subpart 4 shall apply to these waters except as listed below:

Substance, Characteristic, or Pollutant	Class 2D Standard
Oxygen, dissolved	If background is less than 5.0 mg/L as a daily minimum, maintain background
pH	Maintain background
Temperature	Maintain background

B. "Maintain background," as used in this subpart, means the concentration of the water quality substances, characteristics, or pollutants shall not deviate from the range of natural background concentrations or conditions such that there is a potential significant adverse impact to the designated uses.

C. Activities in wetlands which involve the normal farm practices of planting with annually seeded crops or the utilization of a crop rotation seeding of pasture grasses or legumes, including

the recommended applications of fertilizer and pesticides, are excluded from the standards in this subpart and the wetland standards in parts 7050.0224, subpart 4; 7050.0225, subpart 2; and 7050.0227. All other activities in these wetlands must meet water quality standards.

Subp. 7. **Additional standards; class 2 waters.** The following additional standards and requirements apply to all class 2 waters.

A. No sewage, industrial waste, or other wastes from point or nonpoint sources shall be discharged into any of the waters of this category so as to cause any material change in any other substances, characteristics, or pollutants which may impair the quality of the waters of the state or the aquatic biota of any of the classes in subparts 2 to 6 or in any manner render them unsuitable or objectionable for fishing, fish culture, or recreational uses. Additional selective limits or changes in the discharge bases may be imposed on the basis of local needs.

B. To prevent acutely toxic conditions, concentrations of toxic pollutants from point or nonpoint sources must not exceed the FAV as a one-day average at the point of discharge or in the surface water consistent with parts 7050.0210, subpart 5, item D; 7053.0215, subpart 1; 7053.0225, subpart 6; and 7053.0245, subpart 1.

If a discharge is composed of a mixture of more than one chemical, and the chemicals have the same mode of toxic action, the commissioner has the option to apply an additive model to determine the toxicity of the mixture using the following equation:

$$\frac{C_1}{FAV_1} + \frac{C_2}{FAV_2} + \text{.....} + \frac{C_n}{FAV_n}$$ equals a value of one or more, an acutely toxic condition if indicated

where: C_1 .... C_n is the concentration of the first to the n^{th} toxicant.

FAV_1 .... FAV_n is the FAV for the first to the n^{th} toxicant.

C. To prevent chronically toxic conditions, concentrations of toxic pollutants must not exceed the applicable CS or CC and MS or MC in surface waters outside allowable mixing zones as described in part 7050.0210, subpart 5. The CS or CC and MS or MC will be averaged over the following durations: the MS or MC will be a one-day average; the CS or CC, based on toxicity to aquatic life, will be a four-day average; and the CS or CC, based on human health and applied in water or wildlife toxicity, will be a 30-day average.

D. Concentrations of noncarcinogenic or nonlinear carcinogenic (NLC) chemicals in water or fish tissue from point or nonpoint sources, singly or in mixtures, must be below levels expected to produce known adverse effects. This is accomplished through the application of an additive noncancer health risk index using common health risk index endpoints or health endpoints. Mixtures of chemicals with listed CS or site-specific CC are evaluated using the following approach:

Chemicals must be grouped according to medium (water or fish) and each health endpoint. Chemicals for which no health endpoint is specified are not grouped. Chemicals that are also linear

carcinogens must be grouped as described under item E. Using the following equation, a noncancer health risk index must be determined for each group of two or more chemicals that have a common health endpoint listed in this part. To meet the protection objectives in part 7050.0217, the noncancer health risk index must not exceed a value of one.

$$\text{Noncancer health risk index by common health endpoint} = \frac{C_1}{CS_1 \text{ or } CC_1} + \frac{C_2}{CS_2 \text{ or } CC_2} + \ldots + \frac{C_n}{CS_n \text{ or } CC_n} \leq 1$$

where: C_n is the concentration of the first to the n^{th} chemical by common health endpoint and medium

$CS_1 \ldots CS_n$ is the drinking water plus fish consumption and recreation chronic standard (CS_{dfr} or CS_{dev}), fish consumption and recreation chronic standard (CS_{fr}), or fish tissue chronic standard (CS_{ft}) for the first to n^{th} chemical by common health endpoint

$CC_1 \ldots CC_n$ is the drinking water plus fish consumption and recreation chronic criterion (CC_{dfr} or CC_{dev}), fish consumption and recreation chronic criterion (CC_{fr}), or fish tissue chronic criterion (CC_{ft}) for the first to n^{th} chemical by common health endpoint

E. Concentrations of carcinogenic chemicals from point or nonpoint sources, singly or in mixtures, must not exceed an incremental or additional excess risk level of one in 100,000 (10^{-5}) in surface waters or fish tissue. Carcinogenic chemicals will be considered additive in their effect according to the following equation unless an alternative model is supported by available scientific evidence. The additive equation applies to chemicals that have a human health-based chronic standard (CS) or site-specific chronic criterion (CC) calculated with a cancer potency slope factor. To meet the protection objectives in part 7050.0217, the cancer health risk index must not exceed a value of one.

$$\text{Cancer health risk index} = \frac{C_1}{CS_1 \text{ or } CC_1} + \frac{C_2}{CS_2 \text{ or } CC_2} + \ldots + \frac{C_n}{CS_n \text{ or } CC_n} \leq 1$$

where: $C_1 \ldots C_n$ is the concentration of the first to the n^{th} carcinogen in water or fish tissue

$CS_1 \ldots CS_n$ is the drinking water plus fish consumption and recreation chronic standard (CS_{dfr}), fish consumption and recreation chronic standard (CS_{fr}), or fish tissue chronic standard (CS_{ft}) for the first to n^{th} carcinogenic chemical

$CC_1 \ldots CC_n$ is the drinking water plus fish consumption and recreation chronic criterion (CC_{dfr}) fish consumption and recreation chronic criterion (CC_{fr}), or fish tissue chronic criterion (CC_{ft}) for the first to n^{th} carcinogenic chemical

F. When monitoring indicates that chemical breakdown products or environmental degradates are present in surface water or fish tissue, those products must be considered when meeting the objectives for toxic pollutants in part 7050.0217. When no human health-based CS or other MDH health-based guidance is available for the chemical breakdown product, the CS or CC for the parent chemical must be applied for that product. The parent CS or CC must also be applied to evaluate mixtures of chemicals.

G. This item applies to maximum standards (MS), final acute values (FAV), and double dashes (--) in this part and part 7050.0220 marked with an asterisk (*). For carcinogenic or highly bioaccumulative chemicals with BCFs greater than 5,000 or log K_{ow} values greater than 5.19, the human health-based chronic standard (CS) may be two or more orders of magnitude smaller than the acute toxicity-based MS.

If the ratio of the MS to the CS is greater than 100, the CS times 100 must be substituted for the applicable MS, and the CS times 200 must be substituted for the applicable FAV. Any effluent limit derived using the procedures of this item must only be required after the discharger has been given notice of the specific proposed effluent limits and an opportunity to request a hearing as provided in part 7000.1800.

Subp. 8. [Repealed, 32 SR 1699]

Subp. 9. **Conversion factors for dissolved metal standards.**

Metal	Conversion Factor for CS	Conversion Factor for MS and FAV
Cadmium	0.909 1.1017-[(ln TH, mg/L) (0.0418)]	0.946 1.1367-[(ln TH, mg/L) (0.0418)]
Chromium +3	0.860	0.316
Chromium +6	0.962	0.982
Copper	0.960	0.960
Lead	0.791 1.4620-[(ln TH, mg/L) (0.1457)]	0.791 1.4620-[(ln TH, mg/L) (0.1457)]
Mercury	1.0	0.850
Nickel	0.997	0.998
Silver	0.850	0.850
Zinc	0.986	0.978

Conversion factors for cadmium and lead are hardness (TH) dependent. The factors shown in the table above are for a total hardness of 100 mg/L only. Conversion factors for cadmium and lead for other hardness values shall be calculated using the equations included in the table. The dissolved standard is the total standard times the conversion factor.

Statutory Authority: *MS s 14.06; 115.03; 115.44; 116.07*

History: *18 SR 2195; 19 SR 1310; 24 SR 1105; 27 SR 1217; 32 SR 1699; 39 SR 154; 39 SR 1344; 18 SR 2195; 19 SR 1310; 24 SR 1105; 27 SR 1217; 32 SR 1699; 39 SR 154; 39 SR 1344; 41 SR 545; 18 SR 2195; 19 SR 1310; 24 SR 1105; 27 SR 1217; 32 SR 1699; 39 SR 154; 39 SR 1344; 41 SR 545; 42 SR 441*

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7050.0223 SPECIFIC WATER QUALITY STANDARDS FOR CLASS 3 WATERS OF THE STATE; INDUSTRIAL CONSUMPTION.

Subpart 1. **General.** The numeric and narrative water quality standards in this part prescribe the qualities or properties of the waters of the state that are necessary for the industrial consumption designated public uses and benefits. If the standards in this part are exceeded in waters of the state that have the class 3 designation, it is considered indicative of a polluted condition which is actually or potentially deleterious, harmful, detrimental, or injurious with respect to the designated uses.

Subp. 2. **Class 3A waters; industrial consumption.** The quality of class 3A waters of the state shall be such as to permit their use without chemical treatment, except softening for groundwater, for most industrial purposes, except food processing and related uses, for which a high quality of water is required. The following standards shall not be exceeded in the waters of the state:

Substance, Characteristic, or Pollutant	Class 3A Standard
Chlorides (Cl)	50 mg/L
Hardness, Ca + Mg as $CaCO_3$	50 mg/L
pH, minimum value	6.5
pH, maximum value	8.5

Subp. 3. **Class 3B waters.** The quality of class 3B waters of the state shall be such as to permit their use for general industrial purposes, except for food processing, with only a moderate degree of treatment. The following standards shall not be exceeded in the waters of the state:

Substance, Characteristic, or Pollutant	Class 3B Standard
Chlorides (Cl)	100 mg/L
Hardness, Ca + Mg as $CaCO_3$	250 mg/L
pH, minimum value	6.0
pH, maximum value	9.0

Subp. 4. **Class 3C waters.** The quality of class 3C waters of the state shall be such as to permit their use for industrial cooling and materials transport without a high degree of treatment being

necessary to avoid severe fouling, corrosion, scaling, or other unsatisfactory conditions. The following standards shall not be exceeded in the waters of the state:

Substance, Characteristic, or Pollutant	Class 3C Standard
Chlorides (Cl)	250 mg/L
Hardness, Ca + Mg as $CaCO_3$	500 mg/L
pH, minimum value	6.0
pH, maximum value	9.0

Subp. 5. **Class 3D waters; wetlands.** The quality of class 3D wetlands shall be such as to permit their use for general industrial purposes, except for food processing, with only a moderate degree of treatment. The following standards apply:

Substance, Characteristic, or Pollutant	Class 3D Standard
Chlorides (Cl)	Maintain background
Hardness, Ca + Mg as $CaCO_3$	Maintain background
pH	Maintain background

For the purposes of this subpart, "maintain background" means the concentration of the water quality substance, characteristic, or pollutant shall not deviate from the range of natural background concentrations or conditions such that there is a potential significant adverse impact to the designated uses.

Subp. 6. **Additional standards.** Additional selective limits may be imposed for any specific waters of the state as needed.

In addition to the standards in subparts 2 to 5, no sewage, industrial waste, or other wastes from point or nonpoint sources, treated or untreated, shall be discharged into or permitted by any person to gain access to any waters of the state classified for industrial purposes so as to cause any material impairment of their use as a source of industrial water supply.

Statutory Authority: *MS s 115.03; 115.44*

History: *18 SR 2195; 32 SR 1699*

Published Electronically: *December 9, 2016*

7050.0224 SPECIFIC WATER QUALITY STANDARDS FOR CLASS 4 WATERS OF THE STATE; AGRICULTURE AND WILDLIFE.

Subpart 1. **General.** The numeric and narrative water quality standards in this part prescribe the qualities or properties of the waters of the state that are necessary for the agriculture and wildlife designated public uses and benefits. Wild rice is an aquatic plant resource found in certain waters

within the state. The harvest and use of grains from this plant serve as a food source for wildlife and humans. In recognition of the ecological importance of this resource, and in conjunction with Minnesota Indian tribes, selected wild rice waters have been specifically identified [WR] and listed in part 7050.0470, subpart 1. The quality of these waters and the aquatic habitat necessary to support the propagation and maintenance of wild rice plant species must not be materially impaired or degraded. If the standards in this part are exceeded in waters of the state that have the class 4 designation, it is considered indicative of a polluted condition which is actually or potentially deleterious, harmful, detrimental, or injurious with respect to the designated uses.

Subp. 2. **Class 4A waters.** The quality of class 4A waters of the state shall be such as to permit their use for irrigation without significant damage or adverse effects upon any crops or vegetation usually grown in the waters or area, including truck garden crops. The following standards shall be used as a guide in determining the suitability of the waters for such uses, together with the recommendations contained in Handbook 60 published by the Salinity Laboratory of the United States Department of Agriculture, and any revisions, amendments, or supplements to it:

Substance, Characteristic, or Pollutant	Class 4A Standard
Bicarbonates (HCO_3)	5 milliequivalents per liter
Boron (B)	0.5 mg/L
pH, minimum value	6.0
pH, maximum value	8.5
Specific conductance	1,000 micromhos per centimeter at 25°C
Total dissolved salts	700 mg/L
Sodium (Na)	60% of total cations as milliequivalents per liter
Sulfates (SO_4)	10 mg/L, applicable to water used for production of wild rice during periods when the rice may be susceptible to damage by high sulfate levels.
Radioactive materials	Not to exceed the lowest concentrations permitted to be discharged to an uncontrolled environment as prescribed by the appropriate authority having control over their use.

Subp. 3. **Class 4B waters.** The quality of class 4B waters of the state shall be such as to permit their use by livestock and wildlife without inhibition or injurious effects. The standards for substances, characteristics, or pollutants given below shall not be exceeded in the waters of the state:

Substance, Characteristic, or Pollutant	Class 4B Standard

pH, minimum value	6.0
pH, maximum value	9.0
Total salinity	1,000 mg/L
Radioactive materials	Not to exceed the lowest concentrations permitted to be discharged to an uncontrolled environment as prescribed by the appropriate authority having control over their use.
Toxic substances	None at levels harmful either directly or indirectly

Additional selective limits may be imposed for any specific waters of the state as needed.

Subp. 4. **Class 4C waters; wetlands.** The quality of class 4C wetlands shall be such as to permit their use for irrigation and by wildlife and livestock without inhibition or injurious effects and be suitable for erosion control, groundwater recharge, low flow augmentation, storm water retention, and stream sedimentation. The standards for classes 4A and 4B waters shall apply to these waters except as listed below:

Substance, Characteristic, or Pollutant	Class 4C Standard
pH	Maintain background
Settleable solids	Shall not be allowed in concentrations sufficient to create the potential for significant adverse impacts on one or more designated uses.

For the purposes of this subpart, "maintain background" means the concentration of the water quality substance, characteristic, or pollutant shall not deviate from the range of natural background concentrations or conditions such that there is a potential significant adverse impact to the designated uses.

Statutory Authority: *MS s 115.03; 115.44*

History: *18 SR 2195; 22 SR 1466; 24 SR 1105; 32 SR 1699*

Published Electronically: *December 9, 2016*

7050.0225 SPECIFIC WATER QUALITY STANDARDS FOR CLASS 5 WATERS OF THE STATE; AESTHETIC ENJOYMENT AND NAVIGATION.

Subpart 1. **General.** The numeric and narrative water quality standards in this part prescribe the qualities or properties of the waters of the state that are necessary for the aesthetic enjoyment and navigation designated public uses and benefits. If the standards in this part are exceeded in waters of the state that have the class 5 designation, it is considered indicative of a polluted condition which is actually or potentially deleterious, harmful, detrimental, or injurious with respect to the designated uses.

Subp. 2. **Class 5 waters; aesthetic enjoyment and navigation.** The quality of class 5 waters of the state shall be such as to be suitable for aesthetic enjoyment of scenery, to avoid any interference with navigation or damaging effects on property. The following standards shall not be exceeded in the waters of the state:

Substance, Characteristic, or Pollutant	Class 5 Standard	
	For nonwetlands	For wetlands
pH, minimum	6.0	Maintain background
pH, maximum	9.0	Maintain background
Hydrogen sulfide as S	0.02 mg/L	Maintain background

For the purposes of this subpart, "maintain background" means the concentration of the water quality substance, characteristic, or pollutant shall not deviate from the range of natural background concentrations or conditions such that there is a potential significant adverse impact to the designated uses.

Additional selective limits may be imposed for any specific waters of the state as needed.

Statutory Authority: *MS s 115.03; 115.44*

History: *18 SR 2195; 32 SR 1699*

Published Electronically: *December 9, 2016*

7050.0226 SPECIFIC WATER QUALITY STANDARDS FOR CLASS 6 WATERS OF THE STATE; OTHER USES.

Subpart 1. **General.** The numeric and narrative water quality standards in this part prescribe the qualities or properties of the waters of the state that are necessary for other designated public uses and benefits. If the standards in this part are exceeded in waters of the state that have the class 6 designation, it is considered indicative of a polluted condition which is actually or potentially deleterious, harmful, detrimental, or injurious with respect to the designated uses.

Subp. 2. **Class 6 waters; other uses.** The uses to be protected in class 6 waters may be under other jurisdictions and in other areas to which the waters of the state are tributary, and may include any or all of the uses listed in parts 7050.0221 to 7050.0225, plus any other possible beneficial uses. The agency therefore reserves the right to impose any standards necessary for the protection of this class, consistent with legal limitations.

Statutory Authority: *MS s 115.03; 115.44*

History: *18 SR 2195; 32 SR 1699*

Published Electronically: *December 9, 2016*

7050.0227 SPECIFIC WATER QUALITY STANDARDS FOR CLASS 7 WATERS OF THE STATE; LIMITED RESOURCE VALUE WATERS.

Subpart 1. **General.** The numeric and narrative water quality standards in this part prescribe the qualities or properties of the waters of the state that have limited resource value designated public uses and benefits. If the standards in this part are exceeded in waters of the state that have the class 7 designation, it is considered indicative of a polluted condition which is actually or potentially deleterious, harmful, detrimental, or injurious with respect to the designated uses.

Subp. 2. **Class 7 waters; limited resource value waters.** The quality of class 7 waters of the state shall be such as to protect aesthetic qualities, secondary body contact use, and groundwater for use as a potable water supply. Standards for substances, characteristics, or pollutants given below shall not be exceeded in the waters:

Substance, Characteristic, or Pollutant	Class 7 Standard
Escherichia (E.) coli	Not to exceed 630 organisms per 100 milliliters as a geometric mean of not less than five samples representative of conditions within any calendar month, nor shall more than ten percent of all samples taken during any calendar month individually exceed 1,260 organisms per 100 milliliters. The standard applies only between May 1 and October 31.
Oxygen, dissolved	The level of dissolved oxygen must be maintained at concentrations: i. that will avoid odors or putrid conditions in the receiving water; ii. at not less than 1 mg/L (daily average); and iii. above 0 mg/L at all times.
pH, minimum value	6.0
pH, maximum value	9.0
Toxic pollutants	Toxic pollutants shall not be allowed in such quantities or concentrations that will impair the specified uses.

Statutory Authority: *MS s 115.03; 115.44*

History: *18 SR 2195; 24 SR 1105; 32 SR 1699; 42 SR 441*

Published Electronically: *November 20, 2017*

7050.0250 ANTIDEGRADATION PURPOSE.

The purpose of the antidegradation provisions in parts 7050.0250 to 7050.0335 is to achieve and maintain the highest possible quality in surface waters of the state. To accomplish this purpose:

A. existing uses and the level of water quality necessary to protect existing uses shall be maintained and protected;

B. degradation of high water quality shall be minimized and allowed only to the extent necessary to accommodate important economic or social development;

C. water quality necessary to preserve the exceptional characteristics of outstanding resource value waters shall be maintained and protected; and

D. proposed activities with the potential for water quality impairments associated with thermal discharges shall be consistent with section 316 of the Clean Water Act, United States Code, title 33, section 1326.

Statutory Authority: *MS s 115.03; 115.44*

History: *41 SR 545*
Published Electronically: *December 9, 2016*

7050.0255 DEFINITIONS.

Subpart 1. **Applicability.** For purposes of parts 7050.0250 to 7050.0335, the following terms have the meanings given in this part. Terms in parts 7050.0250 to 7050.0335 that are not specifically defined in applicable federal or state law shall be construed in conformance with the context, in relation to the applicable section of the statutes pertaining to the matter and professional usage as of November 21, 2016.

Subp. 2. **Agency.** "Agency" has the meaning given under Minnesota Statutes, section 115.01, subdivision 2, unless otherwise specified.

Subp. 3. **Applicant.** "Applicant" means a person requesting a control document.

Subp. 4. **Beneficial use.** "Beneficial use" means a designated use described under part 7050.0140 and listed under parts 7050.0400 to 7050.0470 for each surface water or segment thereof, whether or not the use is being attained.

Subp. 5. **Calcareous fen.** "Calcareous fen" means an area listed in part 7050.0335, subpart 1, item E, and described under part 8420.0935, subpart 2.

Subp. 6. **Class 2 surface water.** "Class 2 surface water" means a surface water that is protected for aquatic life and recreation beneficial uses and to which water quality standards described in part 7050.0222 apply.

Subp. 7. **Class 7 surface water.** "Class 7 surface water" means a surface water that is protected for limited resource value beneficial uses and to which water quality standards described in part 7050.0227 apply.

Subp. 8. **Clean Water Act.** "Clean Water Act" means the federal Water Pollution Control Act, United States Code, title 33, sections 1251 et seq.

Subp. 9. **Compensatory mitigation.** "Compensatory mitigation" means the restoration, establishment, or enhancement of surface waters to preserve an existing use when there is a physical alteration of a surface water after all prudent and feasible alternatives have been implemented to avoid and minimize degradation.

Subp. 10. **Control document.** "Control document" means an authorization issued by the commissioner that specifies water pollution control conditions under which a regulated activity is allowed to operate. Control document includes Clean Water Act authorizations used to administer NPDES permits and section 401 certifications. For purposes of parts 7050.0250 to 7050.0335, total maximum daily loads are not control documents.

Subp. 11. **Degradation or degrade.** "Degradation" or "degrade" means a measurable change to existing water quality made or induced by human activity resulting in diminished chemical, physical, biological, or radiological qualities of surface waters. For municipal sewage and industrial waste discharges, degradation is calculated at the edge of the mixing zone upon reasonable allowance for dilution of the discharge according to part 7053.0205, subparts 5 to 7.

Subp. 12. **Discharge.** "Discharge" means the addition of pollutants to surface waters.

Subp. 13. **Effective date.** "Effective date" means:

A. for the protection of high water quality:

(1) when applied to a previously unregulated activity, the date when the control document is issued; or

(2) when applied to a currently regulated activity, the date of the most recently issued control document; or

B. for the protection of exceptional characteristics of outstanding resource value waters, except as provided in subitems (1) and (2), the date when the outstanding resource value water was designated in rule.

(1) When the commissioner determines there is an improvement in exceptional characteristics of the outstanding resource value water as a result of changes to water pollution control conditions specified in a reissued control document, the effective date is the date when the control document was reissued.

(2) When the commissioner determines there is an improvement in exceptional characteristics of the outstanding resource value water as a result of a regulated activity ceasing to discharge to or otherwise adversely impact an outstanding resource value water, the effective date is the expiration date of the associated control document.

Subp. 14. **Exceptional characteristics of outstanding resource value waters.** "Exceptional characteristics of outstanding resource value waters" means characteristics for which an outstanding resource value water is designated, including wilderness, scientific, educational, ecological,

recreational, cultural, or aesthetic resource characteristics or other special qualities that warrant stringent protection from degradation.

Subp. 15. **Existing uses.** "Existing uses" means those uses actually attained in the surface water on or after November 28, 1975.

Subp. 16. **Existing water quality.** "Existing water quality" means the physical, chemical, biological, and radiological conditions of a surface water, taking into account natural variability, on the effective date. Existing water quality is expressed either as a concentration of a water quality parameter or by other means to describe the condition of a surface water.

Subp. 17. **Feasible alternative.** "Feasible alternative" means a pollution control alternative that is consistent with sound engineering and environmental practices, affordable, and legal and that has supportive governance that can be successfully put into practice to accomplish the task.

Subp. 18. **Federally designated recreational river segment.** "Federally designated recreational river segment" means a surface water or segment thereof designated as a recreational river under the federal Wild and Scenic Rivers Act, United States Code, title 16, sections 1271 to 1287.

Subp. 19. **Federally designated scenic river segment.** "Federally designated scenic river segment" means a surface water or segment thereof designated as a scenic river under the federal Wild and Scenic Rivers Act, United States Code, title 16, sections 1271 to 1287.

Subp. 20. **Federally designated wild river segment.** "Federally designated wild river segment" means a surface water or segment thereof designated as a wild river under the federal Wild and Scenic Rivers Act, United States Code, title 16, sections 1271 to 1287.

Subp. 21. **High water quality or of high quality.** "High water quality" or "of high quality" means water quality that exceeds, on a parameter-by-parameter basis, levels necessary to support the protection and propagation of aquatic life and recreation in and on the water as described in part 7050.0140, subpart 3.

Subp. 22. **Loading.** "Loading" means the quantity of pollutants, expressed as mass, resulting from a discharge or proposed discharge to a surface water.

Subp. 23. **Loading offset.** "Loading offset" means reductions in loading from regulated or unregulated activities, which reductions create additional capacity for proposed net increases in loading. A loading offset must:

A. occur concurrently with or prior to the proposed net increase in loading;

B. be secured with binding legal instruments between any involved persons for the life of the project that is being offset; and

C. occur either adjacent to or upstream of the proposed activity.

Subp. 24. **Measurable change.** "Measurable change" means the practical ability to detect a variation in water quality, taking into account limitations in analytical technique and sampling variability.

Subp. 25. **National pollutant discharge elimination system permit or NPDES permit.** "National pollutant discharge elimination system permit" or "NPDES permit" means an authorization issued by the agency under sections 307, 318, 402, and 405 of the Clean Water Act, United States Code, title 33, sections 1317, 1328, 1342, and 1345. A general NPDES permit means an NPDES permit issued pursuant to Code of Federal Regulations, title 40, section 122.28.

Subp. 26. **Net increase in loading or other causes of degradation.** "Net increase in loading or other causes of degradation" means:

A. when applied to a proposed activity that is not regulated by an existing control document, any loading or other causes of degradation resulting from the proposed activity; or

B. when applied to a proposed activity that is regulated by an existing control document, an increase in loading or other causes of degradation exceeding the maximum loading or other causes of degradation authorized through water pollution control conditions specified in the existing control document as of the effective date. Application of new effluent limitations based on improved monitoring data or new water quality standards that are not a result of changes in loading or other causes of degradation within the existing capacity and processes authorized by an applicable control document is not considered a net increase in loading or other causes of degradation.

Subp. 27. **Outstanding resource value waters.** "Outstanding resource value waters" mean waters of the state designated under part 7050.0335 for their exceptional characteristics.

Subp. 28. **Parameter.** "Parameter" means a chemical, physical, biological, or radiological characteristic used to describe water quality conditions.

Subp. 29. **Person.** "Person" has the meaning given under Minnesota Statutes, section 115.01, subdivision 10.

Subp. 30. **Physical alteration.** "Physical alteration" means a physical change that degrades surface waters, such as the dredging, filling, draining, or permanent inundation of a surface water.

Subp. 31. **Pollutant.** "Pollutant" has the meaning given under Minnesota Statutes, section 115.01, subdivision 12.

Subp. 32. **Prohibited outstanding resource value waters.** "Prohibited outstanding resource value waters" mean surface waters identified in part 7050.0335, subparts 3 and 4.

Subp. 33. **Proposed activity.** "Proposed activity" means a regulated activity for which control document authorization is being requested.

Subp. 34. **Prudent alternative.** "Prudent alternative" means a pollution control alternative selected with care and sound judgment.

Subp. 35. **Regulated activity.** "Regulated activity" means an activity that requires a control document.

Subp. 36. **Restricted outstanding resource value waters.** "Restricted outstanding resource value waters" mean surface waters identified in part 7050.0335, subparts 1 and 2.

Subp. 37. **Scientific and natural areas.** "Scientific and natural areas" mean areas listed in part 7050.0335, subpart 3, item D, and described under Minnesota Statutes, section 86A.05, subdivision 5, paragraph (b).

Subp. 38. **Section 303(d) of the Clean Water Act.** "Section 303(d) of the Clean Water Act" means, pursuant to United States Code, title 33, section 1313(d), a requirement for states, territories, and authorized tribes to develop lists of waters that do not meet applicable water quality standards, establish priority rankings, and develop total maximum daily loads for these waters.

Subp. 39. **Section 401 certification.** "Section 401 certification" means an authorization issued by the commissioner under section 401 of the Clean Water Act, United States Code, title 33, section 1341.

Subp. 40. **Section 404 permit.** "Section 404 permit" means an authorization issued under section 404 of the Clean Water Act, United States Code, title 33, section 1344. A general section 404 permit means a section 404 permit issued pursuant to section 404 of the Clean Water Act, United States Code, title 33, section 1344, paragraph (e).

Subp. 41. **State designated recreational river segment.** "State designated recreational river segment" means a surface water or segment thereof designated as a recreational river under the Minnesota Wild and Scenic Rivers Act, Minnesota Statutes, sections 103F.301 to 103F.345, and described under Minnesota Statutes, section 103F.311, subdivision 4.

Subp. 42. **State designated scenic river segment.** "State designated scenic river segment" means a surface water or segment thereof designated as a scenic river under the Minnesota Wild and Scenic Rivers Act, Minnesota Statutes, sections 103F.301 to 103F.345, and described under Minnesota Statutes, section 103F.311, subdivision 7.

Subp. 43. **State designated wild river segment.** "State designated wild river segment" means a surface water or segment thereof designated as a wild river under the Minnesota Wild and Scenic Rivers Act, Minnesota Statutes, sections 103F.301 to 103F.345, and described under Minnesota Statutes, section 103F.311, subdivision 9.

Subp. 44. **Total maximum daily load or TMDL.** "Total maximum daily load" or "TMDL" has the meaning given under Minnesota Statutes, section 114D.15, subdivision 10.

Subp. 45. **Unregulated activity.** "Unregulated activity" means an activity that does not require a control document.

Subp. 46. **Water pollution control conditions.** "Water pollution control conditions" means effluent limitations as defined in part 7001.1020, subpart 13, or other conditions specified in a control document that limit water pollution as defined in Minnesota Statutes, section 115.01, subdivision 13.

Subp. 47. **Water quality standard.** "Water quality standard" means a parameter concentration, level, or narrative statement representing a quality of water that supports a beneficial use. When water quality standards are met, water quality will generally protect the beneficial use.

Statutory Authority: *MS s 115.03; 115.44*

History: *41 SR 545*
Published Electronically: *December 9, 2016*

7050.0260 DETERMINING EXISTING WATER QUALITY.

Subpart 1. **Methods.** Existing water quality shall be determined using methods described in items A to D. The methods are listed in descending order of priority. Lower priority methods shall be used only if higher priority methods are not reasonably available. More than one method shall be used when a single method does not adequately describe existing water quality.

A. Using commissioner-approved monitoring data that exist at the time the determination of existing water quality is undertaken.

B. Monitoring surface waters, provided that samples are collected in a manner and place and of such type, number, and frequency as may be considered necessary by the commissioner to adequately reflect the condition of the surface waters. Samples must be collected, preserved, and analyzed following accepted quality control and quality assurance methods and according to the procedures in part 7050.0150, subpart 8.

C. Identifying reference surface waters that have similar physical, chemical, and biological characteristics and similar impacts from regulated and unregulated activities.

D. Use of a water quality model to characterize existing conditions in the surface water, provided that the model uses data from the same watershed as the surface water under review for existing conditions.

Subp. 2. **Consideration of existing regulated activities.** For surface waters impacted by activities that are regulated by existing control documents, existing water quality includes surface water conditions that are anticipated at loadings or other causes of degradation authorized in the applicable control document.

Statutory Authority: *MS s 115.03; 115.44*

History: *41 SR 545*
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7050.0265 ANTIDEGRADATION STANDARDS WHEN CHANGES IN EXISTING WATER QUALITY ARE REASONABLY QUANTIFIABLE.

Subpart 1. **Scope.** This part applies to activities regulated by the following control documents:

A. new, reissued, or modified individual NPDES wastewater permits;

B. new, reissued, or modified individual NPDES storm water permits for industrial activities, as defined under part 7090.0080, subpart 6;

C. new, reissued, or modified individual NPDES storm water permits for construction activities, as defined under part 7090.0080, subpart 4;

D. section 401 certifications for new, reissued, or modified individual federal licenses and permits; and

E. other control documents that authorize net increases in loading or other causes of degradation and where changes in existing water quality of individual surface waters can reasonably be quantified through antidegradation procedures.

Subp. 2. **Protecting existing uses.** The commissioner shall approve a proposed activity only when existing uses and the level of water quality necessary to protect existing uses are maintained and protected.

Subp. 3. **Compensatory mitigation.**

A. The commissioner shall allow compensatory mitigation as a means to preserve an existing use when there is a physical alteration to a surface water only when all of the following conditions are met:

(1) prudent and feasible alternatives are not available to avoid or minimize adverse impacts to the surface water;

(2) the mitigation is sufficient in quality and quantity to ensure replacement of the lost surface water;

(3) the mitigation is accomplished by:

(a) restoring a previously impacted surface water of the same type, or other type if required by statute; or

(b) when restoring is not a prudent or feasible alternative, establishing or enhancing a surface water of the same type, or other type if required by statute;

(4) the mitigation occurs within the same watershed, to the extent prudent and feasible; and

(5) the mitigation is completed before or concurrent with the actual physical alteration, to the extent prudent and feasible.

B. For the purposes of subpart 2 and part 7050.0250, item A, existing uses are maintained and protected when regulated activities involving the physical alterations of surface waters are in compliance with item A.

C. When the physically altered surface water is of high quality, the commissioner shall ensure the requirements specified in subpart 5 are satisfied.

Subp. 4. **Protecting beneficial uses.** The commissioner shall not approve a proposed activity that would permanently preclude attainment of water quality standards.

Subp. 5. **Protecting surface waters of high quality.** Items A to D apply to surface waters the commissioner determines to be of high quality.

A. The commissioner shall not approve a proposed activity when the commissioner makes a finding that prudent and feasible prevention, treatment, or loading offset alternatives exist that would avoid degradation of existing high water quality. When the commissioner finds that prudent and feasible prevention, treatment, or loading offset alternatives are not available to avoid degradation, a proposed activity shall be approved only when the commissioner makes a finding that degradation will be prudently and feasibly minimized.

B. The commissioner shall approve a proposed activity only when the commissioner makes a finding that lower water quality resulting from the proposed activity is necessary to accommodate important economic or social changes in the geographic area in which degradation of existing high water quality is anticipated. The commissioner shall consider the following factors in determining the importance of economic or social changes:

(1) economic gains or losses attributable to the proposed activity, such as changes in the number and types of jobs, median household income, productivity, property values, and recreational, tourism, and other commercial opportunities;

(2) contribution to social services;

(3) prevention or remediation of environmental or public health threats;

(4) trade-offs between environmental media; and

(5) the value of the water resource, including:

(a) the extent to which the resources adversely impacted by the proposed activity are unique or rare within the locality, state, or nation;

(b) benefits associated with high water quality for uses such as ecosystem services and high water quality preservation for future generations to meet their own needs; and

(c) factors, such as aesthetics, that cannot be reasonably quantified; and

(6) other relevant environmental, social, and economic impacts of the proposed activity.

C. A proposed activity that would result in degradation of existing high water quality shall be approved only if the commissioner determines that issuance of the control document will achieve compliance with all applicable state and federal surface water pollution control statutes and rules administered by the commissioner.

D. The commissioner shall provide an opportunity for intergovernmental coordination and public participation before allowing degradation of existing high water quality.

Subp. 6. **Protecting restricted outstanding resource value waters.** The commissioner shall restrict a proposed activity in order to preserve the existing water quality as necessary to maintain and protect the exceptional characteristics for which the restricted outstanding resource value waters identified under part 7050.0335, subparts 1 and 2, were designated.

Subp. 7. **Protecting prohibited outstanding resource value waters.** The commissioner shall prohibit a proposed activity that results in a net increase in loading or other causes of degradation to prohibited outstanding resource value waters identified under part 7050.0335, subparts 3 and 4.

Subp. 8. **Protecting against impairments associated with thermal discharges.** When there is potential for water quality impairment associated with thermal discharges, the commissioner's allowance for existing water quality degradation shall be consistent with section 316 of the Clean Water Act, United States Code, title 33, section 1326. When a variance is granted under section 316(a) of the Clean Water Act, United States Code, title 33, section 1326, antidegradation standards under this part still apply.

Statutory Authority: *MS s 115.03; 115.44*

History: *41 SR 545;*
Published Electronically: *November 20, 2017*

7050.0270 ANTIDEGRADATION STANDARDS WHEN CHANGES IN EXISTING WATER QUALITY ARE NOT REASONABLY QUANTIFIABLE.

Subpart 1. **Scope.** This part applies to activities regulated by the following control documents:

A. new, reissued, or modified individual NPDES storm water permits for municipal separate storm sewer systems, as defined under part 7090.0080, subpart 8;

B. new, reissued, or modified general NPDES permits;

C. section 401 certifications for new, reissued, or modified general federal licenses and permits; and

D. other control documents that authorize net increases in loading or other causes of degradation and where changes in existing water quality of individual surface waters cannot reasonably be quantified through antidegradation procedures.

Subp. 2. **Protecting existing uses.** The commissioner shall issue control documents that will maintain and protect existing uses.

Subp. 3. **Protecting beneficial uses.** The commissioner shall not issue a control document that would permanently preclude attainment of water quality standards.

Subp. 4. **Protecting surface waters of high quality.**

A. For the purpose of this part and on a parameter-by-parameter basis, class 2 surface waters not identified as impaired pursuant to section 303(d) of the Clean Water Act are considered of high quality. Items B to E apply to class 2 surface waters that are of high quality.

B. The commissioner shall not issue a control document when the commissioner makes a finding that prudent and feasible prevention, treatment, or loading offset alternatives exist that would avoid net increases in loading or other causes of degradation. When the commissioner finds that prudent and feasible alternatives are not available to avoid net increases in loading or other causes of degradation, a control document shall only be issued when the commissioner makes a

finding that the issuance of the control document will prudently and feasibly minimize net increases in loading or other causes of degradation.

C. The commissioner shall issue a control document that authorizes a net increase in loading or other causes of degradation only when the commissioner makes a finding that issuance of the control document is necessary to accommodate important economic or social change.

D. The commissioner shall issue a control document that would result in a net increase in loading or other causes of degradation to waters of high quality only if the commissioner determines that issuance of the control document will achieve compliance with all applicable state and federal surface water pollution control statutes and rules administered by the commissioner.

E. The commissioner shall provide an opportunity for intergovernmental coordination and public participation before issuing a control document that would result in net increases in loading or other causes of degradation.

Subp. 5. **Protecting restricted outstanding resource value waters.** The commissioner shall issue control documents that restrict net increases in loading or other causes of degradation as necessary to maintain the exceptional characteristics for which the restricted outstanding resource value waters identified under part 7050.0335, subparts 1 and 2, were designated.

Subp. 6. **Protecting prohibited outstanding resource value waters.** The commissioner shall issue control documents that prohibit a net increase in loading or other causes of degradation to prohibited outstanding resource value waters identified under part 7050.0335, subparts 3 and 4.

Subp. 7. **Protecting against impairments associated with thermal discharges.** When there is potential for water quality impairment associated with thermal discharges, a control document that allows a net increase in loading or other causes of degradation must be consistent with section 316 of the Clean Water Act, United States Code, title 33, section 1326. When a variance is granted under section 316(a) of the Clean Water Act, United States Code, title 33, section 1326, antidegradation standards under this part still apply.

Statutory Authority: *MS s 115.03; 115.44*

History: *41 SR 545;*
Published Electronically: *November 20, 2017*

7050.0275 EXEMPTIONS FROM PROCEDURES.

Subpart 1. **Class 7 surface waters.** The procedures specified in parts 7050.0280 and 7050.0285 do not apply to proposed activities resulting in a net increase in loading or other causes of degradation to a class 7 surface water except when, in the commissioner's judgment, there is reasonable risk that the proposed activity would result in:

A. the loss of existing uses and the level of water quality necessary to protect existing uses in the class 7 surface water and downstream surface waters;

B. permanently precluding attainment of water quality standards;

C. degradation of downstream existing high water quality; or

D. degradation of downstream existing water quality essential to preserve the exceptional characteristics of outstanding resource value waters.

Subp. 2. **Temporary and limited degradation.** The procedures specified in parts 7050.0280 and 7050.0285 do not apply to proposed activities that result in temporary and limited degradation of high water quality when the requirements of items A to D are met.

A. The applicant must provide a request for an exemption, on forms developed by the commissioner, before submitting a control document application. The request must include:

(1) identification of surface waters and associated beneficial uses that will be adversely impacted by the regulated activity;

(2) parameters likely to cause degradation;

(3) length of time during which the water quality will be impacted, which must not exceed 12 months from when water quality is initially impacted by the proposed activity;

(4) a description of water quality at the time the exemption is requested using methods described in part 7050.0260 and anticipated net changes to water quality for parameters likely to cause adverse impacts over the time period the surface waters are impacted;

(5) a description of prevention, treatment, or loading offset alternatives that were considered to avoid and minimize net increases in loading or other causes of degradation and the reasons why the selected alternative was chosen;

(6) a description of how water quality will be returned to pre-activity conditions within 12 months from when water quality is initially impacted by the proposed activity; and

(7) a description of any residual long-term impacts on existing uses.

B. The commissioner shall consider subitems (1) to (3) before deciding to approve or deny the requested exemption from antidegradation procedures for the proposed temporary and limited degradation:

(1) information submitted by the applicant under item A;

(2) information on cumulative effects on water quality from multiple exemptions for temporary and limited degradation; and

(3) other reliable information available to the commissioner.

C. The commissioner shall approve a proposed temporary and limited degradation of high water quality only when:

(1) existing uses and the level of water quality necessary to protect the existing uses are maintained and protected;

(2) it would not cause exceedance of water quality standards; and

(3) a prudent and feasible alternative does not exist that would avoid or minimize the degradation.

D. If the temporary and limited degradation exemption is approved, the control document conditions must include an enforceable plan to ensure that water quality is returned to pre-activity conditions within 12 months from when water quality is initially impacted by the activity.

Statutory Authority: *MS s 115.03; 115.44*

History: *41 SR 545;*

Published Electronically: *November 20, 2017*

7050.0280 PROCEDURES FOR INDIVIDUAL NPDES WASTEWATER PERMITS AND INDIVIDUAL NPDES STORM WATER PERMITS FOR INDUSTRIAL AND CONSTRUCTION ACTIVITIES.

Subpart 1. **Antidegradation procedures required.** Except as provided in part 7050.0275, the antidegradation procedures in this part apply to new, reissued, or modified individual NPDES wastewater, industrial storm water, and construction storm water permits that the commissioner anticipates will result in net increases in loading or other causes of degradation to surface waters.

Subp. 2. **Applicant's antidegradation assessment.** The applicant must include the following information with the written permit application specified in part 7001.0050:

A. an analysis of alternatives that avoid net increases in loading or other causes of degradation through prudent and feasible prevention, treatment, or loading offsets;

B. when the commissioner determines there are no prudent and feasible alternatives to avoid net increases in loading or other causes of degradation, an assessment of:

(1) existing uses; and

(2) existing water quality using determination methods described in part 7050.0260.

C. when the commissioner determines there are no prudent and feasible alternatives to avoid net increases in loading or other causes of degradation to existing high water quality:

(1) an analysis of prudent and feasible alternatives that minimize degradation through prudent and feasible prevention, treatment, or loading offsets that identifies the least degrading prudent and feasible alternatives;

(2) the design considerations and constraints, expected performance, construction, operation, and maintenance costs, and reliability of the least degrading prudent and feasible alternatives; and

(3) the following information based on the least degrading prudent and feasible alternatives:

(a) a comparison of loading or other causes of degradation previously authorized by the commissioner in the most recently issued control document to the anticipated loading or other causes of degradation expected when the proposed activity is fully implemented;

(b) a comparison of existing water quality to the anticipated water quality when the proposed activity is fully implemented; and

(c) for the geographic area in which high water quality degradation is reasonably anticipated, a comparison of existing and expected economic conditions and social services when the proposed activity is fully implemented. The comparison must include the factors identified in part 7050.0265, subpart 5, item B, subitems (1) to (6).

Subp. 3. **Antidegradation review.** The commissioner shall conduct an antidegradation review based on the information provided under subpart 2 and other reliable information available to the commissioner concerning the proposed activity and other activities that cause cumulative changes in existing water quality in the surface waters. The purpose of the antidegradation review is to evaluate whether the proposed activity will satisfy the antidegradation standards in part 7050.0265. If, in the commissioner's judgment, the antidegradation standards described in part 7050.0265 will not be satisfied, the commissioner shall provide written notification to the applicant of the deficiencies and provide recommendations necessary to satisfy the antidegradation standards in part 7050.0265.

Subp. 4. **Preliminary antidegradation determination.** Based upon the review described in subpart 3, the commissioner shall prepare a written preliminary antidegradation determination as to whether the antidegradation standards described in part 7050.0265 are satisfied. The preliminary antidegradation determination must be included with the commissioner's preliminary determination to issue or deny the permit according to part 7001.0100. If, in the commissioner's judgment, the antidegradation standards are not satisfied, reasons why they are not satisfied must be included in the preliminary antidegradation determination.

Subp. 5. **Opportunity for comment.** The commissioner shall:

A. include the preliminary antidegradation determination with the public notice to issue or deny the permit according to part 7001.0100, subpart 4;

B. distribute the public notice according to part 7001.0100, subpart 5; and

C. provide opportunity for comment on the preliminary antidegradation determination according to part 7001.0110.

Subp. 6. **Final antidegradation determination.** The commissioner shall consider comments received under subpart 5 before preparing a written final antidegradation determination. The final antidegradation determination must include a statement of whether the proposed activity achieves or fails to achieve the antidegradation standards specified in part 7050.0265. The final antidegradation determination must be included with the commissioner's final determination to authorize or not authorize the proposed activity according to part 7001.0140.

Statutory Authority: *MS s 115.03; 115.44*

History: *41 SR 545*
Published Electronically: *December 9, 2016*

7050.0285 PROCEDURES FOR SECTION 401 CERTIFICATIONS OF INDIVIDUAL FEDERAL LICENSES AND PERMITS.

Subpart 1. **Antidegradation procedures required.** Except as provided in part 7050.0275, the antidegradation procedures in this part apply to section 401 certifications of new, reissued, or modified individual federal licenses and permits that the commissioner anticipates will result in net increases in loading or other causes of degradation to surface waters.

Subp. 2. **Applicant's antidegradation assessment.** The applicant must provide information specified in part 7050.0280, subpart 2, to the commissioner, unless the applicant is notified that the commissioner is waiving the agency's authority to certify the federal license or permit under part 7001.1460. In addition, the applicant may propose compensatory mitigation to the extent allowed by the Clean Water Act to preserve existing uses and the level of water quality necessary to protect the existing uses when there is a physical alteration. In such cases, the applicant must provide a proposed compensatory mitigation plan that includes:

A. a description of existing uses and the level of water quality necessary to protect existing uses of the surface waters that will be physically altered;

B. a description of existing uses and the level of water quality necessary to protect existing uses of the surface waters in which mitigation will occur;

C. a description of how compensatory mitigation will establish sufficient quality and quantity of uses to preserve existing uses and the level of water quality necessary to protect existing uses;

D. a proposal for monitoring and reporting the changes in existing uses and the level of water quality necessary to protect existing uses of the surface waters in which mitigation will occur; and

E. a description of how the compensatory mitigation will be maintained.

Subp. 3. **Antidegradation review.** The commissioner shall conduct an antidegradation review based on the information provided under subpart 2 and other reliable information available to the commissioner concerning the proposed activity and other activities that cause cumulative changes in existing water quality in the surface waters. The purpose of the antidegradation review is to evaluate whether issuing the section 401 certification for the proposed activity will satisfy the antidegradation standards in part 7050.0265.

Subp. 4. **Preliminary antidegradation determination.** Based upon the review described in subpart 3, the commissioner shall prepare a written preliminary antidegradation determination as to whether the antidegradation standards described in part 7050.0265 are satisfied or can be satisfied by issuing a section 401 certification with conditions. The preliminary antidegradation determination must be included with the commissioner's preliminary determination to issue or deny the section 401 certification according to part 7001.0100 and, if applicable, include the conditions necessary to satisfy antidegradation standards. If, in the commissioner's judgment, the antidegradation standards

are not satisfied, reasons why they are not satisfied must be included in the preliminary antidegradation determination.

Subp. 5. **Opportunity for comment.** The commissioner shall prepare and distribute a public notice of the preliminary antidegradation determination with the preliminary determination to issue or deny the section 401 certification through the procedures described in part 7001.1440, except that part 7001.1440, subpart 2, does not apply.

Subp. 6. **Final antidegradation determination.** The commissioner shall consider comments received under subpart 5 before preparing a written final antidegradation determination. The final antidegradation determination must include a statement of whether the proposed activity achieves or fails to achieve the antidegradation standards specified in part 7050.0265. The final antidegradation determination must be included with the commissioner's final determination according to part 7001.1450.

Statutory Authority: *MS s 115.03; 115.44*

History: *41 SR 545*

Published Electronically: *December 9, 2016*

7050.0290 PROCEDURES FOR INDIVIDUAL NPDES PERMITS FOR MUNICIPAL SEPARATE STORM SEWER SYSTEMS.

Subpart 1. **Antidegradation procedures required.** The antidegradation procedures in this part apply to new, reissued, or modified individual NPDES permits for municipal separate storm sewer systems, as defined under part 7090.0080, subpart 8, that the commissioner anticipates will result in net increases in loading or other causes of degradation to surface waters.

Subp. 2. **Applicant's antidegradation assessment.** The applicant must include the following information with the written permit application specified in part 7001.0050:

A. a list of class 2 surface waters identified as impaired pursuant to section 303(d) of the Clean Water Act within the applicant's jurisdiction;

B. a list of surface waters listed in part 7050.0335 within the applicant's jurisdiction;

C. an analysis of prudent and feasible prevention, treatment, or loading offset alternatives that avoid or minimize net increases in loading or other causes of degradation to high water quality;

D. identification of prudent and feasible prevention, treatment, or loading offset alternatives that result in the least net increase in loading or other causes of degradation to high water quality; and

E. an evaluation of whether net increases in loading or other causes of degradation to high water quality accommodates important economic or social change in the geographic area in which high water quality degradation is reasonably anticipated.

Subp. 3. **Antidegradation review.** The commissioner shall conduct an antidegradation review based on the information provided under subpart 2 and other reliable information available to the

commissioner concerning the proposed activity and other activities that cause cumulative changes in existing water quality in the surface waters. The purpose of the antidegradation review is to evaluate whether the proposed activity will satisfy the antidegradation standards in part 7050.0270. If, in the commissioner's judgment, the antidegradation standards described in part 7050.0270 will not be satisfied, the commissioner shall provide written notification to the applicant of the deficiencies and provide recommendations necessary to satisfy the antidegradation standards in part 7050.0270.

Subp. 4. **Preliminary antidegradation determination.** Based upon the review described in subpart 3, the commissioner shall prepare a written preliminary antidegradation determination as to whether the antidegradation standards described in part 7050.0270 are satisfied. The preliminary antidegradation determination must be included with the commissioner's preliminary determination to issue or deny the permit according to part 7001.0100. If, in the commissioner's judgment, the antidegradation standards are not satisfied, reasons why they are not satisfied must be included in the preliminary antidegradation determination.

Subp. 5. **Opportunity for comment.** The commissioner shall:

A. include the preliminary antidegradation determination with the public notice to issue or deny the permit according to part 7001.0100, subpart 4;

B. distribute the public notice according to part 7001.0100, subpart 5; and

C. provide opportunity for comment on the preliminary antidegradation determination according to part 7001.0110.

Subp. 6. **Final antidegradation determination.** The commissioner shall consider comments received under subpart 5 before preparing a written final antidegradation determination. The final antidegradation determination must include a statement of whether the proposed activity achieves or fails to achieve the antidegradation standards specified in part 7050.0270. The final antidegradation determination must be included with the commissioner's final determination to authorize or not authorize the proposed activity according to part 7001.0140.

Statutory Authority: *MS s 115.03; 115.44*

History: *41 SR 545;*
Published Electronically: *November 20, 2017*

7050.0295 PROCEDURES FOR GENERAL NPDES PERMITS.

Subpart 1. **Antidegradation procedures required.** The antidegradation procedures in this part apply to new, reissued, or modified general NPDES permits that the commissioner anticipates will result in net increases in loading or other causes of degradation to surface waters.

Subp. 2. **Antidegradation review.** The commissioner shall conduct an antidegradation review during the development of general NPDES permits. The purpose of the antidegradation review is to develop permit conditions that will ensure that the antidegradation standards in part 7050.0270 are satisfied.

Subp. 3. **Preliminary antidegradation determination.** Based upon the review described in subpart 2, the commissioner shall prepare a written preliminary antidegradation determination as to whether the permit conditions will satisfy the antidegradation standards described in part 7050.0270. The preliminary antidegradation determination must be included with the commissioner's fact sheet according to part 7001.0100, subpart 3.

Subp. 4. **Opportunity for comment.** The commissioner shall:

A. include the preliminary antidegradation determination with the public notice of intent to issue a general permit according to part 7001.0210, subpart 4;

B. distribute the public notice according to part 7001.0100, subpart 5; and

C. provide opportunity for comment on the preliminary antidegradation determination according to part 7001.0110.

Subp. 5. **Final antidegradation determination.** The commissioner shall consider comments received under subpart 4 before preparing a written final antidegradation determination. The final antidegradation determination must include a statement that issuing the general NPDES permit achieves or fails to achieve the antidegradation standards specified in part 7050.0270. The final antidegradation determination must be included with the commissioner's final determination according to part 7001.0140.

Subp. 6. **Further antidegradation procedures not required.** Except as provided in part 7050.0325, if the commissioner's final antidegradation determination states that issuing a general NPDES permit will achieve the antidegradation standards specified in part 7050.0270, further antidegradation procedures are not required when a person seeking coverage under the general NPDES permit certifies that the permit conditions can and will be met.

Statutory Authority: *MS s 115.03; 115.44*

History: *41 SR 545*
Published Electronically: *December 9, 2016*

7050.0300 [Repealed, 9 SR 913]
Published Electronically: *April 1, 2008*

7050.0305 PROCEDURES FOR SECTION 401 CERTIFICATIONS OF GENERAL SECTION 404 PERMITS.

Subpart 1. **Antidegradation procedures required.** The antidegradation procedures in this part apply to section 401 certifications of new, reissued, or modified general section 404 permits that the commissioner anticipates will result in net increases in loading or other causes of degradation to surface waters, unless the federal permitting authority is notified that the commissioner is waiving the agency's authority to certify the permit under part 7001.1460.

Subp. 2. **Antidegradation review.** Upon public notice of a draft general section 404 permit, the commissioner shall review the determinations specified in Code of Federal Regulations, title 33, part 320, subpart 4, and Code of Federal Regulations, title 40, part 230, subpart 7. The purpose

of the antidegradation review is to evaluate whether issuing the section 401 certification for the general section 404 permit will satisfy the antidegradation standards in part 7050.0270.

Subp. 3. **Preliminary antidegradation determination.** Based upon the review described in subpart 2, the commissioner shall prepare a written preliminary antidegradation determination as to whether the antidegradation standards described in part 7050.0270 are satisfied or can be satisfied by issuing a section 401 certification with conditions. The preliminary antidegradation determination must be included with the commissioner's preliminary determination to issue or deny the section 401 certification according to part 7001.0100 and, if applicable, include the conditions necessary to satisfy antidegradation standards. If, in the commissioner's judgment, the antidegradation standards are not satisfied, reasons why they are not satisfied must be included in the preliminary antidegradation determination.

Subp. 4. **Opportunity for comment.** The commissioner shall prepare and distribute a public notice of the preliminary antidegradation determination with the preliminary determination to issue or deny the section 401 certification through the procedures described in part 7001.1440, except that part 7001.1440, subpart 2, does not apply.

Subp. 5. **Final antidegradation determination.** The commissioner shall consider information received under subpart 4 before preparing a written final antidegradation determination. The final antidegradation determination must include a statement of whether issuing the general section 404 permit achieves or fails to achieve the antidegradation standards specified in part 7050.0270. The final antidegradation determination must be included with the commissioner's final determination according to part 7001.1450.

Subp. 6. **Further antidegradation procedures not required.** Except as provided in part 7050.0325, if the commissioner's final antidegradation determination states that issuing a general section 404 permit will achieve the antidegradation standards specified in part 7050.0270, further antidegradation procedures are not required when a person seeking coverage under the general section 404 permit certifies that the permit conditions can and will be met.

Statutory Authority: *MS s 115.03; 115.44*

History: *41 SR 545*
Published Electronically: *December 9, 2016*

7050.0310 [Repealed, 9 SR 913]
Published Electronically: *April 1, 2008*

7050.0315 PROCEDURES FOR SECTION 401 CERTIFICATIONS OF GENERAL FEDERAL LICENSES AND PERMITS OTHER THAN SECTION 404 PERMITS.

Subpart 1. **Antidegradation procedures required.** The antidegradation procedures in this part apply to section 401 certifications of new, reissued, or modified general federal licenses and permits that are not section 404 permits that the commissioner anticipates will result in net increases in loading or other causes of degradation to surface waters, unless the federal licensing or permitting

authority is notified that the commissioner is waiving the agency's authority to certify the license or permit under part 7001.1460.

Subp. 2. **Antidegradation review.** Upon public notice of a draft general federal license or permit, the commissioner shall review the draft general federal license or permit to evaluate whether issuing the section 401 certification for the general federal license or permit will satisfy the antidegradation standards in part 7050.0270.

Subp. 3. **Preliminary antidegradation determination.** Based upon the review described in subpart 2, the commissioner shall prepare a written preliminary antidegradation determination as to whether the antidegradation standards described in part 7050.0270 are satisfied or can be satisfied by issuing a section 401 certification with conditions. The preliminary antidegradation determination must be included with the commissioner's preliminary determination to issue or deny the section 401 certification according to part 7001.0100 and, if applicable, include the conditions necessary to satisfy antidegradation standards. If, in the commissioner's judgment, the antidegradation standards are not satisfied, reasons why they are not satisfied must be included in the preliminary antidegradation determination.

Subp. 4. **Opportunity for comment.** The commissioner shall prepare and distribute a public notice of the preliminary antidegradation determination with the preliminary determination to issue or deny the section 401 certification through the procedures described in part 7001.1440, except that part 7001.1440, subpart 2, does not apply.

Subp. 5. **Final antidegradation determination.** The commissioner shall consider information received under subpart 4 before preparing a written final antidegradation determination. The final antidegradation determination must include a statement of whether issuing the general federal license or permit achieves or fails to achieve the antidegradation standards specified in part 7050.0270. The final antidegradation determination must be included with the commissioner's final determination according to part 7001.1450.

Subp. 6. **Further antidegradation procedures not required.** Except as provided in part 7050.0325, if the commissioner's final antidegradation determination states that issuing a general federal license or permit will achieve the antidegradation standards specified in part 7050.0270, further antidegradation procedures are not required when a person seeking coverage under the general federal license or permit certifies that the license or permit conditions can and will be met.

Statutory Authority: *MS s 115.03; 115.44*

History: *41 SR 545*

Published Electronically: *December 9, 2016*

7050.0320 [Repealed, 9 SR 913]

Published Electronically: *April 1, 2008*

7050.0325 PROCEDURES FOR MULTIPLE CONTROL DOCUMENTS.

Items A and B apply to proposed activities requiring more than one control document:

A. when the proposed activity requires compliance with standards in both parts 7050.0265 and 7050.0270, the commissioner shall require procedures for which standards in part 7050.0265 apply; and

B. when the proposed activity requires compliance with standards in part 7050.0265 and is subject to more than one procedure, only the procedure that is most protective of existing water quality, as specified by the commissioner, is required.

Statutory Authority: *MS s 115.03; 115.44*

History: *41 SR 545*
Published Electronically: *December 9, 2016*

7050.0330 [Repealed, 9 SR 913]
Published Electronically: *April 1, 2008*

7050.0335 DESIGNATED OUTSTANDING RESOURCE VALUE WATERS.

Subpart 1. **Restricted outstanding resource value waters.** For the purposes of parts 7050.0250 to 7050.0335, the following surface waters are restricted outstanding resource value waters:

A. Lake Superior, except those portions identified in subpart 3, item B, as a prohibited outstanding resource value waters;

B. those portions of the Mississippi River from Lake Itasca to the southerly boundary of Morrison County that are included in the Mississippi Headwaters Board comprehensive plan dated February 12, 1981;

C. lake trout lakes, both existing and potential, as determined by the commissioner in conjunction with the Department of Natural Resources, outside the boundaries of the Boundary Waters Canoe Area Wilderness and Voyageurs National Park and identified in parts 7050.0460 to 7050.0470;

D. the following state and federal designated scenic or recreational river segments:

(1) Saint Croix River, entire length;

(2) Cannon River from northern city limits of Faribault to its confluence with the Mississippi River;

(3) North Fork of the Crow River from Lake Koronis outlet to the Meeker-Wright county line;

(4) Kettle River from north Pine County line to the site of the former dam at Sandstone;

(5) Minnesota River from Lac qui Parle dam to Redwood County State-Aid Highway 11;

(6) Mississippi River from County State-Aid Highway 7 bridge in Saint Cloud to northwestern city limits of Anoka;

(7) Rum River from State Highway 27 bridge in Onamia to Madison and Rice Streets in Anoka; and

E. the following surface waters associated with calcareous fens. The number following the name of the fen is the occurrence number assigned by the Department of Natural Resources that uniquely identifies the record of information for the particular fen:

(1) Becker County: Spring Creek WMA NHR fen, 34 (T.142, R.42, S.13);

(2) Carver County: Seminary fen, 75 (T.116, R.23, S.35);

(3) Clay County:

(a) Barnesville Moraine fen, 44 (T.137, R.44, S.18);

(b) Barnesville WMA fen, 10 (T.137, R.45, S.1);

(c) Barnesville WMA fen, 43 (T.137, R.44, S.18);

(d) Felton Prairie fen, 28 (T.142, R.46, S.36);

(e) Felton Prairie fen, 36 (T.141, R.46, S.13);

(f) Felton Prairie fen, 48 (T.142, R.45, S.31);

(g) Felton Prairie fen, 53 (T.141, R.46, S.24);

(h) Haugtvedt WPA North Unit fen, 54 (T.137, R.44, S.28, 29); and

(i) Spring Prairie fen, 37 (T.140, R.46, S.11);

(4) Clearwater County: Clearbrook fen, 61 (T.149, R.37, S.17);

(5) Dakota County:

(a) Black Dog Preserve fen, 63 (T.27, R.24, S.34);

(b) Fort Snelling State Park fen, 25 (T.27, R.23, S.4); and

(c) Nicols Meadow fen, 24 (T.27, R.23, S.18);

(6) Goodhue County:

(a) Holden 1 West fen, 3 (T.110, R.18, S.1);

(b) Perched Valley Wetlands fen, 2 (T.112, R.13, S.8); and

(c) Red Wing fen, 72 (T.113, R.15, S.21);

(7) Houston County: Houston fen, 62 (T.104, R.6, S.26);

(8) Jackson County:

(a) Heron Lake fen, 45 (T.103, R.36, S.29); and

(b) Thompson Prairie fen, 20 (T.103, R.35, S.7);

(9) Le Sueur County:

(a) Ottawa Bluff fen, 56 (T.110, R.26, S.3);

(b) Ottawa WMA fen, 7 (T.110, R.26, S.11); and

(c) Ottawa WMA fen, 60 (T.110, R.26, S.14);

(10) Lincoln County: Hole-in-the-Mountain Prairie fen, 6; Pipestone (T.108, R.46, S.1; T.109, R.45, S.31);

(11) Mahnomen County: Waubun WMA fen, 11 (T.143, R.42, S.25);

(12) Marshall County:

(a) Tamarac River fen, 71 (T.157, R.46, S.2);

(b) Viking fen, 68 (T.155, R.45, S.18);

(c) Viking fen, 70 (T.155, R.45, S.20); and

(d) Viking Strip fen, 69 (T.154, R.45, S.4);

(13) Martin County: Perch Creek WMA fen, 33 (T.104, R.30, S.7);

(14) Murray County: Lost Timber Prairie fen, 13 (T.105, R.43, S.2);

(15) Nicollet County:

(a) Fort Ridgely fen, 21 (T.111, R.32, S.6); and

(b) Le Sueur fen, 32 (T.111, R.26, S.16);

(16) Nobles County: Westside fen, 59 (T.102, R.43, S.11);

(17) Norman County:

(a) Agassiz-Olson WMA fen, 17 (T.146, R.45, S.22);

(b) Faith Prairie fen, 15 (T.144, R.43, S.26);

(c) Faith Prairie fen, 16 (T.144, R.43, S.35);

(d) Faith Prairie fen, 27 (T.144, R.43, S.25); and

(e) Green Meadow fen, 14 (T.145, R.45, S.35, 36);

(18) Olmsted County:

(a) High Forest fen, 12 (T.105, R.14, S.14, 15); and

(b) Nelson WMA fen, 5 (T.105, R.15, S.16);

(19) Pennington County:

(a) Sanders East fen, 65 (T.153, R.44, S.7);

(b) Sanders East fen, 74 (T.153, R.44, S.7); and

(c) Sanders fen, 64 (T.153, R.44, S.18, 19);

(20) Pipestone County:

(a) Burke WMA fen, 57 (T.106, R.44, S.28); and

(b) Hole-in-the-Mountain Prairie fen, 6 (see Lincoln County, subitem (10));

(21) Polk County:

(a) Chicog Prairie fen, 39 (T.148, R.45, S.28);

(b) Chicog Prairie fen, 40 (T.148, R.45, S.33);

(c) Chicog Prairie fen, 41 (T.148, R.45, S.20, 29);

(d) Chicog Prairie fen, 42 (T.148, R.45, S.33);

(e) Kittleson Creek Mire fen, 55 (T.147, R.44, S.6, 7);

(f) Tympanuchus Prairie fen, 26 (T.149, R.45, S.17); and

(g) Tympanuchus Prairie fen, 38 (T.149, R.45, S.16);

(22) Pope County:

(a) Blue Mounds fen, 1 (T.124, R.39, S.14, 15);

(b) Lake Johanna fen, 4 (T.123, R.36, S.29); and

(c) Ordway Prairie fen, 35 (T.123, R.36, S.30);

(23) Redwood County:

(a) Swedes Forest fen, 8 (T.114, R.37, S.19, 20); and

(b) Swedes Forest fen, 9 (T.114, R.37, S.22, 27);

(24) Rice County:

(a) Cannon River Wilderness Area fen, 18 (T.111, R.20, S.34); and

(b) Cannon River Wilderness Area fen, 73 (T.111, R.20, S.22);

(25) Scott County:

(a) Savage fen, 22 (T.115, R.21, S.17);

(b) Savage fen, 66 (T.115, R.21, S.16); and

(c) Savage fen, 67 (T.115, R.21, S.17);

(26) Wilkin County:

(a) Anna Gronseth Prairie fen, 47 (T.134, R.45, S.15);

(b) Anna Gronseth Prairie fen, 49 (T.134, R.45, S.10);

(c) Anna Gronseth Prairie fen, 52 (T.134, R.45, S.4);

(d) Rothsay Prairie fen, 46 (T.136, R.45, S.33);

(e) Rothsay Prairie fen, 50 (T.135, R.45, S.15, 16); and

(f) Rothsay Prairie fen, 51 (T.135, R.45, S.9);

(27) Winona County: Wiscoy fen, 58 (T.105, R.7, S.15); and

(28) Yellow Medicine County:

(a) Sioux Nation WMA NHR fen, 29 (T.114, R.46, S.17); and

(b) Yellow Medicine fen, 30 (T.115, R.46, S.18).

Subp. 2. **Unlisted restricted outstanding resource value waters.** Until such time that surface waters identified as state or federally designated scenic or recreational river segments and state designated calcareous fens are designated in rule as restricted outstanding resource value waters, the commissioner shall restrict any proposed activity in order to preserve the existing water quality necessary to maintain and protect their exceptional characteristics.

Subp. 3. **Prohibited outstanding resource value waters.** For the purposes of parts 7050.0250 to 7050.0335, the following surface waters are prohibited outstanding resource value waters:

A. waters within the Boundary Waters Canoe Area Wilderness;

B. those portions of Lake Superior north of latitude 47 degrees, 57 minutes, 13 seconds, east of Hat Point, south of the Minnesota-Ontario boundary, and west of the Minnesota-Michigan boundary;

C. waters within Voyageurs National Park;

D. the following scientific and natural areas:

(1) Boot Lake, Anoka County;

(2) Kettle River in Sections 15, 22, 23, T.41, R.20, Pine County;

(3) Pennington Bog, Beltrami County;

(4) Purvis Lake-Ober Foundation, Saint Louis County;

(5) waters within the borders of Itasca Wilderness Sanctuary, Clearwater County;

(6) Iron Springs Bog, Clearwater County;

(7) Wolsfeld Woods, Hennepin County;

(8) Green Water Lake, Becker County;

(9) Black Dog Preserve, Dakota County;

(10) Prairie Bush Clover, Jackson County;

(11) Black Lake Bog, Pine County;

(12) Pembina Trail Preserve, Polk County; and

(13) Falls Creek, Washington County; and

E. the following state and federal designated wild river segments:

(1) Kettle River from the site of the former dam at Sandstone to its confluence with the Saint Croix River; and

(2) Rum River from Ogechie Lake spillway to the northernmost confluence with Lake Onamia.

Subp. 4. **Unlisted prohibited outstanding resource value waters.** Until such time that surface waters identified as state or federally designated wild river segments and surface waters necessary to maintain state designated scientific and natural areas are designated in rule as prohibited outstanding resource value waters, the commissioner shall prohibit any proposed activity that results in a net increase in loading or other causes of degradation.

Subp. 5. **Public hearing.** The commissioner shall provide an opportunity for a hearing before:

A. identifying and establishing additional outstanding resource value waters; or

B. changing the effective date of an outstanding resource value water according to part 7050.0255, subpart 13, item B, subitems (1) and (2).

Statutory Authority: *MS s 115.03; 115.44*

History: *41 SR 545;*
Published Electronically: *November 18, 2019*

7050.0340 [Repealed, 9 SR 913]
Published Electronically: *April 1, 2008*

7050.0350 [Repealed, 9 SR 913]
Published Electronically: *April 1, 2008*

7050.0360 [Repealed, 9 SR 913]
Published Electronically: *April 1, 2008*

7050.0370 [Repealed, 9 SR 913]
Published Electronically: *April 1, 2008*

7050.0380 [Repealed, 9 SR 913]

Published Electronically: *April 1, 2008*

CLASSIFICATIONS

7050.0400 BENEFICIAL USE CLASSIFICATIONS FOR SURFACE WATERS; SCOPE.

Parts 7050.0405 to 7050.0470 classify all surface waters within or bordering Minnesota and designate appropriate beneficial uses for these waters. The use classifications are defined in part 7050.0140.

Statutory Authority: *MS s 115.03; 115.44*

History: *9 SR 914; 12 SR 1810; 32 SR 1699*

Published Electronically: *April 1, 2008*

7050.0405 PETITION BY OUTSIDE PARTY TO CONSIDER ATTAINABILITY OF USE.

Subpart 1. **Petition.** Any person may present evidence to the agency that a beneficial use assigned to a water body in this chapter does not exist or is not attainable and petition the agency to consider a reclassification of that water body under Minnesota Statutes, section 14.09. Outside parties must submit written evidence in support of the petition to the commissioner that includes:

A. the name and address of the petitioner;

B. the name, location, and description of the water body;

C. the specific designated use or uses that do not exist or are unattainable in the water body and the reasons they do not exist or are unattainable;

D. the reasons the current use classification is causing harm, unnecessary expense, or other hardship to the petitioner; and

E. any additional supporting evidence including, but not limited to, water quality, hydrological, and other relevant data; pictures; testimony of local residents; survey results; and resolutions or actions by local organizations or governmental entities.

Subp. 2. **Disposition of petition.** Upon receiving a petition, the commissioner has 60 days to reply in writing and indicate a plan for disposition of the petition. The commissioner may request additional information from the petitioner if the request is considered incomplete, in which case the commissioner has 60 days to reply after the additional information is received and the petition is complete. If the commissioner finds that the evidence submitted supports a review of the designated uses, a use attainability analysis must be commenced within six months of the commissioner's reply to the complete petition. The petition becomes part of the use attainability analysis. If the commissioner finds that the use attainability analysis supports a change in use classification, the commissioner shall propose the change through rulemaking.

Statutory Authority: *MS s 115.03; 115.44; L 2005 1Sp1 art 2 s 151*

History: *31 SR 1168*
Published Electronically: *April 1, 2008*

7050.0410 LISTED WATERS.

Those waters of the state, except wetlands, that are specifically listed in part 7050.0470 are, in addition to any classifications listed in part 7050.0470, also classified as class 3C, 4A, 4B, 5, and 6 waters. Wetlands that are specifically listed in part 7050.0470 are, in addition to any classifications listed in part 7050.0470, also classified as class 3D, 4C, 5, and 6 waters.

Statutory Authority: *MS s 115.03; 115.44*

History: *9 SR 914; 18 SR 2195*
Published Electronically: *December 9, 2016*

7050.0420 TROUT WATERS.

Trout lakes identified in part 6264.0050, subpart 2, as amended through June 14, 2004, are classified as trout waters and are listed under part 7050.0470. Trout streams and their tributaries within the sections specified that are identified in part 6264.0050, subpart 4, as amended through June 14, 2004, are classified as trout waters. Trout streams are listed in part 7050.0470. Other lakes that are classified as trout waters are listed in part 7050.0470. All waters listed in part 7050.0470 as class 1B, 2A, and 3B are also classified as class 4A, 4B, 5, and 6 waters.

Statutory Authority: *MS s 115.03; 115.44*

History: *9 SR 914; 12 SR 1810; 15 SR 1057; 18 SR 2195; 24 SR 1105; 32 SR 1699*
Published Electronically: *December 9, 2016*

7050.0425 UNLISTED WETLANDS.

Those waters of the state that are wetlands as defined in part 7050.0186, subpart 1a, and that are not listed in part 7050.0470 are classified as class 2D, 3D, 4C, 5, and 6 waters.

Statutory Authority: *MS s 115.03; 115.44*

History: *18 SR 2195; 32 SR 1699*
Published Electronically: *December 9, 2016*

7050.0430 UNLISTED WATERS.

Subpart 1. **Statewide surface waters.** Except as provided in subparts 2 and 3, all surface waters of the state that are not listed in part 7050.0470 and that are not wetlands as defined in part 7050.0186, subpart 1a, are hereby classified as class 2B, 3C, 4A, 4B, 5, and 6 waters. Unlisted lotic waters are also assigned the beneficial use subclass designator "g" to the class 2B designator.

Subp. 2. **Boundary Waters Canoe Area Wilderness.**

A. All streams in the Boundary Waters Canoe Area Wilderness [11/5/84P] not listed in part 7050.0470 are classified as class 1B, 2Bdg, 3B.

B. All lakes in the Boundary Waters Canoe Area Wilderness [11/5/84P] not listed in part 7050.0470 are classified as class 1B, 2Bd, 3B.

C. All wetlands in the Boundary Waters Canoe Area Wilderness [11/5/84P] are classified as class 2D.

Subp. 3. **Voyageurs National Park.**

A. All streams in Voyageurs National Park [11/5/84P] not listed in part 7050.0470 are classified as class 2Bg, 3B.

B. All lakes in Voyageurs National Park [11/5/84P] not listed in part 7050.0470 are classified as class 2B, 3B.

C. All wetlands in Voyageurs National Park [11/5/84P] are classified as class 2D.

Statutory Authority: *MS s 115.03; 115.44*

History: *9 SR 914; 12 SR 1810; 18 SR 2195; 32 SR 1699; 42 SR 441*
Published Electronically: *November 20, 2017*

7050.0440 OTHER CLASSIFICATIONS SUPERSEDED.

Parts 7050.0400 to 7050.0470 supersede any other previous classifications and any classifications in other rules.

Statutory Authority: *MS s 115.03; 115.44*

History: *9 SR 914; 12 SR 1810; 32 SR 1699*
Published Electronically: *April 1, 2008*

7050.0450 MULTICLASSIFICATIONS.

All surface waters of the state are classified in more than one class and all the water quality standards for each of the classes apply. If the water quality standards for particular parameters for the various classes are different, the more restrictive of the standards apply.

Statutory Authority: *MS s 115.03; 115.44*

History: *9 SR 914; 32 SR 1699*
Published Electronically: *April 1, 2008*

7050.0460 WATERS SPECIFICALLY CLASSIFIED; EXPLANATION OF LISTINGS IN PART 7050.0470.

Subpart 1. **Explanation of listings.** The waters of the state listed in part 7050.0470 are classified as specified. The location of lakes, wetlands, calcareous fens, and scientific and natural areas are described by township, range, and section. Specific stream stretches are described by township, range, and section; stream confluence; geographic coordinates; road crossing; some other recognizable landmark; or a combination of these descriptors. Streams and rivers are listed by the eight-digit hydrologic unit code (HUC) of the major watersheds in part 7050.0469 in which the

streams and rivers are located. The tables that specify the applicable beneficial uses for the stream and river reaches are incorporated by reference in part 7050.0470. Any community listed in part 7050.0470 is the community nearest the water classified, and is included solely to assist in identifying the water. Most waters of the state are not specifically listed in part 7050.0470. See parts 7050.0425 and 7050.0430 for the classifications of waters not listed.

Subp. 2. **Outstanding international waters.** The waters listed in part 7050.0470, subpart 1, that are not designated as outstanding resource value waters or classified as class 7 waters are designated as outstanding international resource waters under part 7052.0300, subpart 3. Unlisted waters classified in part 7050.0430 and unlisted wetlands classified in part 7050.0425 that are located in the Lake Superior basin are also designated as outstanding international resource waters under part 7052.0300, subpart 3.

Subp. 3. **Abbreviations and symbols.** The listings in part 7050.0470 include the following abbreviations and symbols:

T., R., S. means township, range, and section, respectively.

An asterisk (*) preceding the name of the water body means the water body is an outstanding resource value water.

[month/day/year/letter code] following the name of the outstanding resource value water in brackets is the effective date the water resource was designated as an outstanding resource value water. The letter code (P or R) indicates the applicable discharge restrictions in part 7050.0265, subpart 6 or 7, or 7050.0270, subpart 5 or 6. The letter code P corresponds to the prohibited discharges provision in part 7050.0265, subpart 7, or 7050.0270, subpart 6. The letter code R corresponds to the restricted discharges provision in part 7050.0265, subpart 6, or 7050.0270, subpart 5.

[WR] following the name of the water body means the water body is designated as a wild rice water in part 7050.0470, subpart 1.

Class 2Bd waters are class 2B waters also protected for domestic consumption purposes (class 1). Applicable standards for class 2Bd waters are listed in part 7050.0222, subparts 3 and 3a.

Statutory Authority: *MS s 115.03; 115.44*

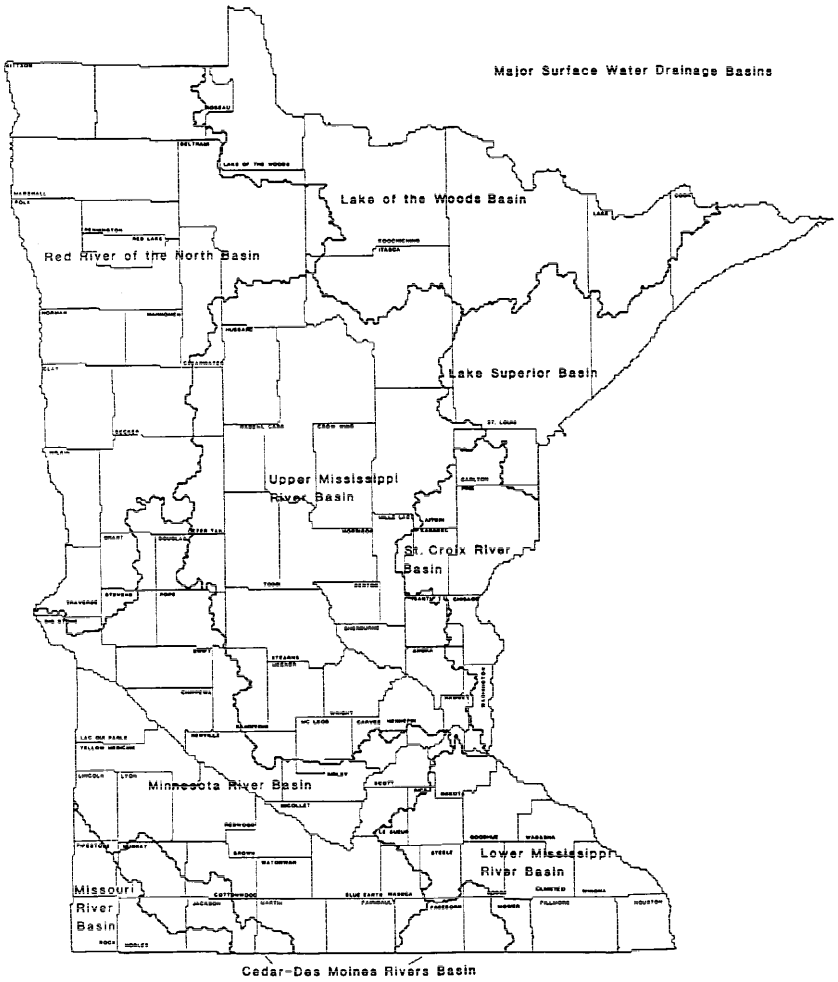
History: *9 SR 914; 12 SR 1810; 15 SR 1057; 18 SR 2195; 22 SR 1466; 32 SR 1699; 9 SR 914; 12 SR 1810; 15 SR 1057; 18 SR 2195; 22 SR 1466; 32 SR 1699; 41 SR 545; 9 SR 914; 12 SR 1810; 15 SR 1057; 18 SR 2195; 22 SR 1466; 32 SR 1699; 41 SR 545; 42 SR 441*

Published Electronically: *November 20, 2017*

7050.0465 [Repealed, 18 SR 2195]

Published Electronically: *April 1, 2008*

7050.0466 MAP: MAJOR SURFACE WATER DRAINAGE BASINS.



Statutory Authority: *MS s 115.03; 115.44*

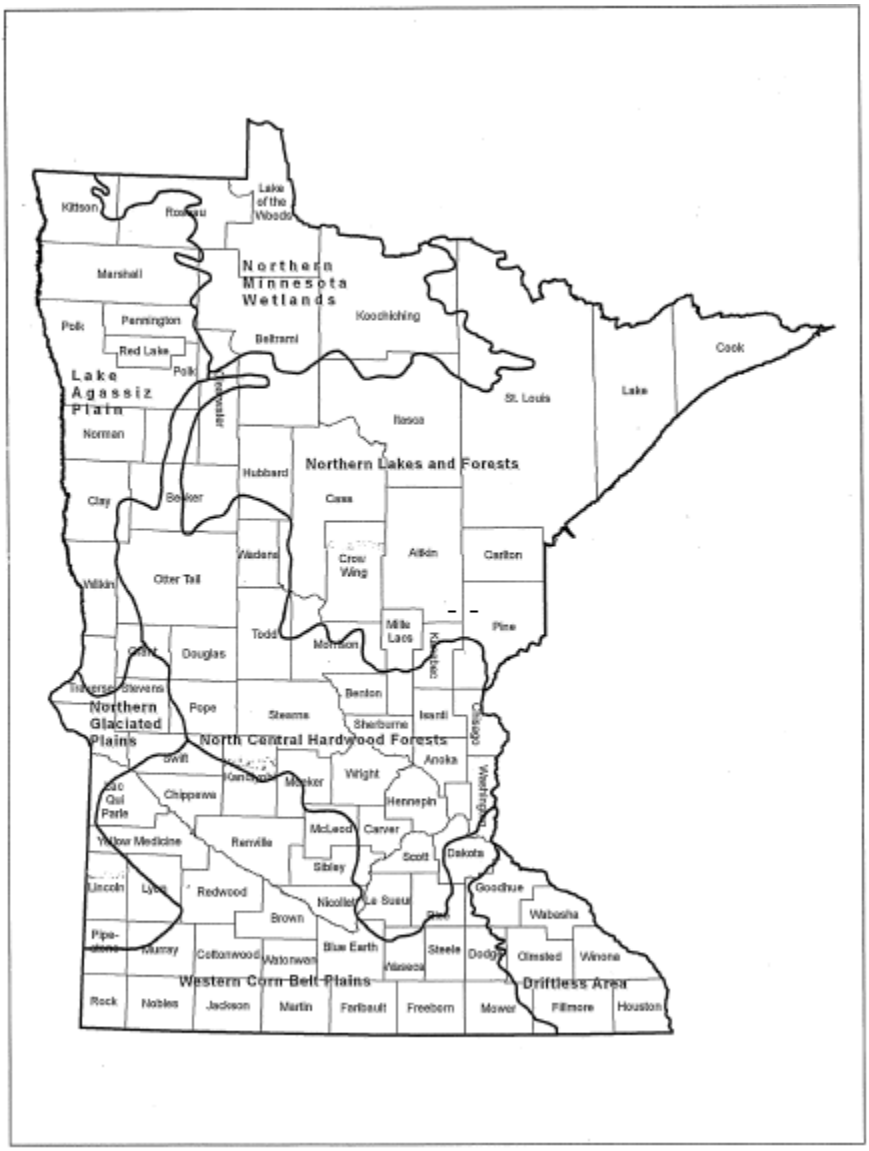
History: *18 SR 2195*

Published Electronically: *April 1, 2008*

7050.0467 [Repealed, 39 SR 154]

Published Electronically: *August 14, 2014*

7050.0468 MAP: MINNESOTA ECOREGIONS.



Statutory Authority: *MS s 115.03*

History: *39 SR 154*

Published Electronically: *August 14, 2014*

7050.0469 MAP: MINNESOTA'S MAJOR WATERSHEDS.

Major Watersheds in Minnesota

Statutory Authority: *MS s 115.03; 115.44*

History: *42 SR 441*

Published Electronically: *November 20, 2017*

7050.0470 CLASSIFICATIONS FOR SURFACE WATERS IN MAJOR DRAINAGE BASINS.

Subpart 1. **Lake Superior basin.** The water-use classifications for the stream reaches within each of the major watersheds in the Lake Superior basin listed in item A are found in tables entitled "Beneficial Use Designations for Stream Reaches" published on the website of the Minnesota Pollution Control Agency at www.pca.state.mn.us/regulations/minnesota-rulemaking. The tables are incorporated by reference and are not subject to frequent change. The date after each watershed listed in item A is the publication date of the applicable table. The water-use classifications for the other listed waters in the Lake Superior basin are as identified in items B to D. See parts 7050.0425 and 7050.0430 for the classifications of waters not listed. Designated use information for water bodies can also be accessed through the agency's Environmental Data Access (http://www.pca.state.mn.us/quick-links/eda-surface-water-data).

A. Streams (by eight-digit hydrologic unit code):

(1) 04010101 Lake Superior - North (August 9, 2016);

(2) 04010102 Lake Superior - South (August 9, 2016);

(3) 04010201 St. Louis River (August 9, 2016);

(4) 04010202 Cloquet River (August 9, 2016); and

(5) 04010301 Nemadji River (August 9, 2016).

B. Lakes:

(1) *Alder Lake, 16-0114-00, [11/5/84P] (T.64, R.1E): 1B, 2A, 3B;

(2) *Alton Lake, 16-0622-00, [11/5/84P] (T.62, 63, R.4, 5): 1B, 2A, 3B;

(3) Artichoke Lake, 69-0623-00, [WR] (T.52, R.17, S.17, 18, 19, 20): 2B, 3B;

(4) Bath Lake, 16-0164-00, (T.62, R.1W, S.5, 6; T.63, R.1W, S.31, 32): 1B, 2A, 3B;

(5) Bean Lake (lower Twin), 38-0409-00, (T.56, R.8W, S.25, 26): 1B, 2A, 3B;

(6) Bear Lake (see Twin Lake, upper);

(7) Bearskin Lake, East, 16-0146-00, (T.64, R.1E, 1W): 1B, 2A, 3B;

(8) *Bearskin Lake, West, 16-0228-00, [3/7/88R] (T.64, 65, R.1): 1B, 2A, 3B;

(9) *Bench Lake, 16-0063-00, [11/5/84P] (T.64, 2E, S.6): 1B, 2A, 3B;

(10) Benson Lake, 38-0018-00, (T.58, R.6W, S.29): 1B, 2A, 3B;

(11) *Birch Lake, 16-0247-00, [3/7/88R] (T.65, R.1, 2): 1B, 2A, 3B;

(12) *Black Lake, 58-0001-00, [3/7/88P] (T.45, R.15): 1B, 2Bd, 3B;

(13) Bluebill Lake, 38-0261-00, [WR] (T.59, R.7, S.15): 2B, 3B;

(14) Bogus Lake, 16-0050-00, (T.62, R.2E, S.12): 1B, 2A, 3B;

(15) Bone Lake, 38-0065-00, (T.61, R.6W, S.13, 14): 1B, 2A, 3B;

(16) Bow Lake, 16-0211-00, (T.64, R.1W, S.15): 1C, 2Bd, 3C;

(17) Boys Lake, 16-0044-00, (T.62, R.2E, S.5, 8): 1B, 2A, 3B;

(18) Breda Lake, 69-0037-00, [WR] (T.56, R.12, S.16): 2B, 3B;

(19) Briar Lake, 69-0128-00, (T.53, R.13W, S.14, 15, 23): 1B, 2A, 3B;

(20) *Brule Lake, 16-0348-00, [11/5/84P] (T.63, R.2, 3): 1B, 2A, 3B;

(21) Cabin Lake, 38-0260-00, [WR] (T.59, R.7, S.13, 14, 23, 24): 2B, 3B;

(22) Canton Mine Pit Lake, 69-1294-00, (T.58, R.16, S.2, 3): 1C, 2Bd, 3C;

(23) Caribou Lake, 16-0360-00, [WR] (T.60, R.3W, S.1, 2, 11, 12; T.61, R.3W, S.35, 36): 2B, 3B;

(24) Carrot Lake, 16-0071-00, (T.64, R.2E, S.17): 1B, 2A, 3B;

(25) Cedar Lake, 69-0431-00, (T.58, R.15W, S.20): 1B, 2A, 3B;

(26) Chester Lake, 69-0033-00, (T.64, R.3E, S.32, 33): 1B, 2A, 3B;

(27) Christine Lake, 16-0373-00, [WR] (T.61, R.3W, S.28, 29, 32): 2B, 3B;

(28) Clearwater Lake (Clear Lake), 69-0397-00, (T.52, R.15W, S.23): 1B, 2A, 3B;

(29) *Clearwater Lake (Emby Lake), 16-0139-00, [11/5/84P] (T.65, R.1E): 1B, 2A, 3B;

(30) Colby Lake, 69-0249-00, (T.58, R.14): 1B, 2Bd, 3C;

(31) *Cone Lake, 16-0412-00, North, [11/5/84P] (T.63, 64, R.3): 1B, 2A, 3B;

(32) Corona Lake, 09-0048-00, (T.48, R.19W, S.11, 12): 1B, 2A, 3B;

(33) Corsica Mine Pit Lake, 69-1316-00, (T.58, R.16, S.18): 1C, 2Bd, 3C;

(34) Crosscut Lake, 38-0257-00, (T.59, R.7W, S.7, 18): 1B, 2A, 3B;

(35) *Crystal Lake, 16-0090-00, [11/5/84P] (T.64, R.1E, 2E): 1B, 2A, 3B;

(36) *Daniels Lake, 16-0150-00, [11/5/84P] (T.65, R.1E, 1W): 1B, 2A, 3B;

(37) *Davis Lake, 16-0435-00, [11/5/84P] (T.64, R.3): 1B, 2A, 3B;

(38) Devilfish Lake, 16-0029-00, (T.64, R.3E): 1B, 2A, 3B;

(39) Divide (Towhey) Lake, 38-0256-00, (T.59, R.7W, S.7, 8): 1B, 2A, 3B;

(40) Duke Lake, 16-0111-00, (T.63, R.1E, S.30): 1B, 2A, 3B;

(41) *Duncan Lake, 16-0232-00, [11/5/84P] (T.65, R.1): 1B, 2A, 3B;

(42) *Dunn Lake, 16-0245-00, [11/5/84P] (T.65, R.1, 2): 1B, 2A, 3B;

(43) East Lake, 38-0020-00, (T.59, R.6W, S.1, 2): 1B, 2A, 3B;

(44) *Echo Lake, 38-0028-00, [3/7/88R] (T.59, R.6, S.14, 15, 22, 23): 1B, 2A, 3B;

(45) Elbow Lake, Little, 69-1329-00, (T.57, R.18W, S.9, 10, 16): 1B, 2A, 3B;

(46) Embarrass Mine Pit (Sabin Lake or Lake Mine), 69-0429-00, (T.58, R.15W, S.5, 6): 1B, 2A, 3B;

(47) Esther Lake, 16-0023-00, (T.63, R.3E, S.6; T.64, R.3E, S.31): 1B, 2A, 3B;

(48) *Fan Lake (West Lily), 16-0084-00, [11/5/84P] (T.65, R.2E): 1B, 2Bd, 3A;

(49) Feather Lake, 16-0905-00, (T.61, R.5W, S.35): 1B, 2A, 3B;

(50) Flour Lake, 16-0147-00, (T.64, R.1E, 1W): 1B, 2A, 3B;

(51) Fourmile Lake, 16-0639-00, [WR] (T.60, R.5W, S.4, 8, 9, 10, 16, 17): 2B, 3B;

(52) Fowl Lake, North, 16-0036-00, (T.64, 65, R.3E): 1B, 2Bd, 3A;

(53) Fowl Lake, South, 16-0034-00, (T.64, 65, R.3E): 1B, 2Bd, 3A;

(54) Fraser Mine Pit Lake, (T.58, R.20, S.23): 1C, 2Bd, 3C, until the city of Chisholm no longer uses Fraser Mine Pit Lake as a water supply source for its public water system, and then the classification is identified in part 7050.0430;

(55) *Gadwall Lake (Gadwell Lake), 16-0060-00, [11/5/84P] (T.64, R.2E, S.3): 1B, 2A, 3B;

(56) *Gaskin Lake, 16-0319-00, [11/5/84P] (T.64, R.2): 1B, 2A, 3B;

(57) *Gogebic Lake, 16-0087-00, [11/5/84P] (T.65, R.2E, S.30, 31): 1B, 2A, 3B;

(58) Goldeneye (Duck) Lake, 38-0029-00, (T.59, R.6W, S.15): 1B, 2A, 3B;

(59) *Greenwood Lake, 16-0077-00, [3/7/88R] (T.64, R.2E): 1B, 2A, 3B;

(60) Hay Lake, 69-0435-00, [WR] (T.59, R.15, S.8): 2B, 3B;

(61) Hungry Jack Lake, 16-0227-00, (T.64, 65, R.1): 1B, 2A, 3B;

(62) Jim Lake (Jerry Lake), 16-0135-00, (T.64, R.1E): 1B, 2A, 3B;

(63) Judson Mine Pit, 69-1295-00, (T.58, R.19W, S.20, 29): 1B, 2A, 3B;

(64) Junco Lake, 16-0159-00, (T.62, R.1W, S.11, 12, 13): 1B, 2A, 3B;

(65) *Kemo Lake, 16-0188-00, [3/7/88R] (T.63, R.1): 1B, 2A, 3B;

(66) Kimball Lake, 16-0045-00, (T.62, R.2E, S.7, 8, 17): 1B, 2A, 3B;

(67) Leo Lake, 16-0198-00, (T.64, R.1W, S.4, 5): 1B, 2A, 3B;

(68) Lieung (Lieuna) Lake, 69-0123-00, [WR] (T.53, R.13, S.3, 4, 9, 10): 2B, 3B;

(69) *Lily Lakes (Vaseux Lake and Fan Lake), 16-0083-00 and 16-0084-00, [11/5/84P] (T.65, R.2E): 1B, 2Bd, 3A;

(70) Lima Lake, 16-0226-00, (T.64, R.1W, S.35): 1B, 2A, 3B;

(71) *Lizz Lake, 16-0199-00, [11/5/84P] (T.64, R.1W, S.7, 18): 1B, 2A, 3B;

(72) Loaine (Sand) Lake, 69-0016-00, (T.54, R.12W, S.16, 17): 1B, 2A, 3B;

(73) Loft Lake, 16-0031-00, (T.64, R.3E, S.21): 1B, 2A, 3B;

(74) Long Lake, 69-0044-00, [WR] (T.57, R.12, S.4, 5; T.58, R.12, S.32, 33): 2B, 3B;

(75) Margaret Lake, 16-0896-00, (T.64, R.3E, S.27, 28, 33, 34): 1B, 2A, 3B;

(76) Marsh Lake, 16-0488-00, [WR] (T.62, R.4W, S.22, 23, 27, 28): 2B, 3B;

(77) McFarland Lake, 16-0027-00, (T.64, R.3E): 1B, 2A, 3B;

(78) Mesabi (Missabe) Mountain Mine Pit Lake, 69-1292-00, (T.58, R.17, S.8): 1C, 2Bd, 3C;

(79) Mink Lake, 16-0046-00, (T.62, R.2E, S.8): 1B, 2A, 3B;

(80) Mirror Lake, 69-0234-00, (T.52, R.14W, S.19, 30): 1B, 2A, 3B;

(81) *Misquah Lake, 16-0225-00, [11/5/84P] (T.64, R.1): 1B, 2A, 3B;

(82) Moore Lake, 16-0489-00, [WR] (T.62, R.4W, S.23, 24): 2B, 3B;

(83) Moosehorn Lake, 16-0015-00, (T.63, R.3E, S.36; T.63, R.4E, S.31): 1B, 2A, 3B;

(84) *Moose Lake, 16-0043-00, [11/5/84P] (T.65, R.2E, 3E): 1B, 2A, 3A;

(85) Morton Mine Pit Lake, 69-1310-00, (T.57, R.21, S.10, 11, 14): 1C, 2Bd, 3C;

(86) *Moss Lake, 16-0234-00, [3/7/88R] (T.65, R.1): 1B, 2A, 3B;

(87) *Mountain Lake, 16-0093-00, [11/5/84P] (T.65, R.1E, 2E): 1B, 2A, 3B;

(88) Muckwa Lake, 16-0105-00, (T.63, R.1E, S.21, 28): 1B, 2A, 3B;

(89) *Mulligan Lake, 16-0389-00, [11/5/84P] (T.63, R.3W, S.1, 12): 1B, 2A, 3B;

(90) Musquash Lake, 16-0104-00, (T.63, R.1E, S.20, 28, 29): 1B, 2A, 3B;

(91) Normanna Lake, 69-0122-00, (T.52, R.13W, S.7, 8): 1B, 2A, 3B;

(92) Northern Light Lake, 16-0089-00, [WR] (T.63, R.2E, S.29, 30, 31, 32, 33; T.63, R.1E, S.25): 2B, 3B;

(93) Olga Lake, 16-0024-00, (T.63, R.3E, S.6; T.64, R.3E, S.31): 1B, 2A, 3B;

(94) Olson Lake, 16-0158-00, (T.62, R.1W, S.9, 16): 1B, 2A, 3B;

(95) *Onega Lake (Omega Lake), 16-0353-00, [11/5/84P] (T.64, R.2, 3): 1B, 2A, 3B;

(96) *Otto Lake, lower (South Otto), 16-0323-00, [11/5/84P] (T.64, R.2): 1B, 2A, 3B;

(97) Pancore (Lost) Lake, 16-0475-00, (T.61, R.4W, S.22, 27): 1B, 2A, 3B;

(98) Papoose Lake, 69-0024-00, [WR] (T.55, R.12, S.9): 2B, 3B;

(99) *Partridge Lake, 16-0233-00, [11/5/84P] (T.65, R.1): 1B, 2A, 3B;

(100) *Pemmican Lake, 16-0085-00, [11/5/84P] (T.65, R.2E, S.22): 1B, 2A, 3B;

(101) *Pike Lake, West, 16-0086-00, [11/5/84P] (T.65, R.2E): 1B, 2A, 3B;

(102) Pine Lake, 16-0194-00, (T.63, R.1W, S.35, 36): 1B, 2A, 3B;

(103) *Pine Lake, 16-0041-00, [11/5/84P] (T.64, 65, R.1E, 2E, 3E): 1B, 2A, 3B;

(104) Pine Mountain Lake, 16-0108-00, (T.63, R.1E, S.26, 27, 34, 35): 1B, 2A, 3B;

(105) Poplar Lake, 16-0239-00, (T.64N, R.1, 2W): 1C, 2Bd, 3C;

(106) *Ptarmigan Lake, 16-0183-00, [11/5/84P] (T.63, R.1, S.20, 29): 1B 2Bd, 3B;

(107) *Ram Lake, 16-0174-00, [11/5/84P] (T.63, R.1W, S.9, 10): 1B, 2A, 3B;

(108) Rice Lake, 16-0453-00, [WR] (T.61 R.3W, S.7; T.61, R.4W, S.2, 11, 12): 2B, 3B;

(109) *Rose Lake, 16-0230-00, [11/5/84P] (T.65, R.1): 1B, 2A, 3B;

(110) Round Island Lake, 38-0417-00 [WR] (T.59, R.8, S.12): 2B, 3B;

(111) Round Lake, 69-0048-00, [WR] (T.58, R.12, S.25, 26): 2B, 3B;

(112) St. James Mine Pit, 69-0428-00, (T.58, R.15W, S.3, 4): 1C, 2Bd, 3C;

(113) Saint Mary's Lake, 69-0651-00, (T.57, R.17, S.9, 16, 17): 1C, 2Bd, 3C;

(114) *Sawbill Lake, 16-0496-00, [11/5/84P] (T.62, 63, R.4): 1B, 2Bd, 3B;

(115) Section 8 Lake, 38-0258-00, (T.59, R.7W, S.8): 1B, 2A, 3B;

(116) Seven Beaver Lake, 69-0002-00, [WR] (T.58, R.11, 12): 2B, 3A;

(117) Shady, North, Lake, 16-0076-00, (T.64, R.2E, S.21, 22): 1B, 2A, 3B;

(118) Shoe Lake, 16-0080-00, (T.64, 2E, S.30): 1B, 2A, 3B;

(119) Sled Lake, 16-0897-00, (T.63, R.1W, S.3): 1B, 2A, 3B;

(120) *Sock Lake, 16-0335-00, [11/5/84P] (T.65, R.2W, S.26): 1B, 2A, 3B;

(121) Sonju Lake, 38-0248-00, (T.58, R.7W, S.27, 28): 1B, 2A, 3B;

(122) *South Lake, 16-0244-00, [11/5/84P] (T.65, R.1, 2): 1B, 2A, 3B;

(123) Spring Hole Lake, 69-1372-00, (T.55, R.14W, S.14): 1B, 2A, 3B;

(124) *State Lake, 16-0293-00, [11/5/84P] (T.63, 64, R.2): 1B, 2A, 3B;

(125) Steer Lake, 38-0920-00, (T.60, R.6W, S.32): 1B, 2A, 3B;

(126) Stone Lake, 69-0686-00, [WR] (T.55, R.17, S.6; T.55, R.18, S.1; T.56, R.17, S.31; T.56, R.18, S.36): 2B, 3B;

(127) Stone Lake (Skibo Lake), 69-0046-00, [WR] (T.58, R.12, S.17, 19, 20): 2B, 3B;

(128) Stone Lake (Murphy Lake or Tommila Lake), 69-0035-00, [WR] (T.56, R.12, S.13, 24): 2B, 3B;

(129) *Superior, Lake, excluding the portions identified in subitem (130) 16-0001-00, [11/5/84R] (T.49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, R.14W-7E): 1B, 2A, 3A;

(130) *Superior, Lake, 16-0001-00, [3/9/98P] (those portions of Lake Superior north of latitude 47 degrees, 57 minutes, 13 seconds, east of Hat Point, south of the Minnesota-Ontario boundary, and west of the Minnesota-Michigan boundary): 1B, 2A, 3A;

(131) Swamp River (Reservoir), 16-0901-00, [WR] (T.63, R.4E, S.4; T.64, R.4E, S.33): 2B, 3B;

(132) *Swan Lake, 16-0268-00, [11/5/84P] (T.63, R.2): 1B, 2A, 3B;

(133) Talus Lake, 16-0187-00, (T.63, R.1W, S.26, 27): 1B, 2A, 3B;

(134) Thompson Lake, 16-0160-00, (T.62, R.1W, S.19, 20, 29, 30): 1B, 2A, 3B;

(135) Thrasher Lake, 16-0192-00, (T.63, R.1W, S.31): 1B, 2A, 3B;

(136) Thrush Lake, 16-0191-00, (T.63, R.1W, S.31): 1B, 2A, 3B;

(137) *Topper Lake, 16-0336-00, [11/5/84P] (T.65, R.2W, S.27): 1B, 2A, 3B;

(138) *Trout Lake, 16-0049-00, [3/7/88R] (T.62, R.2E): 1B, 2A, 3B;

(139) *Trout Lake, Little, 16-0170-00, [11/5/84P] (T.63, R.1): 1B, 2A, 3B;

(140) Turnip Lake, 16-0132-00, (T.64, R.1E, S.24): 1B, 2A, 3B;

(141) Twin Lake, 69-1345-00, (T.50, R.14W, S.28, 33): 1B, 2A, 3B;

(142) *Twin Lake, upper (Bear Lake), 38-0408-00, [3/7/88R] (T.56, R.8, S.25): 1B, 2A, 3B;

(143) unnamed lake, 16-0903-00, (T.63, R.3E, S.20, 21, 28, 29): 1B, 2A, 3B;

(144) unnamed lake, 16-0908-00, (T.63, R.1W, S.31): 1B, 2A, 3B;

(145) *unnamed lake, 16-0237-00, [11/5/84P] (T.63, R.1, S.19, 30; T.63, R.2, S.24, 25): 1B, 2Bd, 3B;

(146) *Vale Lake, 16-0061-00, [11/5/84P] (T.64, R.2E, S.3): 1B, 2A, 3B;

(147) Vaseux Lake (East Lily), see Lily Lakes;

(148) *Vista Lake, 16-0224-00, [11/5/84P] (T.64, R.1): 1B, 2A, 3B;

(149) *Wanihigan Lake (Trap Lake), 16-0349-00, [11/5/84P] (T.63, 64, R.2, 3): 1B, 2A, 3B;

(150) *Wee Lake, 16-0183-00, [11/5/84P] (T.62, R.4W, S.13): 1B, 2A, 3B;

(151) *Wench Lake, 16-0398-00, [11/5/84P] (T.63, R.3W, S.7, 18): 1B, 2A, 3B;

(152) White Pine Lake, 16-0369-00, [WR] (T.61, R.3W, S.19, 20, 29, 30): 2B, 3B; and

(153) *Winchell Lake, 16-0354-00, [11/5/84P] (T.64, R.2, 3): 1B, 2A, 3B.

C. Calcareous fens: none currently listed.

D. Scientific and natural areas: *Black Lake Bog [3/7/88P] waters within the Black Lake Bog Scientific and Natural Area, Pine County, (T.45, R.15, S.18, 19, 30; T.45, R.16, S.13, 24, 25): 2B, 3B, except wetlands, which are 2D.

Subp. 2. **Lake of the Woods basin.** The water-use classifications for the stream reaches within each of the major watersheds in the Lake of the Woods basin listed in item A are found in tables entitled "Beneficial Use Designations for Stream Reaches" published on the website of the Minnesota Pollution Control Agency at www.pca.state.mn.us/regulations/minnesota-rulemaking. The tables are incorporated by reference and are not subject to frequent change. The date after each watershed listed in item A is the publication date of the applicable table. The water-use classifications for the other listed waters in the Lake of the Woods basin are as identified in items B to D. See parts 7050.0425 and 7050.0430 for the classifications of waters not listed. Designated use information for water bodies can also be accessed through the agency's Environmental Data Access (http://www.pca.state.mn.us/quick-links/eda-surface-water-data).

A. Streams (by eight-digit hydrologic unit code):

(1) 09030001 Rainy River - Headwaters (August 9, 2016);

(2) 09030002 Vermilion River (August 9, 2016);

(3) 09030003 Rainy River - Rainy Lake (August 9, 2016);

(4) 09030005 Little Fork River (August 9, 2016);

(5) 09030006 Big Fork River (August 9, 2016);

(6) 09030007 Rapid River (August 9, 2016);

(7) 09030008 Rainy River - Lower (August 9, 2016); and

(8) 09030009 Lake of the Woods (August 9, 2016).

B. Lakes:

(1) *Adams Lake, 38-0153-00, [11/5/84P] (T.64, R.6): 1B, 2A, 3B;

(2) *Agamok Lake, 38-0011-00, [11/5/84P] (T.65, R.5, 6): 1B, 2A, 3B;

(3) *Ahmakose Lake, 38-0365-00 [11/5/84P] (T.64, R.7): 1B, 2A, 3B;

(4) *Ahsub Lake, 38-0516-00, [11/5/84P] (T.64, R.8W, S.27, 28): 1B, 2A, 3B;

(5) *Alpine Lake, 16-0759-00, [11/5/84P] (T.65, R.5): 1B, 2A, 3B;

(6) *Alruss Lake, 69-0005-00, [11/5/84P] (T.64, R.11W, S.7; T.64, R.12W, S.12): 1B, 2A, 3B;

(7) *Amoeber Lake, 38-0227-00, [11/5/84P] (T.65, R.6, 7): 1B, 2A, 3B;

(8) *Arkose Lake, 38-0382-00, [11/5/84P] (T.64, 65, R.7): 1B, 2A, 3B;

(9) *Ashdick Lake (Caribou Lake), 38-0210-00, [11/5/84P] (T.66, R.6): 1B, 2A, 3B;

(10) *Basswood Lake, 38-0645-00, [11/5/84P] (T.64, 65, R.9, 10): 1B, 2A, 3B;

(11) *Bat Lake, 16-0752-00, [11/5/84P] (T.64, 65, R.5): 1B, 2A, 3B;

(12) *Beartrack Lake, 69-0480-00, [11/5/84P] (T.67, R.15): 1B, 2A, 3B;

(13) *Beaver Lake (Elbow Lake), 38-0223-00, [11/5/84P] (T.63, 64, R.6, 7): 1B, 2A, 3B;

(14) Beaver Hut Lake, 38-0737-00, (T.61, R.10W, S.30, 31; T.61, R.11, S.25, 36): 1B, 2A, 3B;

(15) Beetle Lake, 38-0551-00, (T.60, R.9W, S.7): 1B, 2A, 3B;

(16) Big Lake, 69-0190-00, (T.64, 65, R.13): 1C, 2Bd, 3C;

(17) *Bingshick Lake, 16-0627-00, [11/5/84P] (T.65, R.4, 5): 1B, 2A, 3B;

(18) *Brandt Lake (Brant Lake), 16-0600-00, [11/5/84P] (T.65, R.4): 1B, 2A, 3B;

(19) *Burntside Lake, 69-0118-00, [3/7/88R] (T.63, 64, R.12, 13, 14): 1B, 2A, 3B;

(20) Camp Four (Wessman) Lake, 69-0788-00, (T.59, R.19W, S.4): 1B, 2A, 3B;

(21) *Camp Lake, 38-0789-00, [11/5/84P] (T.64, R.11): 1B, 2Bd, 3B;

(22) *Caribou Lake, 31-0620-00, [3/7/88R] (T.58, R.26): 1B, 2A, 3B;

(23) *Cash Lake, 16-0438-00, [11/5/84P] (T.64, R.3): 1B, 2A, 3B;

(24) Cedar Lake, 38-0810-00, (T.63, R.11, 12): 1C, 2Bd, 3C;

(25) Chant Lake, 69-0172-00, (T.63, R.13W, S.10): 1B, 2A, 3B;

(26) *Cherokee Lake, 16-0524-00, [11/5/84P] (T.63, 64, R.4): 1B, 2A, 3B;

(27) *Cherry Lake, 38-0166-00, [11/5/84P] (T.65, R.6): 1B, 2A, 3B;

(28) *Conchu Lake, 38-0720-00, [11/5/84P] (T.63, R.10W, S.21, 22): 1B, 2A, 3B;

(29) *Crab Lake (includes West Crab Lake, 69-0297-00), 69-0220-00, [11/5/84P] (T.63, R.13, 14): 1B, 2A, 3B;

(30) Crab Lake, 16-0357-00, (T.65, R.2, 3): 1B, 2A, 3B;

(31) Crane Lake, 69-0616-00, (T.67, 68, R.16, 17): 1B, 2A, 3A;

(32) *Crooked Lake, 16-0723-00, [11/5/84P] (T.64, R.5): 1B, 2A, 3B;

(33) *Crooked Lake, 38-0817-00, [11/5/84P] (T.66, R.11, 12): 1B, 2A, 3B;

(34) *Cruiser Lake (Trout Lake), 69-0832-00, [11/5/84P] (T.69, 70, R.19): 1B, 2A, 3B;

(35) Cub Lake, 69-1318-00, (T.61, R.14W, S.2): 1B, 2A, 3B;

(36) Dan Lake, 38-0853-00, (T.63, R.10W, S.17): 1B, 2A, 3B;

(37) Deepwater Lake, 69-0858-00, (T.59, R.20W, S.2): 1B, 2A, 3B;

(38) Dry Lake, 69-0064-00, (T.63, R.12W, S.9): 1B, 2A, 3B;

(39) Dry Lake, Little, 69-1040-00, (T.63, R.12W, S.9): 1B, 2A, 3B;

(40) *Eddy Lake, 38-0187-00, [11/5/84P] (T.65, R.6): 1B, 2A, 3B;

(41) Eikela Lake, 38-0677-00, (T.60, R.10W, S.22): 1B, 2A, 3B;

(42) Ennis Lake, 38-0634-00, (T.64, R.9W, S.33): 1B, 2A, 3B;

(43) Erskine Lake, 31-0311-00, (T.61, R.24W, S.2, 3): 1B, 2A, 3B;

(44) *Ester Lake (Gnig Lake), 38-0207-00, [11/5/84P] (T.65, 66, R.6): 1B, 2A, 3B;

(45) *Eugene Lake, 69-0473-00, [11/5/84P] (T.67, R.15): 1B, 2A, 3B;

(46) *Explorer Lake (South Three Lake), 38-0399-00, [11/5/84P] (T.64, R.7, 8): 1B, 2A, 3B;

(47) Extortion Lake, 16-0450-00, (T.65, R.3W, S.31, 32): 1B, 2A, 3B;

(48) Fall Lake, 38-0811-00, (T.63, 64, R.11, 12): 1B, 2Bd, 3C;

(49) Farm Lake, 38-0779-00, (T.62, 63, R.11): 1C, 2Bd, 3C;

(50) *Fat Lake, 69-0481-00, [11/5/84P] (T.67, R.15): 1B, 2A, 3B;

(51) *Fay Lake, 16-0783-00, [11/5/84P] (T.65, R.5): 1B, 2A, 3B;

(52) Fenske Lake, 69-0085-00, (T.64, R.12, S.29, 30, 32): 1C, 2Bd, 3C;

(53) *Fern Lake, 16-0716-00, [11/5/84P] (T.64, R.5): 1B, 2A, 3B;

(54) *Fern Lake, West, 16-0718-00, [11/5/84P] (T.64, R.5): 1B, 2A, 3B;

(55) *Finger Lake, 69-0348-00, [11/5/84P] (T.67, R.14): 1B, 2A, 3B;

(56) *Fishdance Lake, 38-0343-00, [11/5/84P] (T.63, R.7): 1B, 2A, 3B;

(57) *Found Lake, 38-0620-00, [11/5/84P] (T.64, R.9W, S.10, 15): 1B, 2A, 3B;

(58) *Fraser Lake, 38-0372-00, [11/5/84P] (T.64, R.7): 1B, 2A, 3B;

(59) *French Lake, 16-0755-00, [11/5/84P] (T.64, 65, R.5): 1B, 2A, 3B;

(60) *Frost Lake, 16-0571-00, [11/5/84P] (T.64, R.4): 1B, 2A, 3B;

(61) *Gabimichigami Lake, 16-0811-00, [11/5/84P] (T.64, 65, R.5, 6): 1B, 2A, 3B;

(62) *Ge-Be-On-Equat Lake, 69-0350-00, [11/5/84P] (T.67, R.14): 1B, 2A, 3B;

(63) *Gijikiki Lake (Cedar Lake), 38-0209-00, [11/5/84P] (T.65, 66, R.6): 1B, 2A, 3B;

(64) *Gillis Lake, 16-0753-00, [11/5/84P] (T.64, 65, R.5): 1B, 2A, 3B;

(65) Glacier Pond No. 1, 38-0712-00, (T.63, R. 10W, S.11): 1B, 2A, 3B;

(66) Glacier Pond No. 2, 38-0712-02, (T.63, R.10W, S.11): 1B, 2A, 3B;

(67) *Gordon Lake, 16-0569-00, [11/5/84P] (T.64, R.4): 1B, 2A, 3B;

(68) Gull Lake, 16-0632-00, (T.66, R.4, 5): 1C, 2Bd, 3C;

(69) *Gun Lake, 69-0487-00, [11/5/84P] (T.67, 68, R.15): 1B, 2A, 3B;

(70) *Gunflint Lake, 16-0356-00, [3/7/88R] (T.65, R.2, 3, 4): 1B, 2A, 3B;

(71) Gunflint Lake, Little, 16-0330-00, (T.65, R.2): 1B, 2Bd, 3C;

(72) Gypsy Lake, 38-0665-00, (T.60, R.10W, S.6, 7): 1B, 2A, 3B;

(73) Hanson Lake, 69-0189-00, (T.64, R.13W, S.36): 1B, 2A, 3B;

(74) *Hanson Lake, 38-0206-00, [11/5/84P] (T.65, 66, R.6): 1B, 2A, 3B;

(75) High Lake, 69-0071-00, (T.63, R.12W, S.3, 4, 5; T.64, R.12W, S.33, 34): 1B, 2A, 3B;

(76) Hogback (Twin or Canal) Lake, 38-0057-01 and 38-0057-02, (T.60, R.6W, S.31): 1B, 2A, 3B;

(77) *Holt Lake, 38-0178-00, [11/5/84P] (T.65, R.6): 1B, 2A, 3B;

(78) *Howard Lake, 16-0789-00, [11/5/84P] (T.65, R.5): 1B, 2A, 3B;

(79) *Hustler Lake, 69-0343-00, [11/5/84P] (T.66, 67, R.14): 1B, 2A, 3B;

(80) *Ima Lake (Slate Lake), 38-0400-00, [11/5/84P] (T.64, R.7, 8): 1B, 2A, 3B;

(81) Indian Lake, 38-0440-00, (T.60, R.8W, S.35): 1B, 2A, 3B;

(82) *Jacob (Louis) Lake, 69-0077-00, [11/5/84P] (T.64, R.12W, S.11, 12): 1B, 2A, 3B;

(83) James (Jammer) Lake, 69-0734-00, (T.60, R.18W, S.27): 1B, 2A, 3B;

(84) Jasper Lake, 38-0641-00, (T.63, 64, R.9, 10): 1C, 2Bd, 3C;

(85) *Jasper Lake, 16-0768-00, [11/5/84P] (T.65, R.5): 1B, 2A, 3B;

(86) *Johnson Lake, 69-0691-00, [3/7/88R] (T.67, 68, R.17, 18): 1B, 2A, 3B;

(87) Jouppi Lake, 38-0909-00, (T.59, R.8W, S.14, 22, 23): 1B, 2A, 3B;

(88) Judd Lake, 38-0615-00, (T.63, R.9W, S.4, 5; T.64, R.9W, S.32, 33): 1B, 2A, 3B;

(89) *Kabetogama Lake, 69-0845-00, [11/5/84P] (T.69, 70, R.19, 20, 21, 22): 1B, 2Bd, 3A;

(90) *Karl Lake, 16-0461-00, [11/5/84P] (T.64, R.3, 4): 1B, 2A, 3B;

(91) *Kek Lake, Little, 38-0228-00, [11/5/84P] (T.65, R.6, 7): 1B, 2A, 3B;

(92) *Kekekabic Lake, 38-0226-00, [11/5/84P] (T.64, 65, R.6, 7): 1B, 2A, 3B;

(93) *Knife Lake, 38-0404-00, [11/5/84P] (T.65, R.6, 7, 8): 1B, 2A, 3B;

(94) *Lake of the Clouds Lake (Dutton Lake), 38-0169-00, [11/5/84P] (T.65, R.6): 1B, 2A, 3B;

(95) Lake of the Woods, 39-0002-00, (T.161, 162, 163, 164, 165, 166, 167, 168, R.30, 31, 32, 33, 34, 35, 36): 1B, 2Bd, 3A;

(96) Lake Vermilion, 69-0378-00, (T.61, 62, 63, R.14, 15, 16, 17, 18): 1C, 2Bd, 3C;

(97) *Larson Lake, 31-0317-00, [3/7/88R] (T.61, R.24W, S.16, 21): 1B, 2A, 3B;

(98) Little Long Lake, 69-0066-00, (T.63, R.12): 1C, 2Bd, 3C;

(99) *Long Island Lake, 16-0460-00, [11/5/84P] (T.64, R.3, 4): 1B, 2A, 3B;

(100) *Loon Lake, 16-0448-00, [3/7/88R] (T.65, R.3): 1B, 2A, 3B;

(101) *Loon Lake, 69-0470-00, [11/5/84P] (T.66, 67, R.15): 1B, 2A, 3B;

(102) *Lunar Lake (Moon Lake), 38-0168-00, [11/5/84P] (T.65, R.6): 1B, 2A, 3B;

(103) *Lynx Lake, 69-0383-00, [11/5/84P] (T.66, R.14, 15): 1B, 2A, 3B;

(104) *Magnetic Lake, 16-0463-00, [3/7/88R] (T.65, R.3, 4): 1B, 2A, 3B;

(105) *Makwa Lake (Bear Lake), 38-0147-00, [11/5/84P] (T.64, R.6): 1B, 2A, 3B;

(106) *Marble Lake, 38-0109-00, [11/5/84P] (T.64, R.6): 1B, 2A, 3B;

(107) *Mavis Lake, 16-0528-00, [11/5/84P] (T.64, R.4W, S.4): 1B, 2A, 3B;

(108) *Mayhew Lake, 16-0337-00, [3/7/88R] (T.65, R.2): 1B, 2A, 3B;

(109) *Meditation Lake, 16-0583-00, [11/5/84P] (T.65, R.4W, S.7, 8): 1B, 2A, 3B;

(110) *Mesaba Lake, 16-0673-00, [11/5/84P] (T.63, R.5): 1B, 2A, 3B;

(111) Miner's Mine Pit, 69-1293-00, (T.63, R.12W, S.26, 27, 28): 1B, 2A, 3B;

(112) *Missing Link Lake, 16-0529-00, [11/5/84P] (T.64, R.4W, S.4): 1B, 2A, 3B;

(113) *Missionary Lake (East Three Lake), 38-0398-00, [11/5/84P] (T.64, R.7, 8): 1B, 2A, 3B;

(114) *Moose Lake, 38-0644-00, [11/5/84P] (T.64, R.9, 10): 1B, 2Bd, 3B;

(115) *Mora Lake, 16-0732-00, [11/5/84P] (T.64, R.5): 1B, 2A, 3B;

(116) *Mukooda Lake, 69-0684-00, [11/5/84P] (T.68, R.17): 1B, 2A, 3B;

(117) *Namakan Lake, 69-0693-00, [11/5/84P] (T.69, 70, R.17, 18, 19): 1B, 2Bd, 3A;

(118) *Neglige Lake, 38-0492-00, [11/5/84P] (T.64, R.8W, S.1, 2, 11, 12): 1B, 2A, 3B;

(119) Nickel (Nichols) Lake, 31-0470-00, (T.59, R.25W, S.12): 1B, 2A, 3B;

(120) Norberg Lake, 69-1312-00, (T.61, R.14W, S.1): 1B, 2A, 3B;

(121) *North Lake, 16-0331-00, [3/7/88R] (T.65, R.2): 1B, 2A, 3B;

(122) North Lake, Little, 16-0329-00, (T.65, R.2): 1B, 2Bd, 3C;

(123) Norway Lake, 38-0688-00, (T.61, R.10W, S.3): 1B, 2A, 3B;

(124) *Ogishkemuncie Lake, 38-0180-00, [11/5/84P] (T.65, R.6): 1B, 2A, 3B;

(125) *Ojibway Lake (upper Twin), 38-0640-00, [3/7/88R] (T.63, R.9, 10): 1B, 2A, 3B;

(126) *Owl Lake, 16-0726-00, [11/5/84P] (T.64, R.5): 1B, 2A, 3B;

(127) *Oyster Lake, 69-0330-00, [11/5/84P] (T.66, R.14): 1B, 2A, 3B;

(128) *Paulson Lake, 16-0626-00, [11/5/84P] (T.65, R.4W, S.19; T.65, R.5W, S.24): 1B, 2A, 3B;

(129) Peanut Lake, 38-0662-00, (T.60, R.10W, S.5): 1B, 2A, 3B;

(130) Pelican Lake, 69-0841-00, (T.64, 65, R.19, 20, 21): 1C, 2Bd, 3C;

(131) *Pellet Lake, 16-0592-00, [11/5/84P] (T.65, R.4, S.19, 20): 1B, 2Bd, 3B;

(132) *Peter Lake, 16-0757-00, [11/5/84P] (T.64, 65, R.5): 1B, 2A, 3B;

(133) Pickerel Lake, 69-0934-00, (T.60, R.21W, S.17): 1B, 2A, 3B;

(134) Portage Lake, 16-0327-00, (T.64, R. 2W, S.3, 4, 5; T.65, R.2W, S.33): 1B, 2A, 3B;

(135) *Portage Lake, 38-0524-00, [11/5/84P] (T.65, R.8): 1B, 2A, 3B;

(136) Portage Lake, Little, 16-0297-00, (T.64, R.2W, S.3): 1B, 2A, 3B;

(137) *Powell Lake, 16-0756-00, [11/5/84P] (T.64, 65, R.5): 1B, 2A, 3B;

(138) *Rabbit Lake, 38-0214-00, [11/5/84P] (T.66, R.6): 1B, 2A, 3B;

(139) *Rainy Lake, 69-0694-00, [11/5/84P] (T.70, 71, R.18, 19, 20, 21, 22, 23): 1B, 2Bd, 3A;

(140) *Raven Lake (Lynx Lake), 38-0113-00, [11/5/84P] (T.64, R.6): 1B, 2A, 3B;

(141) *Red Rock Lake, 16-0793-00, [11/5/84P] (T.65, 66, R.5): 1B, 2A, 3B;

(142) Regenbogan Lake, 69-0081-00, (T.64, R.12W, S.18): 1B, 2A, 3B;

(143) *Rog Lake, 16-0765-00, [11/5/84P] (T.65, R.5W, S.16, 17): 1B, 2A, 3B;

(144) *Ruby Lake, Big, 16-0333-00, [11/5/84P] (T.66, R.14): 1B, 2A, 3B;

(145) *Saganaga Lake, 16-0633-00, [11/5/84P] (T.66, 67, R.4, 5): 1B, 2A, 3B;

(146) *Saganaga Lake, Little, 16-0890-00, [11/5/84P] (T.64, R.5, 6): 1B, 2A, 3B;

(147) *Sand Point Lake, 69-0617-00, [11/5/84P] (T.67, 68, 69, R.16, 17): 1B, 2A, 3A;

(148) Scarp (Cliff) Lake, 38-0058-00, (T.60, R.6W, S.31, 32): 1B, 2A, 3B;

(149) *Sea Gull Lake, 16-0629-00, [11/5/84P] (T.65, 66, R.4, 5): 1B, 2A, 3B;

(150) *Sema Lake (Coon Lake), 38-0386-00, [11/5/84P] (T.65, R.7): 1B, 2A, 3B;

(151) Shoo-fly Lake, 38-0422-00, (T.59, R.8W, S.1; T.60, R.8W, S.36): 1B, 2A, 3B;

(152) *Skull Lake, 38-0624-00, [11/5/84P] (T.64, R.9W, S.14): 1B, 2A, 3B;

(153) *Snowbank Lake, 38-0529-00, [11/5/84P] (T.63, 64, R.8, 9): 1B, 2A, 3B;

(154) *Spoon Lake (Fames Lake), 38-0388-00, [11/5/84P] (T.65, R.7): 1B, 2A, 3B;

(155) *Spring Lake, 69-0761-00, [3/7/88R] (T.68, R.18): 1B, 2A, 3B;

(156) Steamhaul Lake, 38-0570-00, (T.60, R.9W, S.23): 1B, 2A, 3B;

(157) *Strup Lake, 38-0360-00, [11/5/84P] (T.64, R.7): 1B, 2A, 3B;

(158) *Sumpet Lake, 38-0283-00, [11/5/84P] (T.61, R.7): 1B, 2Bd, 3B;

(159) Surber Lake, 16-0343-00, (T.65, R.2W, S.34): 1B, 2A, 3B;

(160) *Takucmich Lake, 69-0369-00, [11/5/84P] (T.67, 68, R.14): 1B, 2A, 3B;

(161) *Tarry Lake, 16-0731-00, [11/5/84P] (T.64, R.5): 1B, 2A, 3B;

(162) *Thomas Lake, 38-0351-00, [11/5/84P] (T.63, 64, R.7): 1B, 2A, 3B;

(163) *Thumb Lake, 69-0352-00, [11/5/84P] (T.67, R.14): 1B, 2A, 3B;

(164) Tofte Lake, 38-0724-00, (T.63, R.10W, S.2, 3, 10, 11; T.64, R.10W, S.35): 1B, 2A, 3B;

(165) *Topaz Lake (Star Lake), 38-0172-00, [11/5/84P] (T.65, R.6): 1B, 2A, 3B;

(166) *Town Lake, 16-0458-00, [11/5/84P] (T.63, 64, R.3, 4): 1B, 2A, 3B;

(167) Trappers Lake, 38-0431-00, (T.60, R.8W, S.27, 34): 1B, 2A, 3B;

(168) Trip Lake, 16-0451-00, (T.65, R.3W, S.32): 1B, 2A, 3B;

(169) *Trout Lake, Big, 69-0498-00, [11/5/84P] (T.63, 64, R.15, 16): 1B, 2A, 3B;

(170) *Trout Lake, Little (Pocket Lake), 69-0682-00, [11/5/84P] (T.68, R.17): 1B, 2A, 3B;

(171) *Trygg (Twigg) Lake, 69-0389-00, [11/5/84P] (T.68, R.14W, S.31; T.68, R.15W, S.36): 1B, 2A, 3B;

(172) *Tucker Lake (Trucker Lake), 16-0417-00, [11/5/84P] (T.64, R.3): 1B, 2Bd, 3B;

(173) *Tuscarora Lake, 16-0623-00, [11/5/84P] (T.64, R.4, 5): 1B, 2A, 3B;

(174) unnamed (Pear) lake, 38-0769-00, (T.60, R.11W, S.4): 1B, 2A, 3B;

(175) *unnamed lake, 16-0598-00, [11/5/84P] (T.65, R.4, S.29, 30): 1B, 2Bd, 3B;

(176) unnamed swamp, Winton, (T.63, R.11, S.19; T.63, R.12, S.24): 7;

(177) *Vera Lake, 38-0491-00, [11/5/84P] (T.64, R.8): 1B, 2A, 3B;

(178) Vermilion, Lake, 69-0378-00, (see Lake Vermilion);

(179) *Virgin Lake, 16-0719-00, [11/5/84P] (T.64, R.5): 1B, 2A, 3B;

(180) West Crab Lake, 69-0220-00, (see Crab Lake);

(181) White Iron Lake, 69-0004-00, (T.62, 63, R.11, 12): 1C, 2Bd, 3C;

(182) *Wine Lake, 16-0686-00, [11/5/84P] (T.63, R.5): 1B, 2A, 3B;

(183) *Wisini Lake, 38-0361-00, [11/5/84P] (T.64, R.7): 1B, 2A, 3B; and

(184) Woods, Lake of the, 39-0002-00, (see Lake of the Woods).

C. Calcareous fens: none currently listed.

D. Scientific and natural areas: *Purvis Lake-Ober, [11/5/84P] waters within the Purvis Lake-Ober Foundation Scientific and Natural Area, Saint Louis County, (T.62, R.13): 2B, 3B, except wetlands, which are 2D.

Subp. 3. **Red River of the North basin.** The water-use classifications for the stream reaches within each of the major watersheds in the Red River of the North basin listed in item A are found in tables entitled "Beneficial Use Designations for Stream Reaches" published on the website of the Minnesota Pollution Control Agency at www.pca.state.mn.us/regulations/minnesota-rulemaking. The tables are incorporated by reference and are not subject to frequent change. The date after each watershed listed in item A is the publication date of the applicable table. The water-use classifications for the other listed waters in the Red River of the North basin are as identified in items B to D. See parts 7050.0425 and 7050.0430 for the classifications of waters not listed. Designated use information for water bodies can also be accessed through the agency's Environmental Data Access (http://www.pca.state.mn.us/quick-links/eda-surface-water-data).

A. Streams (by eight-digit hydrologic unit code):

(1) 09020101 Bois de Sioux River (August 9, 2016);

(2) 09020102 Mustinka River (August 9, 2016);

(3) 09020103 Otter Tail River (August 9, 2016);

(4) 09020104 Upper Red River of the North (August 9, 2016);

(5) 09020106 Buffalo River (August 9, 2016);

(6) 09020107 Red River of the North - Marsh River (August 9, 2016);

(7) 09020108 Wild Rice River (August 9, 2016);

(8) 09020301 Red River of the North - Sandhill River (August 9, 2016);

(9) 09020302 Upper/Lower Red Lake (August 9, 2016);

(10) 09020303 Red Lake River (August 9, 2016);

(11) 09020304 Thief River (August 9, 2016);

(12) 09020305 Clearwater River (August 9, 2016);

(13) 09020306 Red River of the North - Grand Marais Creek (August 9, 2016);

(14) 09020309 Snake River (August 9, 2016);

(15) 09020311 Red River of the North - Tamarac River (August 9, 2016);

(16) 09020312 Two Rivers (August 9, 2016); and

(17) 09020314 Roseau River (August 9, 2016).

B. Lakes:

(1) Bass Lake, 56-0722-00, (T.135, R.42W, S.10, 11): 1B, 2A, 3B;

(2) Hanson Lake, 03-0177-00, (T.139, R.39W, S.6): 1B, 2A, 3B;

(3) Hoot Lake, 56-0782-00, (T.133, R.42, 43): 1C, 2Bd, 3C;

(4) Lake Bronson, 35-0003-00, (T.160, 161, R.46): 1C, 2Bd, 3C;

(5) Twin Lake, East, 03-0362-00, (T.138, R.41): 1B, 2A, 3B;

(6) unnamed slough, Vergas, (T.137, R.40, S.18; T.137, R.41, S.13, 24): 7;

(7) Wapatus (Island) Lake, 15-0127-00, (T.144, R.38W, S.21, 28): 1B, 2A, 3B; and

(8) Wright Lake, 56-0783-00, (T.133, R.42, 43): 1C, 2Bd, 3C.

C. Calcareous fens:

(1) *Agassiz-Olson WMA fen, 17, Norman [4/18/94R] (T.146, R.45, S.22): 2D;

(2) *Anna Gronseth Prairie fen, 47, Wilkin [4/18/94R] (T.134, R.45, S.15): 2D;

(3) *Anna Gronseth Prairie fen, 49, Wilkin [4/18/94R] (T.134, R.45, S.10): 2D;

(4) *Anna Gronseth Prairie fen, 52, Wilkin [4/18/94R] (T.134, R.45, S.4): 2D;

(5) *Barnesville Moraine fen, 44, Clay [4/18/94R] (T.137, R.44, S.18): 2D;

(6) *Barnesville WMA fen, 10, Clay [3/7/88R] (T.137, R.45, S.1): 2D;

(7) *Barnesville WMA fen, 43, Clay [4/18/94R] (T.137, R.44, S.18): 2D;

(8) *Chicog Prairie fen, 39, Polk [4/18/94R] (T.148, R.45, S.28): 2D;

(9) *Chicog Prairie fen, 40, Polk [3/7/88R] (T.148, R.45, S.33): 2D;

(10) *Chicog Prairie fen, 41, Polk [3/7/88R] (T.148, R.45, S.20, 29): 2D;

(11) *Chicog Prairie fen, 42, Polk [3/7/88R] (T.148, R.45, S.33): 2D;

(12) *Clearbrook fen, 61, Clearwater [3/7/88R] (T.149, R.37, S.17): 2D;

(13) *Faith Prairie fen, 15, Norman [4/18/94R] (T.144, R.43, S.26): 2D;

(14) *Faith Prairie fen, 16, Norman [4/18/94R] (T.144, R.43, S.35): 2D;

(15) *Faith Prairie fen, 27, Norman [3/7/88R] (T.144, R.43, S.25): 2D;

(16) *Felton Prairie fen, 28, Clay [3/7/88R] (T.142, R.46, S.36): 2D;

(17) *Felton Prairie fen, 36, Clay [3/7/88R] (T.141, R.46, S.13): 2D;

(18) *Felton Prairie fen, 48, Clay [4/18/94R] (T.142, R.45, S.31): 2D;

(19) *Felton Prairie fen, 53, Clay [4/18/94R] (T.141, R.46, S.24): 2D;

(20) *Green Meadow fen, 14, Norman [4/18/94R] (T.145, R.45, S.35, 36): 2D;

(21) *Haugtvedt WPA North Unit, 54, Clay [4/18/94R] (T.137, R.44, S.28, 29): 2D;

(22) *Kittleson Creek Mire fen, 55, Polk [4/18/94R] (T.147, R.44, S.6, 7): 2D;

(23) *Rothsay Prairie fen, 46, Wilkin [4/18/94R] (T.136, R.45, S.33): 2D;

(24) *Rothsay Prairie fen, 50, Wilkin [4/18/94R] (T.135, R.45, S.15, 16): 2D;

(25) *Rothsay Prairie fen, 51, Wilkin [4/18/94R] (T.135, R.45, S.9): 2D;

(26) *Sanders East fen, 65, Pennington [4/18/94R] (T.153, R.44, S.7): 2D;

(27) *Sanders East fen, 74, Pennington [4/18/94R] (T.153, R.44, S.7): 2D;

(28) *Sanders fen, 64, Pennington [4/18/94R] (T.153, R.44, S.18, 19): 2D;

(29) *Spring Creek WMA NHR fen, 34, Becker [3/7/88R] (T.142, R.42, S.13): 2D;

(30) *Spring Prairie fen, 37, Clay [3/7/88R] (T.140, R.46, S.11): 2D;

(31) *Tamarac River fen, 71, Marshall [4/18/94R] (T.157, R.46, S.2): 2D;

(32) *Tympanuchus Prairie fen, 26, Polk [3/7/88R] (T.149, R.45, S.17): 2D;

(33) *Tympanuchus Prairie fen, 38, Polk [3/7/88R] (T.149, R.45, S.16): 2D;

(34) *Viking fen, 68, Marshall [4/18/94R] (T.155, R.45, S.18): 2D;

(35) *Viking fen, 70, Marshall [4/18/94R] (T.155, R.45, S.20): 2D;

(36) *Viking Strip fen, 69, Marshall [4/18/94R] (T.154, R.45, S.4): 2D; and

(37) *Waubun WMA fen, 11, Mahnomen [3/7/88R] (T.143, R.42, S.25): 2D.

D. Scientific and natural areas:

(1) *Green Water Lake, [11/5/84P] waters within the Green Water Lake Scientific and Natural Area, Becker County, (T.141, R.38, S.28, 33, 34): 2B, 3B, except wetlands, which are 2D; and

(2) *Pembina Trail Preserve, [3/7/88P] waters within the Pembina Trail Preserve Scientific and Natural Area, Polk County, (T.148, R.45, S.1, 2; T.149, R.44, S.18, 19, 30, 31; T.149, R.45, S.13, 24, 25, 36): 2B, 3B, except wetlands, which are 2D.

Subp. 4. **Upper Mississippi River basin (headwaters to the confluence with the St. Croix River).** The water-use classifications for the stream reaches within each of the major watersheds in the upper Mississippi River basin from the headwaters to the confluence with the St. Croix River listed in item A are found in tables entitled "Beneficial Use Designations for Stream Reaches" published on the website of the Minnesota Pollution Control Agency at www.pca.state.mn.us/regulations/minnesota-rulemaking. The tables are incorporated by reference and are not subject to frequent change. The date after each watershed listed in item A is the publication date of the applicable table. The water-use classifications for the other listed waters in the upper Mississippi River basin from the headwaters to the confluence with the St. Croix River are as identified in items B to D. See parts 7050.0425 and 7050.0430 for the classifications of waters not listed. Designated use information for water bodies can also be accessed through the agency's Environmental Data Access (http://www.pca.state.mn.us/quick-links/eda-surface-water-data).

A. Streams (by eight-digit hydrologic unit code):

(1) 07010101 Mississippi River - Headwaters (August 9, 2016);

(2) 07010102 Leech Lake River (August 9, 2016);

(3) 07010103 Mississippi River - Grand Rapids (August 9, 2016);

(4) 07010104 Mississippi River - Brainerd (August 9, 2016);

(5) 07010105 Pine River (August 9, 2016);

(6) 07010106 Crow Wing River (August 9, 2016);

(7) 07010107 Redeye River (August 9, 2016);

(8) 07010108 Long Prairie River (August 9, 2016);

(9) 07010201 Mississippi River - Sartell (August 9, 2016);

(10) 07010202 Sauk River (August 9, 2016);

(11) 07010203 Mississippi River - St. Cloud (August 9, 2016);

(12) 07010204 North Fork Crow River (August 9, 2016);

(13) 07010205 South Fork Crow River (August 9, 2016);

(14) 07010206 Mississippi River - Twin Cities (August 9, 2016); and

(15) 07010207 Rum River (August 9, 2016).

B. Lakes:

(1) Allen Lake, 18-0208-00, (T.138, R.26W, S.5): 1B, 2A, 3B;

(2) Bald Eagle Lake, 62-0002-00, (T.30, 31, R.21, 22): 1C, 2Bd, 3C;

(3) Bee Cee Lake, 31-0443-00, (T.58, R.25W, S.28, 33): 1B, 2A, 3B;

(4) Benedict Lake, 29-0048-00, (T.142, R.32): 1B, 2A, 3B;

(5) Benjamin Lake, 04-0033-00, (T.148, R.30W, S.7, 18; T.148, R.31W, S.13): 1B, 2A, 3B;

(6) Blacksmith Lake, 29-0275-00, (T.142, R.35W, S.13): 1B, 2A, 3B;

(7) *Blue Lake, 01-0181-00, [3/7/88R] (T.46, 47, R.27): 1B, 2A, 3B;

(8) *Blue Lake, 29-0184-00, [3/7/88R] (T.141, R.34): 1B, 2A, 3B;

(9) *Bluewater Lake, 31-0395-00, [3/7/88R] (T.57, R.25): 1B, 2A, 3B;

(10) Cenaiko Lake (unnamed), 02-0654-00, (T.31, R.24W, S.26): 1B, 2A, 3B;

(11) Centerville Lake, 02-0006-00, (T.31, R.22): 1C, 2Bd, 3C;

(12) Charley Lake, 62-0062-00, (T.30, R.23): 1C, 2Bd, 3C;

(13) Crappie Lake, 29-0127-00, (T.143, R.33W, S.31):1B, 2A, 3B;

(14) Deep Lake, 62-0018-00, (T.30, R.22): 1C, 2Bd, 3C;

(15) Diamond Lake, 11-0396-00, (T.141, R.30W, S.26, 27, 34): 1B, 2A, 3B;

(16) Hazel Lake, 11-0295-00, (T.141, R.29W, S.25): 1B, 2A, 3B;

(17) Hay Lake, lower, 18-0378-00, (T.137, R.28, 29): 1B, 2A, 3B;

(18) *Kabekona Lake, 29-0075-00, [3/7/88R] (T.142, 143, R.32, 33): 1B, 2A, 3B;

(19) Kennedy Lake, 31-0137-00, (T.58, R.23): 1B, 2A, 3B;

(20) Kremer Lake, 31-0645-00, (T.58, R.26W, S.33, 34): 1B, 2A, 3B;

(21) LaSalle Lake, lower, 29-0309-00, (T.145, R.35): 1B, 2A, 3B;

(22) Loon (Townline) Lake, 01-0024-00, (T.50, R.22W, S.7; T.50, R.23W, S.12, 13): 1B, 2A, 3B;

(23) Lucky Lake, 31-0603-00, (T.57, R.26W, S.14): 1B, 2A, 3B;

(24) Mallen Mine Pit, 18-0740-00, (T.46, R.29W, S.17): 1B, 2A, 3B;

(25) Manuel (South Yawkey) Mine Pit, 18-0435-00, (T.46, R.29W, S.1): 1B, 2A, 3B;

(26) Margaret Lake, 11-0045-00, (T.139, R.26W, S.16): 1B, 2A, 3B;

(27) Marion Lake, 11-0046-00, (T.139, R.26W, S.16, 17): 1B, 2A, 3B;

(28) Martin (Huntington, Feigh) Mine Pit, 18-0441-00, (T.46, R.29W, S.9, 10, 16): 1B, 2A, 3B;

(29) Moonshine Lake, Little (Moonshine), 31-0444-00, (T.58, R.25W, S.28, 33): 1B, 2A, 3B;

(30) Newman (Putnam) Lake, 29-0237-00, (T.145, R.34W, S.10, 11): 1B, 2A, 3B;

(31) Otter Lake, 02-0003-00, (T.30, 31, R.22): 1C, 2Bd, 3C;

(32) Pennington (Mahnomen, Alstead, Arco) Mine Pit, 18-0439-00, (T.46, R.29W, S.3, 9, 10, 11): 1B, 2A, 3B;

(33) Perch Lake, 11-0826-00, (T.139, R.31W, S.33): 1B, 2A, 3B;

(34) Pleasant Lake, 62-0046-00, (T.30, R.22, 23): 1C, 2Bd, 3C;

(35) Pleasant Lake, 18-0278-00, (T.137, R.27W, S.19): 1B, 2A, 3B;

(36) *Pokegama Lake, 31-0532-01 and 31-0532-02, [3/7/88R] (T.54, 55, R.25, 26): 1B, 2A, 3B;

(37) Portsmouth Mine Pit, 18-0437-00, (T.46, R.29W, S.1, 2, 11): 1B, 2A, 3B;

(38) *Roosevelt Lake, 11-0043-00, [3/7/88R] (T.138, 139, R.26): 1B, 2A, 3B;

(39) Sagamore Mine Pit, 18-0523-00, (T.46, R.29W, S.19; T.46, R.30W, S.24): 1B, 2A, 3B;

(40) Section 6 Mine Pit, 18-0667-00, (T.46, R.29W, S.6): 1B, 2A, 3B;

(41) Snoshoe Mine Pit, 18-0524-00, (T.46, R.29W, S.17, 18): 1B, 2A, 3B;

(42) Snowshoe (Little Andrus) Lake, 11-0054-00, (T.139, R.26W, S.29, 30): 1B, 2A, 3B;

(43) Strawberry Lake, 18-0363-00, (T.137, R.28W, S.27, 34): 1B, 2A, 3B;

(44) Sucker Lake, 62-0028-00, (T.30, R.22): 1C, 2Bd, 3C;

(45) Taylor Lake, 01-0109-00, (T.52, R.25W, S.16): 1B, 2A, 3B;

(46) Teepee Lake, 11-0312-00, (T.141, R.29W, S.30; T.141, R.30W, S.25): 1B, 2A, 3B;

(47) Tioga Mine Pit, 31-0946-00, (T.55, R.26W, S.26): 1B, 2A, 3B;

(48) Trout Lake, 31-0216-00, (T.55, 56, R.24): 1B, 2A, 3B;

(49) *Trout Lake, Big, 31-0410-00, [3/7/88R] (T.57, 58, R.25): 1B, 2A, 3B;

(50) *Trout Lake, Big, 18-0315-00, [3/7/88R] (T.137, 138, R.27, 28): 1B, 2A, 3B;

(51) *Trout Lake, Little, 31-0394-00, [3/7/88R] (T.57, R.25): 1B, 2A, 3B;

(52) unnamed swamp, Flensburg, (T.129, R.31, S.25): 7;

(53) unnamed slough, Miltona, (T.130, R.37, S.26, 35, 36): 7;

(54) unnamed swamp, Staples, (T.133, R.33, S.1): 7;

(55) unnamed swamp, Taconite, (T.56, R.24, S.22): 7;

(56) Vadnais Lake, 62-0038-00, (T.30, R.22): 1C, 2Bd, 3C;

(57) Wabana Lake, 31-0392-00, (T.57, R.25): 1B, 2A, 3B;

(58) Watab Lake, Big, 73-0102-00, (T.124, R.30): 1B, 2A, 3B;

(59) Wilkinson Lake, 62-0043-00, (T.30, R.22): 1C, 2Bd, 3C;

(60) Willard Lake, 11-0564-00, (T.139, R.30W, S.15): 1B, 2A, 3B; and

(61) Yawkey (North Yawkey) Mine Pit, 18-0434-00, (T.46, R.29W, S.1): 1B, 2A, 3B.

C. Calcareous fens: none currently listed.

D. Scientific and natural areas:

(1) *Itasca Wilderness Sanctuary, [11/5/84P] waters within the Itasca Wilderness Sanctuary, Clearwater County, (T.143, R.36): 2B, 3B, except wetlands, which are 2D;

(2) *Iron Springs Bog, [11/5/84P] waters within the Iron Springs Bog Scientific and Natural Area, Clearwater County, (T.144, R.36): 2B, 3B, except wetlands, which are 2D;

(3) *Pennington Bog, [11/5/84P] waters within the Pennington Bog Scientific and Natural Area, Beltrami County, (T.146, R.30): 2B, 3B, except wetlands, which are 2D; and

(4) *Wolsfeld Woods, [11/5/84P] waters within the Wolsfeld Woods Scientific and Natural Area, Hennepin County, (T.118, R.23): 2B, 3B, except wetlands, which are 2D.

Subp. 5. **Minnesota River basin.** The water-use classifications for the stream reaches within each of the major watersheds in the Minnesota River basin listed in item A are found in tables entitled "Beneficial Use Designations for Stream Reaches" published on the website of the Minnesota Pollution Control Agency at www.pca.state.mn.us/regulations/minnesota-rulemaking. The tables are incorporated by reference and are not subject to frequent change. The date after each watershed listed in item A is the publication date of the applicable table. The water-use classifications for the other listed waters in the Minnesota River basin are as identified in items B to D. See parts 7050.0425 and 7050.0430 for the classifications of waters not listed. Designated use information for water bodies can also be accessed through the agency's Environmental Data Access (http://www.pca.state.mn.us/quick-links/eda-surface-water-data).

A. Streams (by eight-digit hydrologic unit code):

(1) 07020001 Minnesota River - Headwaters (August 9, 2016);

(2) 07020002 Pomme de Terre River (August 9, 2016);

(3) 07020003 Lac qui Parle River (August 9, 2016);

(4) 07020004 Minnesota River - Yellow Medicine River (August 9, 2016);

(5) 07020005 Chippewa River (August 9, 2016);

(6) 07020006 Redwood River (August 9, 2016);

(7) 07020007 Minnesota River - Mankato (August 9, 2016);

(8) 07020008 Cottonwood River (August 9, 2016);

(9) 07020009 Blue Earth River (August 9, 2016);

(10) 07020010 Watonwan River (August 9, 2016);

(11) 07020011 Le Sueur River (August 9, 2016); and

(12) 07020012 Lower Minnesota River (August 9, 2016).

B. Lakes:

(1) Amber Lake, 46-0034-00, (T.102, R.30): 1C, 2Bd, 3C;

(2) Bardwell Lake, 46-0023-00, (T.102, R.30): 1C, 2Bd, 3C;

(3) Budd Lake, 46-0030-00, (T.102, R.30): 1C, 2Bd, 3C;

(4) Courthouse Lake, 10-0005-00, (T.115, R.23W, S.9): 1B, 2A, 3B;

(5) George Lake, 46-0024-00, (T.102, R.30): 1C, 2Bd, 3C;

(6) Hall Lake, 46-0031-00, (T.102, R.30): 1C, 2Bd, 3C;

(7) Mud Lake, 46-0035-00, (T.102, R.30): 1C, 2Bd, 3C;

(8) One Hundred Acre Slough, Saint James, (T.106, R.31, S.7): 7;

(9) Silver Lake, North, 46-0016-00, (T.101, R.30): 1C, 2Bd, 3C;

(10) Sisseton Lake, 46-0025-00, (T.102, R.30): 1C, 2Bd, 3C;

(11) unnamed marsh, Barry, (T.124, R.47, S.8): 7;

(12) unnamed slough, Kensington, (T.127, R.40, S.34): 7;

(13) unnamed slough, Brandon, (T.129, R.39, S.21, 22): 7;

(14) unnamed swamp, Minnesota Lake, (T.104, R.25, S.3, 4): 7;

(15) unnamed swamp (Skauby Lake), 17-0035-00, Storden, (T.107, R.37, S.30): 7;

(16) unnamed swamp, Sunburg, Sunburg Coop Cry., (T.122, R.36, S.30): 7;

(17) unnamed swamp, Lowry, (T.126, R.39, S.35, 36): 7; and

(18) Wilmert Lake, 46-0014-00, (T.101, R.30): 1C, 2Bd, 3C.

C. Calcareous fens:

(1) *Blackdog Preserve fen, 63, Dakota [3/7/88R] (T.27, R.24, S.27, 34): 2D;

(2) *Blue Mounds fen, 1, Pope [4/18/94R] (T.124, R.39, S.14, 15): 2D;

(3) *Fort Ridgely fen, 21, Nicollet [3/7/88R] (T.111, R.32, S.6): 2D;

(4) *Fort Snelling State Park fen, 25, Dakota [3/7/88R] (T.27, R.23, S.4): 2D;

(5) *Lake Johanna fen, 4, Pope [4/18/94R] (T.123, R.36, S.29): 2D;

(6) *Le Sueur fen, 32, Nicollet [3/7/88R] (T.111, R.26, S.16): 2D;

(7) *Nicols Meadow fen, 24, Dakota [3/7/88R] (T.27, R.23, S.18): 2D;

(8) *Ordway Prairie fen, 35, Pope [3/7/88R] (T.123, R.36, S.30): 2D;

(9) *Ottawa Bluffs fen, 56, Le Sueur [4/18/94R] (T.110, R.26, S.3): 2D;

(10) *Ottawa WMA fen, 7, Le Sueur [3/7/88R] (T.110, R.26, S.11): 2D;

(11) *Ottawa WMA fen, 60, Le Sueur, [3/7/88R] (T.110, R.26, S.14): 2D;

(12) *Perch Creek WMA fen, 33, Martin [3/7/88R] (T.104, R.30, S.7): 2D;

(13) *Savage fen, 22, Scott [3/7/88R] (T.115, R.21, S.17): 2D;

(14) *Savage fen, 66, Scott [3/7/88R] (T.115, R.21, S.16, 17): 2D;

(15) *Savage fen, 67, Scott [3/7/88R] (T.115, R.21, S.17): 2D;

(16) *Seminary fen, 75, Carver [4/18/94R] (T.116, R.23, S.35): 2D;

(17) *Sioux Nation WMA NHR fen, 29, Yellow Medicine [3/7/88R] (T.114, R.46, S.17): 2D;

(18) *Swedes Forest fen, 8, Redwood [4/18/94R] (T.114, R.37, S.19, 20): 2D;

(19) *Swedes Forest fen, 9, Redwood [4/18/94R] (T.114, R.37, S.22, 27): 2D; and

(20) *Yellow Medicine fen, 30, Yellow Medicine [4/18/94R] (T.115, R.46, S.18): 2D.

D. Scientific and natural areas: *Blackdog Preserve, [3/7/88P] waters within the Blackdog Preserve Scientific and Natural Area, Dakota County (T.27, R.24, S.27, 34): 2B, 3B, except wetlands, which are 2D.

Subp. 6. **Saint Croix River basin.** The water-use classifications for the stream reaches within each of the major watersheds in the Saint Croix River basin listed in item A are found in tables entitled "Beneficial Use Designations for Stream Reaches" published on the website of the Minnesota Pollution Control Agency at www.pca.state.mn.us/regulations/minnesota-rulemaking. The tables are incorporated by reference and are not subject to frequent change. The date after each watershed listed in item A is the publication date of the applicable table. The water-use classifications for the other listed waters in the Saint Croix River basin are as identified in items B to D. See parts 7050.0425 and 7050.0430 for the classifications of waters not listed. Designated use information for water bodies can also be accessed through the agency's Environmental Data Access (http://www.pca.state.mn.us/quick-links/eda-surface-water-data).

A. Streams (by eight-digit hydrologic unit code):

(1) 07030001 Upper St. Croix River (August 9, 2016);

(2) 07030003 Kettle River (August 9, 2016);

(3) 07030004 Snake River (August 9, 2016); and

(4) 07030005 Lower St. Croix River (August 9, 2016).

B. Lakes:

(1) *Grindstone Lake, 58-0123-00, [3/7/88R] (T.42, R.21): 1B, 2A, 3B; and

(2) unnamed swamp, Shafer, (T.34, R.19, S.31, 32): 7.

C. Calcareous fens: none currently listed.

D. Scientific and natural areas:

(1) *Boot Lake, [11/5/84P] waters within the Boot Lake Scientific and Natural Area, Anoka County, (T.33, R.22): 2B, 3B, except wetlands, which are 2D;

(2) *Falls Creek, [4/18/94P] (trout designated waters within Washington County), (T.32, R.19, S.7; T.32, R.20, S.12): 1B, 2A, 3B;

(3) *Falls Creek, [4/18/94P] waters within the Falls Creek Scientific and Natural Area, Washington County, (T.32, R.19, S.7; T.32, R.20, S.12): 2B, 3B, except wetlands, which are 2D; and

(4) *Kettle River, [11/5/84P] waters within the Kettle River Scientific and Natural Area, Pine County, (T.41, R.20): 2B, 3B.

Subp. 7. **Lower Mississippi River basin (from the confluence with the St. Croix River to the Iowa border).** The water-use classifications for the stream reaches within each of the major watersheds in the lower Mississippi River basin from the confluence with the Saint Croix River to the Iowa border listed in item A are found in tables entitled "Beneficial Use Designations for Stream Reaches" published on the website of the Minnesota Pollution Control Agency at www.pca.state.mn.us/regulations/minnesota-rulemaking. The tables are incorporated by reference

and are not subject to frequent change. The date after each watershed listed in item A is the publication date of the applicable table. The water-use classifications for the other listed waters in the lower Mississippi River basin from the confluence with the St. Croix River to the Iowa border are as identified in items B to D. See parts 7050.0425 and 7050.0430 for the classifications of waters not listed. Designated use information for water bodies can also be accessed through the agency's Environmental Data Access (http://www.pca.state.mn.us/quick-links/eda-surface-water-data).

A. Streams (by eight-digit hydrologic unit code):

(1) 07040001 Mississippi River - Lake Pepin (August 9, 2016);

(2) 07040002 Cannon River (August 9, 2016);

(3) 07040003 Mississippi River - Winona (August 9, 2016);

(4) 07040004 Zumbro River (August 9, 2016);

(5) 07040006 Mississippi River - La Crescent (August 9, 2016);

(6) 07040008 Root River (August 9, 2016);

(7) 07060001 Mississippi River - Reno (August 9, 2016); and

(8) 07060002 Upper Iowa River (August 9, 2016).

B. Lakes:

(1) unnamed marsh, Kilkenny, (T.110, R.23, S.22, 23): 7; and

(2) unnamed swamp, Hampton, (T.113, R.18, S.8): 7.

C. Calcareous fens:

(1) *Cannon River Wilderness Area fen, 18, Rice [3/7/88R] (T.111, R.20, S.34): 2D;

(2) *Cannon River Wilderness Area fen, 73, Rice [4/18/94R] (T.111, R.20, S.22): 2D;

(3) *High Forest fen, 12, Olmsted [4/18/94R] (T.105, R.14, S.14, 15): 2D;

(4) *Holden 1 West fen, 3, Goodhue [4/18/94R] (T.110, R.18, S.1): 2D;

(5) *Houston fen, 62, Houston [4/18/94R] (T.104, R.6, S.26): 2D;

(6) *Nelson WMA fen, 5, Olmsted [3/7/88R] (T.105, R.15, S.16): 2D;

(7) *Perched Valley Wetlands fen, 2, Goodhue [3/7/88R] (T.112, R.13, S.8): 2D;

(8) *Red Wing fen, 72, Goodhue [4/18/94R] (T.113, R.15, S.21): 2D; and

(9) *Wiscoy fen, 58, Winona [3/7/88R] (T.105, R.7, S.15): 2D.

D. Scientific and natural areas: none currently listed.

Subp. 8. **Cedar-Des Moines Rivers basin.** The water-use classifications for the stream reaches within each of the major watersheds in the Cedar-Des Moines Rivers basin listed in item A are found in tables entitled "Beneficial Use Designations for Stream Reaches" published on the website of the Minnesota Pollution Control Agency at www.pca.state.mn.us/regulations/minnesota-rulemaking. The tables are incorporated by reference and are not subject to frequent change. The date after each watershed listed in item A is the publication date of the applicable table. The water-use classifications for the other listed waters in the Cedar-Des Moines Rivers basin are as identified in items B to D. See parts 7050.0425 and 7050.0430 for the classifications of waters not listed. Designated use information for water bodies can also be accessed through the agency's Environmental Data Access (http://www.pca.state.mn.us/quick-links/eda-surface-water-data).

A. Streams (by eight-digit hydrologic unit code):

(1) 07080102 Upper Wapsipinicon River (August 9, 2016);

(2) 07080201 Cedar River (August 9, 2016);

(3) 07080202 Shell Rock River (August 9, 2016);

(4) 07080203 Winnebago River (August 9, 2016);

(5) 07100001 Des Moines River - Headwaters (August 9, 2016);

(6) 07100002 Lower Des Moines River (August 9, 2016); and

(7) 07100003 East Fork Des Moines River (August 9, 2016).

B. Lakes: none currently listed.

C. Calcareous fens:

(1) *Heron Lake fen, 45, Jackson [3/7/88R] (T.103, R.36, S.29): 2D; and

(2) *Thompson Prairie fen, 20, Jackson [3/7/88R] (T.103, R.35, S.7): 2D.

D. Scientific and natural areas: *Prairie Bush Clover, [3/7/88P] waters within the Prairie Bush Clover Scientific and Natural Area, Jackson County, (T.103, R.35, S.17): 2B, 3B, except wetlands, which are 2D.

Subp. 9. **Missouri River basin.** The water-use classifications for the stream reaches within each of the major watersheds in the Missouri River basin listed in item A are found in tables entitled "Beneficial Use Designations for Stream Reaches" published on the website of the Minnesota Pollution Control Agency at www.pca.state.mn.us/regulations/minnesota-rulemaking. The tables are incorporated by reference and are not subject to frequent change. The date after each watershed listed in item A is the publication date of the applicable table. The water-use classifications for the other listed waters in the Missouri River basin are as identified in items B to D. See parts 7050.0425 and 7050.0430 for the classifications of waters not listed. Designated use information for water bodies can also be accessed through the agency's Environmental Data Access (http://www.pca.state.mn.us/quick-links/eda-surface-water-data).

A. Streams (by eight-digit hydrologic unit code):

(1) 10170202 Upper Big Sioux River (August 9, 2016);

(2) 10170203 Lower Big Sioux River (August 9, 2016);

(3) 10170204 Rock River (August 9, 2016); and

(4) 10230003 Little Sioux River (August 9, 2016).

B. Lakes: none currently listed.

C. Calcareous fens:

(1) *Burke WMA fen, 57, Pipestone [11/12/90R] (T.106, R.44, S.28): 2D;

(2) *Hole-in-the-Mountain Prairie fen, 6, Pipestone [11/12/90R] (T.108, R.46, S.1; T.109, R.45, S.31): 2D;

(3) *Lost Timber Prairie fen, 13, Murray [4/18/94R] (T.105, R.43, S.2): 2D; and

(4) *Westside fen, 59, Nobles [11/12/90R] (T.102, R.43, S.11): 2D.

D. Scientific and natural areas: none currently listed.

Statutory Authority: *MS s 115.03; 115.44*

History: *9 SR 914; 12 SR 1810; 15 SR 1057; 18 SR 2195; 22 SR 1466; 24 SR 1105; 24 SR 1133; 27 SR 1217; 32 SR 1699; 42 SR 441*

Published Electronically: *September 10, 2018*

7050.0480 [Renumbered 7050.0465]

Published Electronically: *April 1, 2008*

APPENDIX 4.3.8.2-1 Mississippi River Water Quality Monitoring Data

Environmental Data Access

Print Report New Search

Biological Station Information

Stream Name:	MISSISSIPPI RIVER
Waterbody Name:	Mississippi River
Data Steward Org:	MPCA
Station ID:	13UM009
Hydrologic Unit Code (HUC):	07010201
Assessment Unit:	07010201-631
Period of Record:	2013 through 2013
Predominant substrate:	
Mean Depth (cm):	
Mean Width (meters):	
Drainage Area (square miles)	12,356.92
Land Use	Agricultural 9.0% Forest 49.8% Range 14.0 % Urban 3.4 % Water 8.7 % Wetland 15.0 % Other 0.1 %
Lat/Lon	45.73101,-94.23865

Index of Biological Integrity | Chemical | Projects | Aquatic Life | Species Attributes

Year 2013 Data

Site Index of Biological Integrity

Category	IBI/Rating
Visit Year	2013
Fish IBI	75
Fish Rating	Good = Above upper confid
Invertebrate IBI	16
Invertebrate Rating	Poor = Below lower confid
Visit Year	2013
Fish IBI	75
Fish Rating	Good = Above upper confid
Invertebrate IBI	16
Invertebrate Rating	Poor = Below lower confid

Environmental Data Access

Print Report New Search

Biological Station Information

Stream Name:	MISSISSIPPI RIVER
Waterbody Name:	Mississippi River
Data Steward Org:	MPCA
Station ID:	13UM009
Hydrologic Unit Code (HUC):	07010201
Assessment Unit:	07010201-631
Period of Record:	2013 through 2013
Predominant substrate:	
Mean Depth (cm):	
Mean Width (meters):	
Drainage Area (square miles)	12,356.92
Land Use	Agricultural 9.0% Forest 49.8% Range 14.0 % Urban 3.4 % Water 8.7 % Wetland 15.0 % Other 0.1 %
Lat/Lon	45.73101,-94.23865

Index of Biological Integrity | **Chemical** | **Projects** | Aquatic Life | Species Attributes

Data collected from August 13, 2013

Site Visit Date	13-AUG-13
Water Temperature °C	22.6°
Conductivity µmhos/cm	323
Field Turbidity NTU	
Dissolved Oxygen mg/L	10.75
PH	8.8
Flow m3/sec	
Nitrogen mg/L	0.07
Total Phosphorus mg/L	0.022
Total Suspended Solids mg/L	7.2
Ammonia mg/L	< 0.05
Fish Rating	

Environmental Data Access

Print Report New Search

Biological Station Information

Stream Name:	MISSISSIPPI RIVER
Waterbody Name:	Mississippi River
Data Steward Org:	MPCA
Station ID:	13UM009
Hydrologic Unit Code (HUC):	07010201
Assessment Unit:	07010201-631
Period of Record:	2013 through 2013
Predominant substrate:	
Mean Depth (cm):	
Mean Width (meters):	
Drainage Area (square miles)	12,356.92
Land Use	Agricultural 9.0% Forest 49.8% Range 14.0 % Urban 3.4 % Water 8.7 % Wetland 15.0 % Other 0.1 %
Lat/Lon	45.73101,-94.23865

Index of Biological Integrity | Chemical | Projects | **Aquatic Life** | Species Attributes

Year 2013 Data

Fish that were found at this site

Species	Count	Min Length(mm)	Max Length(mm)
Black Crappie	5	43	160
Black Crappie	5	43	160
Bluegill	24	29	116
Bluegill	24	29	116
Burbot	1	250	250
Burbot	1	250	250
Common Shiner	26	34	84
Common Shiner	26	34	84
Creek Chub	2	44	56
Creek Chub	2	44	56
Greater Redhorse	1	642	642
Greater Redhorse	1	642	642
Hybrid Sunfish	1	83	83
Hybrid Sunfish	1	83	83
Johnny Darter	20	31	61
Johnny Darter	20	31	61
Largemouth Bass	4	60	79
Largemouth Bass	4	60	79
Logperch	45	50	101
Logperch	45	50	101
Northern Pike	4	141	505
Northern Pike	4	141	505
Pumpkinseed	2	73	221
Pumpkinseed	2	73	221

Rock Bass	14	91	260
Rock Bass	14	91	260
Shorthead Redhorse	19	40	482
Shorthead Redhorse	19	40	482
Silver Redhorse	14	391	632
Silver Redhorse	14	391	632
Smallmouth Bass	83	48	475
Smallmouth Bass	83	48	475
Spotfin Shiner	12	48	86
Spotfin Shiner	12	48	86
Spottail Shiner	1	105	105
Spottail Shiner	1	105	105
Walleye	3	95	130
Walleye	3	95	130
White Sucker	2	433	470
White Sucker	2	433	470
Yellow Perch	14	47	128
Yellow Perch	14	47	128

Environmental Data Access

Print Report New Search

Stream Station Information

Station Name:	MISSISSIPPI RIVER
Waterbody Name:	
Data Steward Org:	MPCA
Station ID:	S006-059
Hydrologic Unit Code (HUC):	
Assessment Unit:	
Period of Record:	2009 through 2013
Lat/Lon	45.718122,-94.219906

Chemical | Projects

Download this station

Year 2013 Data

Station Data

Sample Date	Type	Temp	BOD	Chl-a	Stream Trans	DO	TKN	NO2NO3	pH	Pheo	TP	TSS	Turb	FC	Ecoli
	Information														
02-OCT-13	Routine	16.89			59										
25-SEP-13	Routine	19.44			58										
18-SEP-13	Routine	21.67			57										
11-SEP-13	Routine	25.56			58										
04-SEP-13	Routine	27.33			48										
26-AUG-13	Routine	25.00			49										
14-AUG-13	Routine	21.89			47										

09-AUG-13	Routine	25.00	48
31-JUL-13	Routine	26.22	48
24-JUL-13	Routine	26.89	49
17-JUL-13	Routine	26.11	49
10-JUL-13	Routine	25.56	49
03-JUL-13	Routine	25.22	48
26-JUN-13	Routine	23.67	48
17-JUN-13	Routine	20.00	44
29-MAY-13	Routine		39
22-MAY-13	Routine		38
18-MAY-13	Routine		32
08-MAY-13	Routine		28

Year 2012 Data

Year 2011 Data

Year 2010 Data

Year 2009 Data

Environmental Data Access

Print Report New Search

Stream Station Information

Station Name:	MISSISSIPPI RIVER
Waterbody Name:	
Data Steward Org:	MPCA
Station ID:	S006-059
Hydrologic Unit Code (HUC):	
Assessment Unit:	
Period of Record:	2009 through 2013
Lat/Lon	45.718122,-94.219906

Chemical | Projects

Download this station

Year 2013 Data

Year 2012 Data

Station Data

Sample Date	Type	Temp	BOD	Chl-a	Stream Trans	DO	TKN	NO2NO3	pH	Pheo	TP	TSS	Turb	FC	Ecoli
	Information														
03-SEP-12	Routine	23.4			17										
23-AUG-12	Routine				17										
18-AUG-12	Routine	23.3													
08-AUG-12	Routine	23.9													
31-JUL-12	Routine	25.2													

24-JUL-12	Routine	26.8	26
22-MAY-12	Routine	19.1	
15-MAY-12	Routine	17	34
08-MAY-12	Routine	14.4	33
01-MAY-12	Routine		39

Year 2011 Data

Year 2010 Data

Year 2009 Data

Environmental Data Access

Print Report New Search

Stream Station Information

Station Name:	MISSISSIPPI RIVER
Waterbody Name:	
Data Steward Org:	MPCA
Station ID:	S006-059
Hydrologic Unit Code (HUC):	
Assessment Unit:	
Period of Record:	2009 through 2013
Lat/Lon	45.718122,-94.219906

Chemical | Projects

Download this station

Year 2013 Data

Year 2012 Data

Year 2011 Data

Station Data

Sample Date	Type	Temp	BOD	Chl-a	Stream Trans	DO	TKN	NO2NO3	pH	Pheo	TP	TSS	Turb	FC	Ecoli
	Information														
10-OCT-11	Routine	12.2													
26-SEP-11	Routine	13.9			> 60										
19-SEP-11	Routine	16.7			> 60										

12-SEP-11	Routine	18.9	> 60
05-SEP-11	Routine	20.6	> 60
29-AUG-11	Routine	22.2	52
22-AUG-11	Routine	22.2	52
16-AUG-11	Routine	23.9	52
08-AUG-11	Routine	25.6	
01-AUG-11	Routine	26.1	49
25-JUL-11	Routine	27.8	35
19-JUL-11	Routine	25.6	28
11-JUL-11	Routine	24.4	25
04-JUL-11	Routine	25.0	27
28-JUN-11	Routine	16.7	38
20-JUN-11	Routine	16.7	51
13-JUN-11	Routine	14.4	48
06-JUN-11	Routine	13.3	46
30-MAY-11	Routine	11.1	45
24-MAY-11	Routine		45
16-MAY-11	Routine		42
09-MAY-11	Routine		41
25-APR-11	Routine		40
18-APR-11	Routine		42

Year 2010 Data

Year 2009 Data

Environmental Data Access

Print Report New Search

Stream Station Information

Station Name:	MISSISSIPPI RIVER
Waterbody Name:	
Data Steward Org:	MPCA
Station ID:	S006-059
Hydrologic Unit Code (HUC):	
Assessment Unit:	
Period of Record:	2009 through 2013
Lat/Lon	45.718122,-94.219906

Chemical | Projects

Download this station

Year 2013 Data

Year 2012 Data

Year 2011 Data

Year 2010 Data

Station Data

Sample Date	Type	Temp	BOD	Chl-a	Stream Trans	DO	TKN	NO2NO3	pH	Pheo	TP	TSS	Turb	FC	Ecoli
	Information														
22-OCT-10	Routine	8.89			> 60										

15-OCT-10	Routine	11.11	> 60
01-OCT-10	Routine	12.22	> 60
24-SEP-10	Routine	13.33	> 60
17-SEP-10	Routine	16.11	> 60
10-SEP-10	Routine	18.33	> 60
03-SEP-10	Routine	23.33	> 60
27-AUG-10	Routine	25.78	> 60
20-AUG-10	Routine	26.11	> 60
13-AUG-10	Routine	25.78	51
06-AUG-10	Routine	26.44	> 60
30-JUL-10	Routine	26.11	> 60
23-JUL-10	Routine	22.72	> 60
15-JUL-10	Routine	26.11	> 60
08-JUL-10	Routine	25.22	> 60
02-JUL-10	Routine	7.78	> 60
25-JUN-10	Routine	23.33	> 60
18-JUN-10	Routine	22.78	> 60
12-JUN-10	Routine	16.11	> 60
04-JUN-10	Routine		> 60
28-MAY-10	Routine		> 60
21-MAY-10	Routine		> 60
13-MAY-10	Routine		41
06-MAY-10	Routine		53
29-APR-10	Routine		53
22-APR-10	Routine		46
14-APR-10	Routine		45

Year 2009 Data

Environmental Data Access

Print Report New Search

Stream Station Information

Station Name:	MISSISSIPPI RIVER
Waterbody Name:	
Data Steward Org:	MPCA
Station ID:	S006-059
Hydrologic Unit Code (HUC):	
Assessment Unit:	
Period of Record:	2009 through 2013
Lat/Lon	45.718122,-94.219906

Chemical | Projects

Download this station

Year 2013 Data

Year 2012 Data

Year 2011 Data

Year 2010 Data

Year 2009 Data

Station Data

Sample Date	Type	Temp	BOD	Chl-a	Stream Trans	DO	TKN	NO2NO3	pH	Pheo	TP	TSS	Turb	FC	Ecoli
	Information														

05-OCT-09	Routine	11.1	> 60
28-SEP-09	Routine	20	> 60
21-SEP-09	Routine	22.8	> 60
14-SEP-09	Routine	23.4	> 60
07-SEP-09	Routine	22.8	> 60
31-AUG-09	Routine	23.3	> 60
24-AUG-09	Routine	23.4	> 60
17-AUG-09	Routine	23.3	> 60
10-AUG-09	Routine	23.4	> 60
03-AUG-09	Routine	23.5	> 60
27-JUL-09	Routine	23.6	> 60
20-JUL-09	Routine	23.1	> 60
13-JUL-09	Routine	22.2	> 60
06-JUL-09	Routine	22.4	> 60
29-JUN-09	Routine	21.7	> 60
22-JUN-09	Routine	21.1	> 60
15-JUN-09	Routine		> 60
02-JUN-09	Routine		52

Environmental Data Access

Print Report New Search

Stream Station Information

Station Name:	MISSISSIPPI RIVER
Waterbody Name:	Mississippi River
Data Steward Org:	MPCA
Station ID:	S004-320
Hydrologic Unit Code (HUC):	07010201
Assessment Unit:	07010201-631
Period of Record:	2006 through 2008
Lat/Lon	45.67889,-94.18804

Chemical | Projects

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Year 2008 Data

Station Data

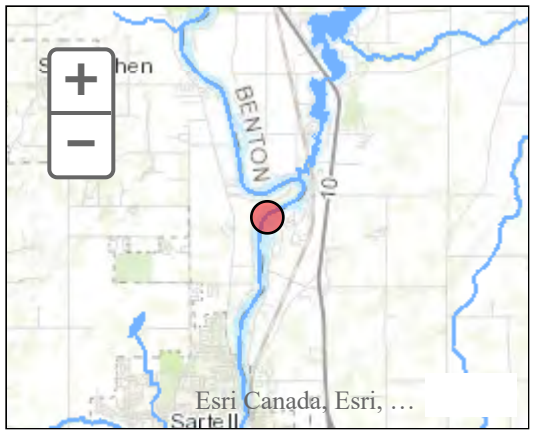
Sample Date	Type	Temp	BOD	Chl-a	Stream Trans	DO	TKN	NO2NO3	pH	Pheo	TP	TSS	Turb	FC	Ecoli
	Information														
15-OCT-08	Routine						0.60	0.18			0.032	3.2	3.3		
15-OCT-08	Routine	11.81				10.46							2.3		
15-OCT-08	Routine	11.82				10.52							2.5		
15-OCT-08	Routine	11.84				10.59							2.2		
15-OCT-08	Routine	11.82				10.47							2.5		
15-OCT-08	Routine	11.84				10.59							2.3		
30-SEP-08	Routine	16.02				9.23							1.9		
30-SEP-08	Routine	16.03				9.26							1.8		
30-SEP-08	Routine	16.11				9.30							1.7		
30-SEP-08	Routine	16.15				9.32							1.6		
30-SEP-08	Routine						3.02	0.13			0.024	2.4	2.1		
30-SEP-08	Routine	16.02				9.21							1.9		
30-SEP-08	Routine	16.11				9.37							1.7		
15-SEP-08	Routine						0.51	0.14			0.034	1.6	2.7		
15-SEP-08	Routine	15.79				8.89							2.1		
15-SEP-08	Routine	15.93				8.96							2.0		
15-SEP-08	Routine	15.87				8.93							2.1		
15-SEP-08	Routine	15.81				8.91							2.2		
15-SEP-08	Routine	15.97				8.97							1.8		
15-SEP-08	Routine	15.78				8.89							2.3		
03-SEP-08	Routine						0.69	< 0.05			0.04	5.2	4.3		
03-SEP-08	Routine	21.47				9.43							3.1		
03-SEP-08	Routine	21.42				9.41							3.6		
03-SEP-08	Routine	21.52				9.73							2.8		
03-SEP-08	Routine	21.36				9.20							3.7		
03-SEP-08	Routine	21.33				8.99							3.9		
19-AUG-08	Routine	24.41				8.70							3.5		

19-AUG-08	Routine	24.84	9.94						42.0
19-AUG-08	Routine	25.88	9.97						2.3
19-AUG-08	Routine	24.43	8.72						3.7
19-AUG-08	Routine	24.46	8.88						3.3
19-AUG-08	Routine	25.68	10.16						2.8
19-AUG-08	Routine			0.76	< 0.05		0.045	5.2	4.3
07-AUG-08	Routine			0.67	0.16		0.049	4.0	4.1
07-AUG-08	Routine	24.05	7.28						3.9
07-AUG-08	Routine	24.54	7.67						2.9
07-AUG-08	Routine	24.07	7.34						3.7
07-AUG-08	Routine	24.06	7.29						3.9
07-AUG-08	Routine	24.11	7.39						3.5
07-AUG-08	Routine	24.74	7.74						3.0
28-JUL-08	Routine	24.43	8.22						3.3
28-JUL-08	Routine			0.82	0.13		0.047	3.2	2.9
28-JUL-08	Routine	24.41	8.22						3.5
28-JUL-08	Routine	24.46	8.27						3.1
28-JUL-08	Routine	24.56	8.35						2.8
28-JUL-08	Routine	25.81	8.76						2.1
28-JUL-08	Routine	25.89	8.74						2.1
15-JUL-08	Routine	24.07	7.82						4.9
15-JUL-08	Routine			0.66	0.24		0.061	6.0	5.7
15-JUL-08	Routine	23.17	7.49						6.0
15-JUL-08	Routine	23.18	7.53						5.9
15-JUL-08	Routine	24.63	8.03						4.8
15-JUL-08	Routine	24.82	8.19						4.3

Year 2006 Data

Environmental Data Access

Print Report New Search



Biological Station Information

Stream Name:	MISSISSIPPI RIVER
Waterbody Name:	Mississippi River
Data Steward Org:	MPCA
Station ID:	07UM283
Hydrologic Unit Code (HUC):	07010201
Assessment Unit:	07010201-631
Period of Record:	2007 through 2007
Predominant substrate:	
Mean Depth (cm):	
Mean Width (meters):	
Drainage Area (square miles)	12,482.08
Land Use	Agricultural 9.3% Forest 49.5% Range 14.1 % Urban 3.4 % Water 8.6 % Wetland 15.0 % Other 0.1 %
Lat/Lon	45.67106641,-94.19485567

Index of Biological Integrity | Chemical | Projects | Aquatic Life | Species Attributes

Year 2007 Data

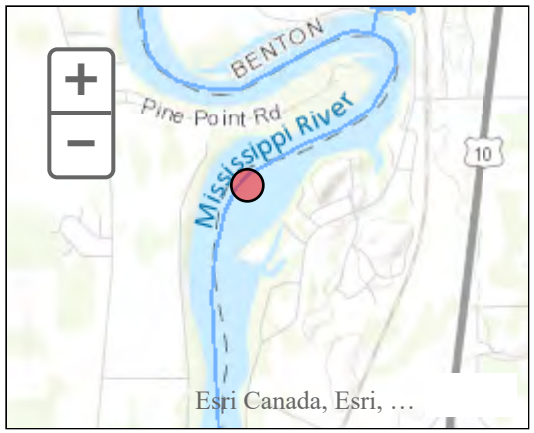
Site Index of Biological Integrity

Category	IBI/Rating
Visit Year	2007

Fish IBI	46
Fish Rating	Fair = Within confidence
Invertebrate IBI	No Visit
Invertebrate Rating	
Visit Year	2007
Fish IBI	46
Fish Rating	Fair = Within confidence
Invertebrate IBI	No Visit
Invertebrate Rating	

Environmental Data Access

Print Report New Search



Biological Station Information

Stream Name:	MISSISSIPPI RIVER
Waterbody Name:	Mississippi River
Data Steward Org:	MPCA
Station ID:	07UM283
Hydrologic Unit Code (HUC):	07010201
Assessment Unit:	07010201-631
Period of Record:	2007 through 2007
Predominant substrate:	
Mean Depth (cm):	
Mean Width (meters):	
Drainage Area (square miles)	12,482.08
Land Use	Agricultural 9.3% Forest 49.5% Range 14.1 % Urban 3.4 % Water 8.6 % Wetland 15.0 % Other 0.1 %
Lat/Lon	45.67106641,-94.19485567

Index of Biological Integrity | Chemical | Projects | Aquatic Life | Species Attributes

Year 2007 Data

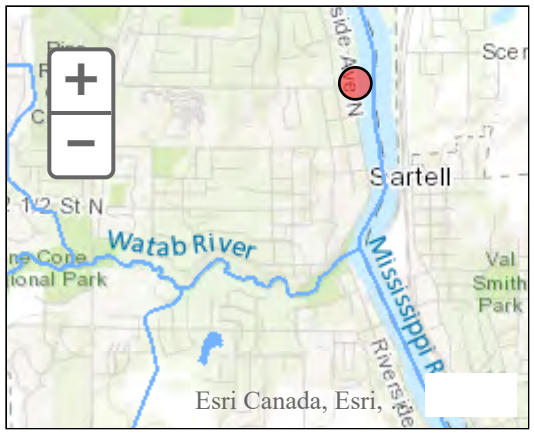
Fish that were found at this site

Species	Count	Min Length(mm)	Max Length(mm)
Black Crappie	2		

Black Crappie	2
Bluegill	80
Bluegill	80
Bluntnose Minnow	5
Bluntnose Minnow	5
Central Stoneroller	1
Central Stoneroller	1
Common Carp	12
Common Carp	12
Common Shiner	1
Common Shiner	1
Hornyhead Chub	5
Hornyhead Chub	5
Johnny Darter	2
Johnny Darter	2
Largemouth Bass	3
Largemouth Bass	3
Logperch	8
Logperch	8
Northern Pike	6
Northern Pike	6
Pumpkinseed	1
Pumpkinseed	1
Rock Bass	8
Rock Bass	8
Shorthead Redhorse	3
Shorthead Redhorse	3
Silver Redhorse	3
Silver Redhorse	3
Smallmouth Bass	18
Smallmouth Bass	18
Spotfin Shiner	3
Spotfin Shiner	3
Spottail Shiner	9
Spottail Shiner	9
Walleye	1
Walleye	1
White Sucker	25
White Sucker	25
Yellow Perch	16
Yellow Perch	16

Environmental Data Access

Print Report New Search



Stream Station Information

Station Name:	MISSISSIPPI RIVER
Waterbody Name:	Mississippi River
Data Steward Org:	MPCA
Station ID:	S006-147
Hydrologic Unit Code (HUC):	07010201
Assessment Unit:	07010201-631
Period of Record:	2010 through 2011
Lat/Lon	45.630045,-94.204434

Chemical | Projects

Download this station

Year 2011 Data

Station Data

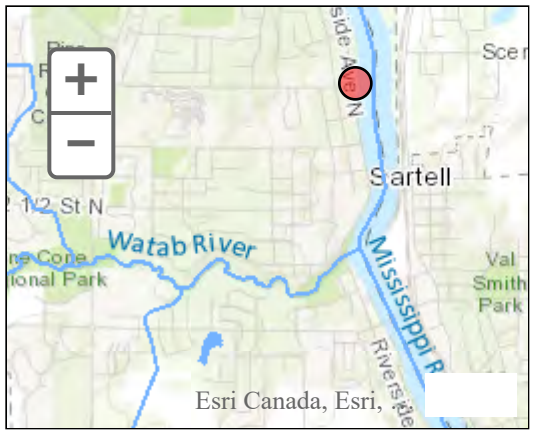
Sample Date	Type	Temp	BOD	Chl-a	Stream Trans	DO	TKN	NO2NO3	pH	Pheo	TP	TSS	Turb	FC	Ecoli
	Information														
26-OCT-11	Routine														12
18-OCT-11	Routine														9
13-OCT-11	QC-FR														27
13-OCT-11	Routine														17
11-OCT-11	Routine	16.86				8.65							5.3		5
27-SEP-11	Routine														5
13-SEP-11	Routine														11

08-SEP-11	Routine				18
23-AUG-11	Routine				26
09-AUG-11	Routine				30
02-AUG-11	Routine				100
26-JUL-11	Routine	26.63	7.34	3.7	6
21-JUN-11	Routine				23
14-JUN-11	Routine				5
08-JUN-11	Routine				10
31-MAY-11	Routine	17.23	8.78		15
24-MAY-11	Routine				150
22-MAY-11	Routine				66
09-MAY-11	Routine				78
05-MAY-11	Routine				5
27-APR-11	Routine	8.18	11.18	4.5	12
21-APR-11	Routine				13
12-APR-11	Routine	7.14	11.82	14.2	12
06-APR-11	Routine				17

Year 2010 Data

Environmental Data Access

Print Report New Search



Stream Station Information

Station Name:	MISSISSIPPI RIVER
Waterbody Name:	Mississippi River
Data Steward Org:	MPCA
Station ID:	S006-147
Hydrologic Unit Code (HUC):	07010201
Assessment Unit:	07010201-631
Period of Record:	2010 through 2011
Lat/Lon	45.630045,-94.204434

Chemical | Projects

Download this station

Year 2011 Data

Year 2010 Data

Station Data

Sample Date	Type	Temp	BOD	Chl-a	Stream Trans	DO	TKN	NO2NO3	pH	Pheo	TP	TSS	Turb	FC	Ecoli
	Information														
26-OCT-10	Routine	10.36				10.34							3.7		
12-OCT-10	Routine	15.41				9.44									10
28-SEP-10	Routine	14.47				10.08							3.3		16
14-SEP-10	Routine	17.77				9.54							2.7		12
31-AUG-10	Routine	23.76				7.66							2.6		26

19-AUG-10	Routine	21.94	7.91	5.1	20
02-AUG-10	Routine	26.08	7.4		30
20-JUL-10	Routine	24.35	6.78	1.2	21
07-JUL-10	Routine	26.02	6.18	2.9	7
22-JUN-10	Routine				14
10-JUN-10	Routine	19.92	7.67		25
25-MAY-10	Routine				130
13-MAY-10	Routine	10.57	10.81	0	91
29-APR-10	Routine				2
19-APR-10	Routine				1

APPENDIX 4.3.8.2-2 Little Rock Creek Water Quality Monitoring Data

Environmental Data Access

Print Report New Search

Stream Station Information

Station Name:	LITTLE ROCK CREEK
Waterbody Name:	Little Rock Creek
Data Steward Org:	MPCA
Station ID:	S005-004
Hydrologic Unit Code (HUC):	07010201
Assessment Unit:	07010201-577
Period of Record:	2008 through 2008
Lat/Lon	45.68411,-94.18145

Chemical | Projects

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Year 2008 Data

Station Data

Sample Date	Type	Temp	BOD	Chl-a	Stream Trans	DO	TKN	NO2NO3	pH	Pheo	TP	TSS	Turb	FC	Ecoli
	Information														
15-OCT-08	Routine	11.93				11.53							6.2		
15-OCT-08	Routine	11.95				11.55							17.0		
15-OCT-08	Routine						1.20	< 0.05			0.085	12	7.7		
15-OCT-08	Routine	11.94				11.55							6.4		
15-OCT-08	Routine	11.95				11.53							6.3		
30-SEP-08	Routine	15.25				11.02							11.9		
30-SEP-08	Routine	15.28				10.99							11.5		
30-SEP-08	Routine						1.44	< 0.05			0.102	23	12		
30-SEP-08	Routine	15.30				11.02							11.7		
30-SEP-08	Routine	15.24				11.01							12.4		
30-SEP-08	Routine	15.25				10.96							13.0		
30-SEP-08	Routine	15.26				10.96							11.6		
15-SEP-08	Routine						1.96	< 0.05			0.203	36	24		
15-SEP-08	Routine	14.73				10.05							24.5		
15-SEP-08	Routine	14.74				10.25							26.6		
15-SEP-08	Routine	15.12				10.83							36.0		
15-SEP-08	Routine	15.01				10.79							30.0		
15-SEP-08	Routine	14.73				10.00							26.5		
15-SEP-08	Routine	14.79				10.39							25.7		
03-SEP-08	Routine	20.36				8.84							31.2		
03-SEP-08	Routine	20.35				7.72							27.6		
03-SEP-08	Routine	20.37				7.66							27.8		
03-SEP-08	Routine						1.69	< 0.05			0.201	34	26		
03-SEP-08	Routine	20.05				6.68							26.8		
19-AUG-08	Routine	25.14				10.37							8.1		
19-AUG-08	Routine	25.69				10.49							7.1		
19-AUG-08	Routine	23.94				8.30							18.4		

19-AUG-08	Routine	25.92	10.42					8.3
19-AUG-08	Routine			1.06	< 0.05	0.089	15	18
19-AUG-08	Routine	23.85	7.87					20.3
07-AUG-08	Routine	25.14	13.39					39.9
07-AUG-08	Routine	25.61	10.96					57.1
07-AUG-08	Routine			2.05	< 0.05	0.234	33	27
07-AUG-08	Routine	24.63	11.30					39.5
07-AUG-08	Routine	24.90	12.41					34.0
28-JUL-08	Routine	24.35	8.28					12.5
28-JUL-08	Routine			1.04	0.09	0.087	12	12
28-JUL-08	Routine	24.71	8.64					9.9
28-JUL-08	Routine	25.58	9.10					9.2
28-JUL-08	Routine	25.73	9.12					10.0
28-JUL-08	Routine	24.59	8.56					10.8
15-JUL-08	Routine	22.89	8.71					61.3
15-JUL-08	Routine	26.26	13.82					32.5
15-JUL-08	Routine			2.53	< 0.05	0.240	31	26
15-JUL-08	Routine	23.65	12.56					50.2
15-JUL-08	Routine	25.53	14.28					26.7

Environmental Data Access

Print Report New Search

Lake Station Information

Station Name:	UNNAMED
Waterbody Name:	Unnamed
Data Steward Org:	MPCA
Station ID: (Lake ID)	05-0012-00-201
Hydrologic Unit Code (HUC):	07010201
Assessment Unit:	05-0012-00
Period of Record:	2007 through 2008
Lat/Lon	45.704325,-94.175283

Chemical | Projects | Other Stations

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Year 2008 Data

Station Data

Sample Date	Type	Depth	BOD	Chl-a	Trans	DO	TKN	NO2NO3	pH	Pheo	TP	TSS	Turb	FC	Ecoli	Secchi
	Info															
10-08-08	Routine	0 m				10.66	< 0.05				0.099		11.3			
08-20-08	Routine	0 m				9.64	< 0.05				0.348		55.7			
04-23-08	Routine	0 m				13.8	1.5				0.106					

Year 2007 Data

Environmental Data Access

Print Report New Search

Lake Station Information

Station Name:	UNNAMED
Waterbody Name:	Unnamed
Data Steward Org:	MPCA
Station ID: (Lake ID)	05-0012-00-201
Hydrologic Unit Code (HUC):	07010201
Assessment Unit:	05-0012-00
Period of Record:	2007 through 2008
Lat/Lon	45.704325,-94.175283

Chemical | Projects | Other Stations

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Year 2008 Data

Year 2007 Data

Station Data

Sample Date	Type	Depth	BOD	Chl-a	Trans	DO	TKN	NO2NO3	pH	Pheo	TP	TSS	Turb	FC	Ecoli	Secchi
	Info															
07-25-07	Routine	0 m				13.3										
07-25-07	Routine	.1 m		127						5.52	0.431					

Environmental Data Access

Print Report New Search

Lake Station Information

Station Name:	UNNAMED
Waterbody Name:	Unnamed
Data Steward Org:	MPCA
Station ID: (Lake ID)	05-0012-00-209
Hydrologic Unit Code (HUC):	07010201
Assessment Unit:	05-0012-00
Period of Record:	1999 through 2003
Lat/Lon	45.699985,-94.176718

Chemical | Projects | Other Stations

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Year 2003 Data

Station Data

Sample Date	Type	Depth	BOD	Chl-a	Trans	DO	TKN	NO2NO3	pH	Pheo	TP	TSS	Turb	FC	Ecoli	Secchi
	Info															
10-15-03	Routine	0 m		34		10.7	3.2				0.115					1.2
10-15-03	Routine	1 m				10.2										
08-21-03	Routine	0 m		139		8.9					0.187					0.6
08-21-03	Routine	1 m				8.8										
07-24-03	Routine	0 m		47		10.6					0.166					0.8
07-24-03	Routine	1 m				10.7										
06-21-03	Routine	0 m		40		9.5	2.7				0.107					0.9
06-21-03	Routine	1 m				9.3										
05-21-03	Routine	0 m		21		11.5	1.3				0.056					1.4
05-21-03	Routine	1 m				11.2										

Year 1999 Data

Environmental Data Access

Print Report New Search

Lake Station Information

Station Name:	UNNAMED
Waterbody Name:	Unnamed
Data Steward Org:	MPCA
Station ID: (Lake ID)	05-0012-00-209
Hydrologic Unit Code (HUC):	07010201
Assessment Unit:	05-0012-00
Period of Record:	1999 through 2003
Lat/Lon	45.699985,-94.176718

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Year 2003 Data

Year 1999 Data

Station Data

Sample Date	Type	Depth	BOD	Chl-a	Trans	DO	TKN	NO2NO3	pH	Pheo	TP	TSS	Turb	FC	Ecoli	Secchi
	Info															
09-10-99	Routine	0 m														0.46
08-16-99	Routine	0 m														0.76
07-13-99	Routine	0 m														0.30
06-15-99	Routine	0 m														0.46

APPENDIX 4.3.8.2-3 Little Rock Lake Water Quality Monitoring Data

Environmental Data Access

Print Report New Search

* Does not reflect exact sampling location

Lake Station Information

Station Name:	LITTLE ROCK
Waterbody Name:	Little Rock
Data Steward Org:	MPCA
Station ID: (Lake ID)	05-0013-00-100 *
Hydrologic Unit Code (HUC):	07010201
Assessment Unit:	05-0013-00
Period of Record:	2007 through 2007
Lat/Lon	45.7072,-94.1679

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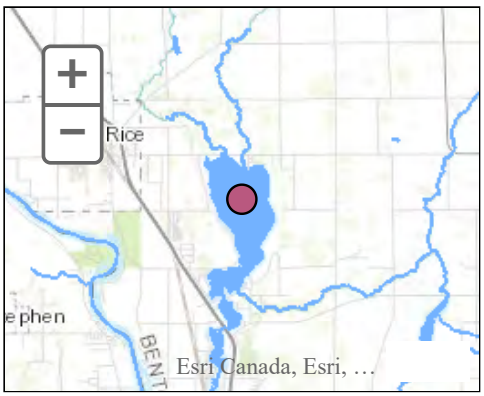
Year 2007 Data

Station Data

Sample Date	Type	Depth	BOD	Chl-a	Trans	DO	TKN	NO2NO3	pH	Pheo	TP	TSS	Turb	FC	Ecoli	Secchi
	Info															
07-12-07	Routine	0 m		501						24.7	0.594					

Environmental Data Access

Print Report New Search



Lake Station Information

Station Name:	LITTLE ROCK
Waterbody Name:	Little Rock
Data Steward Org:	MPCA
Station ID: (Lake ID)	05-0013-00-101
Hydrologic Unit Code (HUC):	07010201
Assessment Unit:	05-0013-00
Period of Record:	1990 through 1990
Lat/Lon	45.738061,-94.167748

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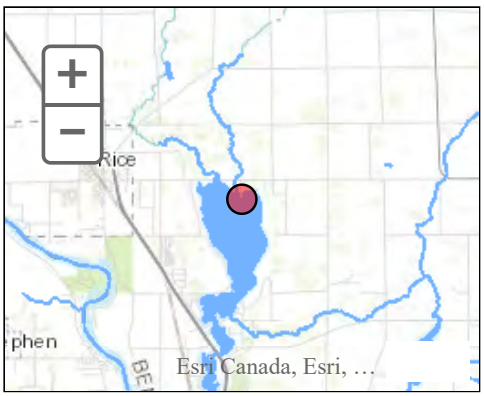
Year 1990 Data

Station Data

Sample Date	Type	Depth	BOD	Chl-a	Trans	DO	TKN	NO2NO3	pH	Pheo	TP	TSS	Turb	FC	Ecoli	Secchi
	Info															
09-19-90	Routine	0 m				2.66	< 0.01				0.173	23	15			0.39
08-28-90	Routine	0 m		85.7		10.8	4	< 0.01		< 0.8	0.286	28	19			0.46
08-28-90	Routine	1 m				11.4										
08-28-90	Routine	2 m				10.4										
08-28-90	Routine	3 m				3.1										
07-30-90	Routine	0 m		127		10.1	2.98	< 0.01		3.2	0.205	35	22			0.38
07-30-90	Routine	1 m				9.8										
07-30-90	Routine	2 m				8.8										
07-30-90	Routine	3 m				7.2										
06-25-90	Routine	0 m		38.5		15	1.83	< 0.01		4.11	0.101	18	12			
06-25-90	Routine	1 m				7										
06-25-90	Routine	2 m				6.4										
06-25-90	Routine	3 m				4										
05-22-90	Routine	0 m		16.7		11.1	1.5	0.67		3.2	0.06	7.4	4.2			1.3
05-22-90	Routine	1 m				11.1										
05-22-90	Routine	2 m				11.1										
05-22-90	Routine	3 m				10.6										

Environmental Data Access

Print Report New Search



Lake Station Information

Station Name:	LITTLE ROCK
Waterbody Name:	Little Rock
Data Steward Org:	MPCA
Station ID: (Lake ID)	05-0013-00-102
Hydrologic Unit Code (HUC):	07010201
Assessment Unit:	05-0013-00
Period of Record:	1990 through 2007
Lat/Lon	45.744741,-94.164937

Chemical | Projects | Other Stations

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Year 2007 Data

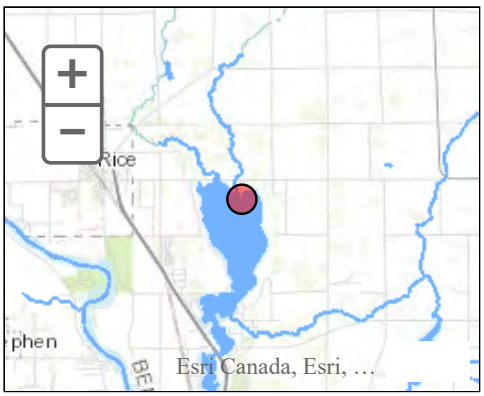
Station Data

Sample Date	Type	Depth	BOD	Chl-a	Trans	DO	TKN	NO2NO3	pH	Pheo	TP	TSS	Turb	FC	Ecoli	Secchi
	Info															
07-25-07	Routine	0 m				13.4										
07-25-07	Routine	.1 m		120						4.01	0.271					

Year 1990 Data

Environmental Data Access

Print Report New Search



Lake Station Information

Station Name:	LITTLE ROCK
Waterbody Name:	Little Rock
Data Steward Org:	MPCA
Station ID: (Lake ID)	05-0013-00-102
Hydrologic Unit Code (HUC):	07010201
Assessment Unit:	05-0013-00
Period of Record:	1990 through 2007
Lat/Lon	45.744741,-94.164937

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Year 2007 Data

Year 1990 Data

Station Data

Sample Date	Type	Depth	BOD	Chl-a	Trans	DO	TKN	NO2NO3	pH	Pheo	TP	TSS	Turb	FC	Ecoli	Secchi
	Info															
08-28-90	Routine	0 m														0.4
07-30-90	Routine	0 m		141						< 1.6						0.31
06-25-90	Routine	0 m		36.7						4.7						
05-22-90	Routine	0 m		15.4		10.4	1.5			6.41	0.061					1.5
05-22-90	Routine	1 m				10.4										
05-22-90	Routine	2 m				10.4										
05-22-90	Routine	3 m				9.1										

Environmental Data Access

Print Report New Search

Lake Station Information

Station Name:	LITTLE ROCK
Waterbody Name:	Little Rock
Data Steward Org:	MPCA
Station ID: (Lake ID)	05-0013-00-103
Hydrologic Unit Code (HUC):	07010201
Assessment Unit:	05-0013-00
Period of Record:	1990 through 2007
Lat/Lon	45.749447,-94.174688

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Year 2007 Data

Station Data

Sample Date	Type	Depth	BOD	Chl-a	Trans	DO	TKN	NO2NO3	pH	Pheo	TP	TSS	Turb	FC	Ecoli	Secchi
	Info															
07-25-07	Routine	0 m				0.2										

Year 1990 Data

Environmental Data Access

Print Report New Search

Lake Station Information

Station Name:	LITTLE ROCK
Waterbody Name:	Little Rock
Data Steward Org:	MPCA
Station ID: (Lake ID)	05-0013-00-103
Hydrologic Unit Code (HUC):	07010201
Assessment Unit:	05-0013-00
Period of Record:	1990 through 2007
Lat/Lon	45.749447,-94.174688

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Year 2007 Data

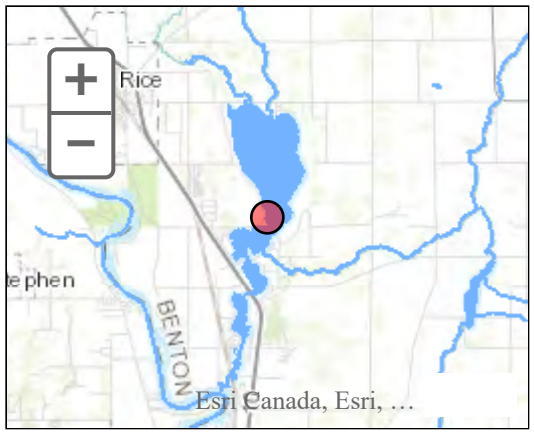
Year 1990 Data

Station Data

Sample Date	Type	Depth	BOD	Chl-a	Trans	DO	TKN	NO2NO3	pH	Pheo	TP	TSS	Turb	FC	Ecoli	Secchi
	Info															
09-19-90	Routine	0 m					2.1				0.127					0.46
08-28-90	Routine	0 m		77.7		12	2.55			< 0.8	0.169					0.31
08-28-90	Routine	1 m				10										
07-30-90	Routine	0 m		125		9.8	3.15			< 1.6	0.213					0.38
07-30-90	Routine	1 m				9.6										
06-25-90	Routine	0 m		96.5		15.6	2.43			8.54	0.16					
06-25-90	Routine	1 m				14.2										
05-22-90	Routine	0 m				11.2	1.57				0.072					1.3
05-22-90	Routine	1 m				11.2										

Environmental Data Access

Print Report New Search



Lake Station Information

Station Name:	LITTLE ROCK
Waterbody Name:	Little Rock
Data Steward Org:	MPCA
Station ID: (Lake ID)	05-0013-00-202
Hydrologic Unit Code (HUC):	07010201
Assessment Unit:	05-0013-00
Period of Record:	1979 through 1981
Lat/Lon	45.722325,-94.167948

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Year 1981 Data

Station Data

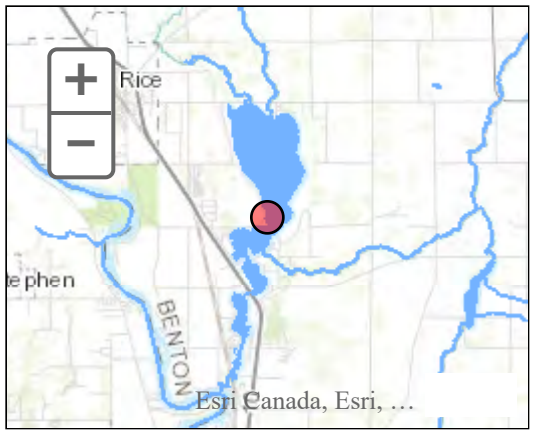
Sample Date	Type	Depth	BOD	Chl-a	Trans	DO	TKN	NO2NO3	pH	Pheo	TP	TSS	Turb	FC	Ecoli	Secchi
	Info															
07-28-81	Routine	0 m					1.58				0.089					

Year 1980 Data

Year 1979 Data

Environmental Data Access

Print Report New Search



Lake Station Information

Station Name:	LITTLE ROCK
Waterbody Name:	Little Rock
Data Steward Org:	MPCA
Station ID: (Lake ID)	05-0013-00-202
Hydrologic Unit Code (HUC):	07010201
Assessment Unit:	05-0013-00
Period of Record:	1979 through 1981
Lat/Lon	45.722325,-94.167948

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Year 1981 Data

Year 1980 Data

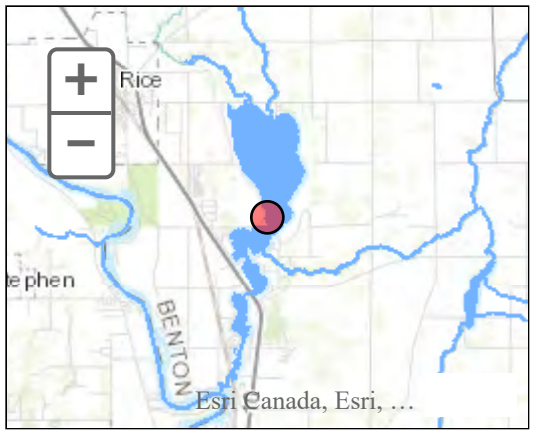
Station Data

Sample Date	Type	Depth	BOD	Chl-a	Trans	DO	TKN	NO2NO3	pH	Pheo	TP	TSS	Turb	FC	Ecoli	Secchi
	Info															
07-29-80	Routine	0 m					1.67				0.144					

Year 1979 Data

Environmental Data Access

Print Report New Search



Lake Station Information

Station Name:	LITTLE ROCK
Waterbody Name:	Little Rock
Data Steward Org:	MPCA
Station ID: (Lake ID)	05-0013-00-202
Hydrologic Unit Code (HUC):	07010201
Assessment Unit:	05-0013-00
Period of Record:	1979 through 1981
Lat/Lon	45.722325,-94.167948

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Year 1981 Data

Year 1980 Data

Year 1979 Data

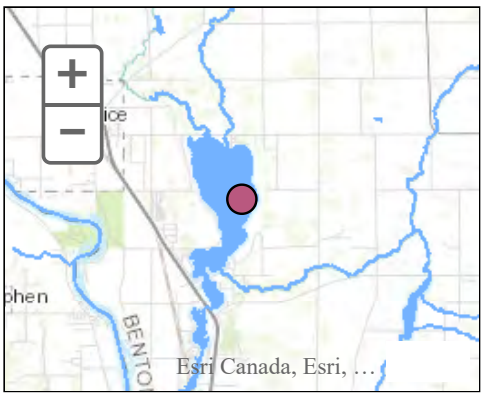
Station Data

Sample Date	Type Info	Depth	BOD	Chl-a	Trans	DO	TKN	NO2NO3	pH	Pheo	TP	TSS	Turb	FC	Ecoli	Secchi
09-23-79	Routine	0 m														0.53
09-16-79	Routine	0 m					1.42				0.122					0.48
09-07-79	Routine	0 m														0.48
08-31-79	Routine	0 m														0.46
08-25-79	Routine	0 m					1.56				0.167					

08-18-79	Routine	0	m			0.43
08-12-79	Routine	0	m			0.38
07-31-79	Routine	0	m	0.98	0.087	
07-31-79	Routine	0	m			0.28
07-25-79	Routine	0	m			0.40
07-15-79	Routine	0	m			0.46

Environmental Data Access

Print Report New Search



Lake Station Information

Station Name:	LITTLE ROCK
Waterbody Name:	Little Rock
Data Steward Org:	MPCA
Station ID: (Lake ID)	05-0013-00-203
Hydrologic Unit Code (HUC):	07010201
Assessment Unit:	05-0013-00
Period of Record:	1980 through 2016
Lat/Lon	45.732752,-94.161343

Chemical | Projects | Other Stations

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Year 2016 Data

Station Data

Sample Date	Type	Depth	BOD	Chl-a	Trans	DO	TKN	NO2NO3	pH	Pheo	TP	TSS	Turb	FC	Ecoli	Secchi
	Info															
09-29-16	Routine	0 m		177		10.35	2.91			19.9	0.235	57				0.3
09-29-16	QC-FR	0 m		183						18.8	0.246					
09-29-16	Routine	1 m				9.2										
09-29-16	Routine	2 m				8.2										
09-29-16	Routine	3 m				8.13										
09-29-16	Routine	4 m				8.49										
09-29-16	Routine	5 m				1.45										
08-23-16	Routine	0 m		198		9.17	3.98			12.1	0.322	55				0.2
08-23-16	Routine	1 m				9.13										
08-23-16	Routine	2 m				9.15										
08-23-16	Routine	3 m				8.9										
08-23-16	Routine	4 m				8.65										
08-23-16	Routine	5 m				6.92										
07-21-16	Routine	0 m		93.0		10.34	1.99			9.09	0.224	27				0.4
07-21-16	QC-FR	0 m		91.6						8.06	0.162					
07-21-16	Routine	1 m				10										
07-21-16	Routine	2 m				9.45										
07-21-16	Routine	3 m				9.17										
07-21-16	Routine	4 m				2.51										
07-21-16	Routine	5 m				0.99										
07-21-16	Routine	5 m									0.163					
07-21-16	Routine	5.4 m				0.37										
06-16-16	Routine	0 m				4.53										0.6
06-16-16	Routine	1 m				4.4										
06-16-16	Routine	2 m				3.69										
06-16-16	Routine	3 m				3.9										
06-16-16	Routine	4 m				3.79										
06-16-16	Routine	4.8 m				1.99										
06-15-16	Routine	0 m		32.5			2.76			5.68	0.112	16				

06-15-16	Routine	4.5	m					0.131		
05-19-16	Routine	0	m	2.62	9.22	1.33	2.33	0.036	3.2	3.8
05-19-16	QC-FR	0	m	2.64			2.48	0.029		
05-19-16	Routine	1	m		9.32					
05-19-16	Routine	2	m		9.34					
05-19-16	Routine	3	m		9.34					
05-19-16	Routine	4	m		7.64					
05-19-16	Routine	4.5	m					0.080		
05-19-16	Routine	5	m		7.45					

Year 2014 Data

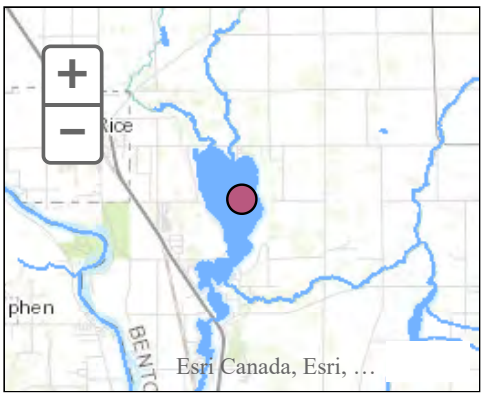
Year 1982 Data

Year 1981 Data

Year 1980 Data

Environmental Data Access

Print Report New Search



Lake Station Information

Station Name:	LITTLE ROCK
Waterbody Name:	Little Rock
Data Steward Org:	MPCA
Station ID: (Lake ID)	05-0013-00-204
Hydrologic Unit Code (HUC):	07010201
Assessment Unit:	05-0013-00
Period of Record:	1989 through 2019
Lat/Lon	45.735775,-94.163233

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Year 2019 Data

Year 2017 Data

Year 2016 Data

Year 2015 Data

Year 2013 Data

Year 2012 Data

Year 2008 Data

Station Data

Sample Date	Type	Depth	BOD	Chl-a	Trans	DO	TKN	NO2NO3	pH	Pheo	TP	TSS	Turb	FC	Ecoli	Secchi
	Info															
10-29-08	Routine	0 m		56.8		13.31	1.99	0.44			0.137	23	12			0.7
10-29-08	Routine	.6 m				13.24							13.0			
10-29-08	Routine	1.2 m				12.97							12.7			
10-29-08	Routine	1.8 m				12.81							12.7			
10-29-08	Routine	2.4 m				12.79							14.6			
10-29-08	Routine	3 m				12.72							13.9			
10-29-08	Routine	3.7 m				12.73							15.3			
10-29-08	Routine	4.267 m				12.70							14.6			
10-29-08	Routine	4.57 m					2.07	0.43			0.158	37	18			
10-29-08	Routine	4.9 m				12.52							20.5			
10-15-08	Routine	0 m		70.3		10.30	2.30	0.23			0.162	23	23.7			0.8
10-15-08	Routine	.6 m				10.29							23.1			
10-15-08	Routine	1.2 m				10.30							24.7			
10-15-08	Routine	1.8 m				10.31							23.5			
10-15-08	Routine	2.4 m				10.32							21.5			

10-15-08	Routine	3 m		10.32				20.6		
10-15-08	Routine	3.7 m		10.32				22.2		
10-15-08	Routine	4.267 m		10.06				23.9		
10-15-08	Routine	4.57 m			2.20	0.22	0.204 25	19		
09-30-08	Routine	0 m	219	10.71	3.00	< 0.05	0.303 60	51.8		0.3
09-30-08	Routine	.6 m		10.69				53.7		
09-30-08	Routine	1.2 m		10.64				54.7		
09-30-08	Routine	1.8 m		10.61				52.1		
09-30-08	Routine	2.4 m		10.61				52.7		
09-30-08	Routine	3 m		10.61				52.1		
09-30-08	Routine	3.7 m		10.63				54.3		
09-30-08	Routine	4.26 m			4.25	< 0.05	0.358 110	61		
09-30-08	Routine	4.267 m		10.62				52.6		
09-15-08	Routine	0 m	184	7.02	2.61	0.10	0.310 43	78.6		0.3
09-15-08	Routine	.6 m		7.09				86.2		
09-15-08	Routine	1.2 m		6.91				46.5		
09-15-08	Routine	1.8 m		6.90				46.7		
09-15-08	Routine	2.4 m		6.86				50.0		
09-15-08	Routine	3 m		6.82				44.6		
09-15-08	Routine	3.7 m		6.79				43.9		
09-15-08	Routine	4.26 m			2.68	0.10	0.329 54	45		
09-15-08	Routine	4.267 m		6.78				41.4		
09-15-08	Routine	4.9 m		6.54				39.5		
09-03-08	Routine	0 m	260	5.82	3.74	< 0.05	0.509 74	94.1		0.2
09-03-08	Routine	.6 m		5.86				90.6		
09-03-08	Routine	1.2 m		5.79				92.5		
09-03-08	Routine	1.8 m		5.71				90.1		
09-03-08	Routine	2.4 m		5.60				88.5		
09-03-08	Routine	3 m		5.50				92.8		
09-03-08	Routine	3.7 m		5.50				90.3		
09-03-08	Routine	4.26 m			3.69	< 0.05	0.458 210	74		
09-03-08	Routine	4.267 m		5.42				88.0		
09-03-08	Routine	4.9 m		5.43				86.9		
08-19-08	Routine	0 m	195	9.43	2.59	< 0.05	0.393 37	70.2		0.3
08-19-08	Routine	.6 m		9.28				68.4		
08-19-08	Routine	1.2 m		9.06				67.5		
08-19-08	Routine	1.8 m		8.59				65.6		
08-19-08	Routine	2.4 m		4.50				67.6		
08-19-08	Routine	3 m		4.52				69.5		
08-19-08	Routine	3.7 m		2.58				77.3		
08-19-08	Routine	4.3 m		0.44	4.1	< 0.05	0.639 200	174.0		
08-07-08	Routine	0 m	151	7.32	3.41	< 0.05	0.477 82	85.9		0.2
08-07-08	Routine	.6 m		7.39				83.9		
08-07-08	Routine	1.2 m		7.28				87.3		
08-07-08	Routine	1.8 m		6.88				90.2		
08-07-08	Routine	2.4 m		6.44				90.6		
08-07-08	Routine	3 m		6.29				92.4		
08-07-08	Routine	4.3 m		7.38	3.52	< 0.05	0.538 130	81.2		
08-07-08	Routine	4.9 m		7.41				79.7		
08-07-08	Routine	6.7 m		6.90				88.1		
07-28-08	Routine	0 m	202	9.90	2.62	< 0.05	0.35 43	53.2		0.3
07-28-08	Routine	.6 m		9.84				57.4		
07-28-08	Routine	1.2 m		9.63				55.9		
07-28-08	Routine	1.8 m		9.31				54.0		
07-28-08	Routine	2.4 m		9.36				53.7		
07-28-08	Routine	3 m		9.40				34.0		
07-28-08	Routine	4.3 m		2.99	2.5	< 0.05	0.428 54	64		
07-28-08	Routine	4.9 m		1.93				56.5		
07-28-08	Routine	6.7 m		4.60				35.1		

07-15-08	Routine	0 m		16.73	2.26	< 0.05	0.264 28	73.5	0.9
07-15-08	Routine	.6 m		10.42				48.9	
07-15-08	Routine	1.2 m		8.94				33.0	
07-15-08	Routine	1.8 m		8.26				30.1	
07-15-08	Routine	2.4 m		7.24				29.7	
07-15-08	Routine	3 m		6.60				30.1	
07-15-08	Routine	4.3 m		4.37				43.7	
07-15-08	Routine	4.9 m		4.25				52.1	
07-15-08	Routine	6.7 m		5.38				35.1	
06-12-08	Routine	0 m	28.6	8.6			0.135	21.5	1.1
06-12-08	Routine	.6 m		8.66				13.3	
06-12-08	Routine	1.2 m		8.69				18.8	
06-12-08	Routine	1.8 m		8.6				17.8	
06-12-08	Routine	2.4 m		8.8				17.1	
06-12-08	Routine	3 m		8.8				11.3	
06-12-08	Routine	3.7 m		8.04				9.7	
06-12-08	Routine	4.3 m		7.96				10.1	
06-12-08	Routine	4.9 m		7.99				9.8	

Year 2007 Data

Year 2006 Data

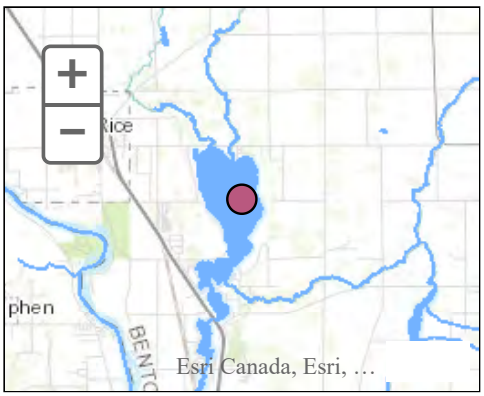
Year 2003 Data

Year 1990 Data

Year 1989 Data

Environmental Data Access

Print Report New Search



Lake Station Information

Station Name:	LITTLE ROCK
Waterbody Name:	Little Rock
Data Steward Org:	MPCA
Station ID: (Lake ID)	05-0013-00-204
Hydrologic Unit Code (HUC):	07010201
Assessment Unit:	05-0013-00
Period of Record:	1989 through 2019
Lat/Lon	45.735775,-94.163233

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Year 2019 Data

Year 2017 Data

Year 2016 Data

Year 2015 Data

Year 2013 Data

Year 2012 Data

Year 2008 Data

Year 2007 Data

Station Data

Sample Date	Type	Depth	BOD	Chl-a	Trans	DO	TKN	NO2NO3	pH	Pheo	TP	TSS	Turb	FC	Ecoli	Secchi
	Info															
10-17-07	Routine	0 m		122		10.23					0.285		48.8			0.4572
10-17-07	Routine	1 m				9.98							47.8			0.4572
10-17-07	Routine	2 m				9.89							44.5			0.4572
10-17-07	Routine	3.05 m				9.76							41.9			0.4572
09-04-07	Routine	0 m		75.2		13.96					0.244		34			0.6096
09-04-07	Routine	1 m				10.45							44.4			0.6096
09-04-07	Routine	2 m				7.67							37.5			0.6096
09-04-07	Routine	2.44 m				6.42							36.8			0.6096
07-17-07	Routine	0 m		73.9		11.24					0.269		63.9			0.3048
07-17-07	Routine	1 m				10.94							71.7			0.3048
07-17-07	Routine	2 m				8.92							43.1			0.3048
07-17-07	Routine	3.05 m				3.35							44.9			0.3048

06-19-07	Routine	0 m	374	9.88	0.322	146.5	0.1524
06-19-07	Routine	1 m		10.15		150.2	0.1524
06-19-07	Routine	1.83 m		10.15		153.1	0.1524
05-02-07	Routine	0 m	71.9	10.44	0.121	15.5	0.4572
05-02-07	Routine	1 m		10.04		16.1	0.4572
05-02-07	Routine	2 m		9.75		17.3	0.4572
05-02-07	Routine	3 m		9.58		18.1	0.4572
05-02-07	Routine	3.96 m		8.56		15.9	0.4572

Year 2006 Data

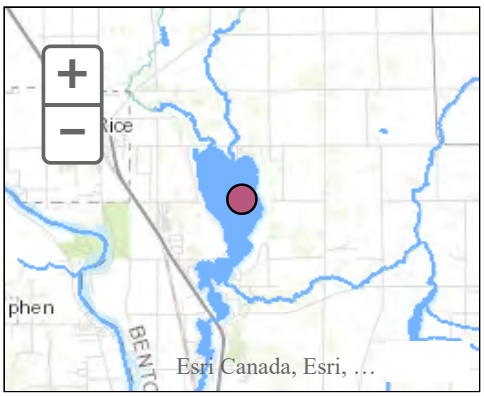
Year 2003 Data

Year 1990 Data

Year 1989 Data

Environmental Data Access

Print Report New Search



Lake Station Information

Station Name:	LITTLE ROCK
Waterbody Name:	Little Rock
Data Steward Org:	MPCA
Station ID: (Lake ID)	05-0013-00-204
Hydrologic Unit Code (HUC):	07010201
Assessment Unit:	05-0013-00
Period of Record:	1989 through 2019
Lat/Lon	45.735775,-94.163233

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Year 2019 Data

Year 2017 Data

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Year 2015 Data

Year 2013 Data

Year 2012 Data

Year 2008 Data

Year 2007 Data

Year 2006 Data

Station Data

Sample Date	Type	Depth	BOD	Chl-a	Trans	DO	TKN	NO2NO3	pH	Pheo	TP	TSS	Turb	FC	Ecoli	Secchi
	Info															
10-10-06	Routine	0 m		364		6.79					0.206		84.9			0.3048
10-10-06	Routine	3 m				6.6							86			
10-10-06	Routine	6 m				6.49							90.4			
10-10-06	Routine	9 m				6.34							86.6			
10-10-06	Routine	12 m				6.31							81.5			
10-10-06	Routine	14 m				6.28							98.2			
09-28-06	Routine	0 m		80.4		10.16					0.216		101.1			0.20117
09-28-06	Routine	3 m				9.84							90.6			
09-28-06	Routine	6 m				9.77							93.7			
09-28-06	Routine	9 m				9.72							96.9			
09-28-06	Routine	12 m				9.69							96.8			
09-28-06	Routine	15 m				9.68							93.6			

08-28-06	Routine 0 m	328	12.3	0.623	63.1	0.4572
08-28-06	Routine 3 m		12.99		62.7	
08-28-06	Routine 6 m		5.07		121.6	
08-28-06	Routine 9 m		1.65		160.9	
08-28-06	Routine 12 m		0.51		204.3	
08-28-06	Routine 14 m		0.84		530.1	
08-28-06	Routine 15 m		0.16		759	
08-08-06	Routine 0 m	117	9.72	0.183	89.6	0.3048
08-08-06	Routine 3 m				90.8	
08-08-06	Routine 6 m		9.84		95.7	
08-08-06	Routine 9 m		7.57		108.1	
08-08-06	Routine 12 m		4.56		116.6	
08-08-06	Routine 15 m		2.69		135.8	
07-13-06	Routine 0 m	90.4	4.99	0.098		0.45719
07-13-06	Routine 3 m		5.03			
07-13-06	Routine 6 m		4.57			
07-13-06	Routine 9 m		3.8			
07-13-06	Routine 12 m		2.82			
07-13-06	Routine 15 m		1.75			
06-21-06	Routine 0 m	64.4	8.78	0.092	22.1	0.61
06-21-06	Routine 3 m		8.92		23.2	
06-21-06	Routine 6 m		9.4		22.3	
06-21-06	Routine 9 m		9.51		23	
06-21-06	Routine 12 m		8.8		22	
06-21-06	Routine 15 m		8.8		22	
05-17-06	Routine 0 m	81.2	12.4	0.199	13.8	
05-17-06	Routine 3 m		13		14.6	
05-17-06	Routine 6 m		11.5		14.8	
05-17-06	Routine 9 m		12.9		14.2	
05-17-06	Routine 12 m		12.8		15	

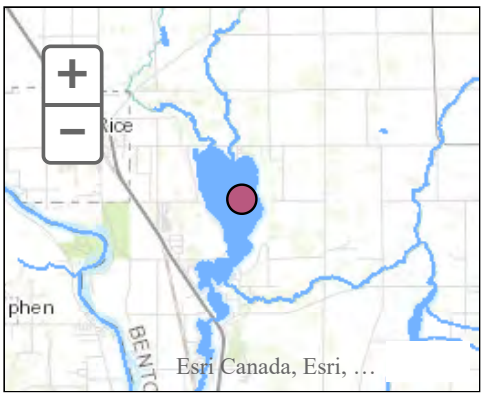
Year 2003 Data

Year 1990 Data

Year 1989 Data

Environmental Data Access

Print Report New Search



Lake Station Information

Station Name:	LITTLE ROCK
Waterbody Name:	Little Rock
Data Steward Org:	MPCA
Station ID: (Lake ID)	05-0013-00-204
Hydrologic Unit Code (HUC):	07010201
Assessment Unit:	05-0013-00
Period of Record:	1989 through 2019
Lat/Lon	45.735775,-94.163233

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Year 2019 Data

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Year 2015 Data

Year 2013 Data

Year 2012 Data

Year 2008 Data

Year 2007 Data

Year 2006 Data

Year 2003 Data

Station Data

Sample Date	Type	Depth	BOD	Chl-a	Trans	DO	TKN	NO2NO3	pH	Pheo	TP	TSS	Turb	FC	Ecoli	Secchi
	Info															
10-15-03	Routine	0 m		34			2.9				0.082					
10-15-03	Routine	0 m				8.01										3.05
10-15-03	Routine	1 m				7.85										
10-15-03	Routine	2 m				7.8										
10-15-03	Routine	3 m				7.73										
08-21-03	Routine	0 m		145		7.04					0.203					0.76
08-21-03	Routine	1 m				7.16										
08-21-03	Routine	2 m				7.04										
08-21-03	Routine	3 m				7.27										
08-21-03	Routine	4 m				1.23										
07-24-03	Routine	0 m		12		6.8					0.061					1.98

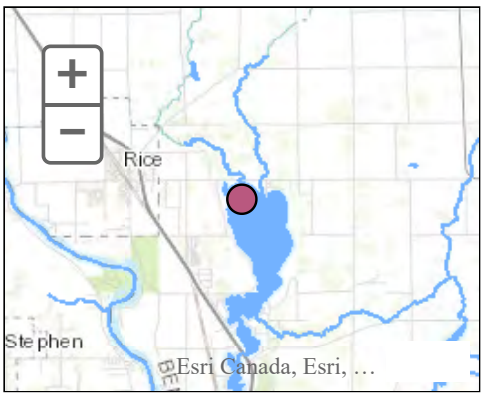
07-24-03	Routine	1	m		6.8		
07-24-03	Routine	2	m		6.2		
07-24-03	Routine	3	m		0.6		
06-21-03	Routine	0	m	29	8.4	2.3	0.077	1.6
06-21-03	Routine	1	m		8.4		
06-21-03	Routine	2	m		8.2		
06-21-03	Routine	3	m		8		
05-21-03	Routine	0	m	3		1.6	0.076	
05-21-03	Routine	0	m		8			2.59
05-21-03	Routine	1	m		7.9		
05-21-03	Routine	2	m		7.8		
05-21-03	Routine	3	m		7.8		

Year 1990 Data

Year 1989 Data

Environmental Data Access

Print Report New Search



Lake Station Information

Station Name:	LITTLE ROCK
Waterbody Name:	Little Rock
Data Steward Org:	MPCA
Station ID: (Lake ID)	05-0013-00-205
Hydrologic Unit Code (HUC):	07010201
Assessment Unit:	05-0013-00
Period of Record:	1989 through 2019
Lat/Lon	45.744882,-94.174491

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Year 2019 Data

Year 2017 Data

Year 2016 Data

Year 2015 Data

Year 2013 Data

Year 2012 Data

Year 2008 Data

Station Data

Sample Date	Type Info	Depth	BOD	Chl-a	Trans	DO	TKN	NO2NO3	pH	Pheo	TP	TSS	Turb	FC	Ecoli	Secchi
10-29-08	Routine	0 m				12.55							10.1			0.8
10-29-08	Routine	.6 m				12.52							10.7			
10-29-08	Routine	1.2 m				12.51							10.7			
10-29-08	Routine	1.8 m				12.56							10.7			
10-29-08	Routine	2.4 m				11.92							15.1			
10-29-08	Routine	3 m				11.91							17.9			
10-15-08	Routine	0 m				10.53					0.166		18.9			0.8
10-15-08	Routine	.6 m				10.58							19.0			
10-15-08	Routine	1.2 m				10.62							17.7			
10-15-08	Routine	1.8 m				10.64							20.0			
10-15-08	Routine	2.4 m				10.40							0.6			
10-15-08	Routine	3 m				8.29							-0.4			
09-30-08	Routine	0 m				10.40					0.309		55.9			0.3
09-30-08	Routine	.6 m				10.44							53.9			
09-30-08	Routine	1.2 m				10.33							53.3			
09-30-08	Routine	1.8 m				10.32							51.7			
09-30-08	Routine	2.4 m				10.29							55.0			

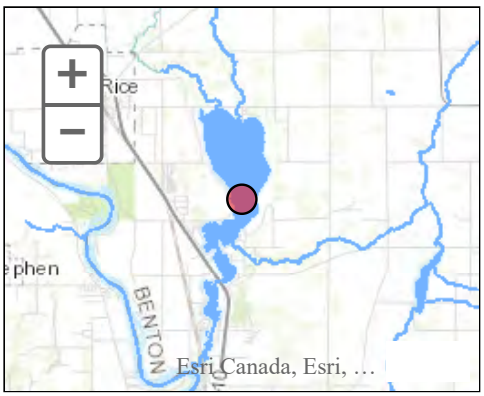
09-30-08	Routine 3 m		10.20		55.7	
09-15-08	Routine 0 m		7.03	0.276	33.6	0.4
09-15-08	Routine .6 m		6.90		32.5	
09-15-08	Routine 1.2 m		6.82		32.7	
09-15-08	Routine 1.8 m		6.76		33.0	
09-15-08	Routine 2.4 m		6.82		31.8	
09-15-08	Routine 3 m		6.54		33.9	
09-03-08	Routine 0 m		5.79	0.428	93.9	0.2
09-03-08	Routine .6 m		5.65		90.2	
09-03-08	Routine 1.2 m		5.63		90.9	
09-03-08	Routine 1.8 m		5.46		87.3	
09-03-08	Routine 2.4 m		5.47		88.9	
09-03-08	Routine 3 m		5.38		88.7	
08-19-08	Routine 0 m		10.11	0.417	90.3	0.3
08-19-08	Routine .6 m		10.11		92.3	
08-19-08	Routine 1.2 m		9.99		89.0	
08-19-08	Routine 1.8 m		9.73		86.3	
08-19-08	Routine 2.4 m		9.11		96.5	
08-19-08	Routine 3 m		8.76		97.2	
08-07-08	Routine 0 m		5.31	0.415	78.3	0.2
08-07-08	Routine .6 m		5.05		76.0	
08-07-08	Routine 1.2 m		4.82		75.0	
08-07-08	Routine 1.8 m		4.67		74.2	
08-07-08	Routine 2.4 m		4.74		75.1	
08-07-08	Routine 3 m		3.57		68.6	
07-28-08	Routine 0 m	152	10.86	0.338	54.0	0.3
07-28-08	Routine .6 m		11.89		64.0	
07-28-08	Routine 1.2 m		11.93		58.0	
07-28-08	Routine 1.8 m		12.09		59.5	
07-28-08	Routine 2.4 m		12.30		66.6	
07-28-08	Routine 3 m		8.69		69.4	
07-15-08	Routine 0 m		15.93	0.251	162.0	0.1
07-15-08	Routine .6 m		16.33		85.1	
07-15-08	Routine 1.2 m		11.11		40.2	
07-15-08	Routine 1.8 m		10.42		34.0	
07-15-08	Routine 2.4 m		9.80		28.2	
07-15-08	Routine 3 m		9.10		24.1	

Year 1990 Data

Year 1989 Data

Environmental Data Access

Print Report New Search



Lake Station Information

Station Name:	LITTLE ROCK
Waterbody Name:	Little Rock
Data Steward Org:	MPCA
Station ID: (Lake ID)	05-0013-00-209
Hydrologic Unit Code (HUC):	07010201
Assessment Unit:	05-0013-00
Period of Record:	2008 through 2008
Lat/Lon	45.725695,-94.165836

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Year 2008 Data

Station Data

Sample Date	Type	Depth	BOD	Chl-a	Trans	DO	TKN	NO2NO3	pH	Pheo	TP	TSS	Turb	FC	Ecoli	Secchi
	Info															
10-29-08	Routine	0 m				13.85							10.7			0.8
10-29-08	Routine	.6 m				13.82							10.3			
10-29-08	Routine	1.2 m				13.82							10.8			
10-29-08	Routine	1.8 m				13.36							11.2			
10-29-08	Routine	2.4 m				13.22							14.8			
10-29-08	Routine	3 m				12.89							15.6			
10-15-08	Routine	0 m				10.31					0.155		18.3			0.8
10-15-08	Routine	.6 m				10.31							17.1			
10-15-08	Routine	1.2 m				10.28							15.9			
10-15-08	Routine	1.8 m				10.28							18.0			
10-15-08	Routine	2.4 m				10.26							18.5			
10-15-08	Routine	3 m				10.24							19.0			
09-30-08	Routine	0 m				11.37					0.284		54.0			0.3
09-30-08	Routine	.6 m				11.38							54.0			
09-30-08	Routine	1.2 m				11.30							53.4			
09-30-08	Routine	1.8 m				11.25							53.8			
09-30-08	Routine	2.4 m				10.82							51.0			
09-30-08	Routine	3 m				10.44							52.4			
09-15-08	Routine	0 m				7.82					0.328		60.6			0.3
09-15-08	Routine	.6 m				7.73							63.0			
09-15-08	Routine	1.2 m				7.71							57.6			
09-15-08	Routine	1.8 m				7.63							54.5			
09-15-08	Routine	2.4 m				7.63							46.5			
09-15-08	Routine	3 m				7.56							36.3			
09-03-08	Routine	0 m				7.03							115.8			0.2
09-03-08	Routine	.6 m				6.95							114.2			
09-03-08	Routine	1.2 m				6.78							115.6			
09-03-08	Routine	1.8 m				6.54							106.3			
09-03-08	Routine	2.4 m				6.56							98.6			

09-03-08	Routine 3 m		5.67		74.0	
08-19-08	Routine 0 m		7.69	0.411	66.0	0.3
08-19-08	Routine .6 m		7.45		70.5	
08-19-08	Routine 1.2 m		6.49		70.9	
08-19-08	Routine 1.8 m		6.34		63.3	
08-19-08	Routine 2.4 m		5.97		66.0	
08-19-08	Routine 3 m		1.77		121.3	
08-07-08	Routine 0 m		8.51	0.450	91.1	0.2
08-07-08	Routine .6 m		8.49		93.1	
08-07-08	Routine 1.2 m		8.41		90.1	
08-07-08	Routine 1.8 m		8.38		91.3	
08-07-08	Routine 2.4 m		7.88		84.1	
08-07-08	Routine 3 m		6.90		91.1	
07-28-08	Routine 0 m	101	7.39	0.339	46.2	0.4
07-28-08	Routine .6 m		7.36		49.9	
07-28-08	Routine 1.2 m		7.46		50.6	
07-28-08	Routine 1.8 m		7.64		50.0	
07-28-08	Routine 2.4 m		8.02		50.3	
07-28-08	Routine 3 m		6.46		56.1	
07-15-08	Routine 0 m		13.14	0.240	40.9	0.3
07-15-08	Routine .6 m		13.14		38.8	
07-15-08	Routine 1.2 m		9.45		45.8	
07-15-08	Routine 1.8 m		7.77		27.1	
07-15-08	Routine 2.4 m		7.20		27.7	
07-15-08	Routine 3 m		5.41		29.4	

Environmental Data Access

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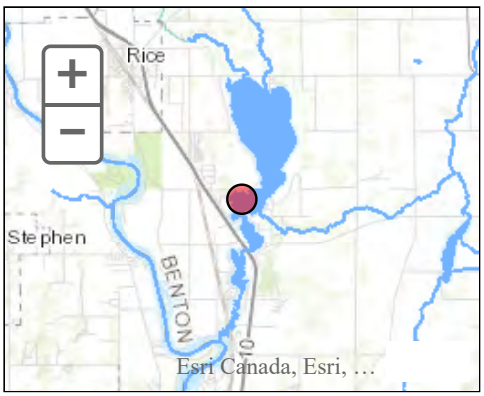

Lake Station Information

Station Name:	LITTLE ROCK
Waterbody Name:	Little Rock
Data Steward Org:	MPCA
Station ID: (Lake ID)	05-0013-00-211
Hydrologic Unit Code (HUC):	07010201
Assessment Unit:	05-0013-00
Period of Record:	2008 through 2008
Lat/Lon	45.717572,-94.175931

Chemical | Projects | Other Stations

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Year 2008 Data

Station Data

Sample Date	Type	Depth	BOD	Chl-a	Trans	DO	TKN	NO2NO3	pH	Pheo	TP	TSS	Turb	FC	Ecoli	Secchi
	Info															
10-29-08	Routine	0 m				13.98	1.81	0.30			0.123	18	8.3			0.8
10-29-08	Routine	.6 m				14.02							8.9			
10-29-08	Routine	1.2 m				13.99							10.0			
10-15-08	Routine	0 m				10.78	1.86	0.10			0.140	20	15			0.9
10-15-08	Routine	.6 m				10.78							15.4			
10-15-08	Routine	1.2 m				10.76							14.3			
10-15-08	Routine	1.5 m				10.76							40.4			
09-30-08	Routine	0 m				13.75	2.57	0.05			0.236	61	43.3			0.5
09-30-08	Routine	.6 m				13.73							40.7			
09-30-08	Routine	1.2 m				13.60							37.5			
09-15-08	Routine	0 m				9.34	4.18	< 0.05			0.396	76	65.7			0.3
09-15-08	Routine	.6 m				9.09							78.3			
09-15-08	Routine	1.2 m				8.32							83.8			
09-03-08	Routine	0 m				7.06	1.88	< 0.05			0.371	38	55.1			0.3
09-03-08	Routine	.6 m				7.10							55.7			
09-03-08	Routine	1.2 m				7.04							56.0			
08-19-08	Routine	0 m				8.72	2.39	< 0.05			0.415	61	65.2			0.3
08-19-08	Routine	.6 m				8.56							66.1			
08-19-08	Routine	1.2 m				8.16							65.0			
08-19-08	Routine	1.8 m				6.55							133.2			
08-07-08	Routine	0 m				8.97	3.48	< 0.05			0.489	90	89.9			0.2
08-07-08	Routine	.6 m				8.61							94.0			
08-07-08	Routine	1.2 m				7.10							91.1			
08-07-08	Routine	1.5 m				5.65							98.0			
07-28-08	Routine	0 m				8.65	4.38	0.05			0.543	81	97.0			0.2
07-28-08	Routine	.6 m				8.48							96.5			
07-28-08	Routine	1.2 m				8.20							75.9			
07-28-08	Routine	1.5 m				8.22							103.6			
07-15-08	Routine	0 m				11.90	2.16	< 0.05			0.241	24	30.1			0.5

07-15-08	Routine .6 m	12.06	25.7
07-15-08	Routine 1.2 m	8.11	25.6
07-15-08	Routine 1.5 m	5.05	26.1

Environmental Data Access

Print Report New Search

Lake Station Information

Station Name:	LITTLE ROCK
Waterbody Name:	Little Rock
Data Steward Org:	MPCA
Station ID: (Lake ID)	05-0013-00-212
Hydrologic Unit Code (HUC):	07010201
Assessment Unit:	05-0013-00
Period of Record:	2008 through 2019
Lat/Lon	45.703855,-94.173282

Chemical | Projects | Other Stations

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Year 2019 Data

Station Data

Sample Date	Type	Depth	BOD	Chl-a	Trans	DO	TKN	NO2NO3	pH	Pheo	TP	TSS	Turb	FC	Ecoli	Secchi
	Info															
07-24-19	Routine	0 m														0.6
06-24-19	Routine	0 m														0.5
05-23-19	Routine	0 m														1.1

Year 2017 Data

Year 2016 Data

Year 2015 Data

Year 2013 Data

Year 2012 Data

Year 2008 Data

Environmental Data Access

Print Report New Search

Lake Station Information

Station Name:	LITTLE ROCK
Waterbody Name:	Little Rock
Data Steward Org:	MPCA
Station ID: (Lake ID)	05-0013-00-212
Hydrologic Unit Code (HUC):	07010201
Assessment Unit:	05-0013-00
Period of Record:	2008 through 2019
Lat/Lon	45.703855,-94.173282

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Download this station

Year 2019 Data

Year 2017 Data

Station Data

Sample Date	Type	Depth	BOD	Chl-a	Trans	DO	TKN	NO2NO3	pH	Pheo	TP	TSS	Turb	FC	Ecoli	Secchi
	Info															
09-12-17	Routine	0 m		33.8							0.072					
08-22-17	Routine	0 m		247							0.16					0.3048
07-17-17	Routine	0 m		88.1							0.148					0.4572
06-12-17	Routine	0 m		61.4							0.085					0.762
05-21-17	Routine	0 m		8.01							0.051					1.9812

Year 2016 Data

Year 2015 Data

Year 2013 Data

Year 2012 Data

Year 2008 Data

Environmental Data Access

Print Report New Search

Lake Station Information

Station Name:	LITTLE ROCK
Waterbody Name:	Little Rock
Data Steward Org:	MPCA
Station ID: (Lake ID)	05-0013-00-212
Hydrologic Unit Code (HUC):	07010201
Assessment Unit:	05-0013-00
Period of Record:	2008 through 2019
Lat/Lon	45.703855,-94.173282

Chemical | Projects | Other Stations

Download this station

Year 2019 Data

Year 2017 Data

Year 2016 Data

Station Data

Sample Date	Type	Depth	BOD	Chl-a	Trans	DO	TKN	NO2NO3	pH	Pheo	TP	TSS	Turb	FC	Ecoli	Secchi
	Info															
09-27-16	Routine	0 m		199							0.346					0.3
08-22-16	Routine	0 m		141							0.35					0.3
07-27-16	Routine	0 m		77.4							0.243					0.5
06-29-16	Routine	0 m		76.5							0.233					0.3
05-23-16	Routine	0 m		12.5							0.12					1.2

Year 2015 Data

Year 2013 Data

Year 2012 Data

Year 2008 Data

Environmental Data Access

Print Report New Search

Lake Station Information

Station Name:	LITTLE ROCK
Waterbody Name:	Little Rock
Data Steward Org:	MPCA
Station ID: (Lake ID)	05-0013-00-212
Hydrologic Unit Code (HUC):	07010201
Assessment Unit:	05-0013-00
Period of Record:	2008 through 2019
Lat/Lon	45.703855,-94.173282

Chemical | Projects | Other Stations

Download this station

Year 2019 Data

Year 2017 Data

Year 2016 Data

Year 2015 Data

Station Data

Sample Date	Type	Depth	BOD	Chl-a	Trans	DO	TKN	NO2NO3	pH	Pheo	TP	TSS	Turb	FC	Ecoli	Secchi
	Info															
09-29-15	Routine	0 m		69							0.12					0.5
08-24-15	Routine	0 m		243							0.374					0.3
07-15-15	Routine	0 m		135							0.139					0.3
06-15-15	Routine	0 m		56							0.092					0.8
05-20-15	Routine	0 m		46							0.118					0.6

Year 2013 Data

Year 2012 Data

Year 2008 Data

Environmental Data Access

Print Report New Search

Lake Station Information

Station Name:	LITTLE ROCK
Waterbody Name:	Little Rock
Data Steward Org:	MPCA
Station ID: (Lake ID)	05-0013-00-212
Hydrologic Unit Code (HUC):	07010201
Assessment Unit:	05-0013-00
Period of Record:	2008 through 2019
Lat/Lon	45.703855,-94.173282

Chemical | Projects | Other Stations

Download this station

Year 2019 Data

Year 2017 Data

Year 2016 Data

Year 2015 Data

Year 2013 Data

Station Data

Sample Date	Type	Depth	BOD	Chl-a	Trans	DO	TKN	NO2NO3	pH	Pheo	TP	TSS	Turb	FC	Ecoli	Secchi
	Info															
09-23-13	Routine	0 m		53							0.129					0.61
08-19-13	Routine	0 m		160							0.316					
07-08-13	Routine	0 m		110							0.390					0.5
06-12-13	Routine	0 m		24							0.057					0.9
05-14-13	Routine	0 m		86							0.095					> 0.9

Year 2012 Data

Year 2008 Data

Environmental Data Access

Print Report New Search

Lake Station Information

Station Name:	LITTLE ROCK
Waterbody Name:	Little Rock
Data Steward Org:	MPCA
Station ID: (Lake ID)	05-0013-00-212
Hydrologic Unit Code (HUC):	07010201
Assessment Unit:	05-0013-00
Period of Record:	2008 through 2019
Lat/Lon	45.703855,-94.173282

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Download this station

Year 2019 Data

Year 2017 Data

Year 2016 Data

Year 2015 Data

Year 2013 Data

Year 2012 Data

Station Data

Sample Date	Type Info	Depth	BOD	Chl-a	Trans	DO	TKN	NO2NO3	pH	Pheo	TP	TSS	Turb	FC	Ecoli	Secchi
09-17-12	Routine	0 m		62							0.163					0.5
09-11-12	Routine	0 m		66							0.129					
09-05-12	Routine	0 m		57							0.161					
08-20-12	Routine	0 m		223							0.332					0.2
08-15-12	Routine	0 m		109							0.341					0.2
07-25-12	Routine	0 m		155							0.244					
07-12-12	Routine	0 m		174							0.268					0.3

Year 2008 Data

Environmental Data Access

Print Report New Search

Lake Station Information

Station Name:	LITTLE ROCK
Waterbody Name:	Little Rock
Data Steward Org:	MPCA
Station ID: (Lake ID)	05-0013-00-212
Hydrologic Unit Code (HUC):	07010201
Assessment Unit:	05-0013-00
Period of Record:	2008 through 2019
Lat/Lon	45.703855,-94.173282

Chemical | Projects | Other Stations

Download this station

Year 2019 Data

Year 2017 Data

Year 2016 Data

Year 2015 Data

Year 2013 Data

Year 2012 Data

Year 2008 Data

Station Data

Sample Date	Type Info	Depth	BOD	Chl-a	Trans	DO	TKN	NO2NO3	pH	Pheo	TP	TSS	Turb	FC	Ecoli	Secchi
10-29-08	Routine	0 m				13.59					0.098		6.2			1.1
10-29-08	Routine	.6 m				13.62							8.9			
10-29-08	Routine	1.2 m				13.64							6.7			
10-29-08	Routine	1.8 m				13.70							6.6			
10-29-08	Routine	2.4 m				13.65							8.2			
10-29-08	Routine	3 m				13.65							7.8			
10-29-08	Routine	3.7 m				13.50							9.3			
10-29-08	Routine	4.3 m				13.57							8.0			
10-29-08	Routine	4.9 m				13.63							8.0			
10-15-08	Routine	0 m				11.36					0.099		10.4			0.9
10-15-08	Routine	.6 m				11.37							10.5			
10-15-08	Routine	1.2 m				11.38							10.5			
10-15-08	Routine	1.8 m				11.34							11.3			
10-15-08	Routine	2.4 m				11.29							11.4			
10-15-08	Routine	3 m				11.29							11.1			
10-15-08	Routine	3.7 m				11.29							12.4			
10-15-08	Routine	4.3 m				11.28							11.6			

09-30-08	Routine 0 m		0.153		
09-15-08	Routine 0 m	10.90	0.255	46.9	0.4
09-15-08	Routine .6 m	10.87		43.7	
09-15-08	Routine 1.2 m	10.68		41.5	
09-15-08	Routine 1.8 m	9.68		43.5	
09-15-08	Routine 2.4 m	9.47		46.3	
09-15-08	Routine 3 m	9.35		44.2	
09-15-08	Routine 3.7 m	9.33		46.3	
09-15-08	Routine 4.3 m	9.31		63.0	
09-15-08	Routine 4.9 m	9.27		55.1	
09-03-08	Routine 0 m	7.91	0.366	65.5	0.2
09-03-08	Routine .6 m	7.78		65.5	
09-03-08	Routine 1.2 m	7.65		61.4	
09-03-08	Routine 1.8 m	7.58		61.1	
09-03-08	Routine 2.4 m	7.39		61.1	
09-03-08	Routine 3 m	7.3		65.6	
09-03-08	Routine 3.7 m	7.21		64.6	
09-03-08	Routine 4.3 m	7.06		68.3	
08-19-08	Routine 0 m	10.41	0.299	42.3	0.3
08-19-08	Routine .6 m	10.29		45.3	
08-19-08	Routine 1.2 m	9.00		46.6	
08-19-08	Routine 1.8 m	8.23		48.1	
08-19-08	Routine 2.4 m	8.03		47.5	
08-19-08	Routine 3 m	7.87		50.7	
08-07-08	Routine 0 m	12.96	0.487	107.1	0.2
08-07-08	Routine .6 m	10.86		103.9	
08-07-08	Routine 1.2 m	10.05		102.9	
08-07-08	Routine 1.8 m	9.49		99.2	
08-07-08	Routine 2.4 m	9.39		97.9	
08-07-08	Routine 3 m	9.22		98.5	
08-07-08	Routine 3.7 m	9.20		100.9	
08-07-08	Routine 4.3 m	3.84		84.2	
08-07-08	Routine 4.9 m	0.91		103.5	
07-28-08	Routine 0 m	10.70	0.412	69.2	0.3
07-28-08	Routine .6 m	10.74		66.6	
07-28-08	Routine 1.2 m	10.57		73.8	
07-28-08	Routine 1.8 m	10.47		72.4	
07-28-08	Routine 2.4 m	10.44		73.1	
07-28-08	Routine 3 m	10.49		66.0	
07-15-08	Routine 0 m	13.09	0.266	71.2	0.3
07-15-08	Routine .6 m	13.50		33.5	
07-15-08	Routine 1.2 m	9.95		45.5	
07-15-08	Routine 1.8 m	8.16		48.0	
07-15-08	Routine 2.4 m	7.69		48.0	

Environmental Data Access

Print Report New Search

* Does not reflect exact sampling location

Lake Station Information

Station Name:	LITTLE ROCK
Waterbody Name:	Little Rock
Data Steward Org:	MPCA
Station ID: (Lake ID)	05-0013-00-100 *
Hydrologic Unit Code (HUC):	07010201
Assessment Unit:	05-0013-00
Period of Record:	2007 through 2007
Lat/Lon	45.7072,-94.1679

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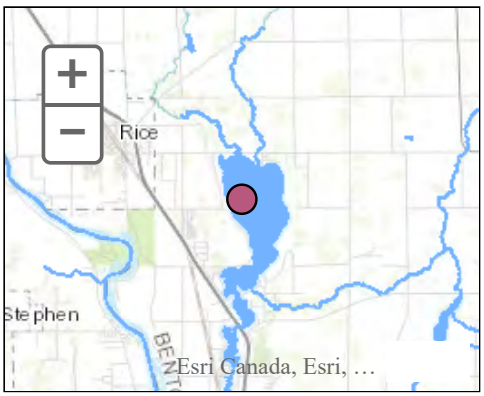
Year 2007 Data

Station Data

Sample Date	Type	Depth	BOD	Chl-a	Trans	DO	TKN	NO2NO3	pH	Pheo	TP	TSS	Turb	FC	Ecoli	Secchi
	Info															
07-12-07	Routine	0 m		501						24.7	0.594					

Environmental Data Access

Print Report New Search



Lake Station Information

Station Name:	LITTLE ROCK
Waterbody Name:	Little Rock
Data Steward Org:	MPCA
Station ID: (Lake ID)	05-0013-00-213
Hydrologic Unit Code (HUC):	07010201
Assessment Unit:	05-0013-00
Period of Record:	2003 through 2003
Lat/Lon	45.737575,-94.172999

Chemical | Projects | Other Stations

Download this station

Year 2003 Data

Station Data

Sample Date	Type	Depth	BOD	Chl-a	Trans	DO	TKN	NO2NO3	pH	Pheo	TP	TSS	Turb	FC	Ecoli	Secchi
	Info															
10-15-03	Routine	0 m		34		8.0	2.9				0.082					3.1
10-15-03	Routine	1 m				7.9										
10-15-03	Routine	2 m				7.8										
10-15-03	Routine	3 m				7.7										
08-21-03	Routine	0 m		145		7.0					0.203					0.8
08-21-03	Routine	1 m				7.2										
08-21-03	Routine	2 m				7.0										
08-21-03	Routine	3 m				7.3										
08-21-03	Routine	4 m				1.2										
07-24-03	Routine	0 m		12		6.8					0.061					2.0
07-24-03	Routine	1 m				6.8										
07-24-03	Routine	2 m				6.2										
07-24-03	Routine	3 m				0.6										
06-21-03	Routine	0 m		29		8.4	2.3				0.077					1.6
06-21-03	Routine	1 m				8.4										
06-21-03	Routine	2 m				8.2										
06-21-03	Routine	3 m				8.0										
05-21-03	Routine	0 m		3		8.0	1.6				0.076					2.6
05-21-03	Routine	1 m				7.9										
05-21-03	Routine	2 m				7.8										
05-21-03	Routine	3 m				7.8										

APPENDIX 4.3.8.2-4 **Little Rock Lake-Sartell Pool Drawdown Feasibility Study**

2017

Little Rock Lake – Sartell Pool Drawdown Feasibility Study

Table of Contents

Little Rock Lake Morphology and Background Information:

Little Rock Lake is a 1,270 acre shallow lake located in the North Central Hardwood Forest (NCHF) Ecoregion in a transitional area between forested and agricultural areas. The lake has an average depth of eight feet and a maximum depth of 16 feet. Based on 1998 data, a detailed bathymetric map was created from sonar data collected by Dr. Charles Nelson at St Cloud State University (Figure 1). More recent depth data has been taken for the project area on Little Rock Lake and the Mississippi River (Figure 2 below and figures 33-58 in the appendix). The lake basin began as shallow wetland, and evolved into a vegetated marsh following the construction of a dam on the Mississippi River downstream of the Little Rock Creek outlet in 1907. Water levels were raised in 1934, further evolving the lake basin from a vegetated marsh into a turbid impoundment. As a result of the dam installation, waters levels increased over 15 feet in some places with Little Rock Lake water levels increasing over seven feet. It has been over 100 years since the initial impoundment, and water levels have not been allowed to fluctuate more than six inches above or below 1014 MSL. Without the natural drought cycle with rising and falling water levels, valuable plant growth expansion is not possible. "The progression from marsh to an open water lake, had profound impact on the lakes biota…" including the "deposition of organic matter in the sediments" (2009 Sediment Core Study of Little Rock Lake, Benton County, Minnesota). The lack of shoreline stability plant growth would provide along with the land use changes from scrub/shrub, wetland, and forested, to now largely agricultural has contributed to the significant increase in nutrients, sediment loading, and algal blooms currently effecting Little Rock Lake.

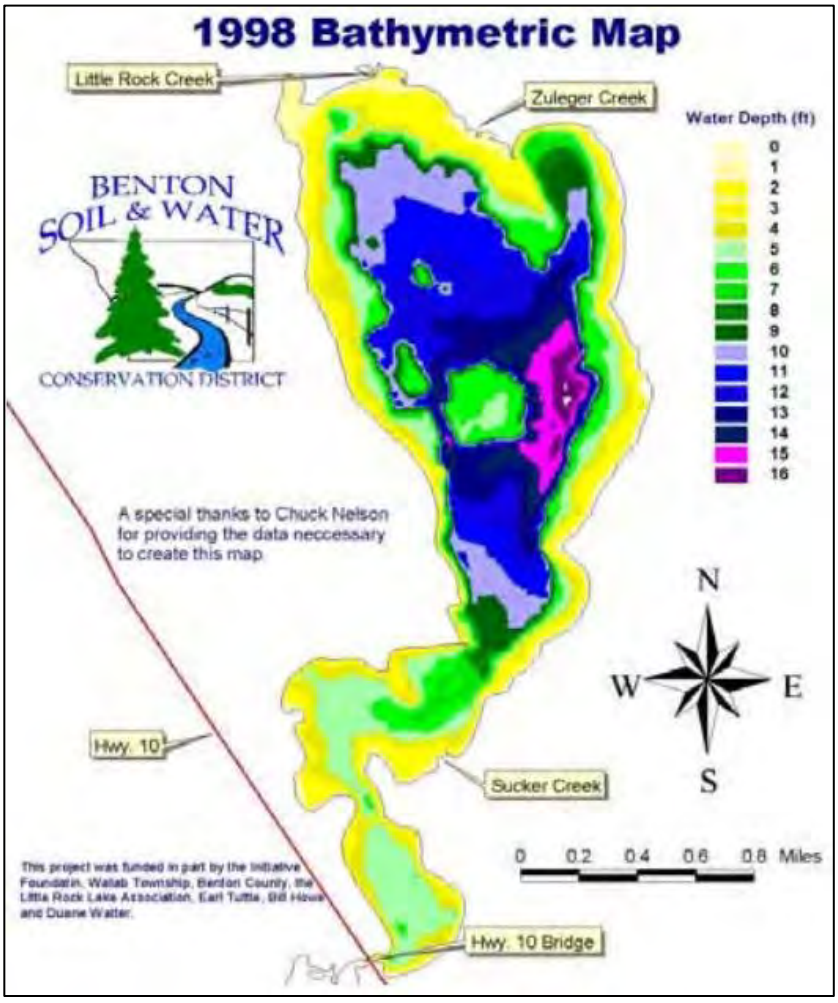


Figure 1: 1998 bathymetric map of Little Rock Lake. Image taken from the Little Rock Lake TMDL

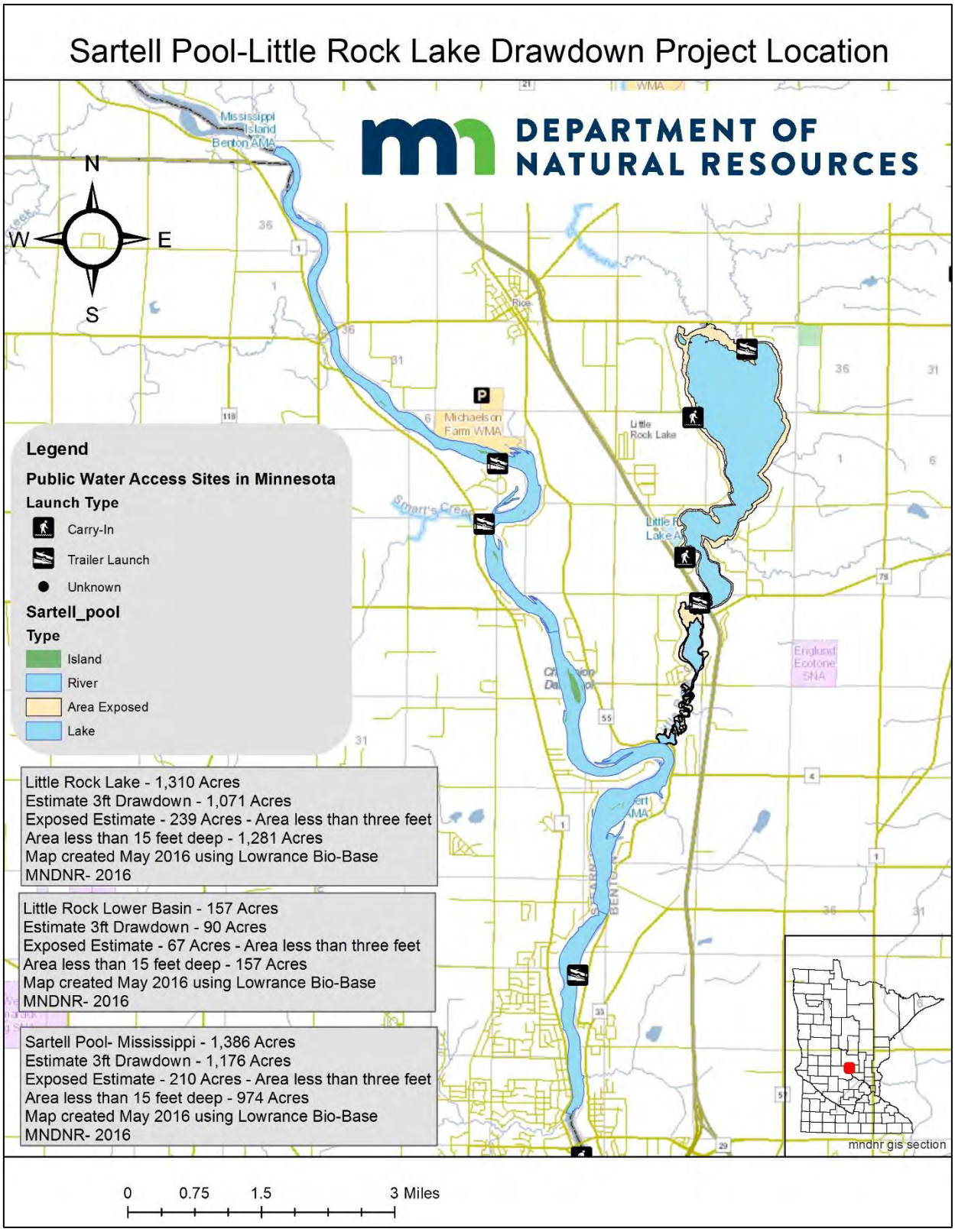


Figure 2: Drawdown project area

Sediment Core Studies:

Sediment Core Study of Little Rock Lake, Benton County, Minnesota 2009

A sediment core study of Little Rock Lake was completed in 2009. Sediment core layers were analyzed for lead-210 (^{210}Pb) to determine age of deposition. The study found that "the specific activity of ^{210}Pb in the surface sediments of the core was 5.88 pCi cm^{-2}, which is somewhat lower than the regional average" (Figure 4). The ^{210}Pb inventory was 22.73 cm^{-2} which is somewhat higher than the regional mean". Results of higher than normal ^{210}Pb inventory and lower than regional mean ^{210}Pb specific activity indicate a likely accelerated sediment input from the largely agricultural land use in the watershed.

Figure 3: Core sample location. Image taken from the "Sediment Core Study of Little Rock Lake, Benton County, Minnesota"

Organic matter content was higher at the bottom of the core, reflecting the marsh conditions that existed prior to the installation of the dam. Another high peak of organic matter between the depths of 40 cm and 55 cm is suspected to represent the time period following the installation of the dam when the lake changed from marsh conditions to open water (Figure 5). The higher water levels likely flooded a substantial amount of vegetation and therefore hindered the decomposition of that organic matter resulting in increased deposition which is reflected in the lower values seen in the upper 35 cm or the core. "The conversion from a marsh to a lake meant that fewer vascular plants were around in the lake and much of the primary production consisted of algae. Stephanodiscus niagarae is a diatom which is found in open water of lakes and rivers. Figure 5 shows a large increase of the diatom at 40 cm which also indicates the transition from marsh to open lake conditions.

Profiles of algal fossils also reflect the historic water level increases seen in Little Rock Lake (Figure 7). The bottom portion of the core is dominated by blue-green algae (Aphanizomenon, Anabaena, and Gloetrichia) and green alga (Pediastrum). The blue-green algae and green alga decline around the same time the stephanodiscus niagarae diatom begins to increase, signaling the rise of water levels in Little Rock Lake. While the rise in water levels are likely the reason for decline in pediastrum, the decline in blue green algae likely signals an increase in nutrients.

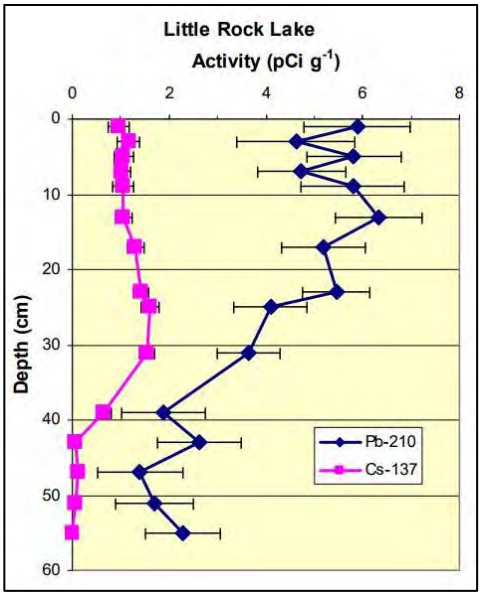


Figure 4: Radioisotope (^{210}Pb and ^{137}Cs) activities vs. sediment depth in the sediment core. Image taken from the "Sediment Core Study of Little Rock Lake, Benton County, Minnesota"

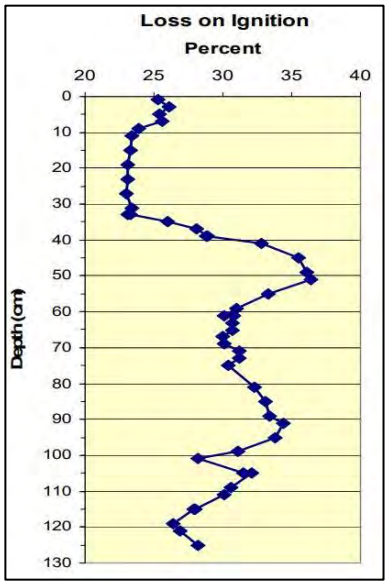


Figure 5: Loss of ignition (indicating organic matter content) vs depth in the sediment core. The peak between 40 cm and 55 cm may represent the time period soon after the installation of the dam. Image taken from the "Sediment Core Study of Little Rock Lake, Benton County, Minnesota"

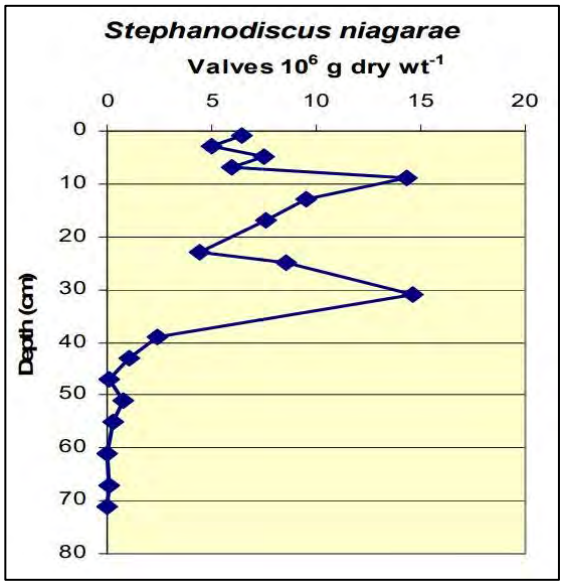


Figure 6: Diatom Stephanodiscus Niagarae vs. depth in the sediment core. Image taken from the "Sediment Core Study of Little Rock Lake, Benton County, Minnesota"

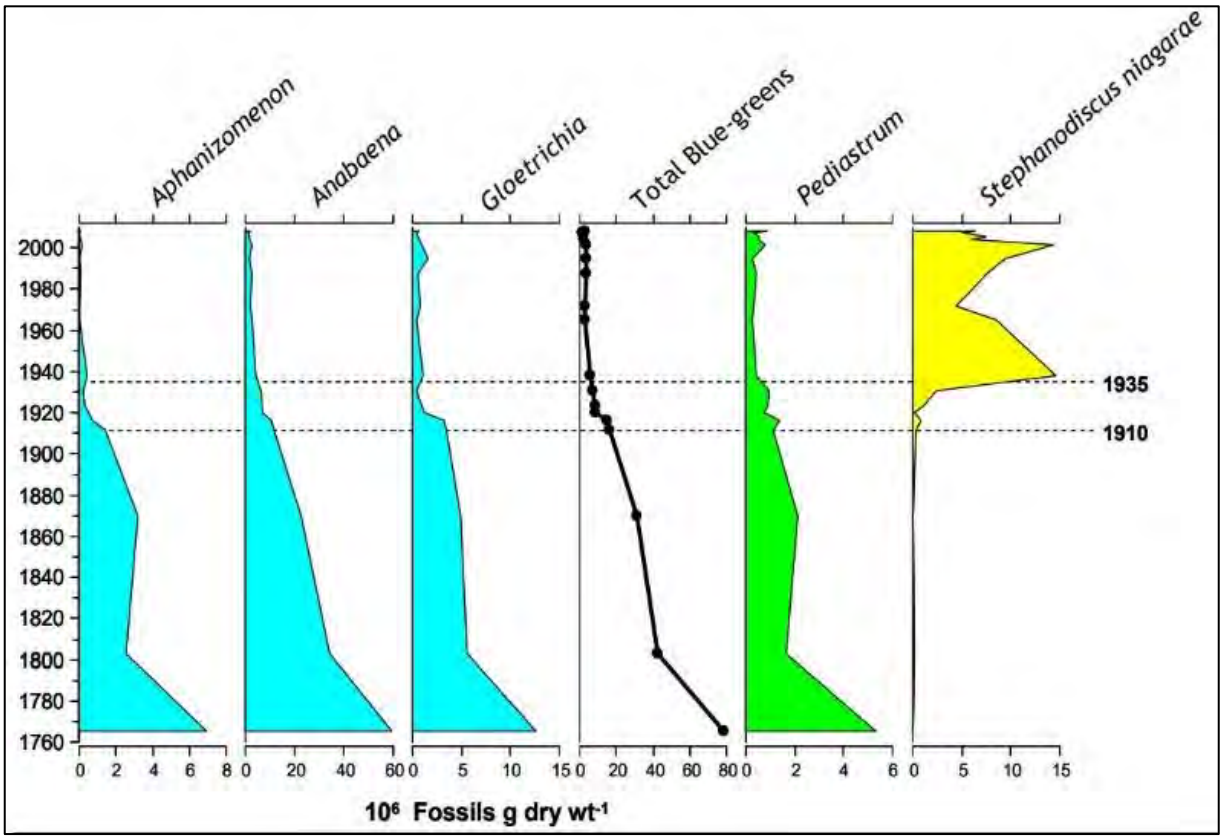


Figure 7: Profiles of selected algal fossils. Image taken from the "Sediment Core Study of Little Rock Lake, Benton County, Minnesota"

Water Quality Problems in Little Rock Lake:

Water clarity and algae blooms driven by exceptionally high phosphorus levels have been a concern for the lake since at least 1990. However, an extreme blue-green algae bloom in 2007 (Figures 9 and 10) produced toxin microcystin to the point that it became an acute public health risk around the lake and downstream to the residents of St. Cloud. St Cloud State professor Matt Julius has been testing microcystins in Little Rock Lake and notes "to put it in perspective 1 $\frac{ug}{L}$ is the UN safe level, Canada uses 2 $\frac{ug}{L}$. I routinely find 100+ $\frac{ug}{L}$ in the lake. I say plus because the ELISA only goes to 100 and we always hit the top. This is the worst known regionally." Phosphorus levels as high as five times greater than the standard acceptable amount, and chlorophyll-a levels 11 times greater than the standard have been recorded resulting in persistent water clarity depth readings of only a few inches. The insistent algal issues in Little Rock Lake is the worse known regionally, and is in the top 4% of the most polluted lakes in the state.

Figure 8: Algae bloom on Little Rock Lake

Figure 9: Blue-green algae bloom seen in Little Rock Lake in 2007

Figure 10: Blue-green algae blooms seen in Little Rock Lake in 2007

Little Rock Lake TMDL Results:

As a result of the extreme blue-green algae bloom in 2007, Little Rock Lake was listed as impaired in 2008 and subsequent plans including the nutrient TMDL and TMDL Implementation Plan were developed and completed in 2012 and 2013, respectively. The TMDL indicates that the highest concentration of phosphorus and other nutrients are seen during spring runoff with animal waste being a significant source, other sources include; internal loading, septic loads, greywater, and streambank/shoreline erosion. The TMDL sets an interim phosphorus reduction goal at 5,375 pounds (35%) and a final phosphorus reduction of 7,927 pounds (53%) is necessary to meet state water quality standards.

Internal Phosphorus Loading and Sediment Phosphorus Fractionation Analysis:

In 2008, Little Rock Lake was analyzed for internal phosphorus loading and sediment phosphorus fractionation to estimate rates of phosphorus release from sediments (Internal Phosphorus Loading and Sediment Phosphorus Fractionation Analysis for Little Rock Lake, Minnesota 2008). Concentration of total phosphorus in the sediment were divided into three main types; redox P, labile P, and refractory P. The labile P represents phosphorus which is either directly available for biological uptake and assimilation or can become available through recycling pathways. Refractory P represents phosphorus which is mostly inert and unavailable for biological uptake and is subject to burial. Redox P represents to sum of loosely bound and iron-bound P fractions which are correlated with sediment P release rates. The refractory P fraction accounted for 44% - 95% of the total sediment P concentration, while the labile P fraction accounted for 5% - 56% and the redox P accounted for 4% - 43%. Nearly all the sampled sites show a higher percentage of refractory P than labile P. The study concludes anoxic phosphorus release rate of 8 (mg $m^{-2}d^{-1}$) and 12.8 (mg $m^{-2}d^{-1}$) under oxic conditions. These rates are relatively high and fall within ranges observed for other eutrophic systems in western Wisconsin and eastern Minnesota. Wave action in near shore areas that are not protected by aquatic plants will accelerate the release of phosphorus under oxic conditions. Establishing a healthy aquatic plant community will reduce the release of this phosphorus.

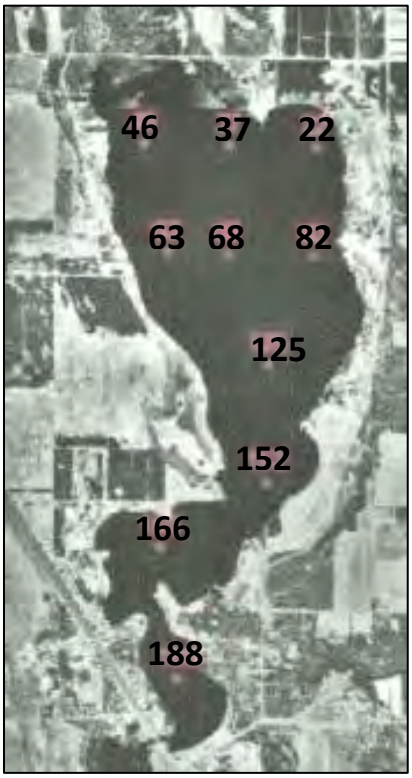


Figure 11: Sediment sample locations

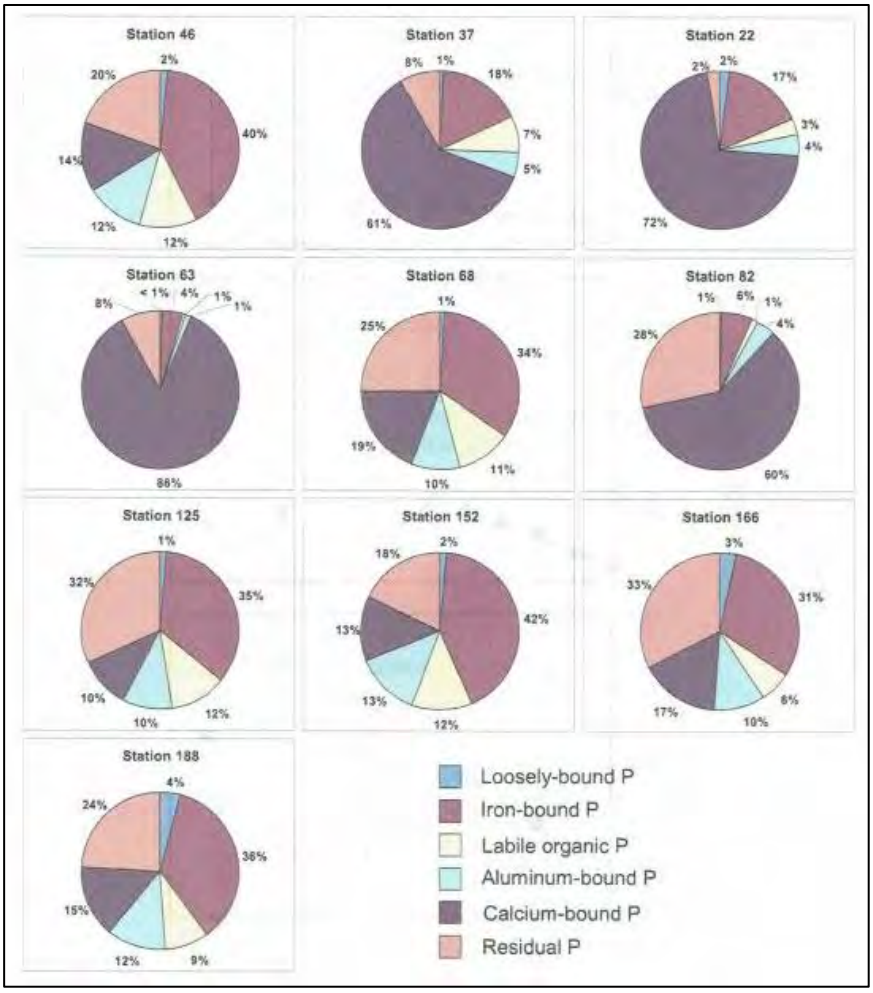


Figure 12: Sediment total phosphorus composition from sites shown in figure 8. The loosely-bound, iron-bound, and the labile organic represent the labile fractions while the aluminum-bound, calcium-bound, and residual are refractory.

Water Quality Monitoring:

Benton Soil and Water Conservation District

Benton SWCD is currently in year two of a three year monitoring plan for Little Rock Creek and other tributaries to Little Rock Lake including; Bunker Hill Creek and Sucker Creek to evaluate our progress towards meeting watershed load reduction goals. This monitoring plan consists of bi-weekly chlorophyll-a, total phosphorus (TP), total suspended solids (TSS), BOD_5, and nitrate nitrogen, and total Kjeldahl nitrogen (TNK) samples as well as stream flow, pH, stream temperature, and dissolved oxygen measurements. A consultant was hired to evaluate the monitoring data each year to develop water quality progress reports. We will use these reports to evaluate the effects of watershed BMPs and other variables, and apply the adaptive management concepts in the implementation plan by adjusting implementation activities in future years.

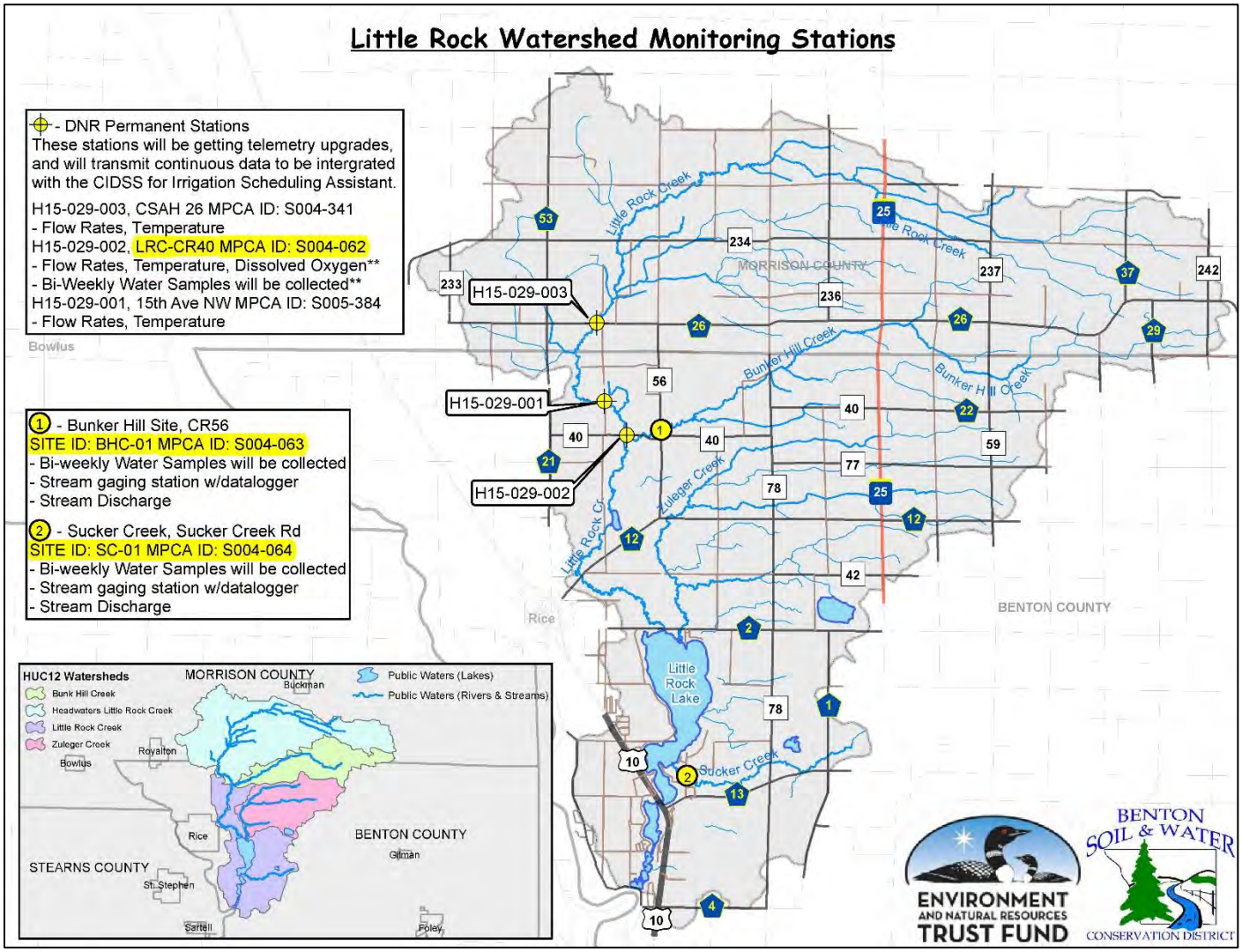


Figure 13: Little Rock Watershed monitoring stations Benton SWCD is currently taking water chemistry samples and flow data.

Little Rock Lake Association

Little Rock Lake Association has been monitoring the Lake since 2012. Water chemistry samples for total phosphorus, chlorophyll-a are taken monthly along with secchi depth water clarity measurements. The short period of record does not allow for statistically significant trend analysis at this time. While no statistically significant long term trend can be evaluated yet, 2017 data shows improvements over 2016 data for total phosphorus, chlorophyll-a, and secchi depth. When this data is visually compared with data from the TMDL study, it suggests that watershed BMPs are resulting in improvements in lake water quality. Consistent with the implementation plan, this signals the need to begin installing second priority implementation activities, including aquatic plant management.

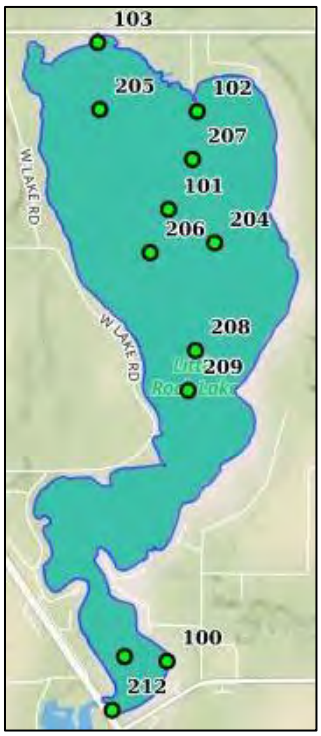


Figure 14: Sampling site locations on Little Rock Lake. Note: Site 204 is the primary site and values and graphs shown correspond with this site. http://app.mapfeeder.net/rmb.php/guest

Table 1: Water quality average values from 2012-2017 from site 204 (Figure 14)

2012-2017 Average Values	
Total Phosphorus (ug/L)	197.5
Chlorophyll-a (ug/L)	116.7
Secchi Depth (Ft)	2.1

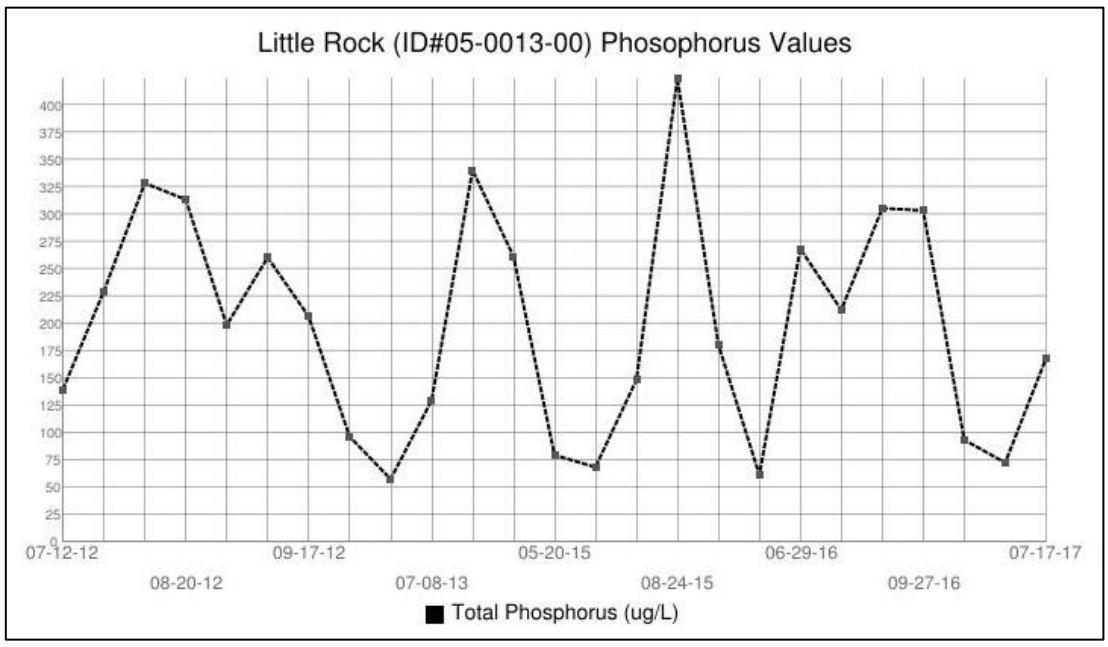


Figure 15: Little Rock Lake phosphorus values from 2012 – 2017 from site 204 (Figure 14)

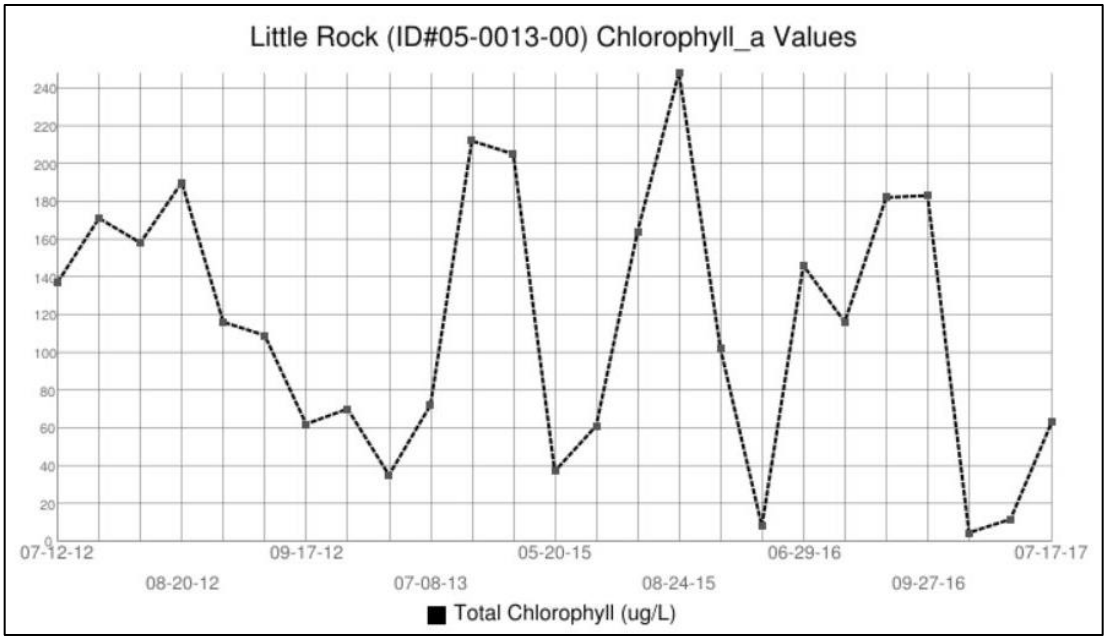


Figure 16: Chlorophyll-a values from 2012 – 2017 from site 204 (Figure 14)

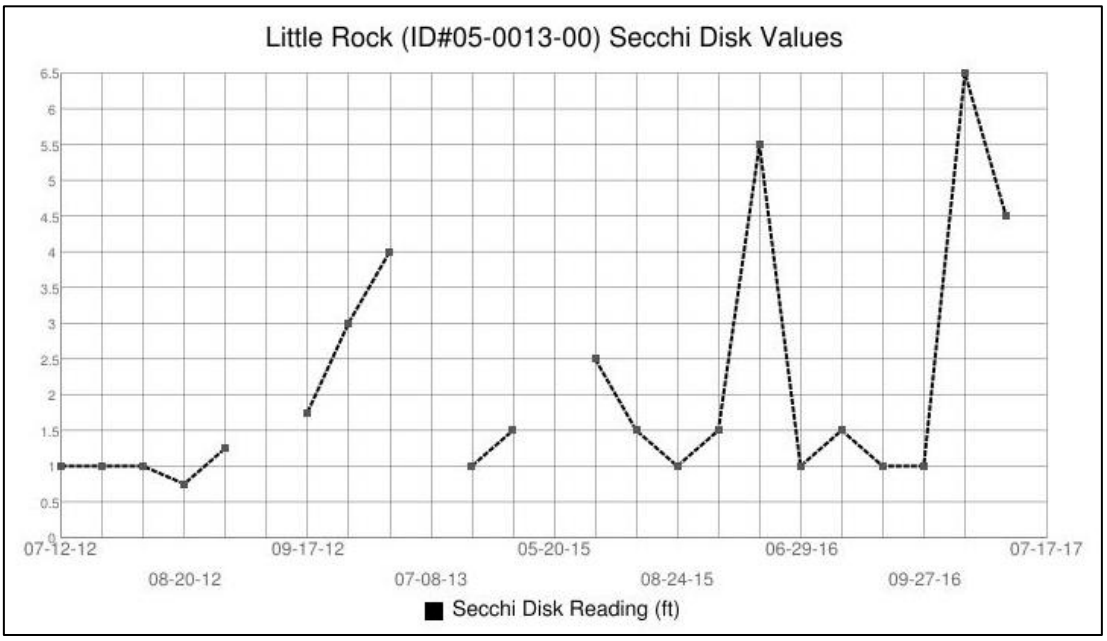


Figure 17: Secchi disk depth values from 2012 – 2017 from site 204 (Figure 14). Note: Data for 7-17-17 is not yet available

Minnesota Pollution Control Agency

The Minnesota Pollution Control Agency (MPCA) has initiated the Watershed Restoration and Protection Strategy (WRAPS) for the Mississippi River – Sartell watershed. This intensive watershed strategy will involve both monitoring and modeling. Numerous sites on Little Rock Creek and Bunker Hill Creek, and tributaries to Little Rock Lake, will be sampled during the WRAPS process (Figure 7). The WRAPS is anticipated to be completed in 2020. Sampling in the Little Rock Lake watershed will consist of biological (fish and invertebrates) and water chemistry, along with habitat assessments and flow monitoring.

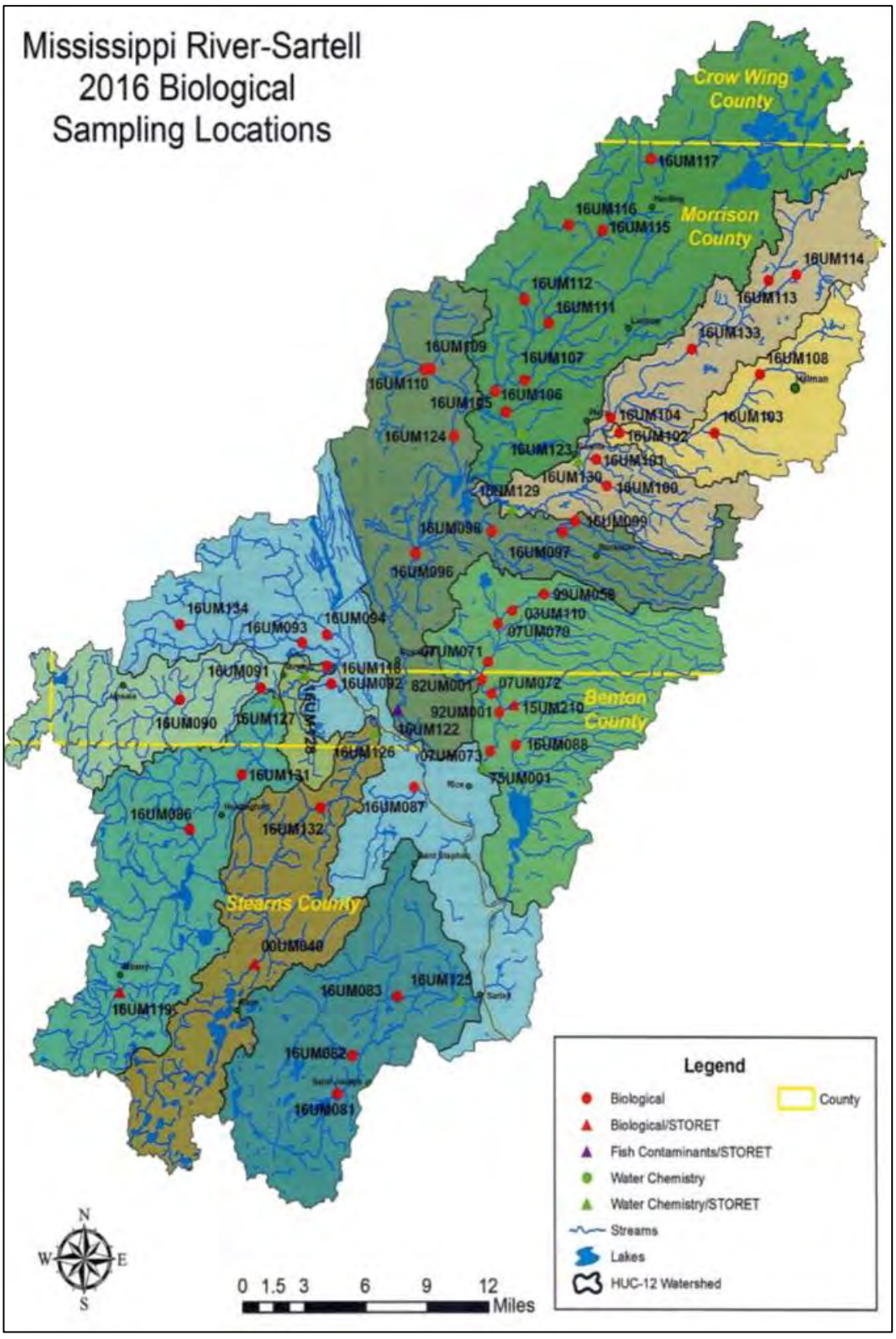


Figure 18: Sampling locations for the Mississippi River - Sartell Watershed WRAPS

Table 2: Sampling locations for the Mississippi River - Sartell Watershed WRAPS

Field Number	Stream Name	Location
00UM040	Spunk Creek	At Queens Rd, 2 mi. NE of Avon
03UM110	Little Rock Creek	US of Cty Rd 234, 5 mi. E of Royalton
07UM070	Little Rock Creek	Downstream of CR 36, 5 mi. NE of Royalton
07UM071	Little Rock Creek	DS of Nature Rd (CR 26)
07UM072	Little Rock Creek	Upstream of 15th Ave NW, 3 mi. NE of Rice
07UM073	Little Rock Creek	DS of 15th Ave NW, 2 mi NE of Rice
15UM210	Bunker Hill Creek	At CR 56, 3 mi. NE of Rice
16UM081	Watab River, South Fork	US of CR 51, 1.5 mi. SW of St Joseph
16UM082	Watab River, North Fork	At CR 3, 1.5 mi. NW of St Joseph
16UM083	County Ditch 12	At CR 2, 4 mi. W of Sartell
16UM086	Krain Creek	US of 190th Ave, 1 mi. W of Holdingford
16UM087	Stony Creek	DS of CR 17, 3 mi. W of Rice
16UM088	Zuleger Creek	DS of CR 12, 2 mi. NE of Rice.
16UM090	North Two River	US of CR 21, 2.5 mi W of Upsala
16UM091	North Two River	US of 110th Ave, 1 mi. SW of Bowlus
16UM092	Hazel Creek	At CR 25, 2 mi. SE of Bowlus
16UM093	Little Two River	US of 130th Ave, 1 mi. NE of Bowlus
16UM094	Hay Creek	US of CR 52, 2 mi. NE of Bowlus
16UM096	Platte River	US of CR 34, 4 mi. N of Royalton
16UM097	Buckman Creek	At 103rd St, 4 mi. S of Pierz
16UM098	Buckman Creek	At Kettl Rd, 5 mi. SW of Pierz
16UM099	Arramba Creek	At Hwy 25, 3.5 mi. S of Pierz
16UM100	Skunk Creek	DS of CR 241, 2 mi. SE of Pierz
16UM101	Trib. to Skunk River	DS of CR 239, 1 mi. S of Pierz
16UM102	Hillman Creek	US of 280th Ave, 1 mi. E of Pierz
16UM103	Trib. to Hillman Creek	US of 330th Ave, 6 mi. E of Pierz
16UM104	Skunk River	US of CR 39, 1 mi. NE of Pierz
16UM105	Little Mink Creek	Us of CR 255, 4 mi. W of Pierz
16UM106	Platte River	US of CR 43, 4.5 mi. NW of Pierz
16UM107	Big Mink Creek	DS of CR 279, 3.5 mi. NW of Pierz

Field Number	Stream Name	Location
16UM108	Hillman Creek	At Ranch Rd, 2 mi. NW of Hillman
16UM109	Trib. to Rice Creek	DS of 173rd St, 8 mi. NW of Pierz
16UM110	Trib. to Rice Creek	DS of CR 263, 8 mi. NW of Pierz
16UM111	Platte River	At CR 278, 4 mi. W of Lastrup
16UM112	Trib. to Platte River	US of CR 265, 5 mi. NW of Lastrup
16UM113	Skunk River	DS of CR 47, 4 mi. NW of Hillman
16UM114	Trib. to Skunk River	At CR 8, 5 mi. N of Hillman
16UM115	Platte River	US of CR 48, 3 mi. SW of Harding
16UM116	Wolf Creek	At Melody Rd, 4 mi. SW of Harding
16UM117	Platte River	At CR 275, 4 mi. NE of Platte
16UM118	Two River	at Great River Road, 2 mi. E of Bowlus
16UM119	South Two River	DS of CR 156, 1 mi. S of Albany
16UM122	Platte River	US of CR 40, 2 mi. S of Royalton
16UM123	Platte River	US of Hwy 27, 3 mi. SW of Pierz
16UM124	Rice Creek	US of Hwy 27, 5 mi. E of Little Falls
16UM125	Watab River	E side of 57th Ave. (Pinecone Rd), in park
16UM126	Spunk Creek	DS of Great River Road, 3.5 mi. SW of Royalton
16UM127	South Two River	Upstream of CR 21, 1 mi. SW of Bowlus
16UM128	Two River	At 40th St, 1 mi. E of Bowlus
16UM129	Skunk River	US of CR 36, 4 mi. SW of Pierz
16UM130	Skunk River	US of CR 38, 1 mi. S of Pierz
16UM131	South Two River	DS of 165th Ave, 2 mi NE of Holdingford
16UM132	Spunk Creek	US of 125 Ave., 4.5 miles E of Holdingford
16UM133	Skunk River	US of 320th Ave, just north of 183rd St., 6 mi NE of Pierz
16UM134	Little Two River	US of Dove Road, NW of Elmdale
75UM001	Little Rock Creek	US of CR 12, 1 mi. NE of Rice
82UM001	Little Rock Creek	Due west of 15th Ave, through corn field on field road.
92UM001	Little Rock Creek	Downstream of Cty Rd 40, DS of Bunker Hill Creek Confluence
99UM058	Little Rock Creek	~0.5 mi. W. of 250th Ave

Implementation Strategies:

Little Rock Lake Nutrient TMDL

The TMDL indicates that a combination of external and internal implementation strategies will be necessary with long term strategies involving "farm management to minimize excess phosphorus (fertilizer + animal feed – crop export – animal export)… coupled with traditional best management practices (BMPs) to reduce surface runoff and phosphorus transport from feedlots and cropland". Since the development of the TMDL, a significant effort has been put forth to address external phosphorus sources, and over 70 BMPs have been installed in the watershed (Figure 18). Not accounting for fate and transport estimates, or BMPs that are currently under construction and being planned, the phosphorus reduction estimate (using primarily BWSR calculators) is 2,340 pounds annually. While extensive work has been done to address the external sources, the internal loading has yet to be addressed. The TMDL indicates that the lake could potentially "keep itself healthy" for a longer period of time if the combination of reduced runoff from best management practices and increased plant growth in the lake can break the critical nutrient "balance point".

Table 3: Reduction estimates for implemented BMPs

Total Reduction Estimates	
Total Suspended Solids (tons)	1814
Soil (tons)	1825
Phosphorus (lbs.)	2340
Nitrogen (lbs.)	4553
Fecal Coliform (CFU)	7.7E+14

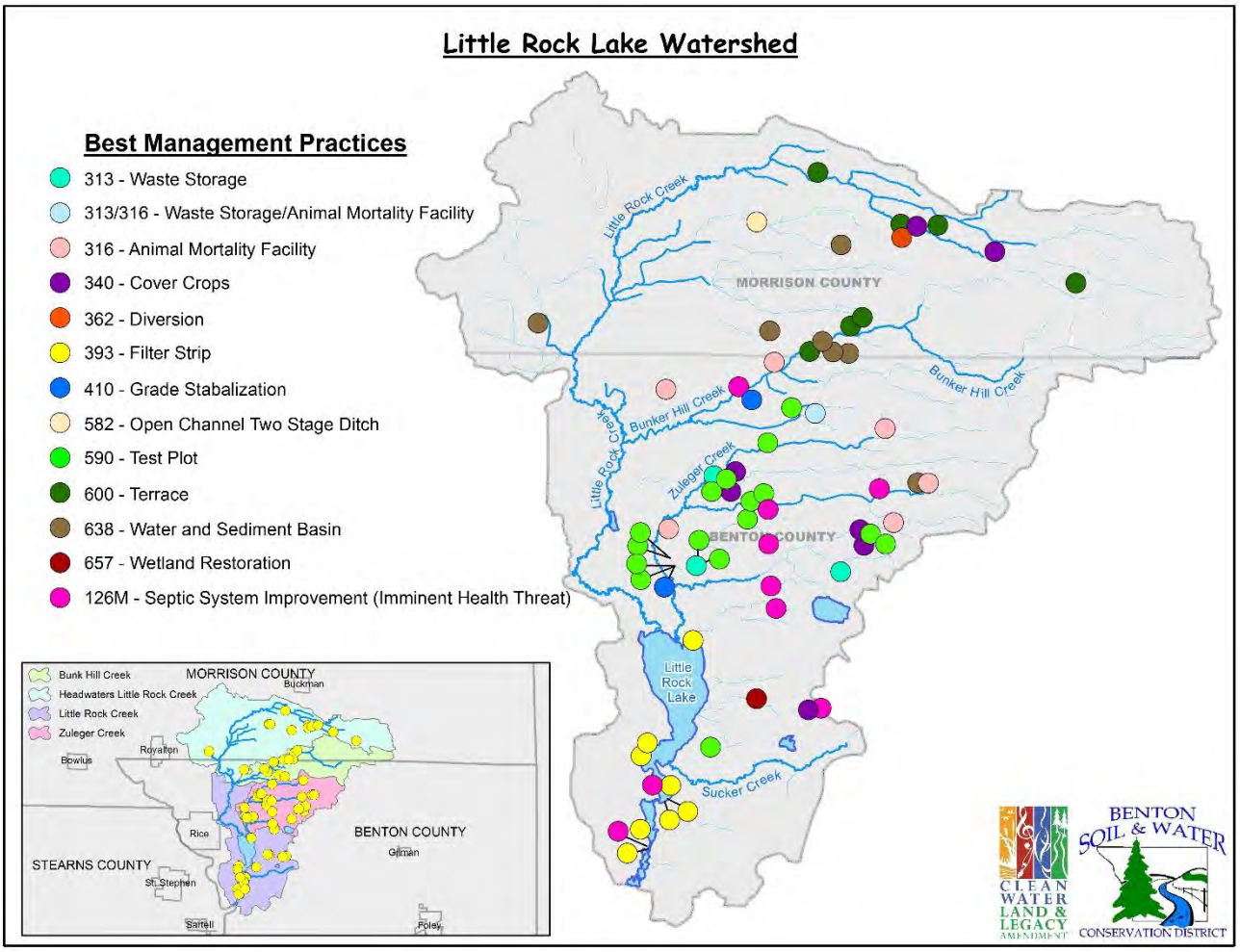


Figure 18: BMPs installed in the Little Rock Lake Watershed since 2012

Little Rock Lake and Creek Watershed Protection and Improvement Plan (TMDL Implementation Plan)

A group of stakeholders (exclusively watershed residents, mostly farmers) were assembled to develop an implementation plan. The criteria for choosing BMPs included the need and effectiveness of the BMP as well as the likelihood that the land owners would install the BMP. The implementation plan will address the root cause of the phosphorus problem and has a high likelihood of being embraced by the individuals that will need to install the BMPs. First priority implementation practices include; nutrient management, cover crops, feedlot projects, residue and tillage management, filter strips, irrigation management, stream crossings, contour buffer strips, prescribed grazing, lakeshore native buffers, rain gardens, water and sediment control basin, wetland restoration, and education outreach.
Implementation of first priority practices has been ongoing since the plan development. Anecdotal reports by lake users suggest we are starting to see improvements and recent water quality data collected by the lake association supports these reports. Recent discussions have concluded it is time to start in lake and second priority practices.

The plan lists few in lake management options, but includes aluminum sulfate treatment, aquatic plant management, and carp control as second priority practices. The TMDL states that "if significant improvements in lake water quality are not achieved within a few years after significant reductions in P load are accomplished, application of alum or other chemicals would help to accelerate recovery by trapping historical P loads in the lake sediments". Lake residents have since been hoping for the water clarity benefits the ALUM treatment or other practices could provide.

Alternative Options:

About four years ago the DNR began exploring the option of performing a drawdown on Little Rock Lake – Sartell Pool with the purpose of improving water quality, shoreland stability, and fish and wildlife habitat. Since then, the Little Rock Lake Association has been working closely with the DNR to determine feasibility of this project and other in lake management practices. A total of six options have been examined including; the complete system drawdown, a temporary drawdown with a coffer dam, creek inlet filtration, dredging, vegetative mats, barley/straw, and ALUM.

The following is information assembled by the Little Rock Lake Association FAQ document.

Option A: Complete System Drawdown

The lake level would be drawn down over a period of six weeks by about three feet. This would expose several feet of shoreline in many areas of the lake and channel. The existing exposed sediment and much would settle into solid soil. There is a seed bank of native seeds in this soil. The time-line for the drawdown would allow these valuable native aquatic plants to establish on the shoreline. As they grow, they will take up and filter many of the nutrients in the soil, including phosphorus. This would enable shore soil to remain soil, even after a drawdown. The most serious pollutant in Little Rock Lake is phosphorus. Phosphorus can be reduced by air, solar exposure, compaction and plant growth that uses nutrient rich soil.
The drawdown would allow the DNR and SWCD to complete some badly needed projects along the shoreline of the lake and river to stop erosion and runoff. Some of these projects cannot be completed without the drawdown as the shore line needs to be exposed to use equipment to help.

- ***How long will the drawdown effects last?***
  The established plants will provide fish and wildlife habitat and shoreline stability due to increased root density on an ongoing basis. It would have an immediate effect on our water quality. The estimated improvement in water quality could last 7-10 years and maybe longer if some of the runoff issues in the watershed are addressed and we all employ good stewardship or our shoreline.
- ***What can I do as a lake property owner to ensure the impact of the drawdown is successful?***
  LRLA will be putting together a post drawdown maintenance and education plan to ensure we all are aware and help to ensure the positive effects of the drawdown are maintained for as long as possible.
- ***Where has this been done before?***
  In Minnesota, this has been done in several shallow basins, the Mississippi River Pool 8 & 9 and various places around the country.
- ***What would the costs to be for a complete system drawdown?***
  There is an economic impact for Eagle Creek Energy to shut down the dam for six weeks in terms of lost production capacity. The estimated cost for the six weeks of lost energy production is around $235,000. There will be additional costs to install erosion control projects and plantings.
- ***What is the downside to conducting a complete drawdown?***
  During the six weeks when the lake will be drawn down three feet, there will be difficulty navigating the lake, river, and channel. There will most likely be foul odors as the shoreline dries out and there is a potential fish kill during drawdown. Lastly we anticipate as the lake cleans itself up there will be more plant growth (weeds) within the lake itself. While this is a downside to some, it is good for the lake and a natural way to utilize the phosphorus that remains in the lake.

Option B: Drawdown with Coffer Dam

Eagle Creek would open up the dam in order to draw the lake/river down three feet for about a one week period. This would allow enough time to install a large, water filled tube (Dam it dam, tube dam, among others) at a narrow and shallow area of the Harris Channel. Once installed, the river levels would be allowed to refill, while on the lake side of this coffer dam pumps would be installed to remove the incoming water. The drawdown would be six weeks long, however a longer or shorter duration could be negotiated. This would expose several feet of shoreline in many areas of the lake and channel. The existing exposed sediment and much would settle into solid soil. There is a seed bank of native seeds in this soil. The time-line for the drawdown would allow these valuable aquatic plants to establish themselves. As they grow, they will take up and filter many of the nutrients in the soil, including phosphorus. The shore soil will remain solid, even after the drawdown

- ***What would the costs be?***
  - Purchase of custom fit, temporary coffer dam: $27,000 - $35,000
  - Training: $6,000
  - Installation/Removal: $10,000
  - Pump rental: $49,450 (for 8 weeks)
  - Operation of pumps with use of diesel generator estimated 540 gallons diesel/day * $2.40/gallon (5/1/17): $1296/day
    - Total operation of pump for 60 days: $77,760

- Total for six week drawdown period: $170,260 - $220,000
- Ongoing storage and maintenance of coffer dam: Estimated $1,500/year
- Cost/Charge from Eagle Creek for one week of drawdown for installation and one week removal: Unknown at this time

- ***Why not use this method?***
  This method will only treat the lake habitat and water quality issue. Mississippi River would not get the benefit of valuable plant growth for shoreline stability and fish habitat, or erosion control projects. Similar concerns as the complete drawdown; difficulty navigating the lake and channel during the drawdown, foul odor as the shoreline dries out and potential fish kill. Additional drawbacks are; constant noise from generators and pumps running. A drawdown (likely one week each) would need to be completed on the entire system both at the installation and removal of the dam. There are also additional risks associated with this option; potential liability issue if a large rain even hits either the Mississippi River of Little Rock Lake watershed, potential flooding until dam would be deflated/removed. The main reason for looking into this method is to avoid impacting the river residents and six weeks of recreation.

Option C: Creek Input (inlet) Filtration

A potential filtration system would consist of a large retention screen with a filter media (carbon or resin) to filter or trap the pollutants that are coming into the lake on each of the three inlet creeks.

- ***How long would the filtration results last?***
  Eventually the filters would become saturated and need to be washed or replaced. The length of time to replacement would depend on intensity and type of pollutants being filtered. This system would also require an enclosure that filtration devices would be mounted on.
- ***Where has this been done before?***
  This type of system has been used in sewage plants and industrial sites for waste/pollutant control with great results using proper maintenance techniques. There is no known lake system of our size that has used filtration.
- ***What would the costs be?***
  It is difficult to determine since there are no known lake filtration system. We believe it would be expensive. The cost would depend on number of filtration devices needed, the amount of water input, and the required on-going maintenance.
- ***Why not use this method?***
  It would not solve the underlying pollutant problems coming from the watershed to the lake. It is unknown if the lake would have the capacity to turn over and improve if the inlets were filtered. This method could also impair movement of fish and wildlife around the filtration systems.

Option D: Dredging

Hydraulic dredging uses suction pumps and piping to move degraded material and water from the lake bottom directly to a storage or disposal site. The dredge material is typically disposed of at a permitted solid waste facility or off-site location. It can also be reused as fill, road sub-base, or in land applications. The removal of sediments from the lake bottom using equipment to pump the silt out of the lake. The sediment is then disposed of on land. This option does not address quality directly.

- ***How long will the dredging results last?***

This would remove existing material in select locations which can be a major source of phosphorus. If the source of the phosphorus is not taken care of, this may not lower the phosphorus levels in the lake. The results may vary as the dredging would stir up layers of sediment in the lake bottom. The lake would still have to process or flush these nutrients out. In reviewing other lake dredging projects, the dredging appears to be a fairly on-going process. Storm Lake, Iowa operates the dredging equipment all season.

- ***Where has this been done before?***
  Storm Lake Iowa has an ongoing project. It appears they operate dredging equipment all summer, each year.
  Fountain Lake, Albert Lea starting in 2017. Fountain Lake has an area of 550 acres, less than half the size of Little Rock Lake.
- ***What would the costs be?***
  The estimated cost for Fountain Lake dredging is $12 - $18 per cubic foot of sludge including the cost to store the sludge.
- ***Why not use this method?***
  Storm Lake, Iowa has recognized only a tiny improvement in water clarity. Dredging would not solve the underlying pollutants coming from the watershed into the lake. It is unknown if the lake would have the capacity to turn over and improve. This method may only stir up more phosphorus in the sediment. The potential damage to fish, wildlife or habitat is unknown

Option E: Vegetative Mats

May also be referred to as Becmats, tussocks, flotations or suds. These are natural floating islands, composed of vegetation growing on a buoyant mat which floats on the lake. The growing plants process nutrients as they grow. The effect is similar to having aquatic vegetation and shoreline vegetation to filter the nutrients and sediment.

- ***How long would the mats last?***
  It would vary depending on the size of the mat and the growing season. There would be ongoing maintenance of the mats
- ***Where has this been done before?***
  To our knowledge, it has been used in small golf course ponds and treatment lagoons. We have no information where it has been used on a lake.
- ***What would the costs be?***
  The costs are unknown at this time. Grant funding would be unlikely since the method has not been proven to be effective on a large scale.
- ***Why not use this method?***
  The mats might be a navigation hazard on the lake. It is unknown what the size of the mat would need to be to have an effect on improving the water quality
  Shoreline buffers of aquatic and shoreline plants would have the same or better effect on the water quality.
  In some applications effective removal of phosphorus occurred at 50% or more of lake area coverage. It is unlikely that is reasonable or practical for Little Rock Lake.

Option F: Barley/Straw

An amount of barley straw is placed in the lake. Decomposition of barely creates hydrogen peroxide which prevents algae growth

- ***How long would the effects last?***
  It would vary depending on the amount of barley input and the location on the lake. The rate of decay of the barley is typically 2-6 weeks to start forming hydrogen peroxide which inhibits the algae growth. The barely would need to be replaced every 4-6 months.
- ***Where has it been done before?***
  We have no knowledge of this method being used on a large scale, such as a lake
- ***What would the costs be?***
  Again, it would depend on the amount of barely straw to use, the availability, and the ongoing maintenance.
- ***Why not use this method?***
  We don't know what effect a large amount of decomposing barely straw would have on the rest of the lake. It still only treats a symptom and not the cause. It would reduce the algal growth but has not been effective in a large setting. This would not have a positive effect on the water quality. The barely may also be a navigation hazard.

Option G: Aluminum Sulfate (Alum)

Alum treatment binds up phosphorus in water and settles to the bottom – puts a cop on the bottom of the lake. It would involve applying the chemical to portions of the lake and channel over three feet deep.

- ***How long would the effects last?***
  It binds phosphorus in a matter of weeks, likely to improve water quality. For eight years or more, 85% effective when used properly. It is best suited in deeper lakes that don't experience as much wind mixing as Little Rock Lake. We would have an initial improvement in water clarity. This would also depend on the amount of phosphorus coming into the lake via the creeks after the chemical application
- ***Where has it been done before?***
  Spring Lake in 2012, among others.
- ***What would the costs be?***
  $450 per acres where the water is greater than three feet deep. This would be 1159 multiplied by $450/acre = $521,550. We are not sure if this would include the application of the chemical.
- ***Why not use this method?***
  Potential chemical reaction to lake water. No swimming or pets allowed in the water during application. It does not address the source of the problem. It merely puts a blanket over it for a while. It does not establish submerged vegetation that continuously process nutrients. This does not enhance fish and wildlife habitat.

Cost Effectiveness

Of the options listed above, the only other feasible option would be the coffer dam. However, this option would provide benefits to Little Rock Lake only, will cost more than twice what the proposed drawdown will, and will expose significantly less shoreline, thereby decreasing the amount of plant growth and their associated benefits. The proposed drawdown will expose 704 acres of soil and would equate to $\frac{\$333}{acre}$ while the coffer would only expose 306 acres at $\frac{\$816}{acre}$.

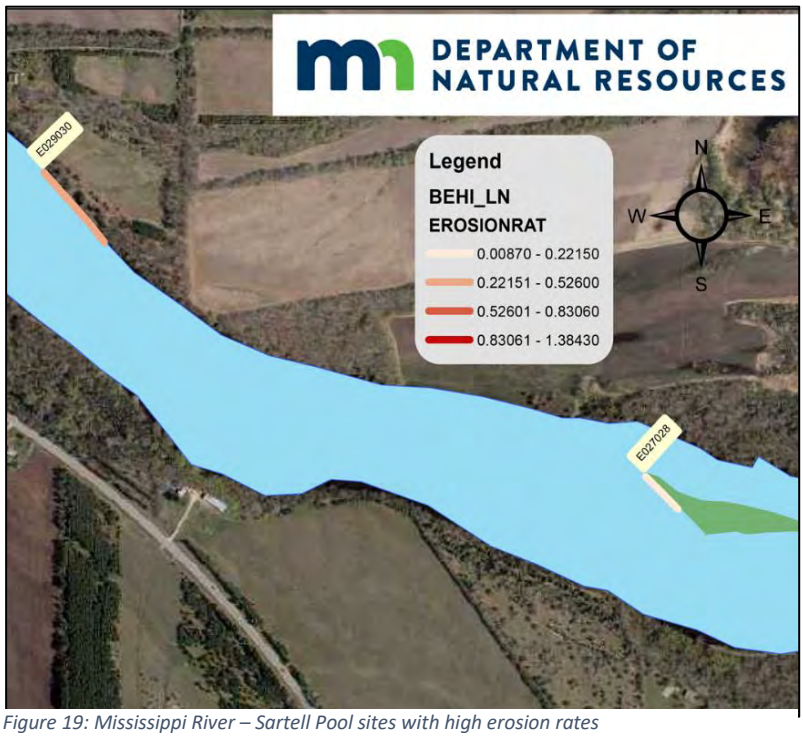


Figure 19: Mississippi River – Sartell Pool sites with high erosion rates

Preliminary Research

Erosion Maps

In 2016 Stearns SWCD and DNR staff completed a shoreland erosion survey of the entire project area of the Mississippi River. The process included 18 sites where erosion rates were estimated using the Bank Erosion Hazard Index (BEHI) and Near Bank Stress (NBS) method (Rosgen 2006). Individual and cumulative annual erosion estimates can be found in table 4. At many of the sites, installing BMPs will be most cost effectively installed if work can be completed from the water side, as opposed to from the top of the bank. Some sites do not appear to be feasible from the top of bank. During the drawdown we will install erosion control measures at the top priority sites that are amenable to construction from the water side. We expect to complete construction at the top three sites. The DNR has created maps showing sites with the highest erosion rates (tons/year/foot) for the project area on the Mississippi River.

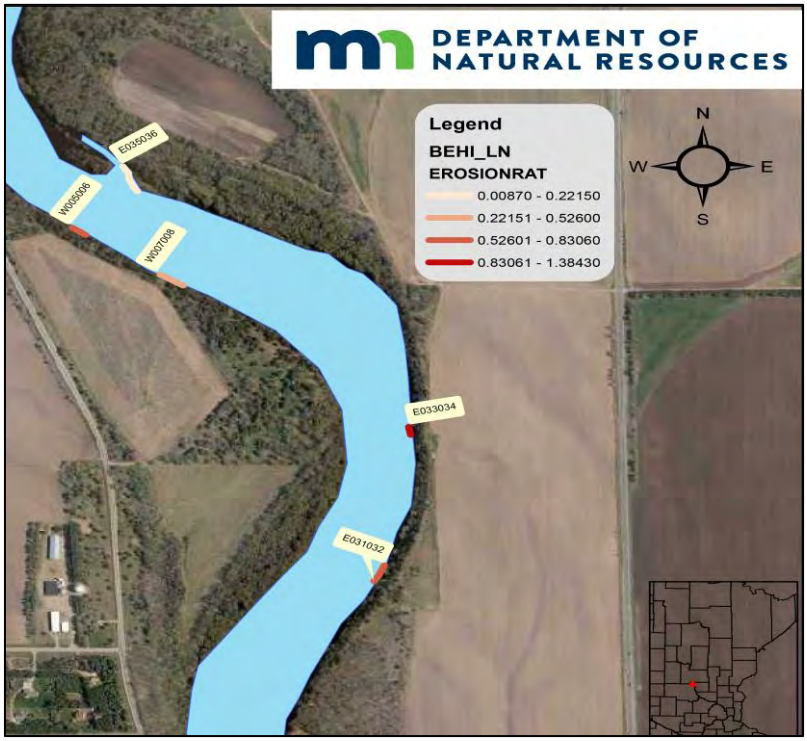


Figure 20: Mississippi River – Sartell Pool sites with defined~~high~~ erosion rates. Note: site E033034 has the highest erosion rate followed by site E031032 (Table 4)

Figure 21: Mississippi River – Sartell Pool sites with defined erosion rates. Note: site E023024 has the third highest erosion rate (Table 4)

Figure 22: Mississippi River – Sartell Pool sites with high erosion rates.

Table 4: Erosion rates for sites within the project area on the Mississippi River

Station	BEHI rating (Worksheet 3-11) (adjective)	NBS rating (Worksheet 3-12) (adjective)	Bank erosion rate (Figure 3-9 or 3-10) (ft/yr)	Length of bank (ft)	Study bank height (ft)	Erosion subtotal [(4)×(5)×(6)] (ft^3/yr)	Erosion Rate (tons/yr/ft) {[(7)/27] × 1.3 / (5)}
E033034	Very High	High	0.575	70.0	50.0	2012.50	1.38430
E031032	Very High	High	0.575	150.0	30.0	2587.50	0.83060
E023024	High	Very High	0.872	205.0	17.0	3038.92	0.71370
W005006	High	High	0.575	100.0	25.0	1437.50	0.69210
E025026	High	High	0.575	96.0	19.0	1048.80	0.52600
W009010	High	Moderate	0.380	270.0	25.0	2565.00	0.45740
W007008	Very High	High	0.575	75.0	16.0	690.00	0.44300
E029030	Very High	High	0.575	500.0	15.0	4312.50	0.41530
E021022	High	High	0.575	150.0	11.0	948.75	0.30450
W011012	High	High	0.575	1000.0	10.0	5750.00	0.27690
W003004	Very High	Moderate	0.380	100.0	15.0	570.00	0.27440
E019020	Very High	High	0.575	300.0	8.0	1380.00	0.22150
E017018	High	Moderate	0.380	1372.0	10.0	5213.60	0.18300
E015016	High	Moderate	0.380	350.0	8.0	1064.00	0.14640
W013014	High	Low	0.250	121.0	12.0	363.00	0.14440
E035036	High	High	0.575	150.0	4.0	345.00	0.11070
E027028	High	Moderate	0.380	240.0	5.0	456.00	0.09150
W001002	Low	Moderate	0.073	200.0	2.5	36.25	0.00870

Exposed Shoreline Maps

The entire lake and river project area was mapped using a GPS depth finder to determine how many acres of shoreline will be exposed during the drawdown. In total, the three foot drawdown would expose an estimated 704 acres of soil along the Mississippi River and Little Rock Lake. Maps are shown in the appendix.

Table 5: Amount of shoreline that will be exposed during the drawdown

Location	Area Exposed (acres)
Little Rock Lake	239
South Basin/Channel	67
Mississippi River	398
Total Area Exposed	704

Analogous Drawdowns Done in Minnesota

In recent years, drawdowns have become a more commonly used lake management method throughout Minnesota. Results from nearly all previously measured drawdowns on wetland basins have shown favorable results (Figures 23, 24, and 25), including increased water clarity and decreased phosphorus levels. Based on these results, the proposed drawdown project will provide a phosphorus reduction between 30% - 40% and a 50% - 75% water clarity increase. However, it must be noted that while general lake morphology is similar between Little Rock Lake and the lakes shown in figures 23 and 24, various aspects of the drawdown itself will vary. Many of these projects were complete drawdowns which were performed for an entire season or more. For this reason it is likely that the phosphorus reductions and water clarity improvements that will be seen for this project will be on the lower end of the ranges stated above. However, a drawdown performed on a wildlife management area just upstream of Little Rock Lake (Sartell WMA, 2003), did achieve significant emergent plant growth in a similar time frame.

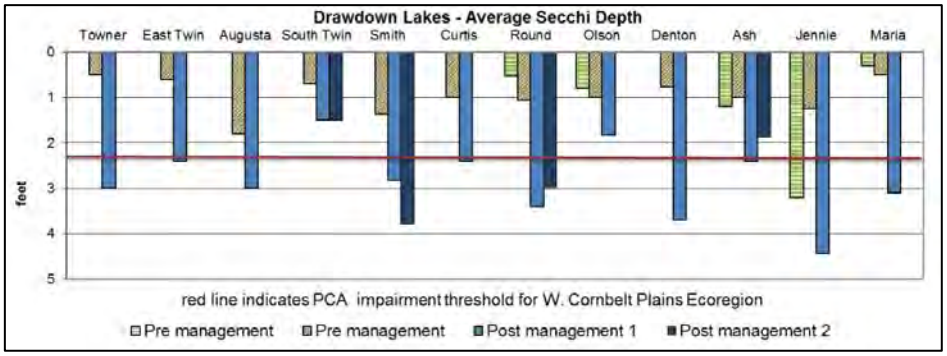


Figure 23: Secchi transparency readings on drawdown lakes pre and post projects in Minnesota

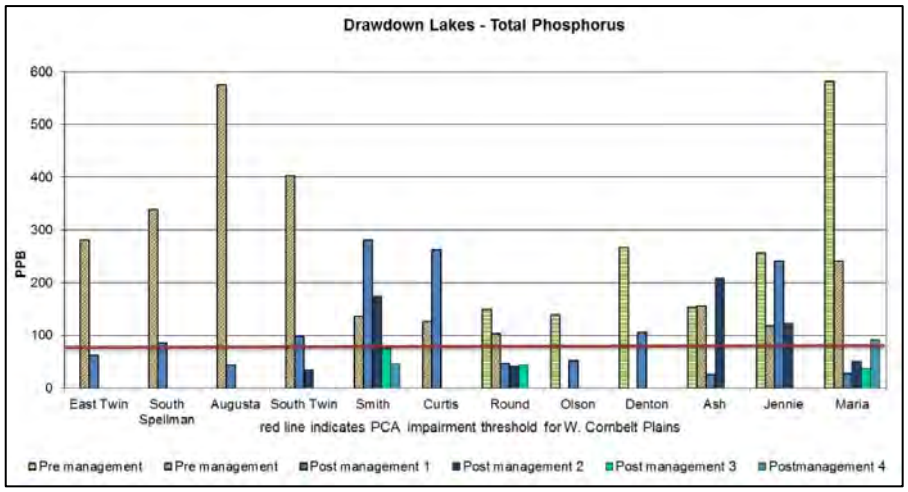


Figure 24: Total phosphorus concentration on drawdown lakes pre and post project in Minnesota

We have kept in contact with the TMDL modeler Bill Walker regarding the potential water quality effects of this drawdown. He states that "Another mechanism that would provide water quality benefits would be that drawdown during August would help to flush nutrients out of the Lake during the season when the water column concentrations are highest. This would have a cumulative effect of reducing the nutrients that have accumulated in the water and sediments over the years." He has also stated in phone calls that perpetuating plant growth in the near shore areas will help reduce recycling and re-suspension of nutrients, which is important for the lake because of its size, shape and long fetch (which causes extensive wave action).

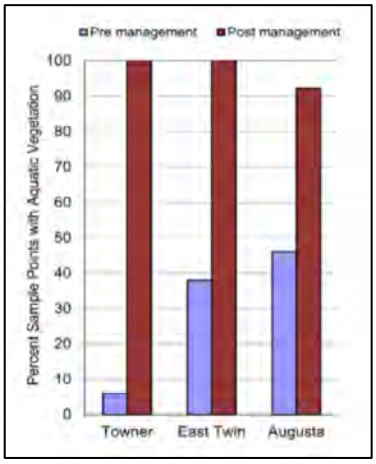


Figure 25: Percent sample points with aquatic vegetation on drawdown lakes pre and post projects in Minnesota. http://files.dnr.state.mn.us/aboutdnr/reports/legislative/2012-shallow-lk-mgmt.pdf

Drawdowns have been routinely used for wetland restoration in waterfowl basins and on navigable channels of the Mississippi River. In 2003, a drawdown was performed on the Sartell Wildlife Management Area (WMA). This drawdown is perhaps to most comparable to the proposed drawdown on Little Rock Lake because the Sartell WMA is in the same watershed. The Sartell WMA drawdown showed very promising results for the establishment of aquatic plants. This drawdown was performed for a longer period of time, significant plant growth was seen in a short time frame. The drawdown began in mid-summer, however due to flooding from large rain events, no vegetation had germinated prior to the flood. Water levels did not decrease until late-July and early-August. The lake basin would likely see similar vegetation growth results due to a remnant extensive seed bed.

Figure 26: Vegetation growth on August 15th after the drawdown on Sartell WMA

Figure 27: Vegetation growth on August 29th after the drawdown on Sartell WMA. Note: This photo was taken just 14 days after the photo shown in Figure 26, and significant plant growth has already established.

Figure 28: Another photo of the vegetation growth on August 29th after the drawdown on Sartell WMA. Note: This photo was taken just 14 days after the photo shown in Figure 26, and significant plant growth has already established.

Figure 29: Height of vegetation growth on August 29th after the drawdown on Sartell WMA. Note: This photo was taken just 14 days after the photo shown in Figure 26, and significant plant growth has already established.

Little Rock Lake Current Model

During a 2001 data gathering project for Little Rock Lake, a lake current model was developed by Charles Nelson. The model shows the predicted water movement within the lake under varying wind directions. As shown in figures 30 and 31, predicted water movements at many near shore and shallow locations are accelerated in areas that currently have little if any aquatic vegetation.

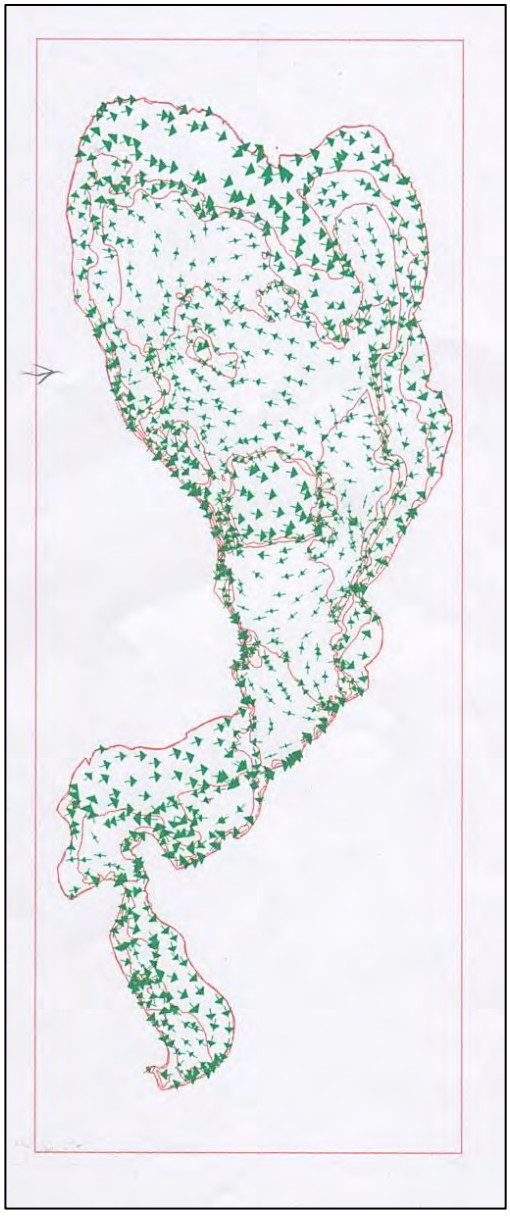


Figure 30: This map is representing a model, generated by Dr. Charles Nelson, for the speed of currents. Specifically, it shows how the wind will affect currents in Little Rock Lake under wind conditions of five (5) meters per second with the wind blowing at a bearing of 270 degrees. The larger the arrow size, the greater the current speed.

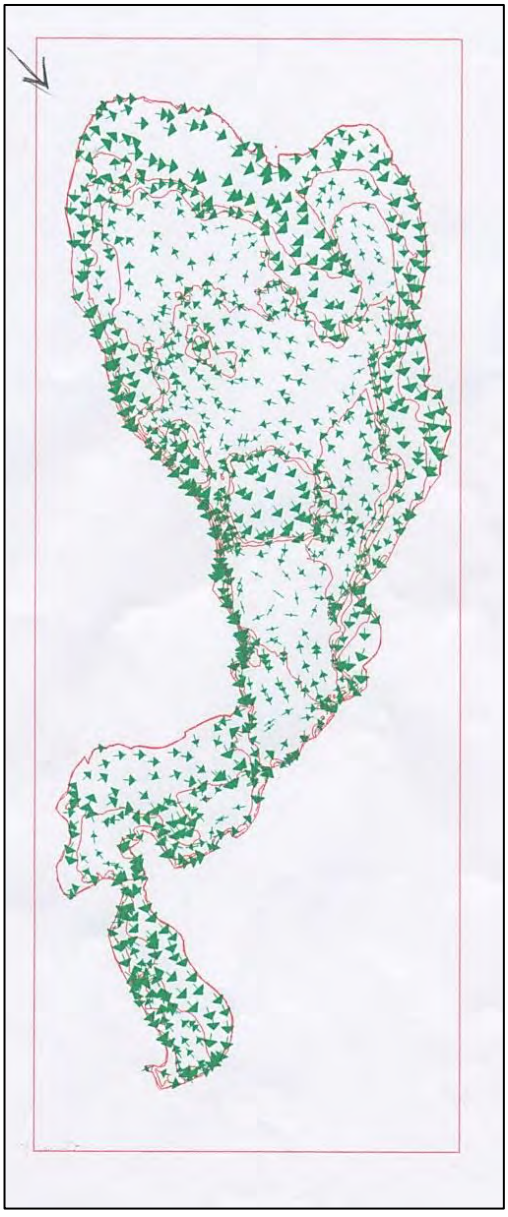


Figure 31: This map represents the same model, but the data used to generate this map includes a wind at five (5) meters per second blowing at a bearing of 315 degrees. The larger the arrow, the greater the current speed.

Aquatic Invasive Species Assessment

Little Rock Lake is currently known to contain three invasive species; common carp, zebra mussels (lower basin) and curly-leaf pondweed. Carp and other bottom feeding fish contribute to water quality issues because they increase nutrient levels in the lake through their foraging. Curly-leaf pond weed also has negative effects on water quality as these plants affect internal nutrient cycling which can result in algal blooms. While significant amounts of curly-leaf pond weed have been present on Little Rock Lake in the past, the very low water clarity depth has likely prevented all plant growth in the lake, including curly-leaf pond weed. It is likely that the drawdown will allow significant populations to return due to the increased water clarity. With increases in water clarity, many species of plants will likely proliferate. Currently, species such as flatstem pondweed, Sago pondweed and bushy pondweed have been observed with moderate increases in water clarity.

To date, no in-lake management practices have been initiated regarding aquatic invasive species (AIS) management. As TMDL Implementation has begun focusing on secondary practices, AIS management efforts will increase as carp management and AIS plant management are both listed as secondary implementation focuses. This switch to focusing on secondary practices has come at a great time as Benton County is currently in the process of developing a county wide AIS management plan. The plan will assess the presence and severity of AIS and focus management and restoration strategies, with some focus on carp control.

As a means of carp management, the Little Rock Lake Association began their first annual Carp Fishing Contest in 2017. This event has a significant turnout of 106 participants. This contest not only promoted AIS awareness but also removed nearly 3,000 pounds of carp from the lake. Carp control and removal alone is not likely to have a high percentage impact on phosphorus reduction. It will however help extend the timeline of benefits of the drawdown by reducing the degradation of the aquatic plant community.

Complete System Drawdown Project Details

Cost Calculation of the Project

Eagle Creek Renewable Energy (Eagle Creek) has investigated the feasibility of a controlled three-foot drawdown over a six week period at its federally licensed Sartell Hydroelectric Project. In order to accomplish the planned drawdown of the project impoundment, Eagle Creek will need to shut down the generating equipment to avoid hydraulic operating issues with the station turbines, and provide controlled flow releases through spillway gates at the dam to gradually lower the project impoundment to the targeted elevation. The drawdown effort will result in an extended period of non-generation at the project and associated loss of energy production revenue and capacity value. Several meetings have been held with EC to determine the feasibility of the drawdown and the cost associated with the activity. The costs associated with investigating the technical feasibility of an impoundment drawdown, including the planning, permitting and labor associated with the manipulation of the spillway gates, and monitoring the project during the drawdown and refill, are not being sought for this project. Costs are based solely on the lost energy and capacity revenue as a result of an extended station outage. Costs were calculated based on historic energy production records calculated on a weekly basis for the proposed drawdown timeframe of August 1 – September 15, 2018. The calculations are shown below in Table 6.

Table 6: Weekly average cost calculations for Eagle Creek Energy

Month	Weekly Average Costs
August	$44,556 per week * 4 weeks = $178,224
September	$28,154 per week * 2 weeks = $56,308
Total for 6 Weeks	**$234,532**

Table 7: Breakdown of drawdown project expenses and sources

Activity	**Total Cost**	**Source of Funding**				
		State Grant	**EC/LRLA**	**DNR**		**Landowner**
				Cash	In-Kind	Match
Drawdown the water at Sartell dam by three feet	$235,000	$166,250	$68,750	-	-	-
Education outreach	$5,000	-	$3,000	-	$2,000	-
Engineering and technical assistance	$20,000	$20,000	-	-	TBD	-
Erosion control project installation	$134,000	-	-	$134,000	-	25%
Plantings, clean up, post drawdown education and maintenance activities	$55,000	-	20,000 *includes volunteer boyscouts	$20,000	$15,000	-
Post drawdown activites	$5,000	-	$5,000	-	-	-
Administration and coordination	$12,000	$12,000	-	-	-	-
Total Cost	**$466,000**	**$198,250**	**$96,750**	**$154,000**	**$17,000+**	

Public Acceptance of the Project

The DNR conducted a survey in 2016 to evaluate public acceptance of the project. Post-card and online surveys were mailed and made available to all potentially affected area shoreline residents (907), nearly 54% of all postcards were returned and numerous online responses were also received from non-residents alike. Results show that this project is widely accepted (65% overall) approval, either in favor or impartial. However, acceptance rates from the lake residents were significantly higher than the river residents (95%). The limited navigation on the river, channel, and lake along with recreational impacts were the main reasons for public disapproval. The survey indicated the drawdown would occur July – August, however, due to the higher revenue loss during these months the project was pushed back to August – September. As a result, acceptance of this project from river residents improved as recreation and navigation will not be hindered on July 4th. As this project has progressed, public acceptance of this project has significantly increased with almost 100% approval from lake residents.

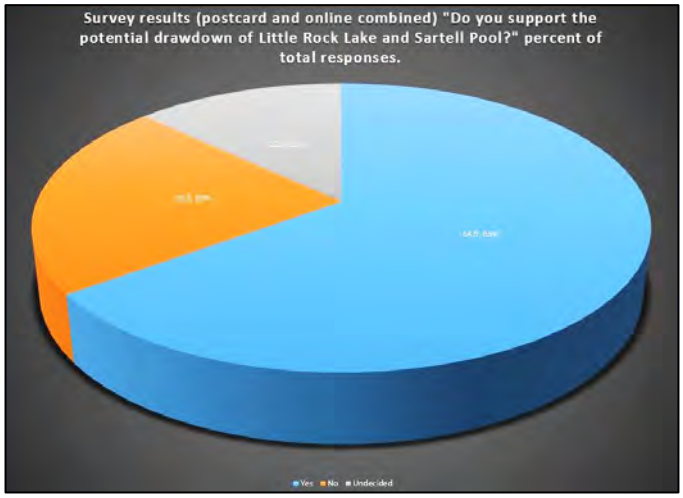


Figure 32: Results from 2016 survey conducted to evaluate public support for the drawdown

Social Implications of the Drawdown

The newly exposed soil during the drawdown will allow native plant species to flourish. Current conditions in the lake have allowed for very minimal plant growth. The drawdown will allow these native plants to establish and will likely be quite abundant along shoreline. Lake and River residents were informed they will likely see a significant change in abundance of aquatic plants "weeds," and were informed that while the presence of aquatic plants can be less than aesthetically pleasing to some, there are water quality benefits of this plant growth.

Percentage of Phosphorus Treated

The drawdown will aerate, compact and achieve solar exposure for the soil, facilitating plant growth and nutrient uptake to reduce phosphorus levels and increase water clarity. Based on results from other drawdowns performed in Minnesota, the proposed drawdown project will provide a phosphorus reduction between 30% - 40% and a 50% - 75% water clarity increase.

Table 7: Estimated reductions for 3 erosion control projects

Soil (estimated savings)	368 (T/yr)
Phosphorus	356 (lbs/yr)

The three erosion control projects which will be completed during the drawdown will provide an additional phosphorus reduction. Based on DNR erosion rate calculations, the top three sites were chosen to install erosion control BMPs. The top erosion site has already been surveyed and designed. The installation of these projects will significantly reduce total suspended solids, soil, and phosphorus (Table 9).

For the purposes of estimating the phosphorus reduction that will result from the drawdown, we have taken a conservative approach. Little Rock Lake has several unique characteristics that make predicting the impacts using TMDL calculations very difficult and perhaps unreliable without in-depth study. Based on other drawdowns, we know the impact will be significant.

We feel the phosphorus reduction values from other drawdowns will be more closely related to the Little Rock Lake system than the increase in water clarity from other drawdowns. Therefore, we chose to perform our calculations on the phosphorus reductions followed by a comparison to water clarity expectations for validation. One aspect of Little Rock Lake that complicates estimating is the complex phosphorus feedback loops that occur, primarily during the summer months when precipitation is low. We did not add anything to our estimates to account for these complex feedback loops. Additionally, internal loading was not explicit in the TMDL allocation because it is implicit in the calibration. We chose to look at release rates from the sediment study.

The following states how the phosphorus reduction values were calculated

Assumptions:

- Lake phosphorus reduction data from other drawdown projects are typically between 30% and 40%. **We used 30% in our calculations.**
- Phosphorus release rates from the sediment studies were 8-12 mg/square meter/day. **We used 8 in our calculations.**
- The surface area exposed in Little Rock Lake during the drawdown, including the lower parts, is 306 acres (1,238,338 square meters). **We limited our calculations to the exposed areas of the lake exclusively.**
- **Phosphorus release reductions were limited to a 90 day** period (approximately June to August), which coincides the closest to the typical low flow time period when in-lake sources are the greatest.

Calculation:

1. $8\ mg\ \frac{\frac{phosphorus}{square\ meter}}{Day} \div 453{,}592\ \frac{mg}{pound} = 0.0000176369\ pounds\ \frac{\frac{phosphorus}{square\ meter}}{Day}$

2. $0.0000176369\ pounds\ \frac{\frac{phosphorus}{square\ meter}}{Day} \times 1{,}238{,}338\ square\ meters = 21.84\ \frac{pounds\ of\ phosphorus}{day}$

3. $21.84\ \frac{pounds\ of\ phosphorus}{day} \times 30\% = 6.5\ \frac{pounds\ of\ phosphorus\ reduction}{day}$

4. $6.5\ \frac{pounds\ of\ phosphorus\ reduction}{day} \times 90\ days = 598\ pounds\ of\ phosphorus\ reduced\ (annually)$

Validation:

$589\ pounds\ of\ phosphorus\ reduced\ (annually) \times 0.45359237 = 267\ kilograms\ annually$

- Local phosphorus reduction goal set during the TMDL study is 907 kilograms (2,000 pounds). This would avoid the most serious algae blooms.
- Interim TMDL phosphorus reduction goal is 2,450 kilograms (5,401 pounds)

- Final TMDL phosphorus reduction goal is 3,685 kilograms (8,124 pounds)

A 589 pound phosphorus reduction is very reasonable and would be expected to produce visually measurable (secchi disk) improvements to water clarity, and a noticeable reduction in the severity of algae blooms. However, given the conservative assumptions in our calculations, we expect the reductions to be at least double the calculations, or at least 1,000 pounds. Other drawdowns produced a 50% - 75% water clarity improvement, which would equate to several inches to perhaps a foot in Little Rock Lake, and as much as a 2,000 phosphorus reduction. This further validates the conservative estimate of 589 pounds. For the purposes of this feasibility study and grant application we will use 589 pounds.

Effective Life of the Drawdown / Future Maintenance

Work Done Pre-Drawdown to Extend Effected Life

In the years following the development of the Little Rock Lake TMDL and Implementation Plan there have been significant efforts to address external sources of phosphorus with the installation of over 70 BMPs in the watershed. Additional BMPs are being installed and others are being planned. While the drawdown itself will address internal phosphorus loading, this project gives the opportunity to address additional external sources of phosphorus loading as well. Based on figures 19-22 and table 4, the top three erosion sites were chosen to implement erosion control BMPs. Additionally, the DNR and LRLA along with numerous volunteers will work to plant native plant species to increase shoreline stability and decrease runoff. These projects will assist in extending the effective life of the drawdown as the TMDL states that the lake could potentially "keep itself healthy" for a longer period of time if the combination of reduced runoff from best management practices and increased plant growth in the lake can break the critical nutrient "balance point". It is believed that the drawdown will bring the lake to this critical nutrient balance point.

Effective Life of the Drawdown

Previous drawdowns have shown to be effective in the short term (7 – 10 years) and somewhat effective in the years that follow. In many cases, a drawdown will need to be periodically repeated over time, to maintain benefits. Watershed nutrient loading reductions and sedimentation reductions are necessary to favor long term improvements. It is felt that with combining several projects (within the watershed, in the lake and on the river) that increased clarity and decreased algal growth can be achieved. A stakeholder committee will be organized with representatives from the lake, river, general public, agencies and Eagle Creek Energy to evaluate the effectiveness of the drawdown. The intent is for the public to generate criteria in which subsequent drawdowns may be considered. There is potential for an area Lake Improvement District (LID) that may be able to collect funding for future projects involving water quality improvements such as drawdowns.

Plant Growth during the Drawdown

Resident seedbed within the lake basin is likely rich, however, seed examinations have not been performed. Drawdowns in similar basins typically yield quick results from plant growth if the time frame is in peak summer temperatures (June-August). Several wetland management guidelines suggest that later and quicker drawdown cycles typically result in increased cattail production in managed basins. We

expect to see significant colonization of wetland favored grasses and forbs during the drawdown. Initial lake survey reports from DNR (1945) suggest that species such as prairie cord grass, bulrush, cattail, cane grass and giant burred were “common or abundant”. In addition, “submerged vegetation was present in great variety and abundance. Much of it usually is present in lakes of cool temperatures and clear water”. Species such as leafy pondweed, coontail and bushy pondweed were considered abundant. While species such as floatingleaf pondweed, claspingleaf pondweed and flatstem pondweed were considered common in the 1945 survey. There are some sites where public funding may allow the opportunity to insure that some emergent plant growth does occur. By using volunteer labor and native plant plugs in public areas (Benton Beach, Benton County Park carry in access, Little Rock Lake Public access) to re-establish some areas with known plant growth, we will be able to measure the success of planting during the drawdown.

Future Maintenance

As of now, only one drawdown is scheduled for this lake. The TMDL states the lake could potentially “keep itself healthy” for a longer period of time if the combination of reduced runoff from best management practices and increased plant growth in the lake can break the critical nutrient “balance point”. The drawdown is anticipated to provide sufficient benefits, and therefore additional projects have not been scheduled. As the LRLA and DNR are the primary leads for this project and therefore they will be responsible for any future maintenance and planning.

The LRLA is in the process of developing a post drawdown education and maintenance plan. This plan will work to keep the public educated on the drawdown and outline the necessary steps to maintain project quality over time such as; posting signage, suggesting no wake zones, restricting four-wheeler navigation on newly exposed soil, and plant management.

Appendix

Exposed Project Area on the Mississippi River

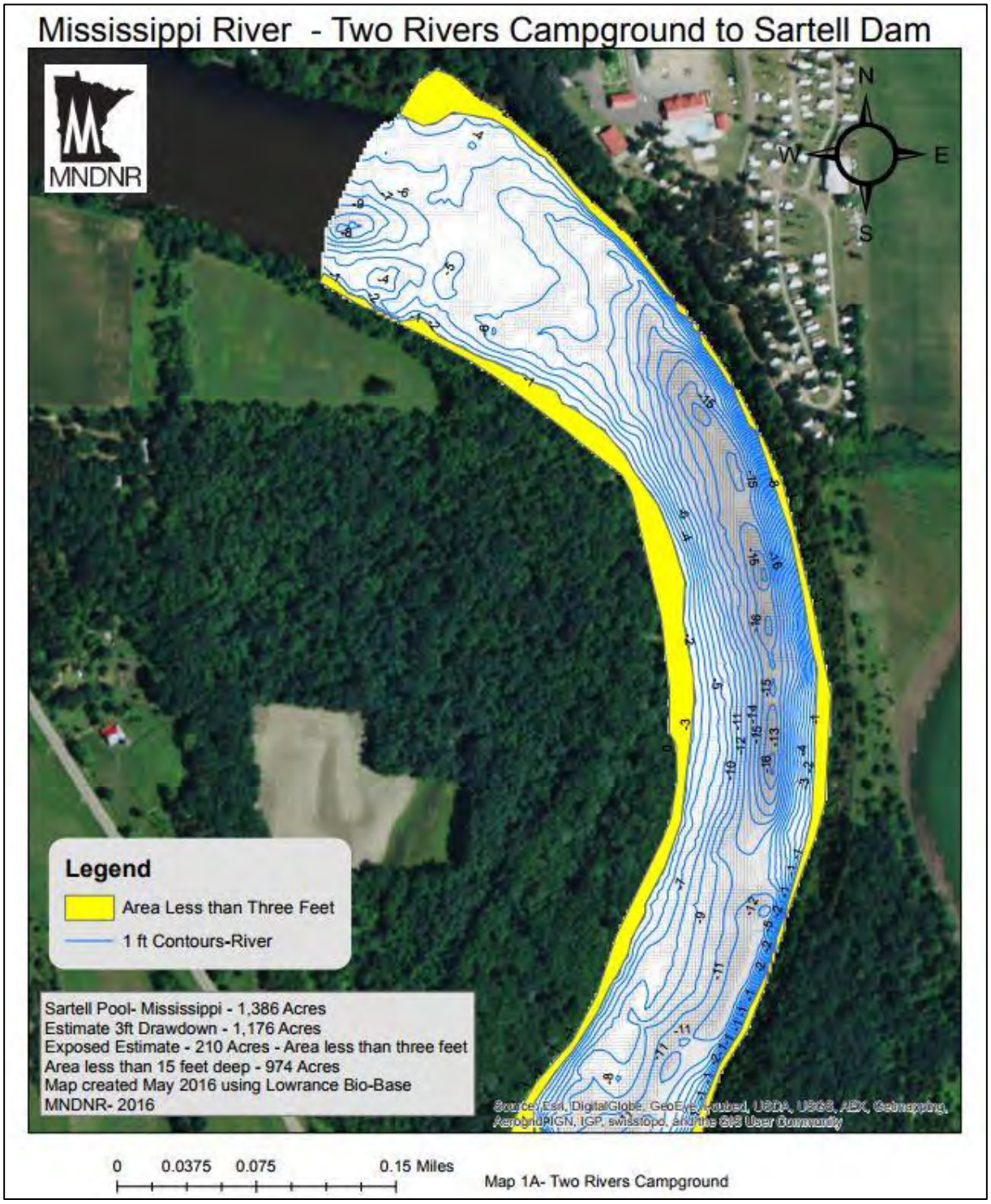


Figure 33: Exposed project area on the Mississippi River

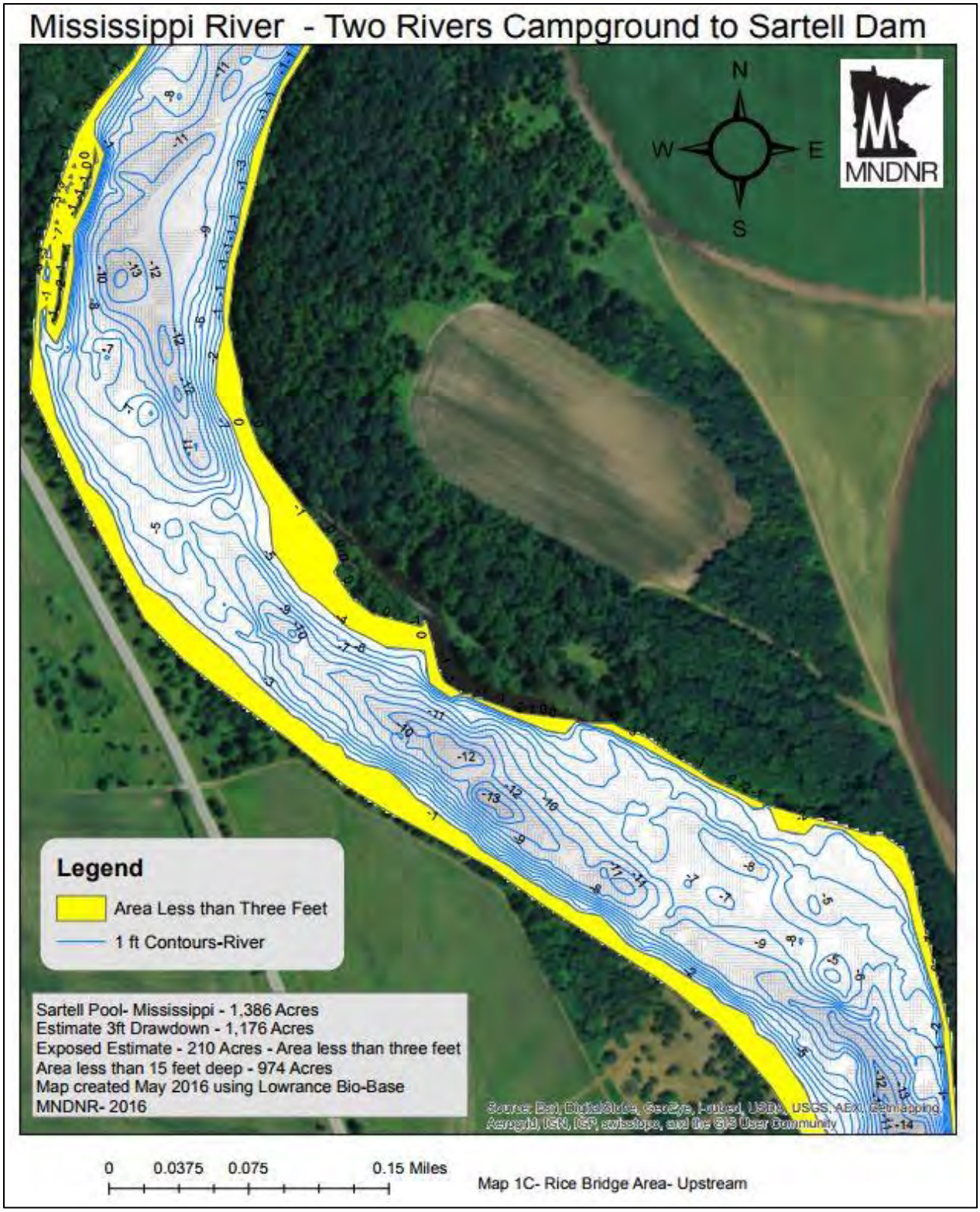


Figure 34: Exposed project area on the Mississippi River

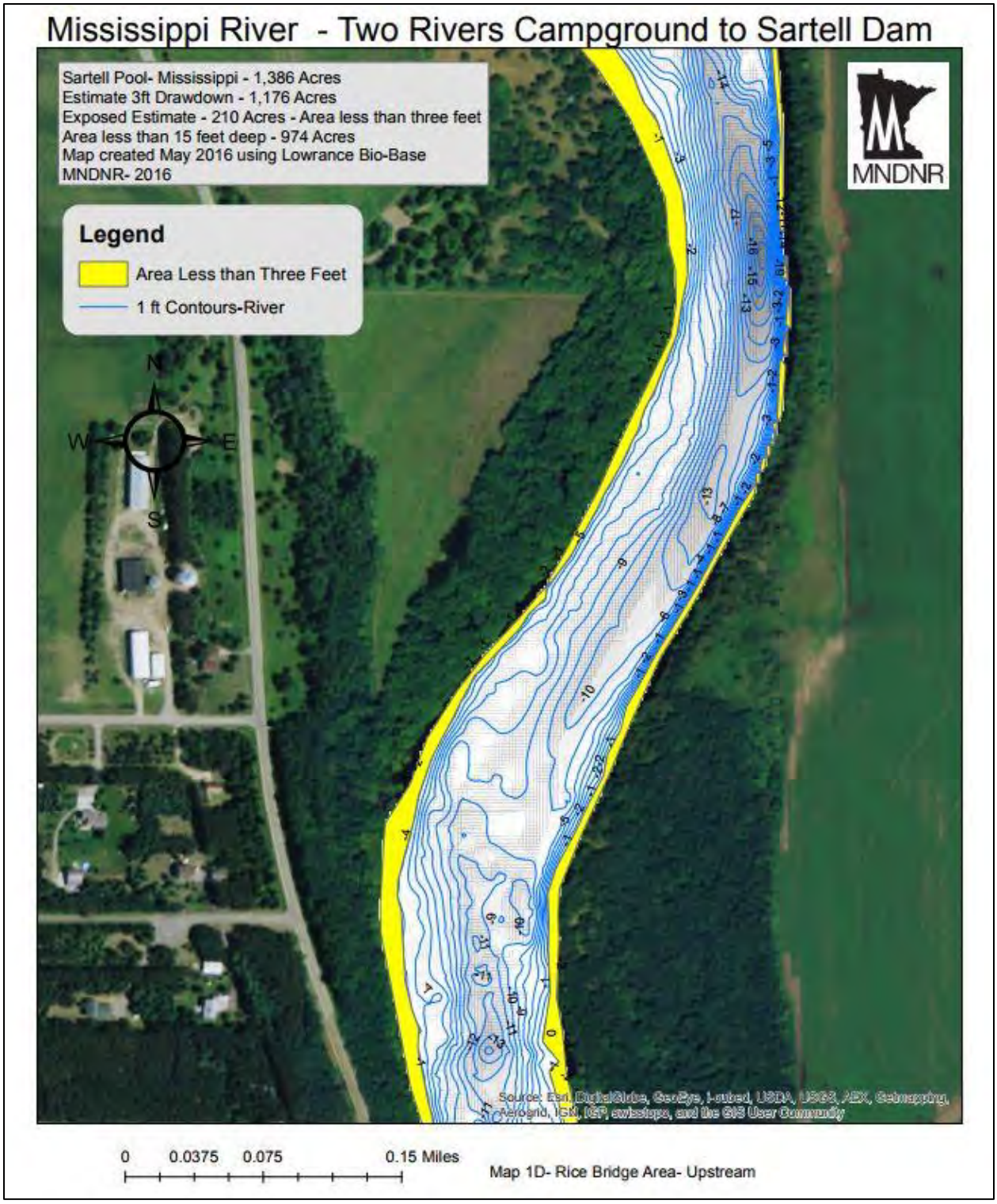


Figure 35: Exposed project area on the Mississippi River

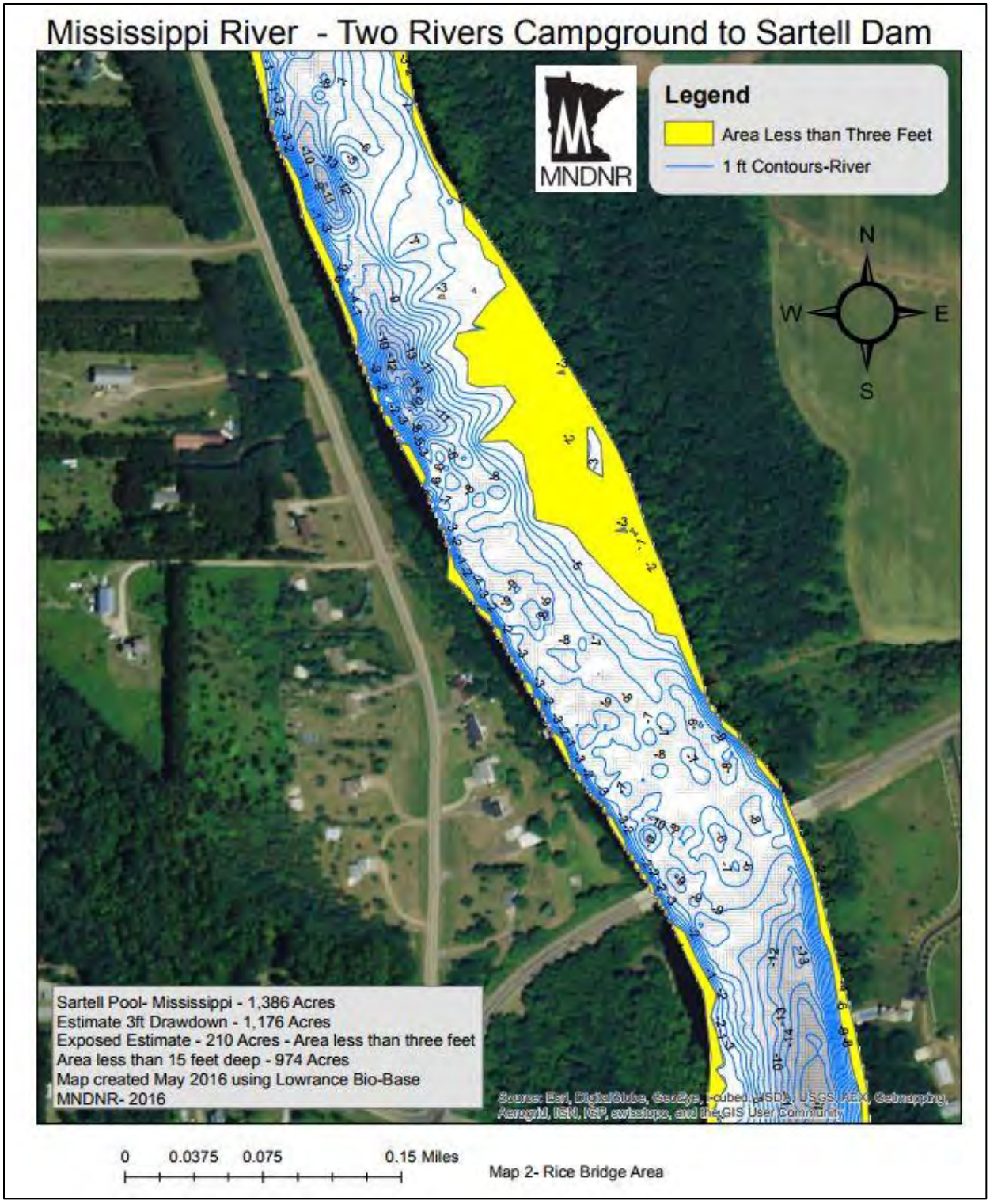


Figure 36: Exposed project area on the Mississippi River

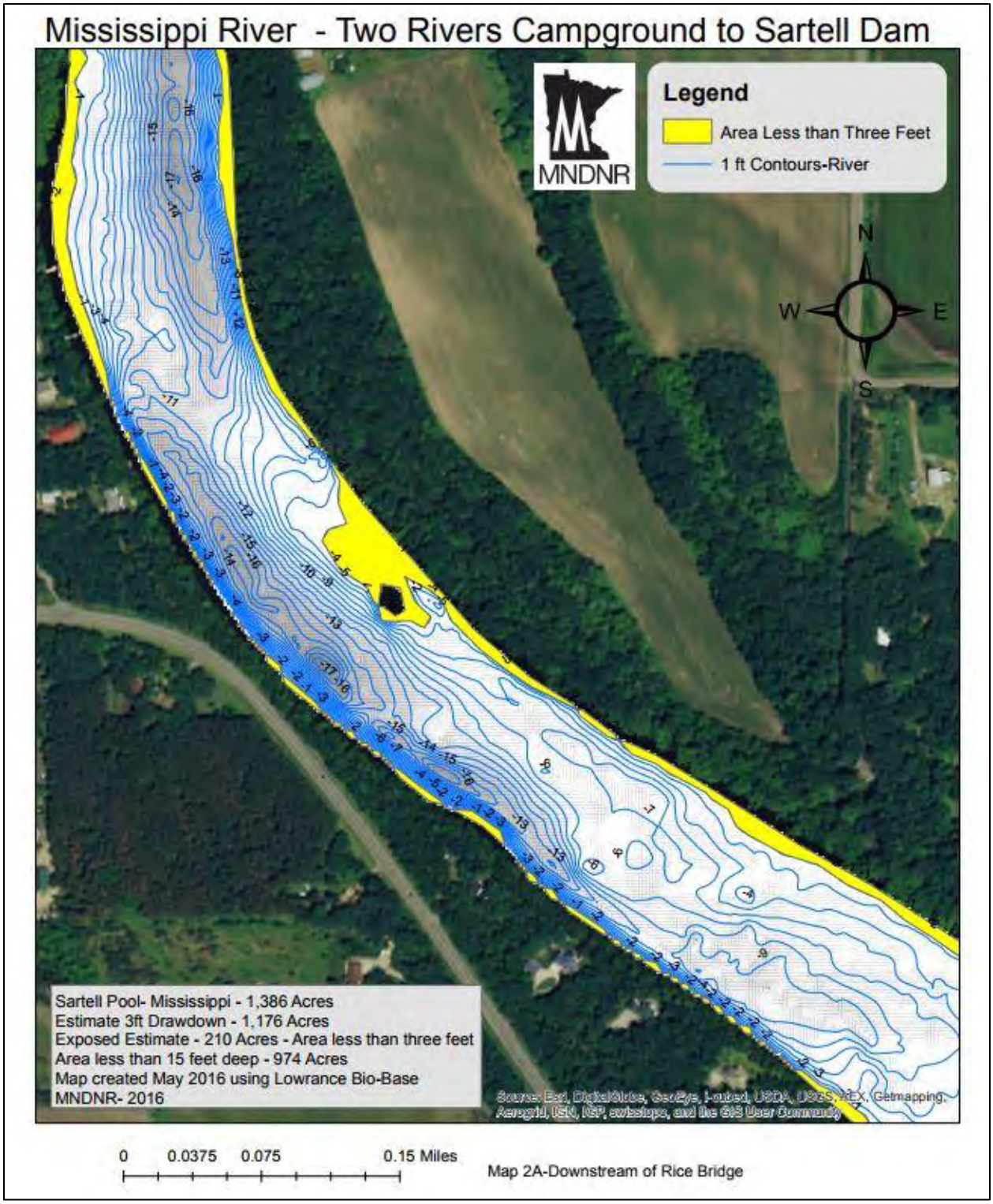


Figure 37: Exposed project area on the Mississippi River

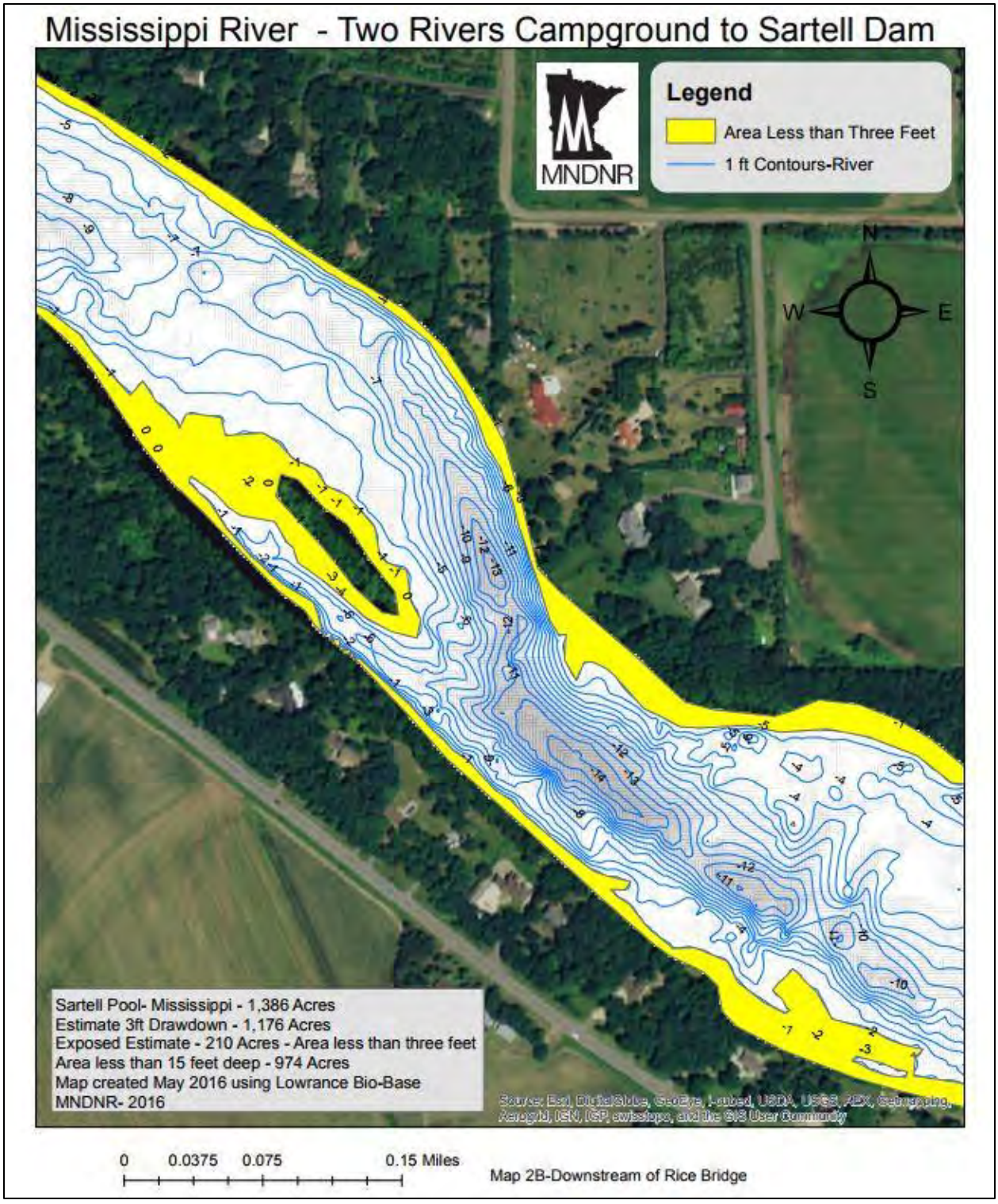


Figure 38: Exposed project area on the Mississippi River

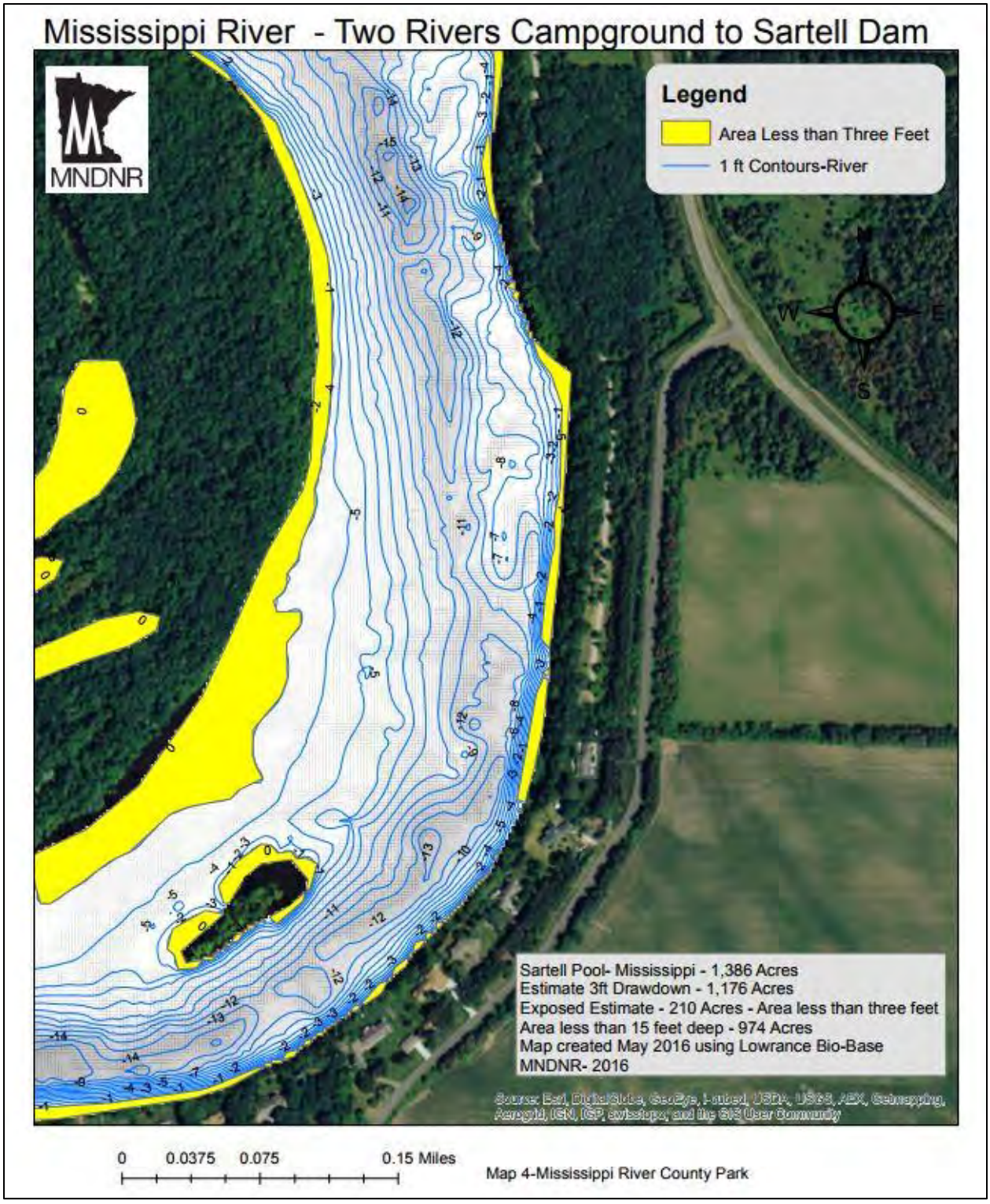


Figure 39: Exposed project area on the Mississippi River

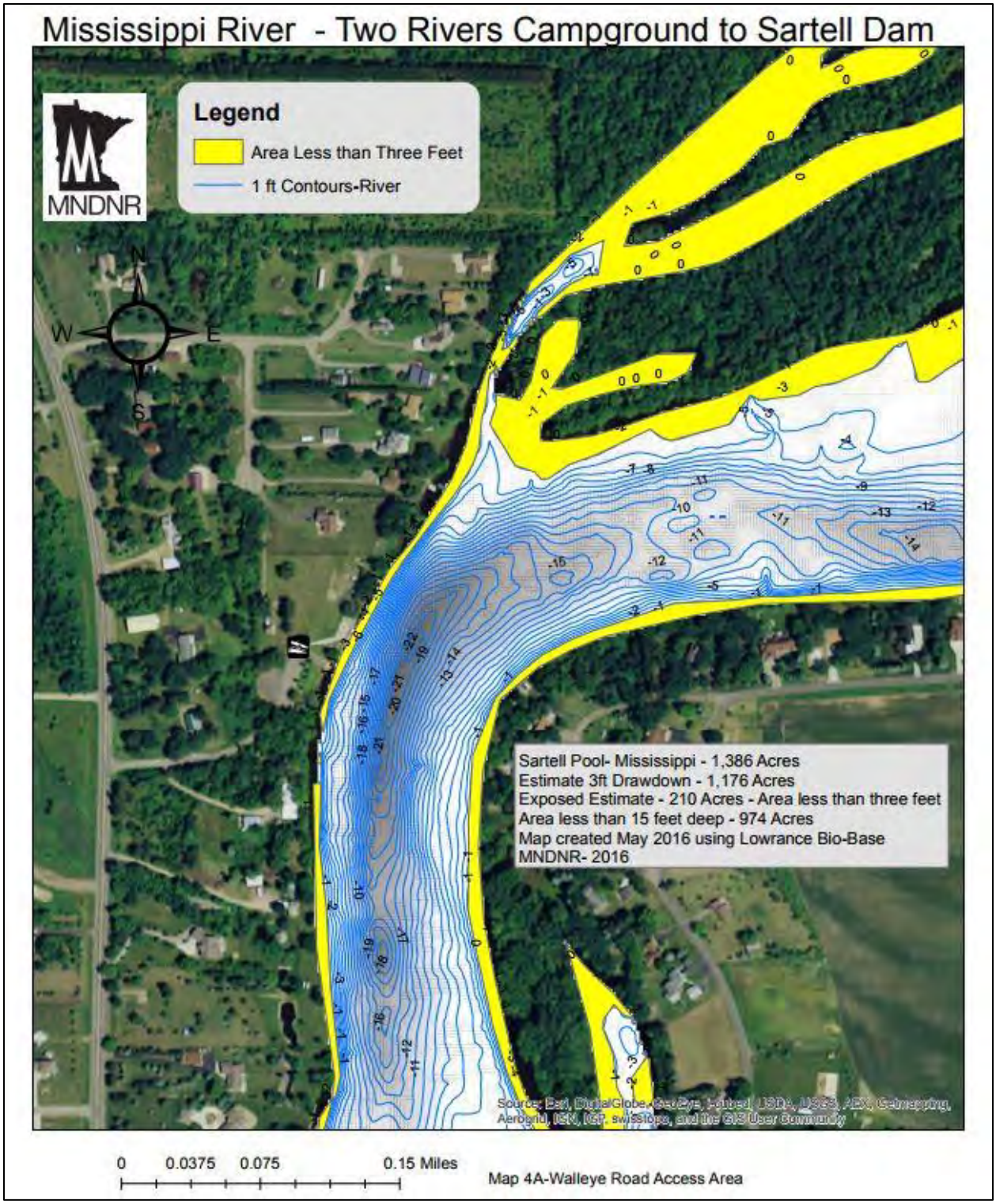


Figure 40: Exposed project area on the Mississippi River

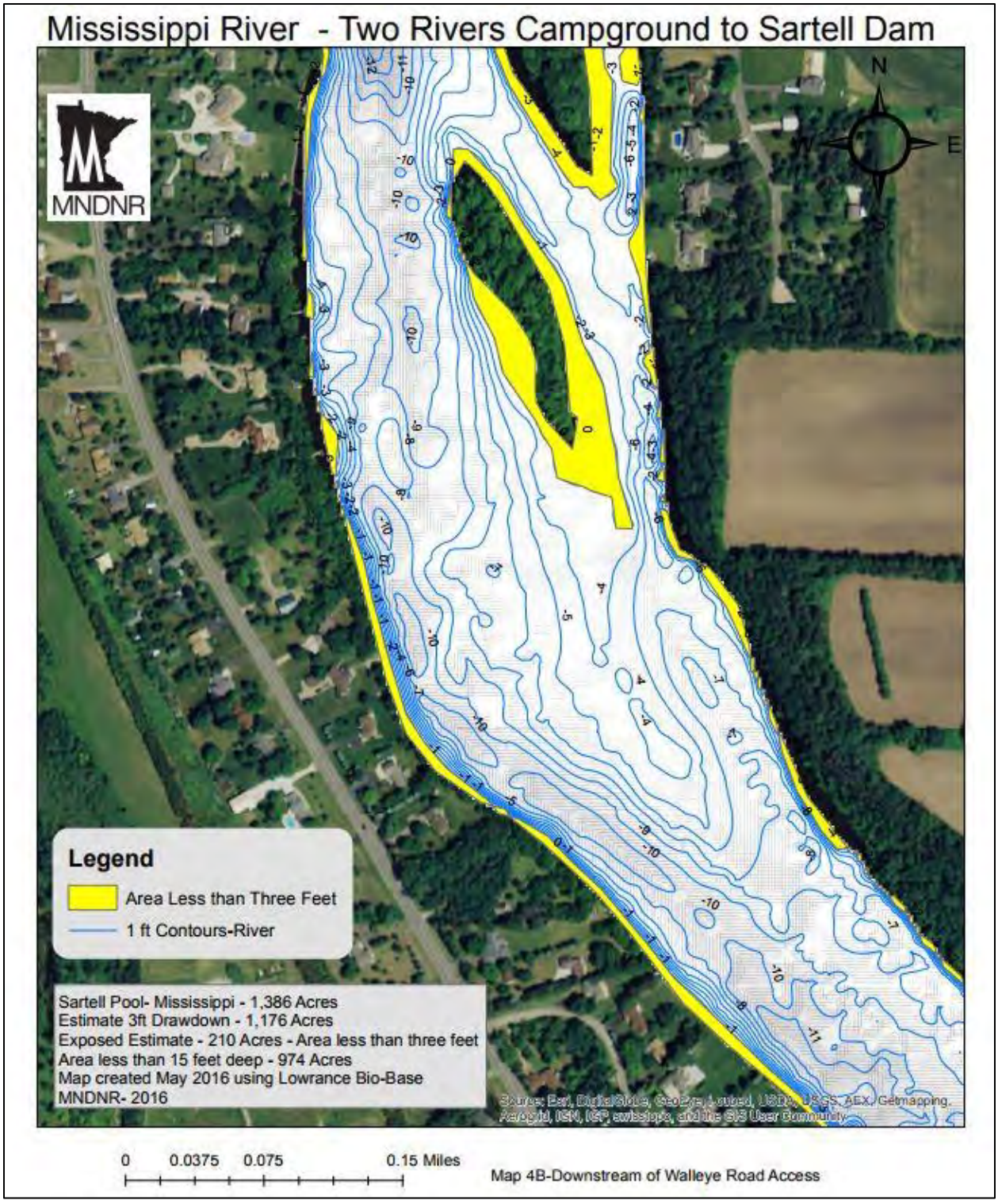


Figure 41: Exposed project area on the Mississippi River

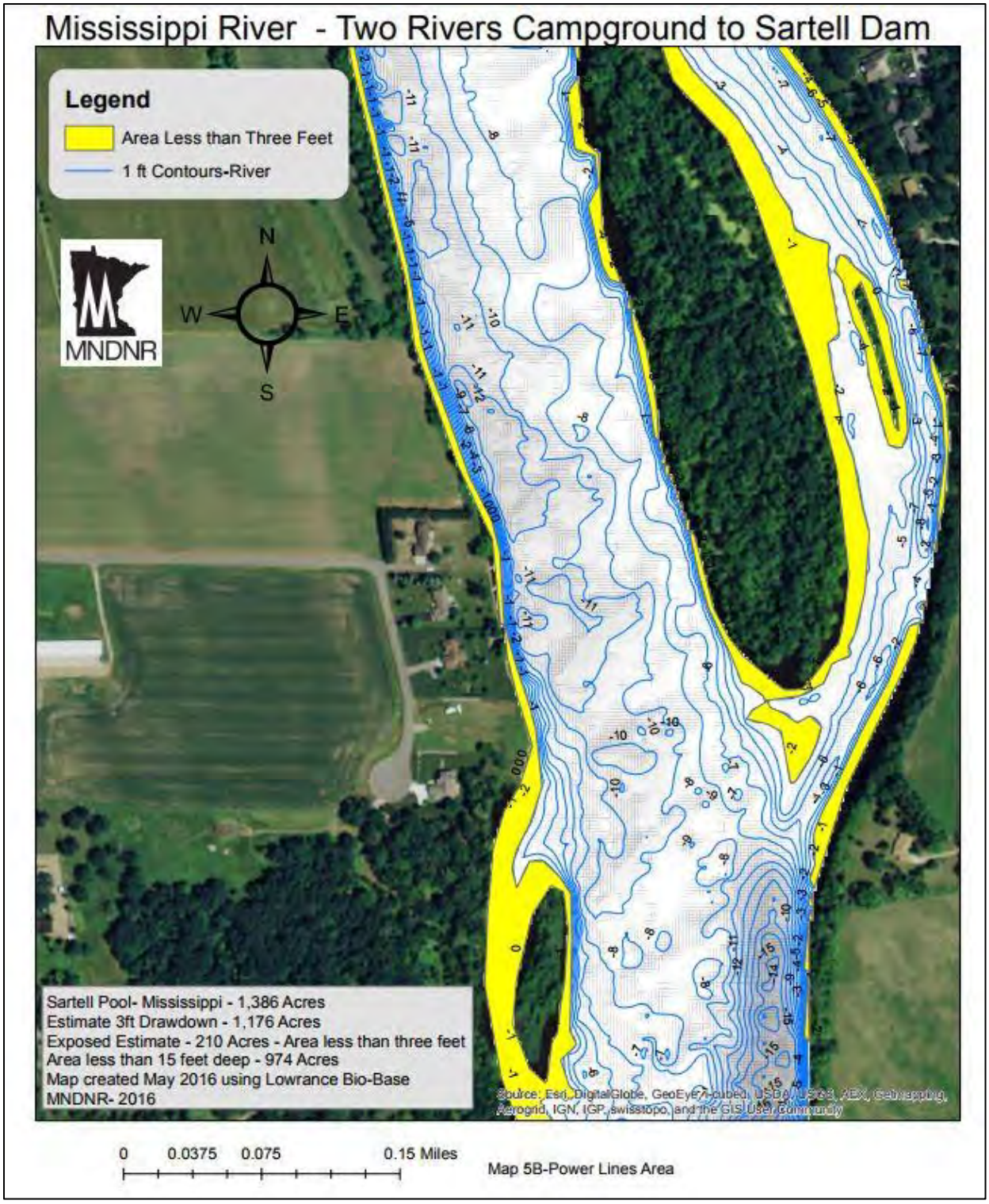


Figure 42: Exposed project area on the Mississippi River

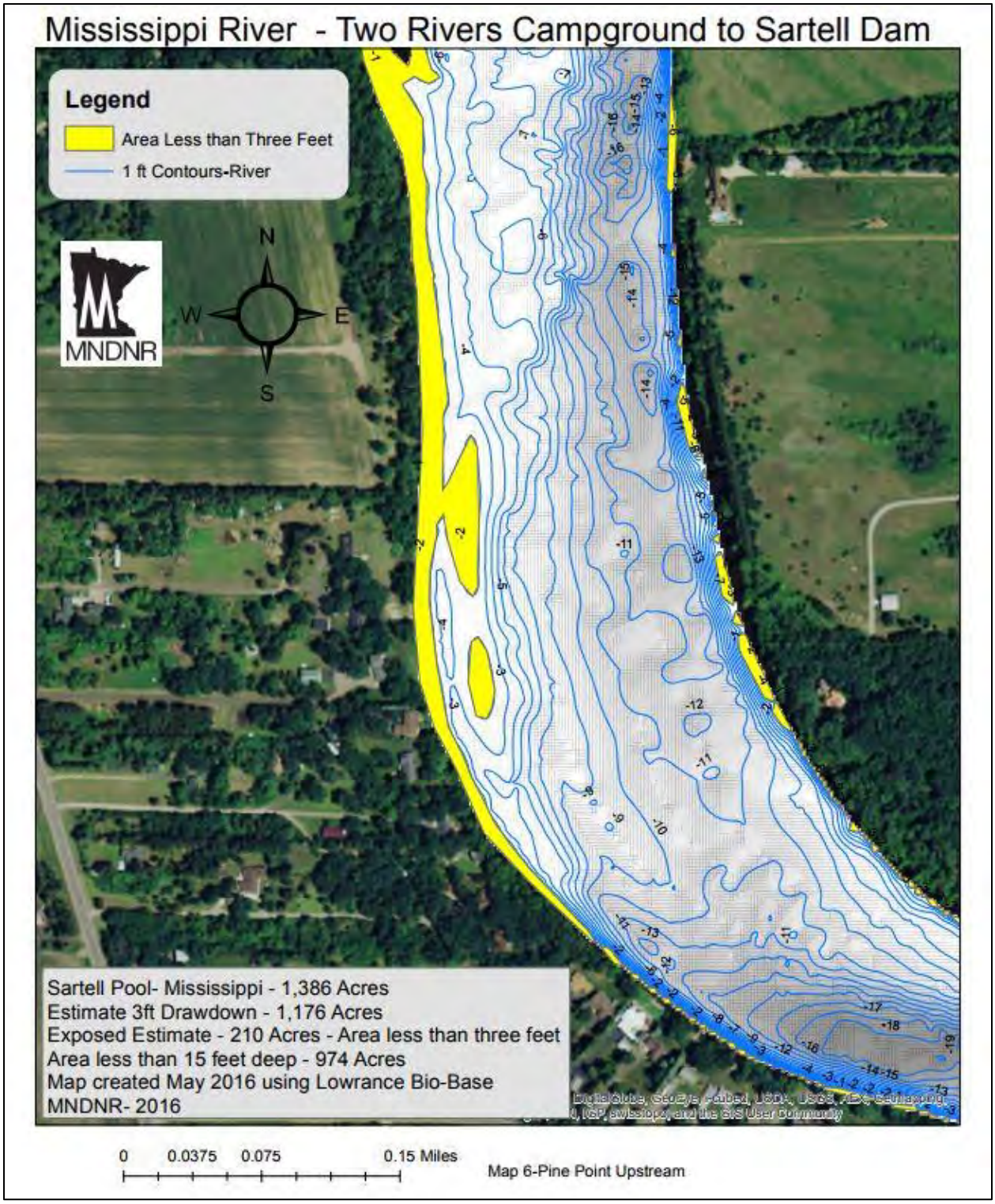


Figure 43: Exposed project area on the Mississippi River

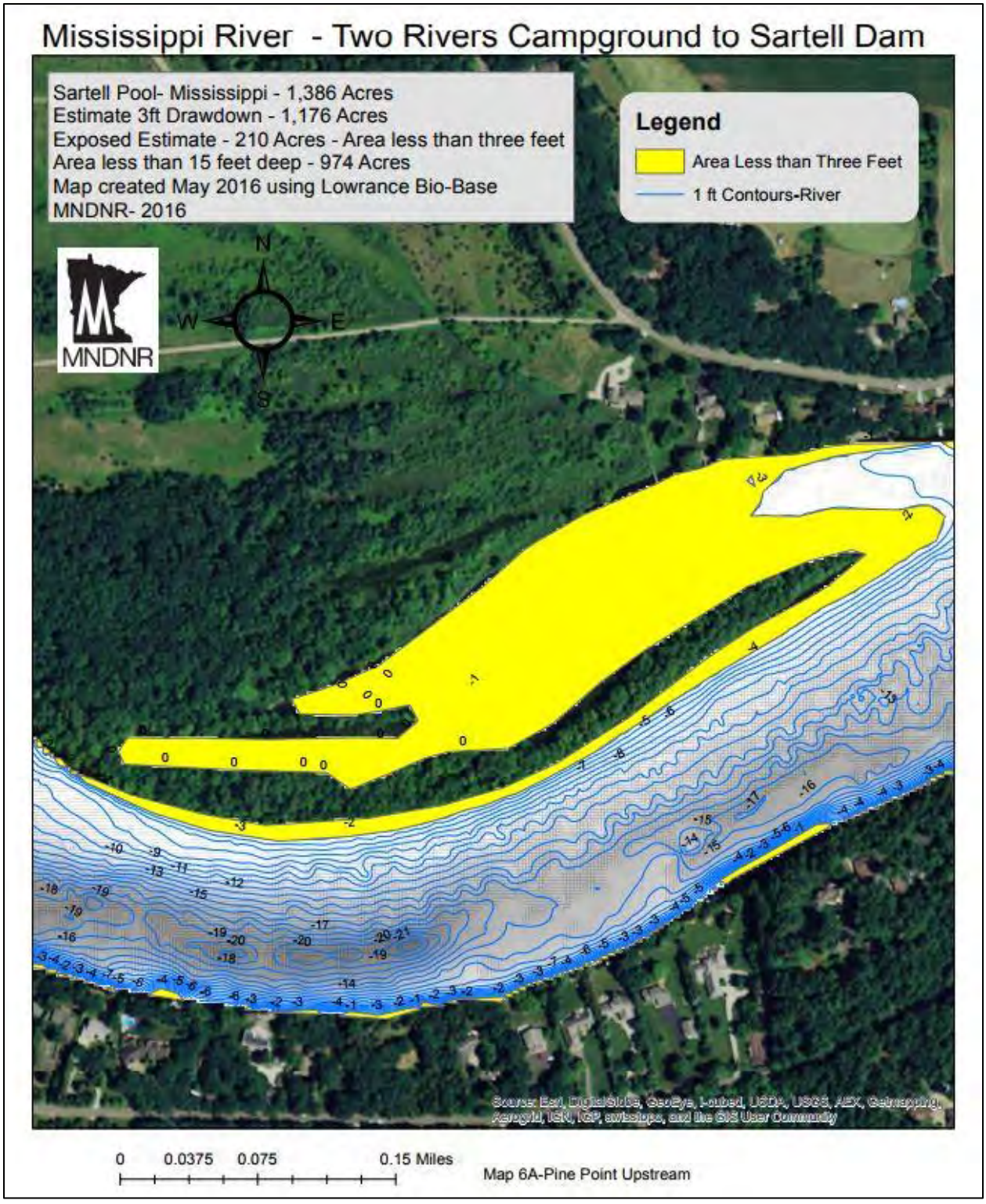


Figure 44: Exposed project area on the Mississippi River

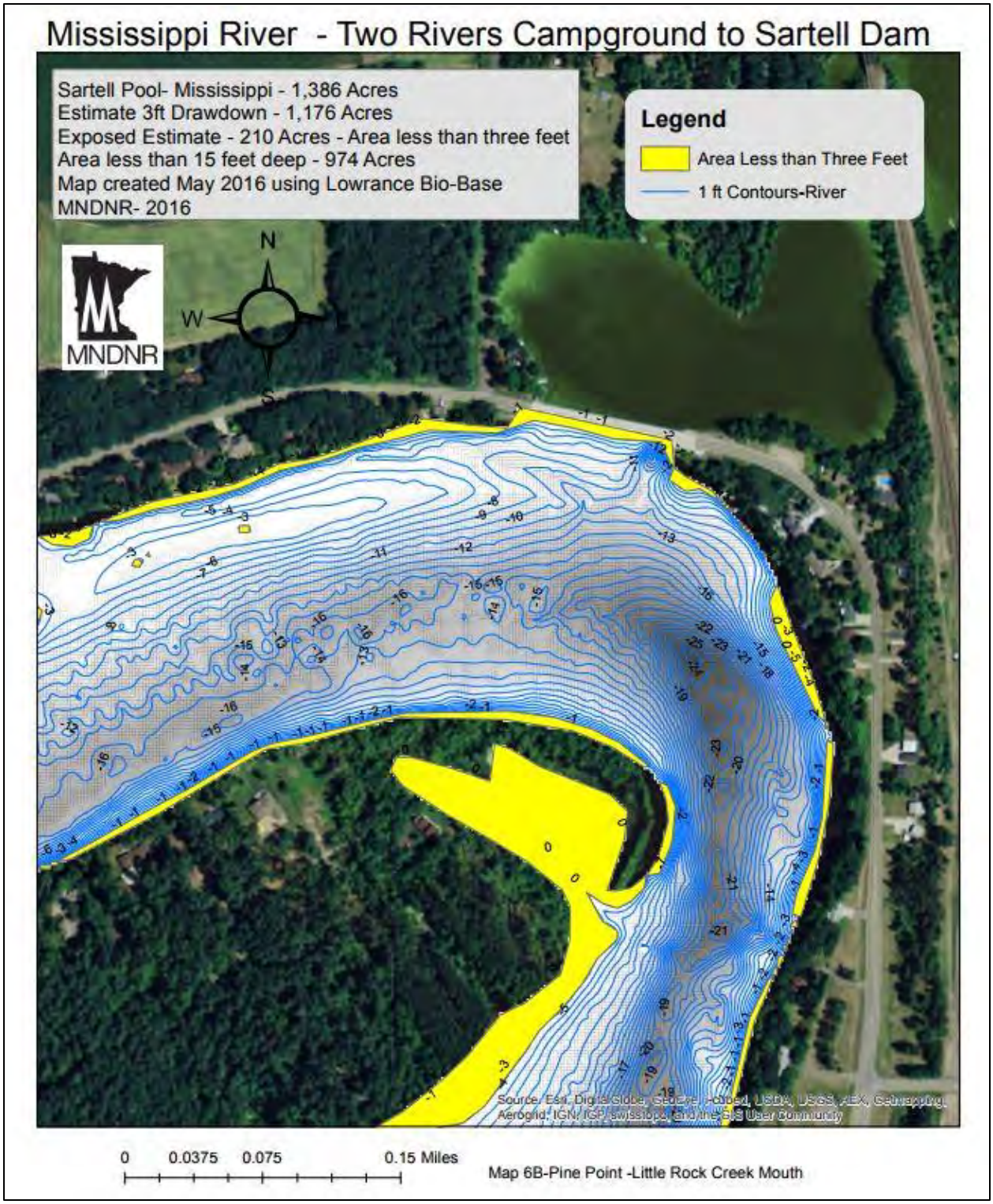


Figure 45: Exposed project area on the Mississippi River

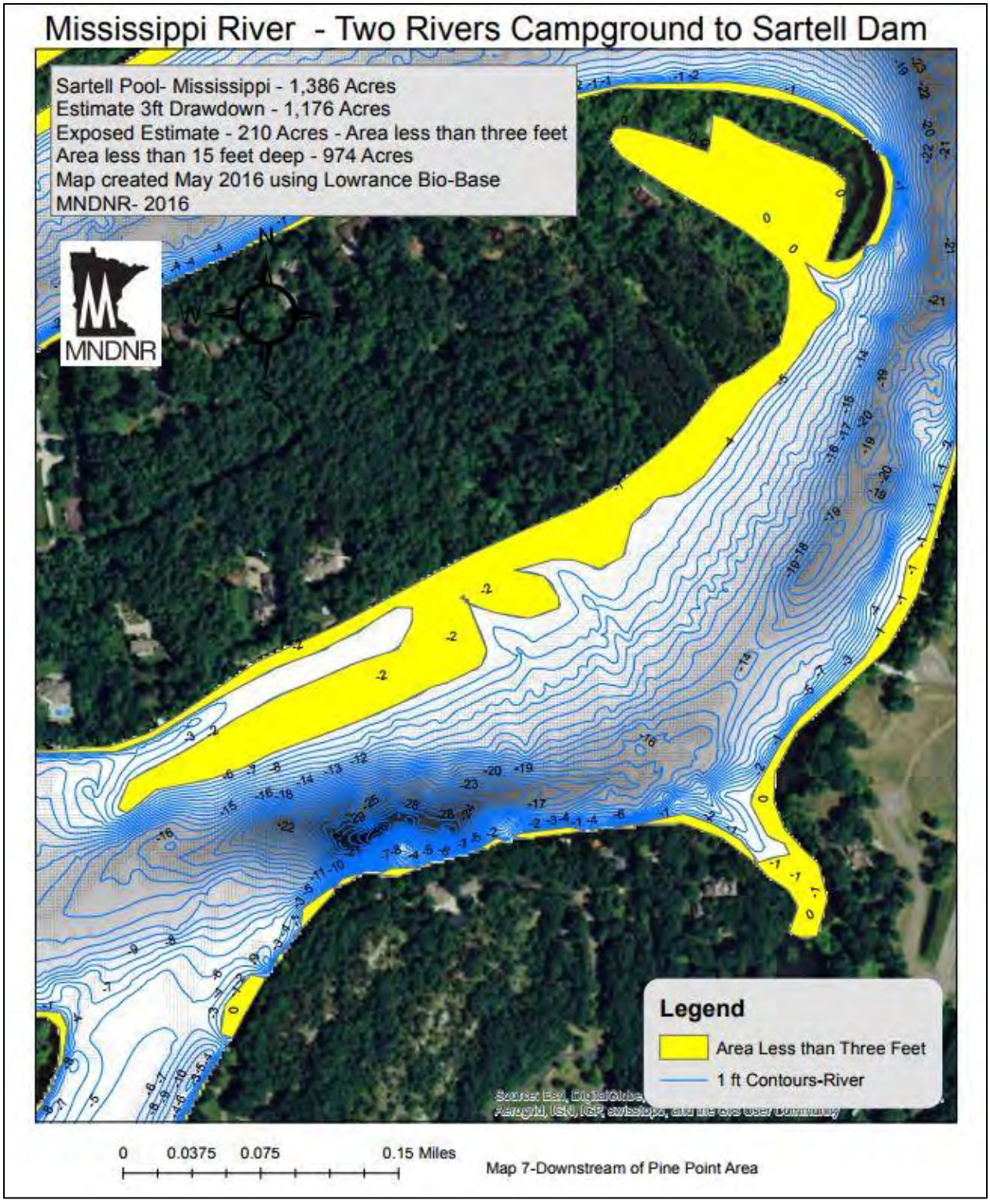


Figure 46: Exposed project area on the Mississippi River

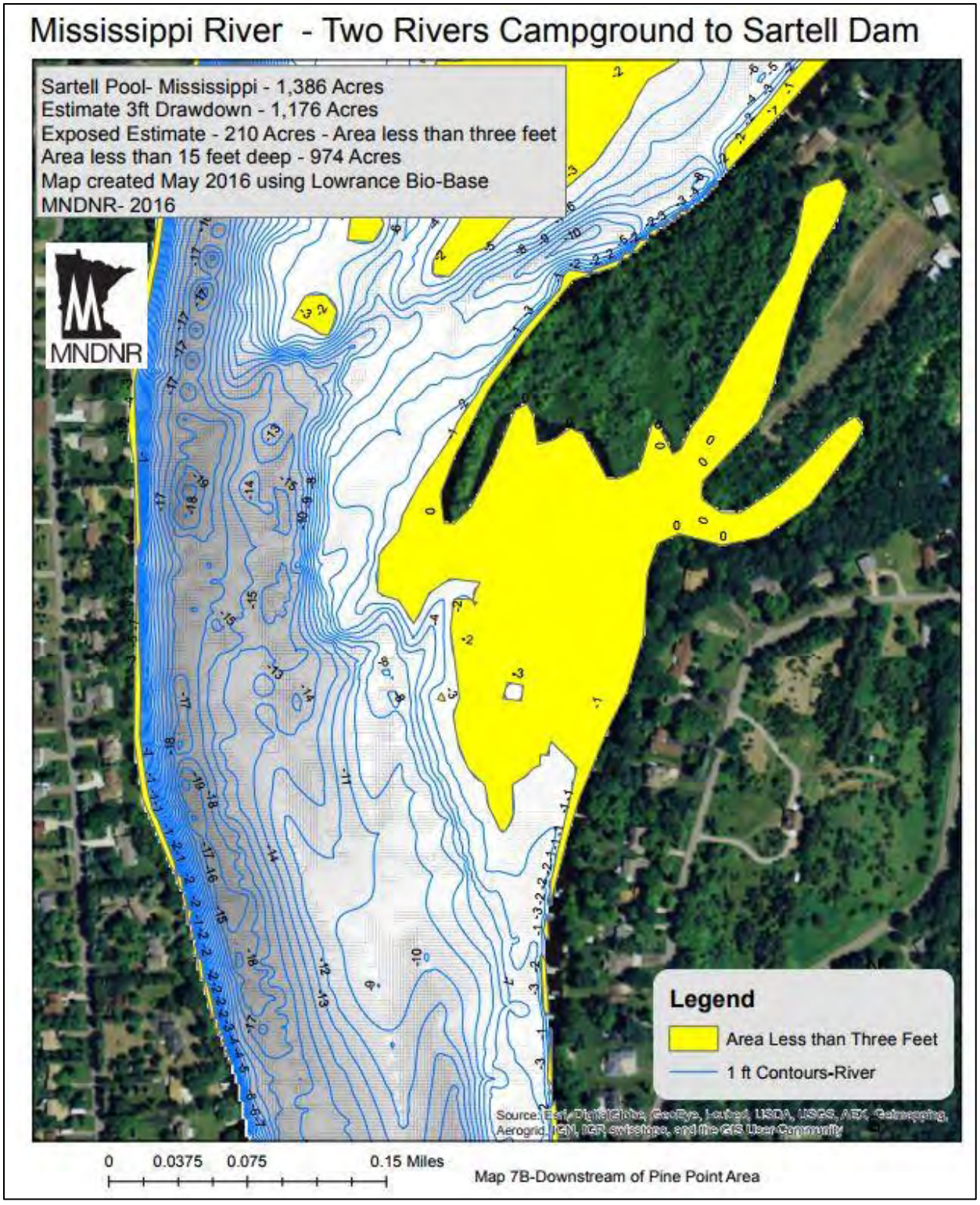


Figure 47: Exposed project area on the Mississippi River

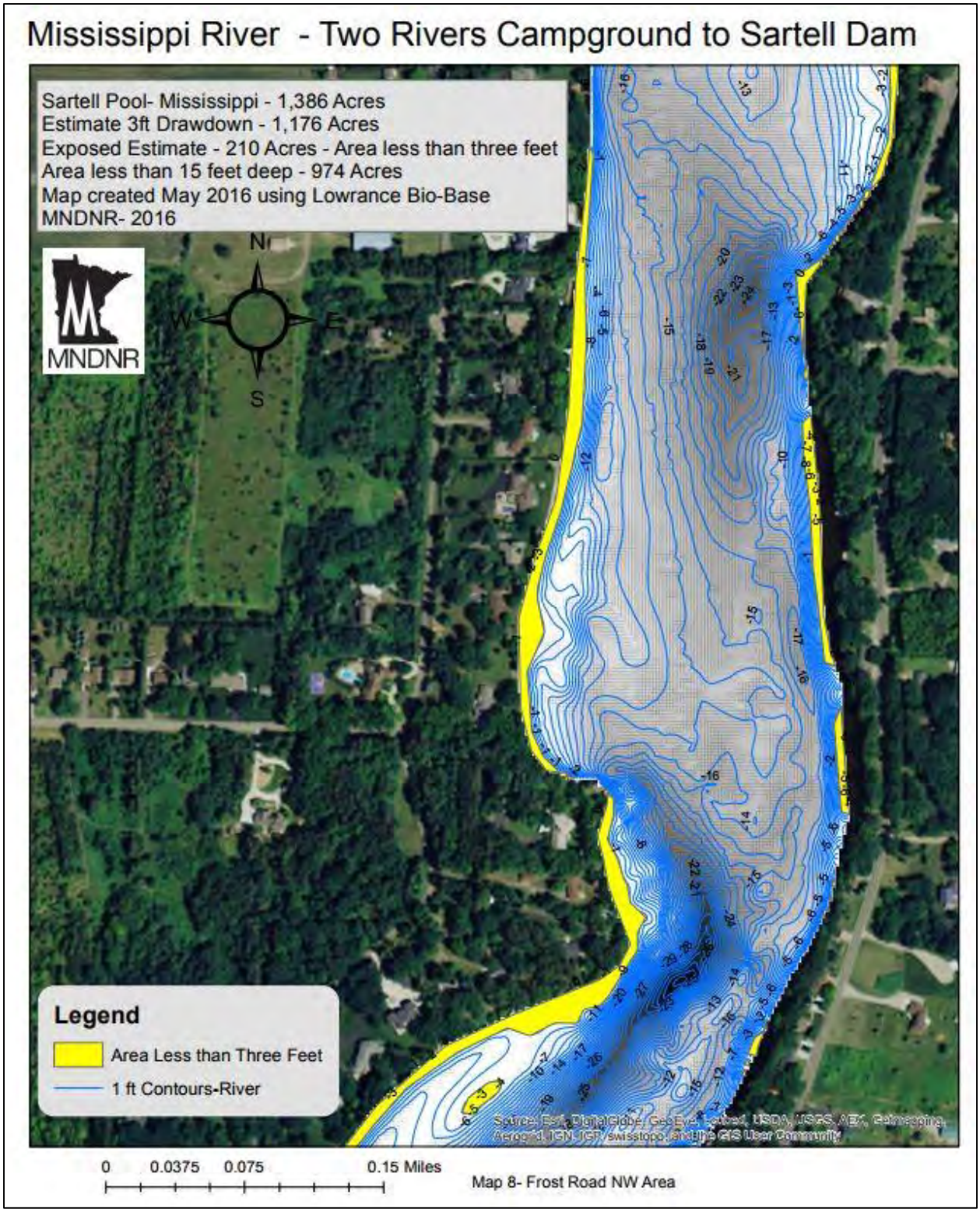


Figure 48: Exposed project area on the Mississippi River

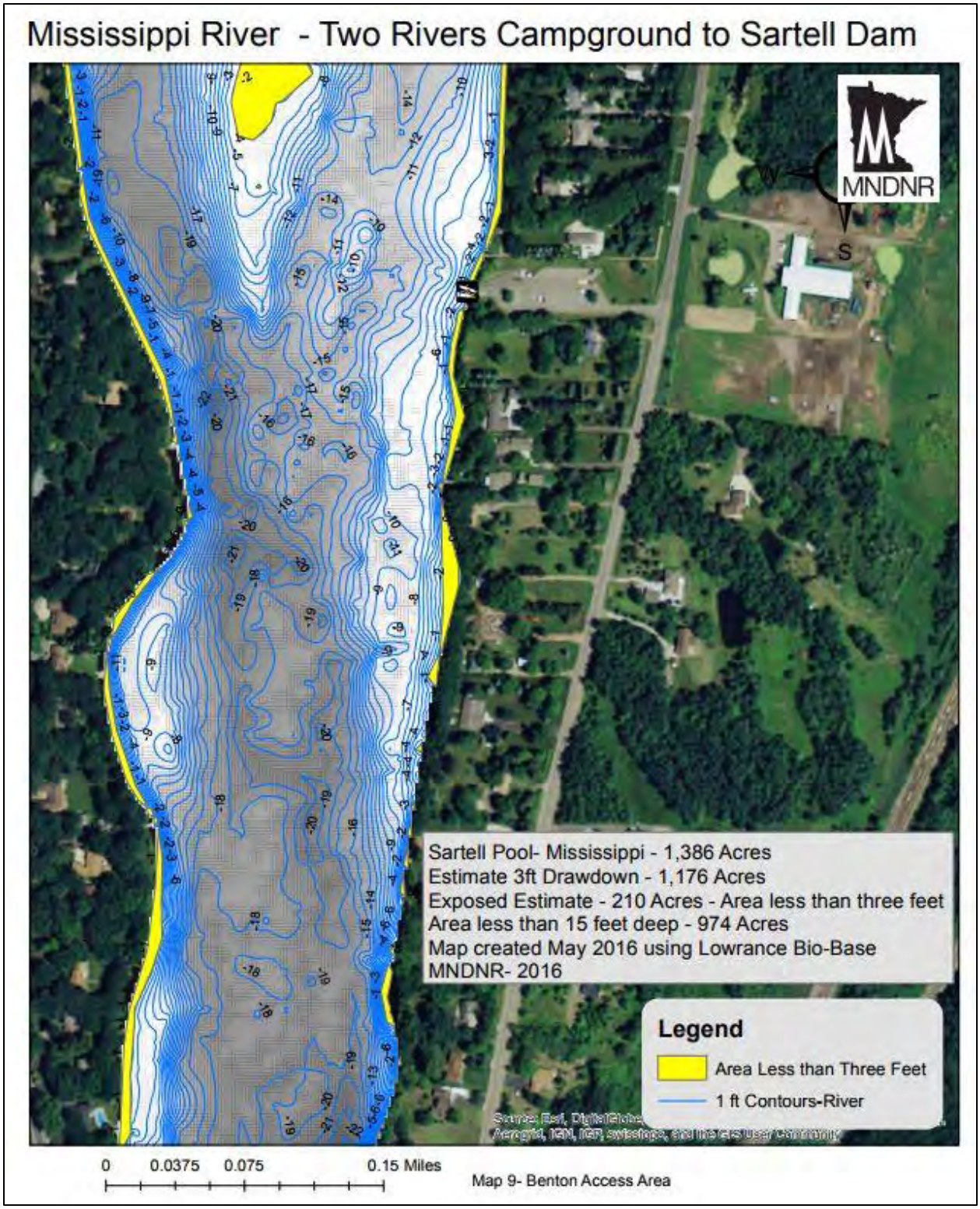


Figure 49: Exposed project area on the Mississippi River

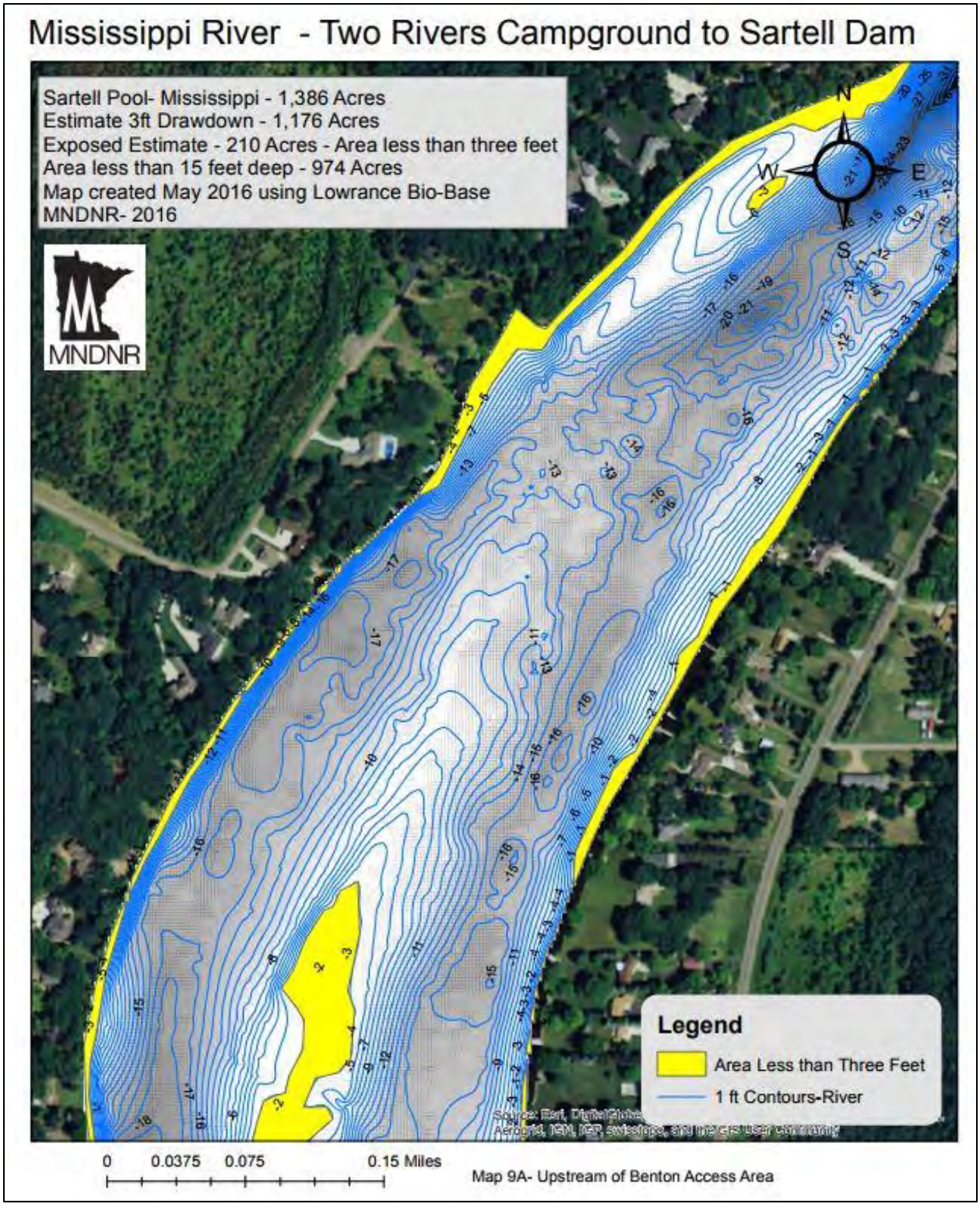


Figure 50: Exposed project area on the Mississippi River

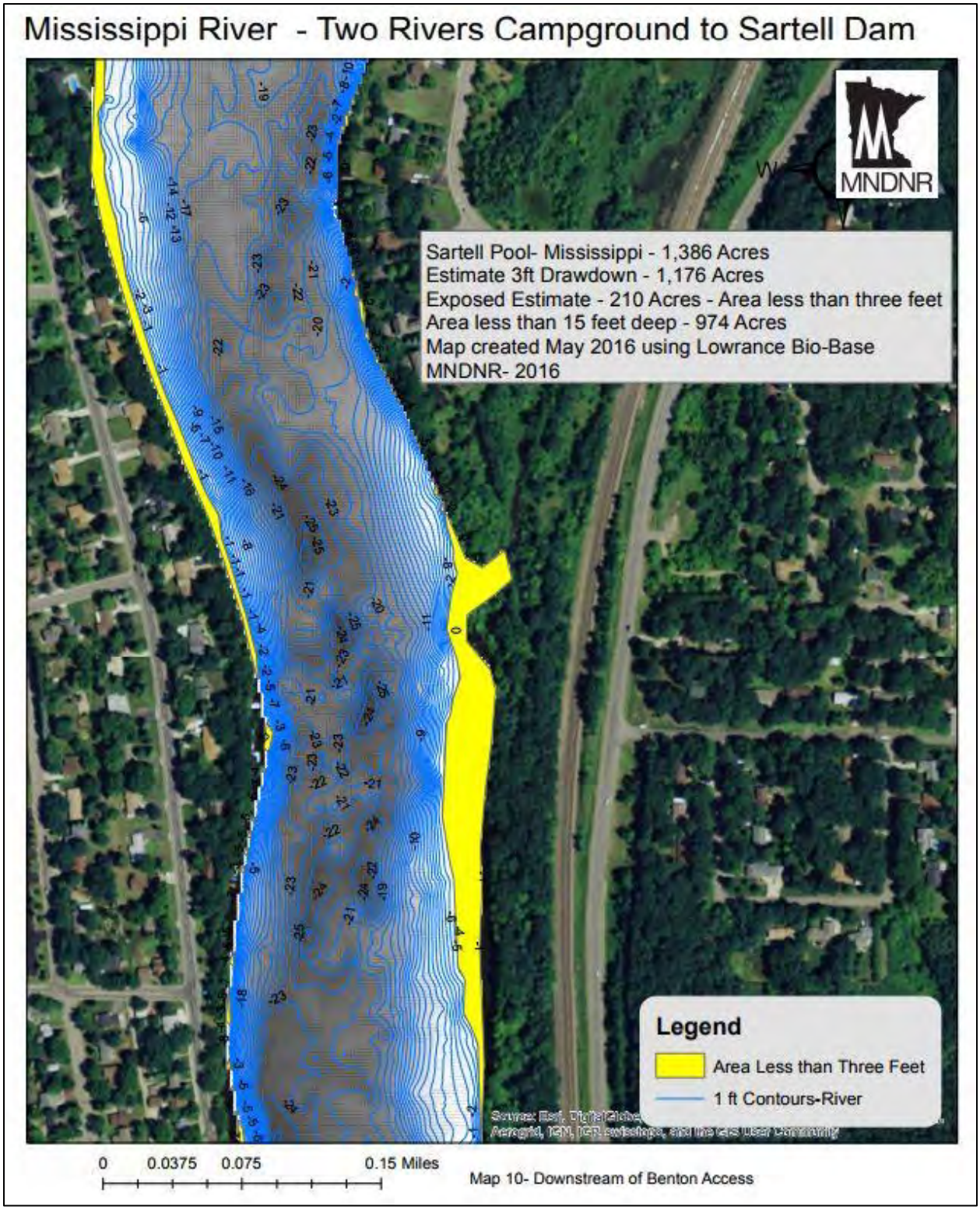


Figure 51: Exposed project area on the Mississippi River

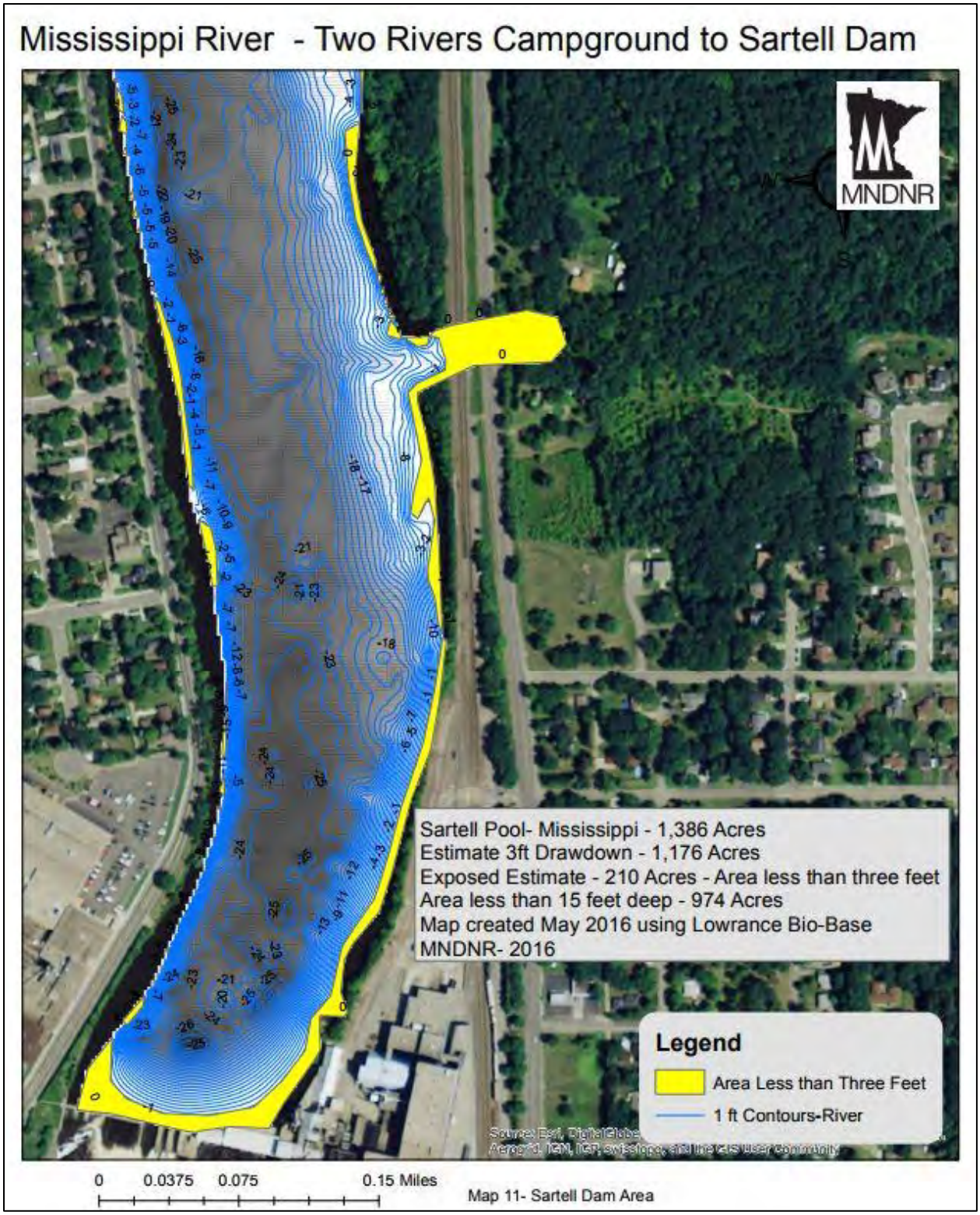


Figure 52: Exposed project area on the Mississippi River

Exposed Area on Little Rock Lake

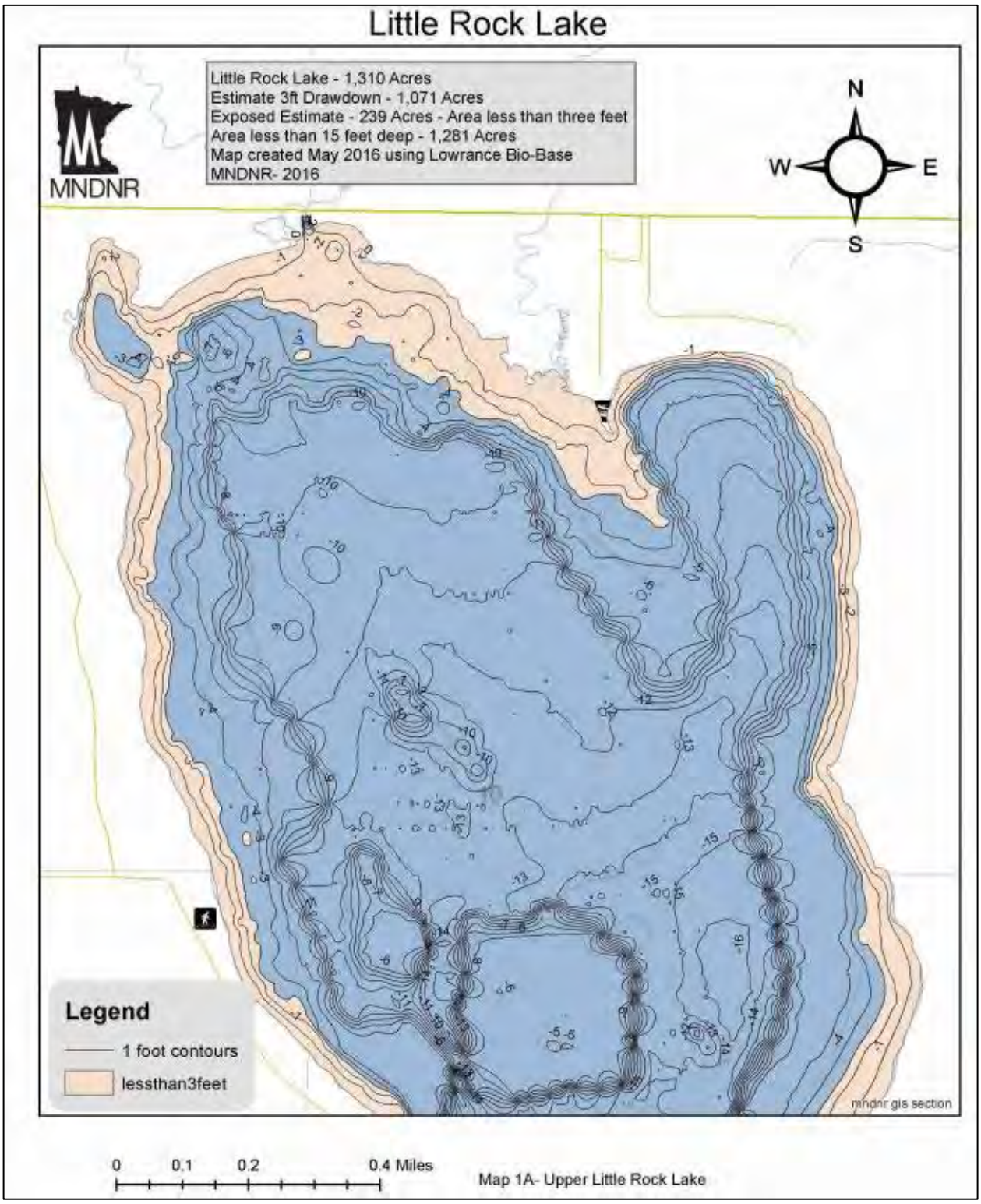


Figure 53: Exposed project area on Little Rock Lake

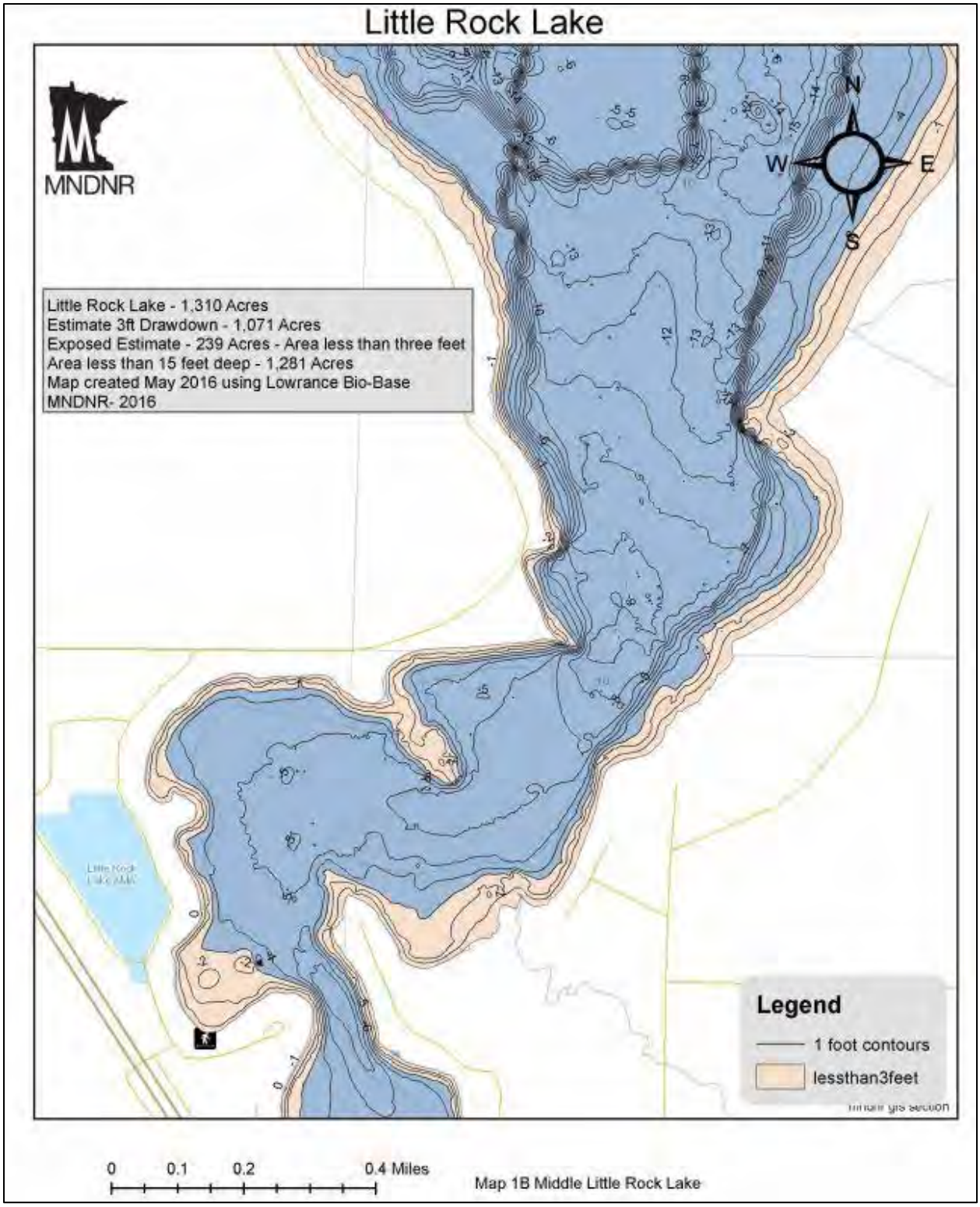


Figure 54: Exposed project area on Little Rock Lake

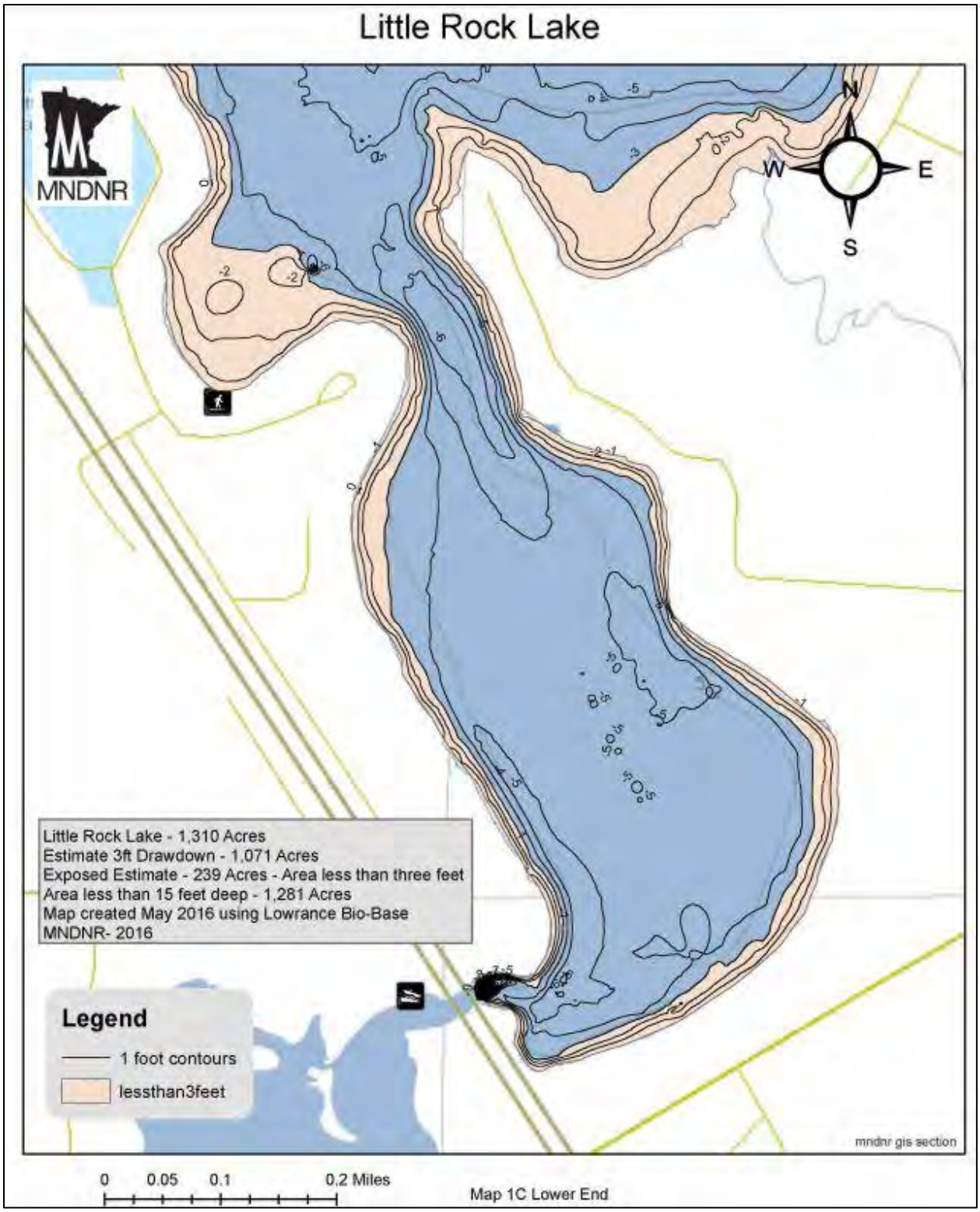


Figure 55: Exposed project area on Little Rock Lake

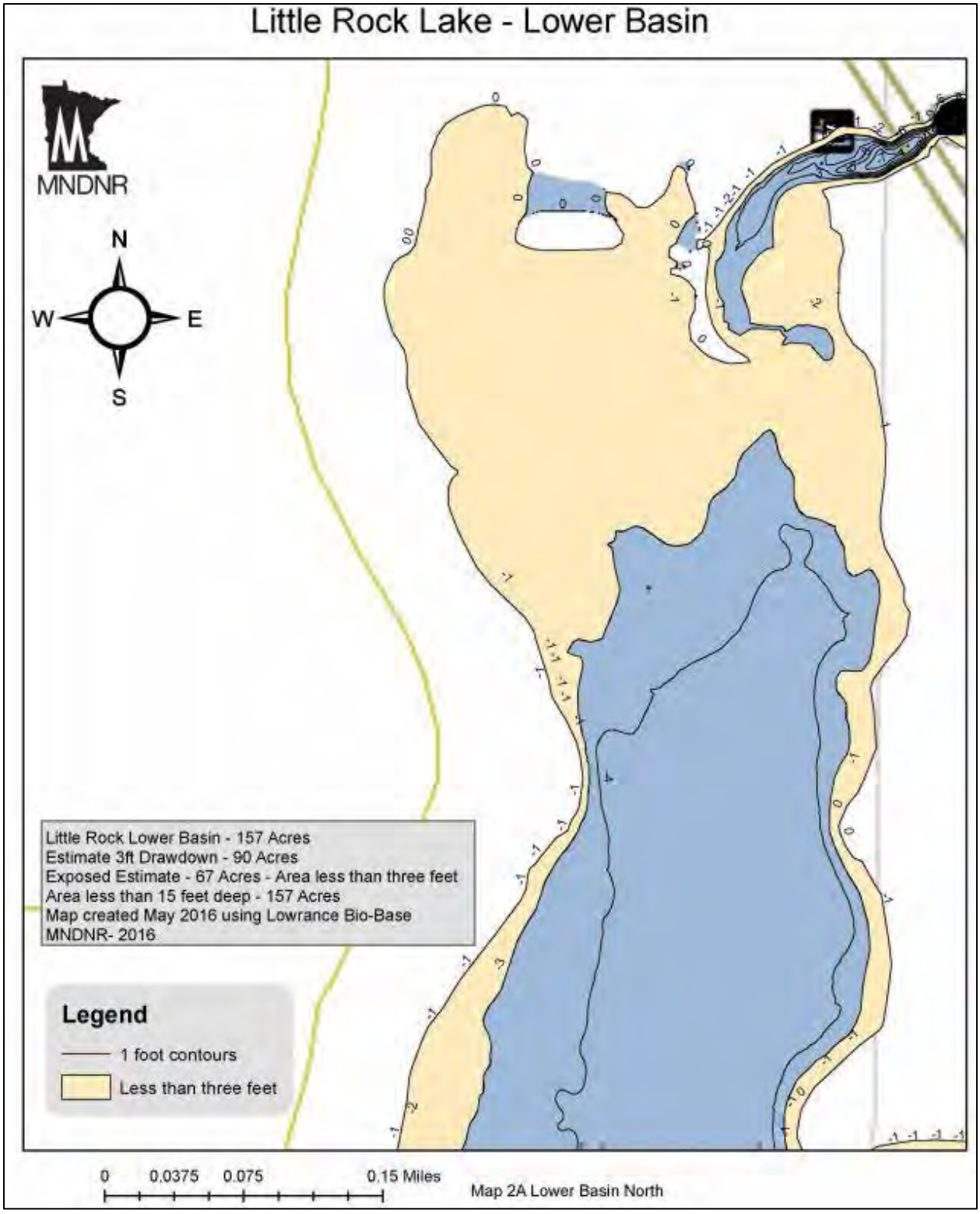


Figure 56: Exposed project area on Little Rock Lake

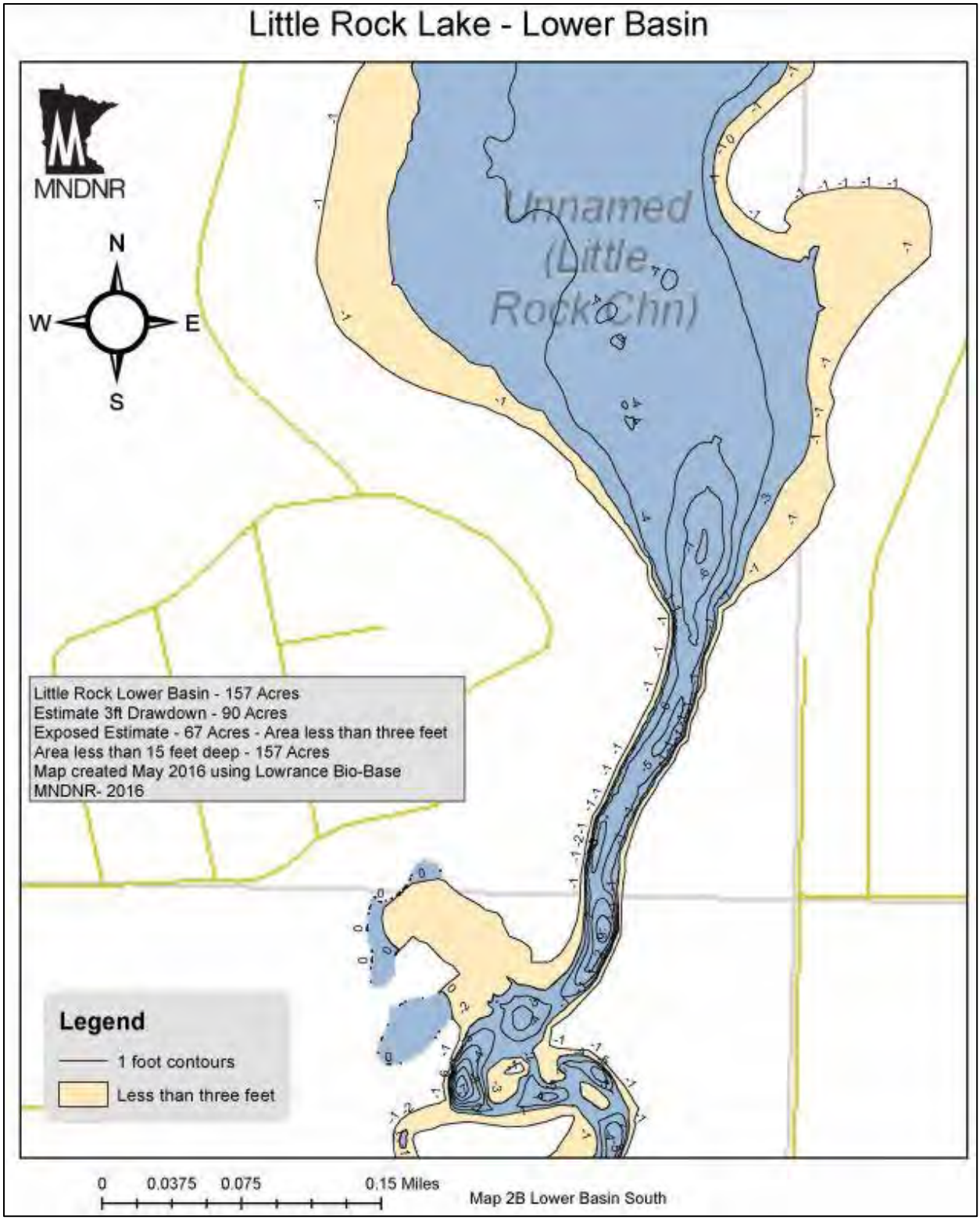


Figure 57: Exposed project area on Little Rock Lake

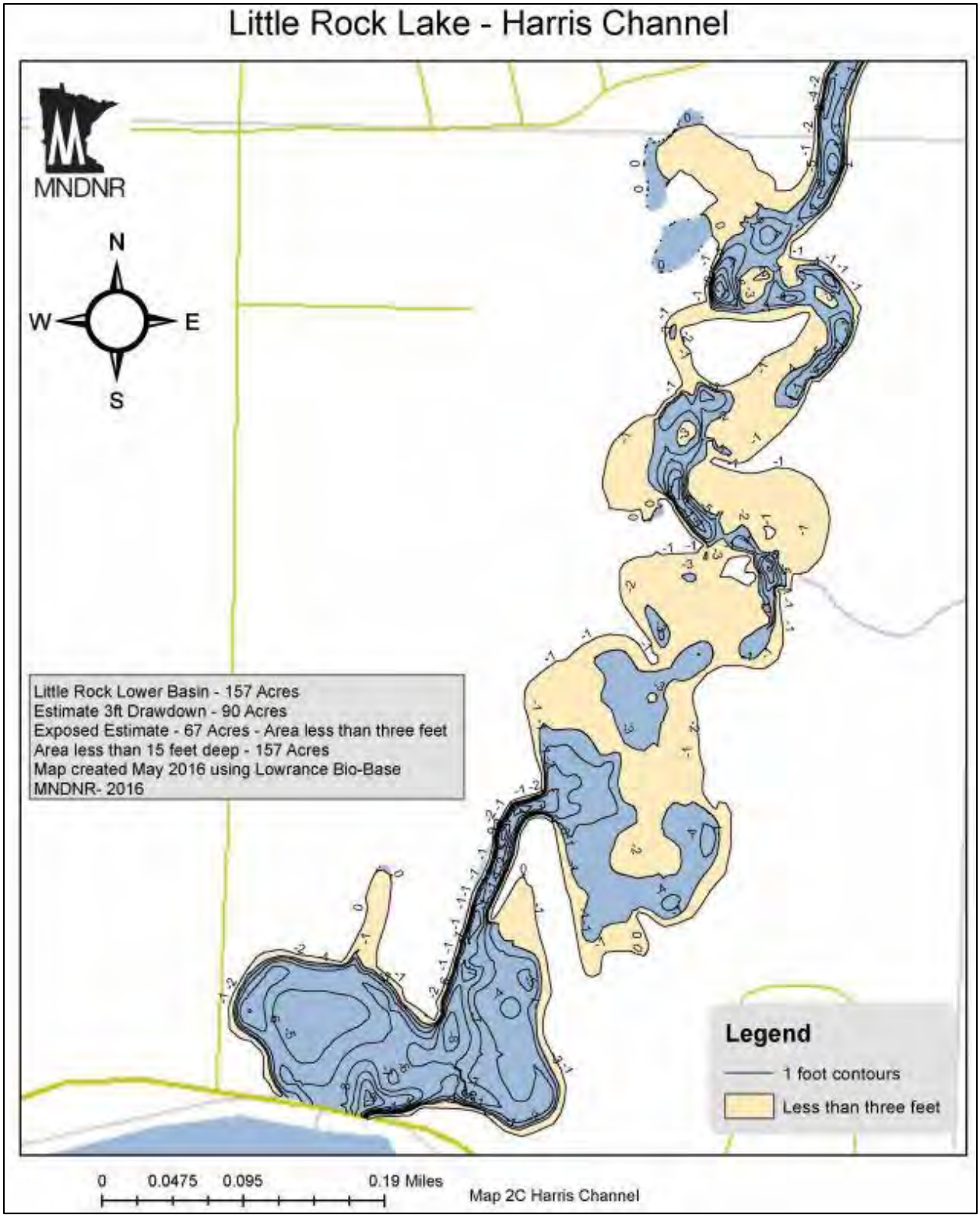


Figure 58: Exposed project area on Little Rock Lake

References

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Benton Soil and Water Conservation District. 2013. Little Rock Lake and Creek Watershed Protection and Improvement Plan (TMDL Implementation Plan). Benton Soil and Water Conservation District.

Garrison,P.J., and LaLiberte G.D. 2009. Sediment Core Study or Little Rock Lake, Benton County, Minnesota. PUB-SS-1065 2009, Wisconsin Department of Natural Resources, Bureau of Science Services.

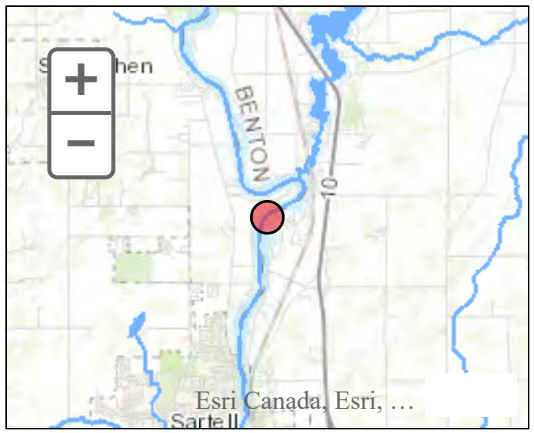
James. W.F. 2008. Internal Phosphorus Loading and Sediment Phosphorus Fractionation Analysis for Little Rock Lake, Minnesota. ERDC Eau Galle Aquatic Ecology Laboratory.

Miller, J., 2001. Little Rock Lake Data Gathering, unpublished, Benton Soil and Water Conservation District

APPENDIX 4.4.1.1-1 MPCA Biological Monitoring Fish Data

Environmental Data Access

Print Report New Search



Biological Station Information

Stream Name:	MISSISSIPPI RIVER
Waterbody Name:	Mississippi River
Data Steward Org:	MPCA
Station ID:	07UM283
Hydrologic Unit Code (HUC):	07010201
Assessment Unit:	07010201-631
Period of Record:	2007 through 2007
Predominant substrate:	
Mean Depth (cm):	
Mean Width (meters):	
Drainage Area (square miles)	12,482.08
Land Use	Agricultural 9.3% Forest 49.5% Range 14.1 % Urban 3.4 % Water 8.6 % Wetland 15.0 % Other 0.1 %
Lat/Lon	45.67106641,-94.19485567

Index of Biological Integrity | Chemical | Projects | Aquatic Life | Species Attributes

Year 2007 Data

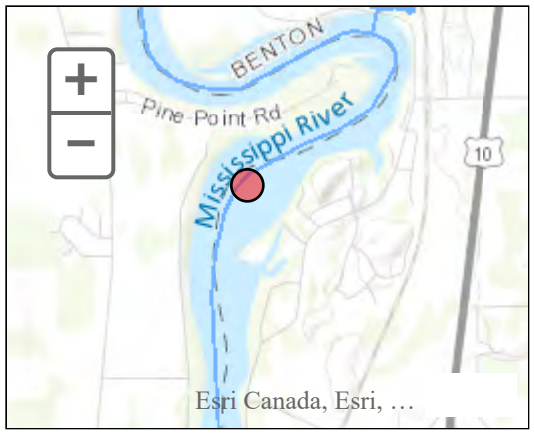
Site Index of Biological Integrity

Category	IBI/Rating
Visit Year	2007

Fish IBI	46
Fish Rating	Fair = Within confidence
Invertebrate IBI	No Visit
Invertebrate Rating	
Visit Year	2007
Fish IBI	46
Fish Rating	Fair = Within confidence
Invertebrate IBI	No Visit
Invertebrate Rating	

Environmental Data Access

Print Report New Search



Biological Station Information

Stream Name:	MISSISSIPPI RIVER
Waterbody Name:	Mississippi River
Data Steward Org:	MPCA
Station ID:	07UM283
Hydrologic Unit Code (HUC):	07010201
Assessment Unit:	07010201-631
Period of Record:	2007 through 2007
Predominant substrate:	
Mean Depth (cm):	
Mean Width (meters):	
Drainage Area (square miles)	12,482.08
Land Use	Agricultural 9.3% Forest 49.5% Range 14.1 % Urban 3.4 % Water 8.6 % Wetland 15.0 % Other 0.1 %
Lat/Lon	45.67106641,-94.19485567

Index of Biological Integrity | Chemical | Projects | Aquatic Life | Species Attributes

Year 2007 Data

Fish that were found at this site

Species	Count	Min Length(mm)	Max Length(mm)
Black Crappie	2		

Black Crappie	2
Bluegill	80
Bluegill	80
Bluntnose Minnow	5
Bluntnose Minnow	5
Central Stoneroller	1
Central Stoneroller	1
Common Carp	12
Common Carp	12
Common Shiner	1
Common Shiner	1
Hornyhead Chub	5
Hornyhead Chub	5
Johnny Darter	2
Johnny Darter	2
Largemouth Bass	3
Largemouth Bass	3
Logperch	8
Logperch	8
Northern Pike	6
Northern Pike	6
Pumpkinseed	1
Pumpkinseed	1
Rock Bass	8
Rock Bass	8
Shorthead Redhorse	3
Shorthead Redhorse	3
Silver Redhorse	3
Silver Redhorse	3
Smallmouth Bass	18
Smallmouth Bass	18
Spotfin Shiner	3
Spotfin Shiner	3
Spottail Shiner	9
Spottail Shiner	9
Walleye	1
Walleye	1
White Sucker	25
White Sucker	25
Yellow Perch	16
Yellow Perch	16

Environmental Data Access

Print Report New Search

Biological Station Information

Stream Name:	MISSISSIPPI RIVER
Waterbody Name:	Mississippi River
Data Steward Org:	MPCA
Station ID:	13UM009
Hydrologic Unit Code (HUC):	07010201
Assessment Unit:	07010201-631
Period of Record:	2013 through 2013
Predominant substrate:	
Mean Depth (cm):	
Mean Width (meters):	
Drainage Area (square miles)	12,356.92
Land Use	Agricultural 9.0% Forest 49.8% Range 14.0 % Urban 3.4 % Water 8.7 % Wetland 15.0 % Other 0.1 %
Lat/Lon	45.73101,-94.23865

Index of Biological Integrity | Chemical | Projects | Aquatic Life | Species Attributes

Year 2013 Data

Site Index of Biological Integrity

Category	IBI/Rating
Visit Year	2013
Fish IBI	75
Fish Rating	Good = Above upper confid
Invertebrate IBI	16
Invertebrate Rating	Poor = Below lower confid
Visit Year	2013
Fish IBI	75
Fish Rating	Good = Above upper confid
Invertebrate IBI	16
Invertebrate Rating	Poor = Below lower confid

Environmental Data Access

Print Report New Search

Biological Station Information

Stream Name:	MISSISSIPPI RIVER
Waterbody Name:	Mississippi River
Data Steward Org:	MPCA
Station ID:	13UM009
Hydrologic Unit Code (HUC):	07010201
Assessment Unit:	07010201-631
Period of Record:	2013 through 2013
Predominant substrate:	
Mean Depth (cm):	
Mean Width (meters):	
Drainage Area (square miles)	12,356.92
Land Use	Agricultural 9.0% Forest 49.8% Range 14.0 % Urban 3.4 % Water 8.7 % Wetland 15.0 % Other 0.1 %
Lat/Lon	45.73101,-94.23865

Index of Biological Integrity | **Chemical** | **Projects** | Aquatic Life | Species Attributes

Data collected from August 13, 2013

Site Visit Date	13-AUG-13
Water Temperature °C	22.6°
Conductivity µmhos/cm	323
Field Turbidity NTU	
Dissolved Oxygen mg/L	10.75
PH	8.8
Flow m3/sec	
Nitrogen mg/L	0.07
Total Phosphorus mg/L	0.022
Total Suspended Solids mg/L	7.2
Ammonia mg/L	< 0.05
Fish Rating	

Environmental Data Access

Print Report New Search

Biological Station Information

Stream Name:	MISSISSIPPI RIVER
Waterbody Name:	Mississippi River
Data Steward Org:	MPCA
Station ID:	13UM009
Hydrologic Unit Code (HUC):	07010201
Assessment Unit:	07010201-631
Period of Record:	2013 through 2013
Predominant substrate:	
Mean Depth (cm):	
Mean Width (meters):	
Drainage Area (square miles)	12,356.92
Land Use	Agricultural 9.0% Forest 49.8% Range 14.0 % Urban 3.4 % Water 8.7 % Wetland 15.0 % Other 0.1 %
Lat/Lon	45.73101,-94.23865

Index of Biological Integrity | Chemical | Projects | **Aquatic Life** | Species Attributes

Year 2013 Data

Fish that were found at this site

Species	Count	Min Length(mm)	Max Length(mm)
Black Crappie	5	43	160
Black Crappie	5	43	160
Bluegill	24	29	116
Bluegill	24	29	116
Burbot	1	250	250
Burbot	1	250	250
Common Shiner	26	34	84
Common Shiner	26	34	84
Creek Chub	2	44	56
Creek Chub	2	44	56
Greater Redhorse	1	642	642
Greater Redhorse	1	642	642
Hybrid Sunfish	1	83	83
Hybrid Sunfish	1	83	83
Johnny Darter	20	31	61
Johnny Darter	20	31	61
Largemouth Bass	4	60	79
Largemouth Bass	4	60	79
Logperch	45	50	101
Logperch	45	50	101
Northern Pike	4	141	505
Northern Pike	4	141	505
Pumpkinseed	2	73	221
Pumpkinseed	2	73	221

Rock Bass	14	91	260
Rock Bass	14	91	260
Shorthead Redhorse	19	40	482
Shorthead Redhorse	19	40	482
Silver Redhorse	14	391	632
Silver Redhorse	14	391	632
Smallmouth Bass	83	48	475
Smallmouth Bass	83	48	475
Spotfin Shiner	12	48	86
Spotfin Shiner	12	48	86
Spottail Shiner	1	105	105
Spottail Shiner	1	105	105
Walleye	3	95	130
Walleye	3	95	130
White Sucker	2	433	470
White Sucker	2	433	470
Yellow Perch	14	47	128
Yellow Perch	14	47	128

APPENDIX 4.4.1.1-2 MDNR Little Rock Lake Fish Data

(/index.html)

Fisheries Lake Surveys

Little Rock (05001300)

Area: 1,310.66 acres
Littoral Area: 1,240.12 acres
Shore Length: 10.55 miles
Mean Depth: 8 feet
Maximum Depth: 17 feet
Average Water Clarity: 2.8 feet

Choose a survey:

Standard Survey (1990-07-16)

Water Access Information:

Administrator	Access Type	Notes	Use Type
County	Gravel	COUNTY OWNED ACCESS ON NE SIDE OF LAKE ; NE1/4	Unknown
DNR	Concrete	STATE OWNED ACCESS BY HWY. 10 BRIDGE. SEC 15	Open to Public use

Fish Sampled

Filters:

all species

all gear

Species	Gear	CPUE	Normal Range	Avg Weight	Normal Range	Count
black bullhead	Standard trap nets	0.40	1.3-78.1	0.47	0.2-0.6	4
black bullhead	Standard gill nets	4.58	4.6-83.0	0.62	0.2-0.6	55

Species	Gear	CPUE	Normal Range	Avg Weight	Normal Range	Count
black crappie	Standard gill nets	1.25	0.8-11.1	0.27	0.2-0.4	15
black crappie	Standard trap nets	1.80	1.0-12.3	0.24	0.2-0.5	18
bluegill	Standard trap nets	2.20	1.0-14.9	0.30	0.2-0.4	22
bowfin (dogfish)	Standard gill nets	0.17	0.1-1.0	6.00	3.3-5.5	2
bowfin (dogfish)	Standard trap nets	0.50	0.1-0.7	5.24	3.7-5.1	5
brown bullhead	Standard gill nets	0.08	0.6-7.7	1.10	0.4-1.1	1
channel catfish	Standard gill nets	0.17	N/A	1.75	N/A	2
common carp	Standard gill nets	2.50	0.5-9.1	6.84	1.0-4.9	30
common carp	Standard trap nets	1.00	0.7-5.1	4.44	2.3-5.6	10
common shiner	Standard gill nets	0.08	N/A	0.10	N/A	1
largemouth bass	Standard trap nets	0.10	0.1-0.8	1.00	0.4-1.5	1
northern pike	Standard gill nets	2.00	1.2-7.8	3.18	1.5-3.0	24
northern pike	Standard trap nets	0.30	N/A	3.73	N/A	3
shorthead redhorse	Standard trap nets	1.60	0.7-2.1	1.99	1.7-3.5	16
silver redhorse	Standard trap nets	0.10	N/A	1.10	N/A	1

Species	Gear	CPUE	Normal Range	Avg Weight	Normal Range	Count
smallmouth buffalo	Standard trap nets	0.50	N/A	2.48	N/A	5
walleye	Standard gill nets	2.67	3.2-15.3	1.24	0.9-1.9	32
walleye	Standard trap nets	1.00	0.3-1.7	1.15	0.9-2.4	10
white crappie	Standard gill nets	6.08	0.8-11.0	0.24	0.2-0.4	73
white crappie	Standard trap nets	8.90	0.5-15.9	0.23	0.2-0.5	89
white sucker	Standard gill nets	14.33	0.8-5.9	1.58	1.4-2.2	172
white sucker	Standard trap nets	0.50	0.3-1.3	1.46	1.3-2.6	5
yellow bullhead	Standard trap nets	0.40	0.5-4.1	0.65	0.4-0.8	4
yellow perch	Standard trap nets	0.20	0.3-2.6	0.25	0.1-0.3	2
yellow perch	Standard gill nets	4.42	3.0-22.5	0.21	0.1-0.4	53

showing 27 of 27 fish samples

Status of the Fishery

The fish population of Little Rock Lake, with regard to selective net catch data and ecological lake classification can be described as follows: The walleye net catch is low at 2.67/set, which is below the first quartile of 2.71/set. There has been no "real" change in the population since the previous survey in 1985. Mean fish size is within the normal range as is growth rate. Age groups present in the sample include II, III, V, and VI. The lake is stocked with fingerlings. Natural reproduction has been documented by several checks during the 1980's. The contribution of naturally reproduced fish to the fishery may be considerable, however, it has been difficult to assess.Northern pike show a "real" increase in numbers, though the net catch falls within the normal range. Average size is large at 3.1

pounds, compared to 2.1 pounds in 1985. Age groups II through VI are represented and growth rates are normal for all age groups.Yellow perch show a "real" decrease in numbers. Although both numbers and mean size are normal for this lake class. Age groups II, III, and IV are present in the sample and median length group is 7.0-7.4 inches.A significant population of white crappie is present in the lake. The net catch (8.9/set) is many times higher than recorded in any previous survey. The current population is considered average in numbers and mean size. Mean weight is 0.23 pounds and median length group is 7.5-7.9 inches. The 1988 year class dominates the catch comprising 93% of the sample. The 1984 year class showed similar dominating characteristics, however, that group is no longer prevalent in the lake.The black crappie population is also dominated by the 1988 year class which makes up 79% of the net catch. The population is considered normal in terms of number and mean size. The black crappie net catch of 1.8/set is much lower than the white crappie catch indicating the predominance of the white crappie. Black crappie display normal growth rates and mean weight is 0.24 pounds.Bluegill net catches increased to four times the 1985 catch, however, numbers are in the normal range. Mean size is also normal and has changed little since 1985. Several age groups up to age VII are present including seven hundred young-of-the-year captured during late summer seining. Normal growth rates are evident in all groups. Adult bluegill were stocked in 1986 and 1989 to augment the previous low population and stimulate natural reproduction.Other gamefish found in the net catches include largemouth bass (1 fish) and channel catfish (2 fish). Largemouth bass populations are difficult to assess using lake survey gear and low catches may not alway indicate low numbers.A large variety of roughfish species are also present in the lake. The common carp net catch doubled since 1985, but is still within the normal range. Shorthead redhorse catches also doubled while silver redhorse numbers have remained stable. White sucker numbers are high and the net catch increased 100% from 1985 levels. Average white sucker is normal at 1.57 pounds. Yellow, brown, and black bullheads are all present in low numbers for this lake class. Bowfin are found in high numbers and average size is large. Smallmouth buffalo were discovered in the net catch for the first time (5 fish) on record, while bigmouth buffalo were absent.

For More Information

Little Falls Area Fisheries Supervisor
16543 Haven Rd
Little Falls, MN
Phone: 320-232-1060
Email: LittleFalls.Fisheries@state.mn.us (mailto:LittleFalls.Fisheries@state.mn.us)
Website (/areas/fisheries/littlefalls/index.html)

We use JSON (http://www.json.org/), a lightweight data-interchange format, to deliver the lake survey data. If you are an application developer, you can access this data to develop custom reports and products - get the data (https://maps2.dnr.state.mn.us/cgi-bin/lakefinder/detail.cgi?type=lake_survey&id=05001300).

(/)

Questions?

Call 651-296-6157 or 888-MINNDNR (646-6367)

Email us: info.dnr@state.mn.us (mailto:info.dnr@state.mn.us)

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Sign up for email updates

Email address Subscribe

(/index.html)

Fisheries Lake Surveys

Little Rock (05001300)

Area: 1,310.66 acres
Littoral Area: 1,240.12 acres
Shore Length: 10.55 miles
Mean Depth: 8 feet
Maximum Depth: 17 feet
Average Water Clarity: 2.8 feet

Choose a survey:

Standard Survey (1996-07-15)

Water Access Information:

Administrator	Access Type	Notes	Use Type
County	Gravel	COUNTY OWNED ACCESS ON NE SIDE OF LAKE ; NE1/4	Unknown
DNR	Concrete	STATE OWNED ACCESS BY HWY. 10 BRIDGE. SEC 15	Open to Public use

Fish Sampled

Filters:

all species

all gear

Species	Gear	CPUE	Normal Range	Avg Weight	Normal Range	Count
bigmouth buffalo	Standard gill nets	0.08	0.3-6.1	6.39	N/A	1
bigmouth buffalo	Survey seining	0.33	N/A	0.00	N/A	1

Species	Gear	CPUE	Normal Range	Avg Weight	Normal Range	Count
bigmouth buffalo	Standard trap nets	0.25	0.2-1.5	10.57	1.3-5.1	3
black bullhead	Standard gill nets	1.42	4.6-83.0	1.01	0.2-0.6	17
black crappie	Standard gill nets	3.25	0.8-11.1	0.07	0.2-0.4	39
black crappie	Survey seining	5.33	N/A	0.00	N/A	16
black crappie	Standard trap nets	3.00	1.0-12.3	0.11	0.2-0.5	36
bluegill	Survey seining	23.00	N/A	0.00	N/A	69
bluegill	Standard trap nets	0.25	1.0-14.9	0.10	0.2-0.4	3
bowfin (dogfish)	Standard gill nets	0.33	0.1-1.0	5.66	3.3-5.5	4
bowfin (dogfish)	Standard trap nets	0.25	0.1-0.7	8.45	3.7-5.1	3
brook silverside	Survey seining	2.67	N/A	0.00	N/A	8
channel catfish	Standard gill nets	0.25	N/A	4.07	N/A	3
common carp	Standard gill nets	1.17	0.5-9.1	7.85	1.0-4.9	14
common carp	Standard trap nets	0.92	0.7-5.1	13.05	2.3-5.6	11
common shiner	Standard gill nets	0.42	N/A	0.14	N/A	5
common shiner	Survey seining	0.33	N/A	0.00	N/A	1

Species	Gear	CPUE	Normal Range	Avg Weight	Normal Range	Count
fathead minnow	Survey seining	11.67	N/A	0.00	N/A	35
Johnny darter	Survey seining	3.00	N/A	0.00	N/A	9
largemouth bass	Survey seining	2.33	N/A	0.00	N/A	7
northern pike	Special electrofishing	1.20	N/A	0.56	N/A	1
northern pike	Standard gill nets	3.50	1.2-7.8	2.51	1.5-3.0	42
northern pike	Survey seining	0.33	N/A	0.00	N/A	1
northern pike	Standard trap nets	0.25	N/A	1.79	N/A	3
shorthead redhorse	Standard gill nets	0.33	0.6-2.8	1.82	1.5-2.2	4
shorthead redhorse	Standard trap nets	0.33	0.7-2.1	3.04	1.7-3.5	4
silver redhorse	Standard trap nets	1.08	N/A	5.17	N/A	13
smallmouth bass	Survey seining	1.00	N/A	0.00	N/A	3
trout-perch	Survey seining	0.67	N/A	0.00	N/A	2
walleye	Special electrofishing	8.40	N/A	0.21	N/A	7
walleye	Standard gill nets	7.92	3.2-15.3	1.36	0.9-1.9	95
walleye	Survey seining	0.33	N/A	0.00	N/A	1

Species	Gear	CPUE	Normal Range	Avg Weight	Normal Range	Count
walleye	Standard trap nets	1.00	0.3-1.7	0.58	0.9-2.4	12
white crappie	Survey seining	1.00	N/A	0.00	N/A	3
white crappie	Standard trap nets	0.25	0.5-15.9	0.52	0.2-0.5	3
white crappie	Standard gill nets	0.08	0.8-11.0	0.44	0.2-0.4	1
white sucker	Survey seining	1.33	N/A	0.00	N/A	4
white sucker	Standard trap nets	1.58	0.3-1.3	1.26	1.3-2.6	19
white sucker	Standard gill nets	14.25	0.8-5.9	3.01	1.4-2.2	171
yellow bullhead	Standard trap nets	0.08	0.5-4.1	1.23	0.4-0.8	1
yellow perch	Standard gill nets	40.75	3.0-22.5	0.19	0.1-0.4	489
yellow perch	Survey seining	25.33	N/A	0.00	N/A	76
yellow perch	Standard trap nets	4.67	0.3-2.6	0.08	0.1-0.3	56

showing 43 of 43 fish samples

Length of Select Species Sampled - All Gear Combined

	Number of fish caught in each category (inches)												
Species	0-5	6-7	8-9	10-11	12-14	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50+	Tota

Number of fish caught in each category (inches)

Species	0-5	6-7	8-9	10-11	12-14	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50+	Tota
bigmouth buffalo	0	0	0	0	0	0	3	0	1	0	0	0	0	4
black bullhead	0	2	0	4	11	0	0	0	0	0	0	0	0	17
black crappie	84	4	1	1	0	0	0	0	0	0	0	0	0	90
bluegill	56	1	0	0	0	0	0	0	0	0	0	0	0	57
bowfin (dogfish)	0	0	0	0	0	0	3	4	0	0	0	0	0	7
common carp	0	0	1	0	0	0	6	17	1	0	0	0	0	25
channel catfish	0	0	0	0	0	0	2	1	0	0	0	0	0	3
common shiner	5	0	0	0	0	0	0	0	0	0	0	0	0	5
largemouth bass	7	0	0	0	0	0	0	0	0	0	0	0	0	7
northern pike	0	0	1	0	5	17	14	2	3	2	0	0	0	44
shorthead redhorse	0	0	0	0	0	8	0	0	0	0	0	0	0	8
silver redhorse	0	0	0	0	0	1	11	0	0	0	0	0	0	12
smallmouth bass	3	0	0	0	0	0	0	0	0	0	0	0	0	3
walleye	1	20	19	10	18	36	8	2	0	0	0	0	0	114
white crappie	3	0	2	2	0	0	0	0	0	0	0	0	0	7

	Number of fish caught in each category (inches)												
Species	**0-5**	**6-7**	**8-9**	**10-11**	**12-14**	**15-19**	**20-24**	**25-29**	**30-34**	**35-39**	**40-44**	**45-49**	**50+**	**Tota**
white sucker	0	10	8	18	21	133	0	0	0	0	0	0	0	190
yellow bullhead	0	0	0	0	1	0	0	0	0	0	0	0	0	1
yellow perch	301	147	21	4	0	0	0	0	0	0	0	0	0	473

Status of the Fishery

Little Rock Lake is a large, shallow, fertile lake. Champion Paper Company's damat Sartell effects water levels and the rate of flow through the system. The lakehas an extensive watershed, approximately 68,000 acres, with land use that ispredominantly agricultural. Summer algae blooms caused by excess phosphorus haveoccurred in Little Rock Lake for years. The Mississippi River connection and thelake's water quality influence the species composition in the lake. Lack ofvegetation and turbid water makes the lake poorly suited to largemouth bass andbluegill. Little Rock Lake has been a noted walleye and crappie fishery in centralMinnesota. The primary gamefish species, (walleye, northern pike, black crappies,and yellow perch), showed population increases in the summer survey. The mostabundant walleye size group sampled was 16 - 17 inches in length, however fish upto 27 inches were caught. Natural reproduction has been successful at maintainingthe population and meeting fishing pressure demands. Winter angling for blackcrappies has been popular on the lake. Size varies depending on year classstrengths entering the population susceptible to angling. A winter creel conductedin the '95 - '96 season showed the average size kept by anglers to be 10 - 12inches. White crappies are also present in the lake, although their numbers havenot been as abundant as the black crappies. Anglers reported good fishing fornorthern pike in 1995 and 1996. Five to ten pound pike were common with fish upto 38 inches reported. The summer survey showed an average size of 21 - 22 inches,however five northern over 30 inches were also sampled. Yellow perch numbers werehigh for the lake and fish ranged in size from 5 to 10.6 inches in length. Perchare an important food fish for the walleye and northern pike. Bluegill numbers arelow, however, fish up to nine inches were observed. Largemouth bass and channelcatfish are present, but the populations are difficult to assess with survey gear. Roughfish such as bigmouth buffalo, black bullheads, bowfin, carp, shortheadredhorse, and white suckers are major components in the fish community. Whitesuckers were the most numerous roughfish sampled in the summer survey. Carp andbuffalo populations are also difficult to assess with lake survey gear. Numerouscarp are

seen in shallow bays and streams in late spring. Shorthead redhorse andblack bullhead numbers suggest low abundance, while bowfin abundance appear to benormal for the lake.If improved water quality is a desired goal for Little Rock Lake, best land usemanagement practices will need to be implemented in the watershed. Reestablishingvegetation in the lake basin would provide fish habitat, slow shoreline erosion,and help water quality.

For More Information

Little Falls Area Fisheries Supervisor
16543 Haven Rd
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Phone: 320-232-1060
Email: LittleFalls.Fisheries@state.mn.us (mailto:LittleFalls.Fisheries@state.mn.us)
Website (/areas/fisheries/littlefalls/index.html)

We use JSON (http://www.json.org/), a lightweight data-interchange format, to deliver the lake survey data. If you are an application developer, you can access this data to develop custom reports and products - get the data (https://maps2.dnr.state.mn.us/cgi-bin/lakefinder/detail.cgi?type=lake_survey&id=05001300).

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Fisheries Lake Surveys

Little Rock (05001300)

Area: 1,310.66 acres
Littoral Area: 1,240.12 acres
Shore Length: 10.55 miles
Mean Depth: 8 feet
Maximum Depth: 17 feet
Average Water Clarity: 2.8 feet

Choose a survey:

Standard Survey (2002-07-15)

Water Access Information:

Administrator	Access Type	Notes	Use Type
County	Gravel	COUNTY OWNED ACCESS ON NE SIDE OF LAKE ; NE1/4	Unknown
DNR	Concrete	STATE OWNED ACCESS BY HWY. 10 BRIDGE. SEC 15	Open to Public use

Fish Sampled

Filters:

all species

all gear

Species	Gear	CPUE	Normal Range	Avg Weight	Normal Range	Count
bigmouth buffalo	Standard trap nets	0.08	0.2-1.5	12.22	1.3-5.1	1
black bullhead	Standard gill nets	3.82	4.6-83.0	0.25	0.2-0.6	42

Species	Gear	CPUE	Normal Range	Avg Weight	Normal Range	Count
black bullhead	Standard trap nets	0.50	1.3-78.1	0.35	0.2-0.6	6
black crappie	Standard gill nets	6.00	0.8-11.1	0.23	0.2-0.4	66
black crappie	Survey seining	1.00	N/A	0.00	N/A	3
black crappie	Standard trap nets	12.25	1.0-12.3	0.31	0.2-0.5	147
bluegill	Survey seining	9.67	N/A	0.00	N/A	29
bluegill	Standard trap nets	4.67	1.0-14.9	0.23	0.2-0.4	56
bowfin (dogfish)	Standard trap nets	1.00	0.1-0.7	4.84	3.7-5.1	12
brown bullhead	Standard gill nets	0.09	0.6-7.7	0.52	0.4-1.1	1
brown bullhead	Standard trap nets	1.08	0.4-9.8	0.92	0.4-0.9	13
channel catfish	Standard trap nets	0.50	N/A	3.94	N/A	6
channel catfish	Standard gill nets	4.55	N/A	4.71	N/A	50
common carp	Standard gill nets	0.64	0.5-9.1	9.70	1.0-4.9	7
common carp	Standard trap nets	1.42	0.7-5.1	8.50	2.3-5.6	17
common shiner	Standard gill nets	0.18	N/A	0.08	N/A	2
Johnny darter	Survey seining	0.67	N/A	0.00	N/A	2

Species	Gear	CPUE	Normal Range	Avg Weight	Normal Range	Count
largemouth bass	Survey seining	1.67	N/A	0.00	N/A	5
logperch	Survey seining	2.67	N/A	0.00	N/A	8
northern pike	Standard gill nets	6.45	1.2-7.8	2.36	1.5-3.0	71
northern pike	Standard trap nets	0.33	N/A	2.31	N/A	4
shorthead redhorse	Standard gill nets	0.18	0.6-2.8	2.21	1.5-2.2	2
shorthead redhorse	Standard trap nets	0.50	0.7-2.1	2.45	1.7-3.5	6
silver redhorse	Standard trap nets	0.42	N/A	4.59	N/A	5
silver redhorse	Standard gill nets	0.09	N/A	1.94	N/A	1
smallmouth bass	Survey seining	0.33	N/A	0.00	N/A	1
walleye	Standard gill nets	10.36	3.2-15.3	1.56	0.9-1.9	114
walleye	Standard trap nets	1.33	0.3-1.7	1.21	0.9-2.4	16
white crappie	Standard gill nets	0.18	0.8-11.0	0.10	0.2-0.4	2
white sucker	Survey seining	5.00	N/A	0.00	N/A	15
white sucker	Standard trap nets	1.67	0.3-1.3	1.98	1.3-2.6	20
white sucker	Standard gill nets	13.18	0.8-5.9	1.38	1.4-2.2	145

Species	Gear	CPUE	Normal Range	Avg Weight	Normal Range	Count
yellow bullhead	Standard gill nets	0.09	0.3-3.6	0.06	0.5-0.9	1
yellow perch	Standard gill nets	17.18	3.0-22.5	0.09	0.1-0.4	189
yellow perch	Survey seining	12.00	N/A	0.00	N/A	36
yellow perch	Standard trap nets	1.25	0.3-2.6	0.07	0.1-0.3	15

showing 36 of 36 fish samples

Length of Select Species Sampled - All Gear Combined

	Number of fish caught in each category (inches)													
Species	0-5	6-7	8-9	10-11	12-14	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50+	Total
bigmouth buffalo	0	0	0	0	0	0	0	1	0	0	0	0	0	1
black bullhead	18	13	12	4	1	0	0	0	0	0	0	0	0	48
black crappie	95	31	40	51	0	0	0	0	0	0	0	0	0	217
bluegill	44	36	5	0	0	0	0	0	0	0	0	0	0	85
bowfin (dogfish)	0	0	0	0	0	0	8	4	0	0	0	0	0	12
brown bullhead	0	0	0	6	8	0	0	0	0	0	0	0	0	14
common carp	0	0	0	0	1	1	3	17	2	0	0	0	0	24
channel catfish	0	0	0	0	2	6	34	14	0	0	0	0	0	56

	Number of fish caught in each category (inches)													
Species	**0-5**	**6-7**	**8-9**	**10-11**	**12-14**	**15-19**	**20-24**	**25-29**	**30-34**	**35-39**	**40-44**	**45-49**	**50+**	**Total**
common shiner	1	1	0	0	0	0	0	0	0	0	0	0	0	2
largemouth bass	5	0	0	0	0	0	0	0	0	0	0	0	0	5
northern pike	0	0	0	0	2	31	27	11	2	0	0	0	0	73
shorthead redhorse	0	0	0	0	0	8	0	0	0	0	0	0	0	8
silver redhorse	0	0	0	0	0	2	4	0	0	0	0	0	0	6
walleye	0	6	4	3	40	66	10	1	0	0	0	0	0	130
white crappie	0	2	0	0	0	0	0	0	0	0	0	0	0	2
white sucker	1	3	11	35	30	83	0	0	0	0	0	0	0	163
yellow bullhead	1	0	0	0	0	0	0	0	0	0	0	0	0	1
yellow perch	97	127	0	0	0	0	0	0	0	0	0	0	0	224

Status of the Fishery

Being the largest of the two lakes in Benton County, Little Rock Lake has high value both as recreational water and shoreline development. Little Rock has a wide connection to the Mississippi River and the International Paper Company's dam at Sartell effects water levels and the rate of flow through the system. The lake is relatively shallow being only about 17 feet deep with much of the shoreline sand. The lake has an extensive watershed, approximately 68,000 acres, with land use that is predominantly agricultural. Summer algae blooms resulting in secchi disk reading as low as 1.5 feet and advisorys against swimming being common. The combination of poor water clarity, carp, and wave action prevents much

vegetative growth in the lake. The Mississippi River connection and the lake's water quality influence the fish species composition in the lake. Lack of vegetation and turbid water makes the lake poorly suited to largemouth bass and bluegill. Little Rock Lake receives heavy winter and spring fishing pressure for walleye and black crappies. Walleye natural reproduction has been successful at maintaining the population and meeting fishing pressure demands. The most abundant walleye size group seen in the survey was 14 to 16 inches, however larger fish over 25 inches were caught. Black crappie angler success depends on year class strength of the fish susceptible to angling and acceptable to the fisherman. Two size groups were dominant in the summer survey, 4.5 - 5.5 inches and 9.5 - 10.5 inches, suggesting crappie fishing could be good this winter and in another 2 years. White crappies are also present in the lake, although they are not as abundant as the black crappies. Northern pike numbers showed a significant increase from the last survey and anglers could have more action from this species. The size range seen in this survey was not as impressive or desirable as the previous survey, however, the average size was not bad at 2.5 pounds. Over a quarter of the pike caught in the survey were over 24 inches in length and several were over 30 inches. One negative change seen in the survey was the decrease in yellow perch numbers. This may have been a result of the higher pike population and could effect the growth of the gamefish as perch can be an important food species for northern pike and walleye. Most of the perch seen in the survey were between 5 and 8 inches, a good size for gamefish, but usually considered too small for anglers. Many substitute prey species such as trout perch, shiners, small suckers, and redhorse are available due to the river connection. Although the 2002 bluegill catch was a record high for the lake anglers will have to work to find the fish. For those willing to put the time and effort into seeking bluegills the return could be worth it. Average size of the bluegills seen in the survey was 6.5 inches with several individuals over 9 inches measured. One of the biggest changes seen in the lake was the increase in catfish numbers. Size of the catfish ranged from 13 to 29 inches with many of them over 24 inches in length. Roughfish such as bigmouth buffalo, black bullheads, bowfin or dogfish, brown bullheads, carp, shorthead redhorse, silver redhorse, and white suckers are major components of the fish community. White suckers were the most numerous roughfish sampled in the summer survey. Although most of the suckers were over 12 inches in length, smaller suckers were also seen in good numbers suggesting another food source for the larger gamefish. Carp can provide an additional sport fishery, whether it be angling or archery. Lake survey nets are typically not effective at catching carp, however, the fish seen in the survey were impressive with many of them over 26 inches. The largest carp caught was about 32 inches or around 15 pounds. Black bullheads were the most abundant of the three bullhead species which is indicative of the water quality. Black bullheads are more tolerant of poor water quality. Improving the water quality in Little Rock Lake has been a goal of the lakeshore owners as well as local government and state agencies. Work has been done with landowners in the watershed to reduce nutrient run-off to streams feeding the lake. A study was conducted in 2001 by the Benton County Soil and Water Conservation District documenting the lake bottom type, water moving into and out of the lake, and vegetative cover and/or culture practices on the lakeshore. This study was

to begin planning for a process to identify problem sources for the lake. Reestablishing vegetation in the lake basin would provide fish habitat, slow shoreline erosion, and help improve water quality.

For More Information

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Website (/areas/fisheries/littlefalls/index.html)

We use JSON (http://www.json.org/), a lightweight data-interchange format, to deliver the lake survey data. If you are an application developer, you can access this data to develop custom reports and products - get the data (https://maps2.dnr.state.mn.us/cgi-bin/lakefinder/detail.cgi?type=lake_survey&id=05001300).

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Fisheries Lake Surveys

Little Rock (05001300)

Area: 1,310.66 acres
Littoral Area: 1,240.12 acres
Shore Length: 10.55 miles
Mean Depth: 8 feet
Maximum Depth: 17 feet
Average Water Clarity: 2.8 feet

Choose a survey:

Standard Survey (2008-09-08)

Water Access Information:

Administrator	Access Type	Notes	Use Type
County	Gravel	COUNTY OWNED ACCESS ON NE SIDE OF LAKE ; NE1/4	Unknown
DNR	Concrete	STATE OWNED ACCESS BY HWY. 10 BRIDGE. SEC 15	Open to Public use

Fish Sampled

Filters:

all species

all gear

Species	Gear	CPUE	Normal Range	Avg Weight	Normal Range	Count
bigmouth buffalo	Standard trap nets	5.10	0.2-1.5	4.35	1.3-5.1	51
black bullhead	Standard trap nets	0.70	1.3-78.1	0.73	0.2-0.6	7

Species	Gear	CPUE	Normal Range	Avg Weight	Normal Range	Count
black crappie	Special electrofishing	76.24	N/A	0.02	N/A	86
black crappie	Standard trap nets	11.40	1.0-12.3	0.32	0.2-0.5	114
bluegill	Special electrofishing	26.59	N/A	0.15	N/A	30
bluegill	Standard trap nets	2.60	1.0-14.9	0.36	0.2-0.4	26
bowfin (dogfish)	Standard trap nets	0.50	0.1-0.7	5.34	3.7-5.1	5
channel catfish	Special electrofishing	1.77	N/A	3.00	N/A	2
channel catfish	Standard trap nets	0.50	N/A	4.75	N/A	5
common carp	Standard trap nets	3.50	0.7-5.1	7.59	2.3-5.6	35
green sunfish	Special electrofishing	2.66	N/A	0.00	N/A	3
largemouth bass	Special electrofishing	16.84	N/A	0.43	N/A	19
largemouth bass	Standard trap nets	0.30	0.1-0.8	3.00	0.4-1.5	3
northern pike	Special electrofishing	4.43	N/A	1.02	N/A	5
northern pike	Standard trap nets	0.50	N/A	3.30	N/A	5
shorthead redhorse	Standard trap nets	0.10	0.7-2.1	2.49	1.7-3.5	1
silver redhorse	Standard trap nets	2.60	N/A	4.82	N/A	26

Species	Gear	CPUE	Normal Range	Avg Weight	Normal Range	Count
smallmouth bass	Special electrofishing	1.77	N/A	0.19	N/A	2
smallmouth bass	Standard trap nets	0.10	0.2	2.88	2.5	1
walleye	Special electrofishing	15.96	N/A	0.72	N/A	18
walleye	Standard trap nets	1.00	0.3-1.7	1.90	0.9-2.4	10
white crappie	Standard trap nets	0.10	0.5-15.9	0.39	0.2-0.5	1
white sucker	Standard trap nets	6.10	0.3-1.3	1.97	1.3-2.6	61
yellow bullhead	Standard trap nets	0.80	0.5-4.1	0.68	0.4-0.8	8
yellow perch	Standard trap nets	0.30	0.3-2.6	0.33	0.1-0.3	3
yellow perch	Special electrofishing	234.92	N/A	0.00	N/A	265

showing 26 of 26 fish samples

Length of Select Species Sampled - All Gear Combined

	Number of fish caught in each category (inches)													
Species	0-5	6-7	8-9	10-11	12-14	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50+	Total
bigmouth buffalo	0	0	0	0	0	38	13	0	0	0	0	0	0	51
black bullhead	0	0	1	6	0	0	0	0	0	0	0	0	0	7

Number of fish caught in each category (inches)

Species	0-5	6-7	8-9	10-11	12-14	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50+	Total
black crappie	14	19	99	0	0	0	0	0	0	0	0	0	0	132
bluegill	10	20	13	0	0	0	0	0	0	0	0	0	0	43
bowfin (dogfish)	0	0	0	0	0	0	2	3	0	0	0	0	0	5
common carp	0	0	0	0	0	3	19	7	6	0	0	0	0	35
channel catfish	0	0	0	0	0	2	3	2	0	0	0	0	0	7
largemouth bass	13	0	0	2	4	3	0	0	0	0	0	0	0	22
northern pike	0	1	0	2	0	1	4	2	0	0	0	0	0	10
shorthead redhorse	0	0	0	0	0	1	0	0	0	0	0	0	0	1
silver redhorse	0	0	0	0	0	0	26	0	0	0	0	0	0	26
smallmouth bass	0	2	0	0	0	1	0	0	0	0	0	0	0	3
walleye	1	4	0	5	8	8	1	1	0	0	0	0	0	28
white crappie	0	0	1	0	0	0	0	0	0	0	0	0	0	1
white sucker	0	0	0	0	3	58	0	0	0	0	0	0	0	61
yellow bullhead	0	1	0	7	0	0	0	0	0	0	0	0	0	8
yellow perch	0	1	3	0	0	0	0	0	0	0	0	0	0	4

Status of the Fishery

Little Rock Lake is the largest lake in Benton County and has high value both for shoreline development and recreational use. The lake, however, does have a history of severe algae blooms in mid to late summer, which affect both the recreational value and fish community. Little Rock has a wide connection to the Mississippi River, which also influences the fish species composition in the lake. Lack of vegetation and turbid water make the lake less suitable for largemouth bass and bluegill.

The lake receives heavy winter and spring fishing pressure for walleye and black crappies. Walleye natural reproduction has been successful at maintaining the population and meeting fishing pressure demands. This assessment was different from past surveys due to the timing of the survey and gear types used. Gamefish sampled in the survey included walleye, northern pike, largemouth bass, and smallmouth bass. Most of the walleye captured in the survey were from 12 to 20 inches in length, however, larger fish are available. Little Rock Lake is not known for its northern pike fishery, and anglers will have to work to locate them. Average size of the pike observed in the survey was about 3.3 pounds and most of the pike reported by anglers are good size. Although neither largemouth or smallmouth bass appear to be abundant, some nice largemouth over 18 inches and smallmouth over 17 inches were found.

Black crappie can tolerate the turbid waters found in Little Rock Lake and they are prolific. Angler success depends on the strength of the year class of fish that have grown to acceptable size. Most of the crappie found in the assessment were from the 2005 year class and ranged from 7.5 to 9 inches in length, a size at which anglers will begin targeting these fish. White crappie are also present in the lake, although they are not as abundant as the black crappie. Although bluegill are not that abundant, Little Rock Lake does produce some quality fish. Most of the fish caught in the assessment were over 7 inches in length with some over 9 inches being measured.

Although not many yellow perch were observed in the assessment, it was noted that young of the year perch were abundant in the electrofishing effort. Numerous other species such as trout perch, shiners, small suckers, and redhorse may also substitute as prey species for the gamefish. Roughfish such as bigmouth buffalo, black bullhead, bowfin or dogfish, common carp, shorthead redhorse, silver redhorse, and white sucker are major components of the fish community. White sucker were the most numerous roughfish sampled, but net catches also suggest high populations of bigmouth buffalo. Most of the buffalo were from 18 to 21 inches in length suggesting the presence of a strong year class. Carp can provide an additional sport fishery, whether it be angling or bow fishing. Carp just over 33 inches were measured and it's likely there are bigger ones in the lake. Black bullhead were the only bullhead species sampled in the assessment, although both brown and yellow bullheads have been captured in previous assessments. Black bullheads can be an indicator of water quality as they are more tolerant of poor water quality than the other two bullhead species.

The last survey in 2002 indicated that the channel catfish were increasing in abundance and doing well in the lake. Fewer catfish were caught in this assessment, but with the river connection, there is ample opportunity for migration.

Improving the water quality in Little Rock Lake has been a goal of an active lake association as well as local government and state agencies. Work has been done with landowners in the watershed to reduce nutrient run-off to streams feeding the lake. The Benton County Soil and Water Conservation District is conducting a TMDL (Total Maximum Daily Load) study on the lake to identify nutrient sources and needed remedies.

For More Information

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Email: LittleFalls.Fisheries@state.mn.us (mailto:LittleFalls.Fisheries@state.mn.us)
Website (/areas/fisheries/littlefalls/index.html)

We use JSON (http://www.json.org/), a lightweight data-interchange format, to deliver the lake survey data. If you are an application developer, you can access this data to develop custom reports and products - get the data (https://maps2.dnr.state.mn.us/cgi-bin/lakefinder/detail.cgi?type=lake_survey&id=05001300).

(/index.html)

Fisheries Lake Surveys

Little Rock (05001300)

Area: 1,310.66 acres
Littoral Area: 1,240.12 acres
Shore Length: 10.55 miles
Mean Depth: 8 feet
Maximum Depth: 17 feet
Average Water Clarity: 2.8 feet

Choose a survey:

Standard Survey (2009-06-22)

Water Access Information:

Administrator	Access Type	Notes	Use Type
County	Gravel	COUNTY OWNED ACCESS ON NE SIDE OF LAKE ; NE1/4	Unknown
DNR	Concrete	STATE OWNED ACCESS BY HWY. 10 BRIDGE. SEC 15	Open to Public use

Fish Sampled

Filters:

all species

all gear

Species	Gear	CPUE	Normal Range	Avg Weight	Normal Range	Count
bigmouth buffalo	Standard gill nets	0.18	0.3-6.1	3.17	N/A	2
bigmouth buffalo	Standard trap nets	0.50	0.2-1.5	4.05	1.3-5.1	5

Species	Gear	CPUE	Normal Range	Avg Weight	Normal Range	Count
black bullhead	Standard gill nets	1.27	4.6-83.0	0.71	0.2-0.6	14
black bullhead	Backpack electrofishing	0.72	N/A	0.00	N/A	1
black bullhead	Standard trap nets	0.80	1.3-78.1	0.64	0.2-0.6	8
black crappie	Standard gill nets	6.18	0.8-11.1	0.33	0.2-0.4	68
black crappie	Backpack electrofishing	2.15	N/A	0.00	N/A	3
black crappie	Standard trap nets	4.60	1.0-12.3	0.33	0.2-0.5	46
black crappie	15-ft beach seine	0.25	N/A	0.00	N/A	4
bluegill	Backpack electrofishing	17.91	N/A	0.00	N/A	25
bluegill	Standard trap nets	2.90	1.0-14.9	0.27	0.2-0.4	29
bluegill	15-ft beach seine	2.06	N/A	0.00	N/A	33
bluntnose minnow	15-ft beach seine	1.12	N/A	0.00	N/A	18
bluntnose minnow	Backpack electrofishing	1.43	N/A	0.00	N/A	2
bowfin (dogfish)	Standard trap nets	0.10	0.1-0.7	3.95	3.7-5.1	1
brassy minnow	15-ft beach seine	0.25	N/A	0.00	N/A	4
brown bullhead	Standard gill nets	0.09	0.6-7.7	0.73	0.4-1.1	1

Species	Gear	CPUE	Normal Range	Avg Weight	Normal Range	Count
channel catfish	Standard trap nets	0.30	N/A	3.81	N/A	3
channel catfish	Standard gill nets	4.00	N/A	3.99	N/A	44
common carp	15-ft beach seine	0.75	N/A	0.00	N/A	12
common carp	Standard gill nets	0.55	0.5-9.1	6.24	1.0-4.9	6
common carp	Backpack electrofishing	0.72	N/A	0.00	N/A	1
common carp	Standard trap nets	1.00	0.7-5.1	6.56	2.3-5.6	10
common shiner	15-ft beach seine	0.31	N/A	0.00	N/A	5
common shiner	Backpack electrofishing	1.43	N/A	0.00	N/A	2
common shiner	Standard trap nets	0.10	N/A	0.07	N/A	1
fathead minnow	Backpack electrofishing	2.15	N/A	0.00	N/A	3
fathead minnow	15-ft beach seine	0.06	N/A	0.00	N/A	1
green sunfish	Backpack electrofishing	1.43	N/A	0.00	N/A	2
Johnny darter	15-ft beach seine	10.88	N/A	0.00	N/A	174
Johnny darter	Backpack electrofishing	12.18	N/A	0.00	N/A	17
largemouth bass	15-ft beach seine	0.12	N/A	0.00	N/A	2

Species	Gear	CPUE	Normal Range	Avg Weight	Normal Range	Count
largemouth bass	Backpack electrofishing	1.43	N/A	0.00	N/A	2
largemouth bass	Standard trap nets	0.30	0.1-0.8	1.11	0.4-1.5	3
logperch	15-ft beach seine	34.62	N/A	0.00	N/A	554
logperch	Backpack electrofishing	13.61	N/A	0.00	N/A	19
mimic shiner	15-ft beach seine	1.00	N/A	0.00	N/A	16
northern pike	15-ft beach seine	0.12	N/A	0.00	N/A	2
northern pike	Standard gill nets	1.00	1.2-7.8	3.14	1.5-3.0	11
northern pike	Standard trap nets	0.20	N/A	2.67	N/A	2
shiners	15-ft beach seine	0.19	N/A	0.00	N/A	3
shorthead redhorse	Standard gill nets	0.73	0.6-2.8	2.05	1.5-2.2	8
shorthead redhorse	Standard trap nets	0.80	0.7-2.1	2.59	1.7-3.5	8
silver redhorse	Standard trap nets	1.30	N/A	5.42	N/A	13
silver redhorse	Standard gill nets	0.09	N/A	3.36	N/A	1
spotfin shiner	Backpack electrofishing	0.72	N/A	0.00	N/A	1
spotfin shiner	15-ft beach seine	0.62	N/A	0.00	N/A	10

Species	Gear	CPUE	Normal Range	Avg Weight	Normal Range	Count
sunfish	Backpack electrofishing	0.72	N/A	0.00	N/A	1
sunfish	15-ft beach seine	8.81	N/A	0.00	N/A	141
unknown fish one	15-ft beach seine	0.06	N/A	0.00	N/A	1
walleye	Standard gill nets	0.64	3.2-15.3	1.37	0.9-1.9	7
walleye	Standard trap nets	0.50	0.3-1.7	1.94	0.9-2.4	5
white sucker	Backpack electrofishing	18.63	N/A	0.00	N/A	26
white sucker	Standard trap nets	0.70	0.3-1.3	2.48	1.3-2.6	7
white sucker	15-ft beach seine	102.50	N/A	0.00	N/A	1640
white sucker	Standard gill nets	7.36	0.8-5.9	2.08	1.4-2.2	81
yellow bullhead	Standard gill nets	0.09	0.3-3.6	0.71	0.5-0.9	1
yellow perch	15-ft beach seine	34.31	N/A	0.00	N/A	549
yellow perch	Standard gill nets	0.64	3.0-22.5	0.36	0.1-0.4	7
yellow perch	Backpack electrofishing	55.16	N/A	0.00	N/A	77

showing 60 of 60 fish samples

Length of Select Species Sampled - All Gear Combined

Number of fish caught in each category (inches)

Species	0-5	6-7	8-9	10-11	12-14	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50+	Total
bigmouth buffalo	0	0	0	0	0	7	0	0	0	0	0	0	0	7
black bullhead	0	1	2	18	1	0	0	0	0	0	0	0	0	22
black crappie	2	6	106	0	0	0	0	0	0	0	0	0	0	114
bluegill	11	13	5	0	0	0	0	0	0	0	0	0	0	29
bowfin (dogfish)	0	0	0	0	0	0	1	0	0	0	0	0	0	1
brown bullhead	0	0	0	1	0	0	0	0	0	0	0	0	0	1
common carp	0	0	0	0	0	2	11	1	2	0	0	0	0	16
channel catfish	0	0	0	0	0	7	36	4	0	0	0	0	0	47
common shiner	1	0	0	0	0	0	0	0	0	0	0	0	0	1
largemouth bass	0	0	0	0	3	0	0	0	0	0	0	0	0	3
northern pike	0	0	0	0	1	0	7	5	0	0	0	0	0	13
shorthead redhorse	0	0	0	0	0	16	0	0	0	0	0	0	0	16
silver redhorse	0	0	0	0	0	1	13	0	0	0	0	0	0	14
walleye	0	0	0	0	4	7	1	0	0	0	0	0	0	12
white sucker	0	0	0	0	0	87	1	0	0	0	0	0	0	88

	Number of fish caught in each category (inches)													
Species	**0-5**	**6-7**	**8-9**	**10-11**	**12-14**	**15-19**	**20-24**	**25-29**	**30-34**	**35-39**	**40-44**	**45-49**	**50+**	**Total**
yellow bullhead	0	0	0	1	0	0	0	0	0	0	0	0	0	1
yellow perch	0	1	4	2	0	0	0	0	0	0	0	0	0	7

Status of the Fishery

Little Rock Lake is the largest lake in Benton County. Though large, its development and recreational value has been limited by poor water quality. The lake has a history of severe algae blooms in mid to late summer, which affect both the recreational value and the fish community. At the time of the 2009 survey in mid-June the secchi disk reading was 1.5 feet and the water looked like pea-soup. Algae coated the survey nets which likely affected the efficiency of the nets. Little Rock Lake is a popular destination when walleye season opens but by early June, few boats are found on the lake after algae blooms begin. The lake likely receives more fishing pressure during winter rather than summer. A wide connection to the Mississippi River has some influence on the fish species composition in the lake. Lack of vegetation and the turbid water make the lake less suitable for largemouth bass and bluegill.

Black crappie, channel catfish, and white sucker were the most numerous fish species sampled in the 2009 summer survey. In winter, Little Rock Lake is a popular crappie fishing lake. Most of the crappie in the 2009 summer survey, however, were less than 9 inches in length, but by winter the fish may have reached a size acceptable to anglers. Occasional strong year classes appear to sustain the crappie population as most of the fish looked to be from the 2005 year class. The channel catfish caught in the survey averaged about 22 inches or 4 pounds and abundance has remained about the same since the last survey in 2002. All white sucker caught were over 15 inches in length. Other species in the sucker family found in Little Rock Lake are shorthead redhorse and silver redhorse. Common carp and bigmouth buffalo were also caught in the summer survey and abundance appears to be within the normal range when compared to similar type lakes. Carp bowfishing has become increasingly popular and Little Rock Lake has an abundance of shallow flats to accommodate the sport. Catches of many of the species was low due to netting conditions. Walleye natural reproduction has been successful at maintaining the population and meeting fishing pressure. The low walleye catch may have been due to the natural fluctuation of reproduction success and poor netting conditions as most of the walleye in the 2009 survey came from the 2005 year class with only a few from other year classes. The northern pike catch was down from the previous survey but a range of sizes was documented. Although the

average size in the survey was 24 inches or 3 pounds, past surveys have caught fish over 36 inches. Yellow perch also showed a drop in abundance with the catch being the lowest to date for Little Rock Lake, and below the normal range for similar type lakes. Although perch can be an important prey species for walleye and northern pike, there are likely enough other prey species like white sucker that have filled that niche.

All three species of bullhead were caught in Little Rock Lake, but abundance appears to be low for all three. The black bullhead, which tend to be more tolerant of turbid water, were the most numerous of the three species.

Improving the water quality in Little Rock Lake has been a goal of an active lake association as well as local government and state agencies. Work has been done with landowners in the watershed to reduce nutrient run-off to streams feeding the lake. The Benton County Soil and Water Conservation District is conducting a TMDL (Total Maximum Daily Load) study on the lake to identify nutrient sources and needed remedies.

For More Information

Little Falls Area Fisheries Supervisor
16543 Haven Rd
Little Falls, MN
Phone: 320-232-1060
Email: LittleFalls.Fisheries@state.mn.us (mailto:LittleFalls.Fisheries@state.mn.us)
Website (/areas/fisheries/littlefalls/index.html)

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(/index.html)

Fisheries Lake Surveys

Little Rock (05001300)

Area: 1,310.66 acres
Littoral Area: 1,240.12 acres
Shore Length: 10.55 miles
Mean Depth: 8 feet
Maximum Depth: 17 feet
Average Water Clarity: 2.8 feet

Choose a survey:

Standard Survey (2014-06-24)

Water Access Information:

Administrator	Access Type	Notes	Use Type
County	Gravel	COUNTY OWNED ACCESS ON NE SIDE OF LAKE ; NE1/4	Unknown
DNR	Concrete	STATE OWNED ACCESS BY HWY. 10 BRIDGE. SEC 15	Open to Public use

Fish Sampled

Filters:

all species

all gear

Species	Gear	CPUE	Normal Range	Avg Weight	Normal Range	Count
bigmouth buffalo	Standard trap nets	0.11	0.2-1.5	6.26	1.3-5.1	1
black crappie	Standard gill nets	0.36	0.8-11.1	0.20	0.2-0.4	4

Species	Gear	CPUE	Normal Range	Avg Weight	Normal Range	Count
black crappie	Standard trap nets	0.56	1.0-12.3	0.33	0.2-0.5	5
bluegill	Standard trap nets	4.78	1.0-14.9	0.18	0.2-0.4	43
bowfin (dogfish)	Standard trap nets	0.44	0.1-0.7	3.16	3.7-5.1	4
brown bullhead	Standard trap nets	0.11	0.4-9.8	1.55	0.4-0.9	1
channel catfish	Standard gill nets	6.64	N/A	3.68	N/A	73
channel catfish	Standard trap nets	1.11	N/A	3.55	N/A	10
common carp	Standard gill nets	0.09	0.5-9.1	13.27	1.0-4.9	1
common carp	Standard trap nets	1.56	0.7-5.1	8.97	2.3-5.6	14
green sunfish	Standard trap nets	0.11	0.1-0.7	0.11	0.1-0.2	1
hybrid sunfish	Standard trap nets	0.11	N/A	0.14	N/A	1
largemouth bass	Standard trap nets	0.11	0.1-0.8	2.44	0.4-1.5	1
northern pike	Standard gill nets	1.09	1.2-7.8	1.90	1.5-3.0	12
northern pike	Standard trap nets	0.44	N/A	2.95	N/A	4
shorthead redhorse	Standard gill nets	0.27	0.6-2.8	2.79	1.5-2.2	3
silver redhorse	Standard trap nets	1.78	N/A	5.24	N/A	16

Species	Gear	CPUE	Normal Range	Avg Weight	Normal Range	Count
silver redhorse	Standard gill nets	0.18	N/A	2.94	N/A	2
smallmouth bass	Standard gill nets	0.18	0.3-3.2	1.67	0.2-2.0	2
tadpole madtom	Standard trap nets	0.11	N/A	0.04	N/A	1
walleye	Standard gill nets	1.55	3.2-15.3	1.96	0.9-1.9	17
walleye	Standard trap nets	0.67	0.3-1.7	1.47	0.9-2.4	6
white sucker	Standard gill nets	2.27	0.8-5.9	1.59	1.4-2.2	25
white sucker	Standard trap nets	0.89	0.3-1.3	2.39	1.3-2.6	8
yellow bullhead	Standard gill nets	0.09	0.3-3.6	0.00	0.5-0.9	1
yellow bullhead	Standard trap nets	0.22	0.5-4.1	1.19	0.4-0.8	2
yellow perch	Standard trap nets	3.00	0.3-2.6	0.09	0.1-0.3	27
yellow perch	Standard gill nets	4.82	3.0-22.5	0.11	0.1-0.4	53

showing 28 of 28 fish samples

Length of Select Species Sampled - All Gear Combined

	Number of fish caught in each category (inches)												
Species	0-5	6-7	8-9	10-11	12-14	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50+	Total

Number of fish caught in each category (inches)

Species	0-5	6-7	8-9	10-11	12-14	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50+	Total
bigmouth buffalo	0	0	0	0	0	0	1	0	0	0	0	0	0	1
black crappie	0	7	1	1	0	0	0	0	0	0	0	0	0	9
bluegill	26	12	5	0	0	0	0	0	0	0	0	0	0	43
bowfin (dogfish)	0	0	0	0	0	1	3	0	0	0	0	0	0	4
brown bullhead	0	0	0	0	1	0	0	0	0	0	0	0	0	1
common carp	0	0	0	0	0	1	4	6	4	0	0	0	0	15
channel catfish	0	0	1	0	3	11	63	5	0	0	0	0	0	83
green sunfish	1	0	0	0	0	0	0	0	0	0	0	0	0	1
hybrid sunfish	1	0	0	0	0	0	0	0	0	0	0	0	0	1
largemouth bass	0	0	0	0	0	1	0	0	0	0	0	0	0	1
northern pike	0	0	0	0	1	4	9	2	0	0	0	0	0	16
shorthead redhorse	0	0	0	0	0	3	0	0	0	0	0	0	0	3
silver redhorse	0	0	0	0	0	1	17	0	0	0	0	0	0	18
smallmouth bass	0	0	0	0	2	0	0	0	0	0	0	0	0	2

	Number of fish caught in each category (inches)													
Species	**0-5**	**6-7**	**8-9**	**10-11**	**12-14**	**15-19**	**20-24**	**25-29**	**30-34**	**35-39**	**40-44**	**45-49**	**50+**	**Total**
tadpole madtom	1	0	0	0	0	0	0	0	0	0	0	0	0	1
walleye	0	0	0	0	7	10	5	0	0	0	0	0	0	22
white sucker	0	0	0	7	3	23	0	0	0	0	0	0	0	33
yellow bullhead	0	0	0	0	2	0	0	0	0	0	0	0	0	2
yellow perch	16	57	6	0	0	0	0	0	0	0	0	0	0	79

Status of the Fishery

Little Rock Lake is the largest lake in Benton County. Though large and close to a major metropolitan area, the lake's development and recreational value has been limited by poor water quality. Severe algal blooms have historically occurred in mid to late summer, which affect both the recreational value and fish community diversity. At the time of the 2014 survey in mid-June the secchi disk reading was 4.1 feet which was better than usual for the time of year. Little Rock Lake is a popular destination when Walleye season opens but by early June, few boats are found on the lake after algal blooms begin. The lake likely receives more fishing pressure during the winter season than summer.

The lake has limited vegetation due to poor water clarity. Four feet was the deepest any vegetation was found to grow. Filamentous algae was more common than any aquatic plant species when documenting vegetation diversity in August. The most common shallow water substrate was sand.

A broad connection to the Mississippi River has some influence on the fish species composition in the lake as many of the species found are associated with riverine conditions. Lack of vegetation and turbid water make the lake less suitable for Largemouth Bass and Bluegill. Due to its shallow nature, Little Rock is one of the first lakes to freeze over in the area and fishermen are quick to take advantage of this targeting Walleye and Black Crappie. Little Rock also warms up rapidly in the spring making it a good season opener destination. Walleye natural reproduction maintains the population in the lake and for the most part has been successful at meeting fishing pressure demands. The Walleye gill net catch rate was below management goals and low when compared to similar type lakes. Occasional strong year classes appear to sustain the Black Crappie population. Most crappie caught in surveys and reported "hot bites" are of similar sized fish. The Northern Pike catch was also low when

compared to similar type lakes and most of the fish caught in the survey were small by most anglers' standards. An occasional large pike is caught in spring sampling and ice fishing also. Channel Catfish are quite common and averaged 21 inches or about four pounds in the survey and are rarely targeted by anglers. All three species of bullhead are known to inhabit Little Rock Lake. Brown and Yellow Bullhead were the two species caught in the 2014 survey and abundance appears to be low for both. Species in the sucker family found in Little Rock Lake are White Sucker, Shorthead Redhorse, Silver Redhorse, and Bigmouth Buffalo. Common Carp were also caught in the summer survey and abundance appears to be within the normal range when compared to similar type lakes. Carp bowfishing has become increasingly popular and Little Rock Lake has an abundance of shallow flats to accommodate the sport. Yellow Perch numbers showed a significant improvement from the last survey. Although most anglers consider perch to be nuisance when fishing, the species can be an important food species for most game fish.

Improving the water quality in Little Rock Lake has been a goal of an active lake association as well as local government and state agencies. Work has been done with landowners in the watershed to reduce nutrient run-off to streams feeding the lake. The Benton County Soil and Water Conservation District is conducting a TMDL (Total Maximum Daily Load) study on the lake to identify nutrient sources and needed remedies.

For More Information

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Website (/areas/fisheries/littlefalls/index.html)

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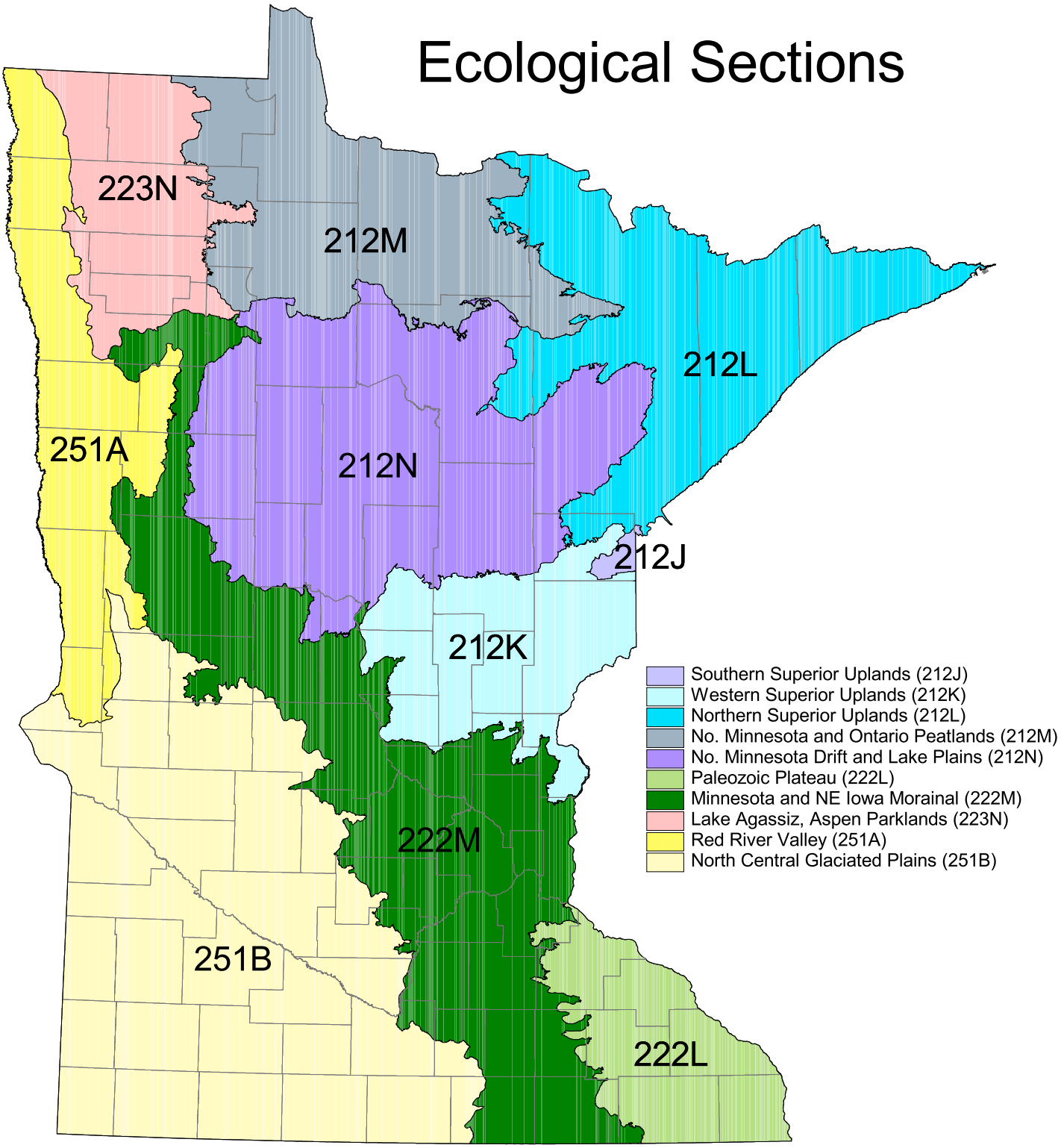
APPENDIX 4.5-1 **Ecological Sections and Subsections of MN**

Ecological Sections



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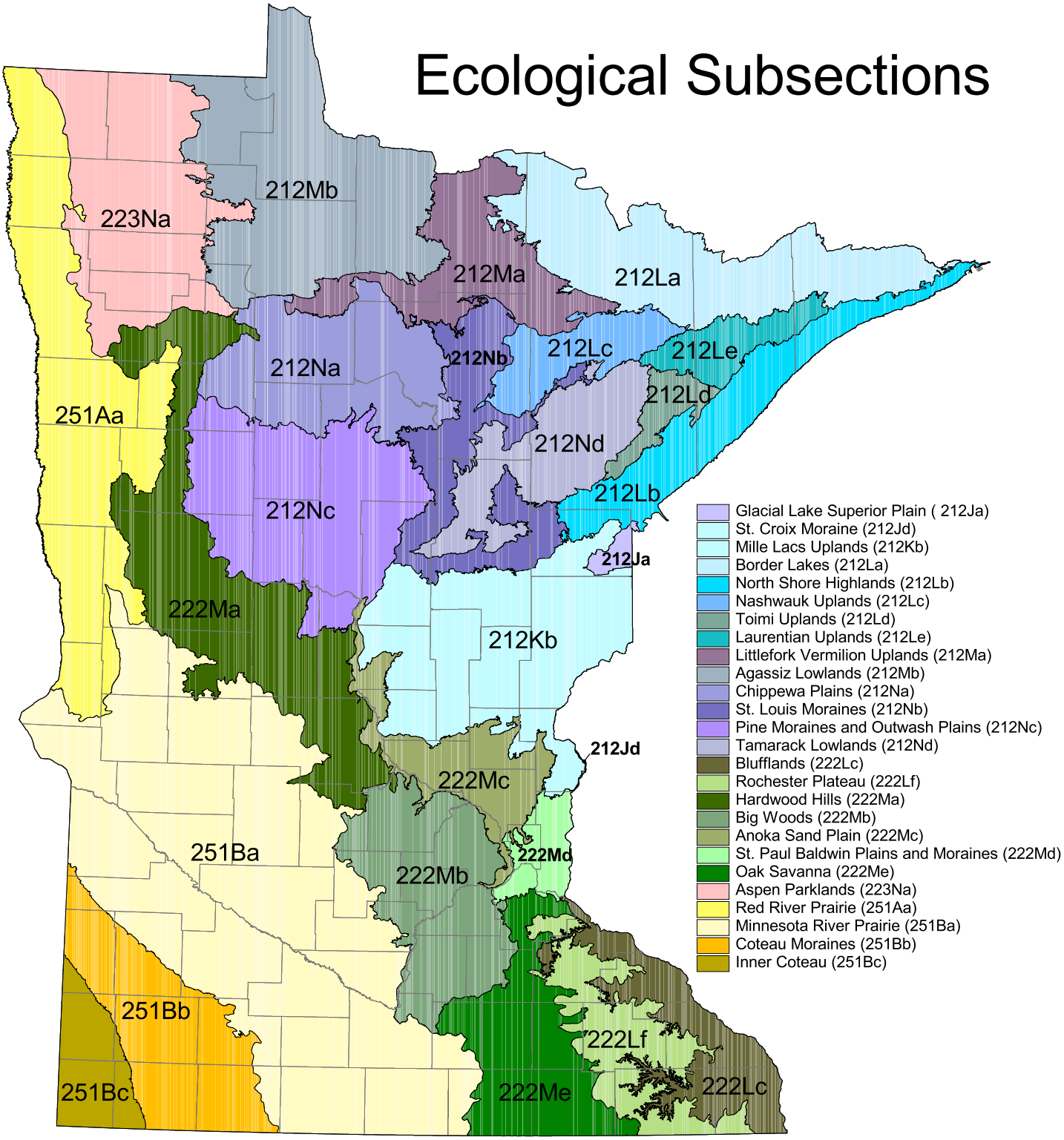
Beltrami County
Blandin Paper Company
MN Center for Environmental Advocacy
MN Department of Agriculture
MN Department of Natural Resources
Natural Resources Conservation Service
Potlatch Corporation
USDA Forest Service
U.S. Fish and Wildlife Service

For more information contact:
ECS Specialist
MN DNR, Division of Forestry
Resource Assessment Program
413 SE 13 Street
Grand Rapids, MN 55744
(218) 327-4449 ext 239

September, 2000

Division of Forestry
Ecological Land Classification Program

Ecological Subsections



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413 SE 13 Street
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September, 2000

Division of Forestry
Ecological Land Classification Program

APPENDIX 4.5.3.2-1 MN Rule 6216

CHAPTER 6216
DEPARTMENT OF NATURAL RESOURCES
INVASIVE SPECIES

6216.0100 PURPOSE.

The purpose of this chapter is to prevent the spread of invasive species, including prohibited and regulated invasive aquatic plants and wild animals, into and within the state as authorized by Minnesota Statutes, sections 17.497 and 84D.12, while allowing flexibility for conditional possession of invasive species. This chapter also provides a public process for listing infested waters and classifying and designating nonnative species according to criteria in statute.

Statutory Authority: *MS s 14.388; 84.9691; 84D.12*

History: *20 SR 2292(NO. 43); L 1996 c 385 art 2 s 7; 22 SR 2076; L 2004 c 243 s 40; L 2014 c 289 s 69; 43 SR 683*

Published Electronically: *January 10, 2019*

6216.0200 DEFINITIONS.

Subpart 1. **Scope.** For the purposes of parts 6216.0100 to 6216.0600, the terms used have the meanings given to them in Minnesota Statutes, section 84D.01, unless otherwise noted in this part.

Subp. 1a. **Applicant.** "Applicant" means a person who applies for a Minnesota Department of Natural Resources prohibited invasive species permit or regulated invasive species permit according to part 6216.0265, a water appropriation permit or public works permit according to Minnesota Statutes, chapter 103G, or an infested water permit according to part 6216.0500, subpart 6, or who requests a determination of the appropriate classification of an unlisted nonnative species for introduction according to Minnesota Statutes, section 84D.06.

Subp. 2. **Commissioner.** "Commissioner" means the commissioner of natural resources of Minnesota or the commissioner's designated representative.

Subp. 3. **Department.** "Department" means the Minnesota Department of Natural Resources.

Subp. 3a. **Free-living state.** "Free-living state" means to be unconfined or outside the control of a person, and:

A. in the case of animals other than fish, includes the ability to fly, walk, or swim out of human control;

B. in the case of a fish or aquatic plants, the following locations shall be considered to be in a free-living state:

(1) waters identified as public waters;

(2) natural or artificial waters that are continually or intermittently connected to public waters; or

(3) water-using facilities, such as fish hatcheries, aquatic farms, zoos, and minnow retail or wholesale operations, with outflows that provide direct access for species to enter public waters; and

C. in the case of a fish or aquatic plant, the following locations are not considered a free-living state:

(1) artificial ponds such as water gardens that have no outlet to public waters;

(2) waters whose shorelines are entirely within the land owned by a person, not continually or intermittently connected to public waters, and not identified by the department as public waters; or

(3) water-using facilities, such as fish hatcheries, aquatic farms, zoos, and minnow retail or wholesale operations, with outflows that do not provide direct access for species to enter public waters.

Subp. 4. [Repealed, 22 SR 2076]

Subp. 4a. **Introduction.** "Introduction" has the meaning given in Minnesota Statutes, section 84D.01, subdivision 9. Introduction does not include the immediate return of a nonnative species to waters of the state from which it was removed. "Introduce" means the act of introduction.

Subp. 5. **Littoral area.** "Littoral area" means any part of a body of water 15 feet deep or less.

Subp. 6. **Person.** "Person" has the meaning given in Minnesota Statutes, section 645.44, subdivision 7.

Subp. 7. **Public waters.** "Public waters" means public waters as defined under Minnesota Statutes, section 103G.005, subdivision 15, that have been designated as public waters under the public waters inventory pursuant to Minnesota Statutes, section 103G.201.

Statutory Authority: *MS s 84.9691; 84D.12*

History: *20 SR 2292(NO. 43); L 1996 c 385 art 2 s 7; 22 SR 2076; L 2004 c 243 s 40*
Published Electronically: *June 11, 2008*

6216.0230 NOMENCLATURE.

The scientific taxonomic nomenclature used in this chapter follows the nomenclature assigned by the following sources, which are incorporated by reference. The sources are available through the Minitex interlibrary loan system and are not subject to frequent change:

A. The American Fisheries Society, Common and Scientific Names of Fishes from the United States, Canada, and Mexico (seventh edition 2013);

B. John J. Mayer and I. Lehr Brisbin, Jr., Wild Pigs in the United States (1991);

C. The American Ornithologists' Union, Checklist of North American Birds (seventh edition 1998 and subsequent supplements);

D. John T. Kartesz, A Synonymized Checklist of the Vascular Flora of the United States, Canada, and Greenland (second edition 1994);

E. Ronald M. Nowak, Walker's Mammals of the World, volumes I and II (sixth edition 1999);

F. A.J. Healy and Elizabeth Edgar, Flora of New Zealand, volume III (1980);

G. C.J. Webb, W.R. Sykes, and P.J. Garnock-Jones, Flora of New Zealand, volume IV (1988); and

H. Flora of North America Editorial Committee, Flora of North America North of Mexico, volume 3 (1997) (for waterlilies only).

Statutory Authority: *MS s 14.388; 84D.12*

History: *22 SR 2076; 43 SR 683*
Published Electronically: *January 10, 2019*

6216.0250 PROHIBITED INVASIVE SPECIES.

Subpart 1. **Designation.** The species in subparts 2 to 5 and any hybrids, cultivars, or varieties of the species are designated as prohibited invasive species.

Subp. 2. **Aquatic plants.** The following aquatic plants are designated as prohibited invasive species:

A. African oxygen weed (*Lagarosiphon major*) (Ridley) Moss ex Wagner;

B. aquarium watermoss or giant salvinia (*Salvinia molesta*) Mitchell;

C. Australian stonecrop (*Crassula helmsii*) (Kirk) Cockayne;

D. brittle naiad (*Najas minor*) Allioni;

E. curly-leaf pondweed (*Potamogeton crispus*) Linnaeus;

F. Eurasian watermilfoil (*Myriophyllum spicatum*) Linnaeus, including its hybrids;

G. European frog-bit (*Hydrocharis morsus-ranae*) Linnaeus;

H. flowering rush (*Butomus umbellatus*) Linnaeus;

I. hydrilla (*Hydrilla verticillata*) (Carl von Linnaeus) Royle;

J. Indian swampweed (*Hygrophila polysperma*) (Roxburgh) T. Anders;

K. purple loosestrife (*Lythrum salicaria*, *Lythrum virgatum*, or any variety, hybrid, or cultivar thereof) Linnaeus;

L. starry stonewort (*Nitellopsis obtusa*) (N.A. Desvaux) J. Groves;

M. water aloe or water soldiers (*Stratiotes aloides*) Linnaeus; and

N. water chestnut (*Trapa natans*) Linnaeus.

Subp. 2a. **Federal noxious weed list.** For purposes of this part, the aquatic plants listed in Code of Federal Regulations, title 7, section 360.200, are also designated as prohibited invasive species except for Chinese water spinach (*Ipomoea aquatica*) Forsskal.

Subp. 3. **Fish.** The following fish are designated as prohibited invasive species:

A. Amur sleeper (*Perccottus glenii)* Dybowski;

B. bighead carp (*Hypophthalmichthys nobilis*) Richardson;

C. black carp (*Mylopharyngodon piceus*) (Richardson) Peters;

D. crucian carp (*Carassius carassius)* Linnaeus;

E. Eurasian minnow (*Phoxinus phoxinus*) Linnaeus;

F. European perch (*Perca fluviatilis*) Linnaeus;

G. grass carp (*Ctenopharyngodon idella*) Valenciennes;

H. largescale silver carp (*Hypophthalmichthys harmandi)* Sauvage;

I. northern snakehead fish (*Channa argus*);

J. Oriental weatherfish (*Misgurnus anguillicaudatus)* Cantor;

K. Prussian carp (*Carassius gibelio)* Bloch;

L. roach (*Rutilus rutilus*) Linnaeus;

M. round goby (*Neogobius melanostomus*);

N. rudd (*Scardinius erythrophthalmus*) Linnaeus;

O. ruffe (*Gymnocephalus cernuus*) Linnaeus;

P. sea lamprey (*Petromyzon marinus*) Linnaeus;

Q. silver carp (*Hypophthalmichthys molitrix*) Valenciennes;

R. stone moroko (*Pseudorasbora parva*) Temminck & Schlegel;

S. tubenose goby (*Proterorhinus semilunaris*) Heckel or (*Proterorhinus marmoratus*) Pallas;

T. wels catfish (*Silurus glanis*) Linnaeus;

U. western mosquitofish (*Gambusia affinis*) Baird & Girard;

V. white perch (*Morone americana*) Gmelin; and

W. zander (*Sander lucioperca*) or (*Stizostedion lucioperca*) Linnaeus.

Subp. 4. **Invertebrates.** The following invertebrates are designated as prohibited invasive species:

A. faucet snail (*Bithynia tentaculata*) Linnaeus;

B. New Zealand mud snail (*Potamopyrgus antipodarum*) Gray;

C. quagga mussel (*Dreissena bugensis*) Andrusov;

D. red swamp crayfish (*Procambarus clarkii*) Girard;

E. yabby (*Cherax destructor*) Clark; and

F. zebra mussel (*Dreissena* spp.).

Subp. 5. **Mammals.** The following mammals are designated as prohibited invasive species:

A. Asian raccoon dog, also known as finnraccoon (*Nyctereutes procyonoides*);

B. Eurasian swine, European wild boar (*Sus scrofa scrofa*) Linnaeus;

C. European rabbit (*Oryctolagus cuniculus*); and

D. nutria, any strain (*Myocastor coypus*).

Statutory Authority: *MS s 14.388; 84.027; 84.9691; 84D.12*

History: *20 SR 2292(NO. 43); L 1996 c 385 art 2 s 7; 22 SR 2076; 28 SR 629; L 2004 c 243 s 40; 32 SR 724; 38 SR 1706; L 2014 c 289 s 69; 41 SR 113; 43 SR 683*

Published Electronically: *January 10, 2019*

6216.0260 REGULATED INVASIVE SPECIES.

Subpart 1. **Designation.** The species in subparts 2 to 6 are designated as regulated invasive species.

Subp. 2. **Aquatic plants.** The following aquatic plants are designated as regulated invasive species:

A. Brazilian waterweed (*Egeria densa*) Planchon;

B. Carolina fanwort or fanwort (*Cabomba caroliniana*) A. Gray;

C. Chinese water spinach (*Ipomoea aquatica*) Forsskal;

D. parrot's feather (*Myriophyllum aquaticum*) (da Conceicao Vellozo) Verdcourt;

E. nonnative waterlilies (*Nymphaea* spp.) Linnaeus, or any variety, hybrid, or cultivar thereof. Native Minnesota waterlilies are: *Nymphaea odorata* Aiton subsp. *odorata* Aiton, *N. leibergii* Morong, and *N. odorata* Aiton subsp. *tuberosa* (Paine) Wiersema & Hellquist;

F. yellow iris or yellow flag (*Iris pseudacorus*) Linnaeus; and

G. water hyacinth (*Eichhornia crassipes*) Solms.

Subp. 3. **Fish.** The following fish are designated as regulated invasive species:

A. alewife (*Alosa pseudoharengus*) Wilson;

B. common carp, koi (*Cyprinus carpio*) Linnaeus;

C. goldfish (*Carassius auratus*) Linnaeus;

D. rainbow smelt (*Osmerus mordax*) Mitchell; and

E. tilapia (*Tilapia, Oreochromis, Sarotherodon* spp.).

Subp. 4. **Invertebrates.** The following invertebrates are designated as regulated invasive species:

A. banded mystery snail (*Viviparus georgianus*) I. Lea;

B. Chinese mystery snail, Japanese trap door snail (*Cipangopaludina* spp.) Hannibal or (*Bellamya chinensis*) Reeve;

C. rusty crayfish (*Orconectes rusticus*) Girard; and

D. spiny waterflea (*Bythotrephes longimanus*) Leydig.

Subp. 5. **Birds.** The following birds are designated as regulated invasive species:

A. Egyptian goose (*Alopochen aegyptiaca*) Linne;

B. mute swan (*Cygnus olor*) Gmelin; and

C. Sichuan pheasant (*Phasianus colchicus strauchi*).

Subp. 6. **Reptiles.** The following reptile is designated as a regulated invasive species: red-eared slider (*Trachemys scripta elegans*) Wied-Neuweid.

Statutory Authority: *MS s 14.388; 84.027; 84D.12*

History: *22 SR 2076; 28 SR 629; L 2004 c 243 s 40; 32 SR 724; 38 SR 1706; L 2014 c 289 s 69; 41 SR 113; 43 SR 683*

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6216.0265 PERMITS FOR PROHIBITED AND REGULATED INVASIVE SPECIES.

Subpart 1. **Requirement.** No person may possess, import, purchase, propagate, or transport a prohibited invasive species without a permit from the commissioner issued according to this part, except as authorized by Minnesota Statutes, section 84D.05. No person may introduce a regulated invasive species without a permit from the commissioner issued according to this part, except as authorized in subpart 2. A regulated invasive species permit is not required for a person to possess, import, purchase, propagate, transport, own, or sell a regulated invasive species.

Subp. 2. **Exemptions and alternate permits for regulated invasive species.** In lieu of an additional permit issued under Minnesota Statutes, section 84D.11, permits and licenses issued under Minnesota Statutes, sections 17.4981 to 17.4994, and Minnesota Statutes, chapter 97C, and rules adopted thereunder, may authorize the introduction of regulated invasive species, provided that the conditions specified in those permits and licenses are in accordance with this part.

Subp. 3. **Prohibited invasive species permit limitation.** A person may apply for a permit for prohibited invasive species only for the purposes of disposal, decontamination, control, research, or education according to Minnesota Statutes, section 84D.11, subdivision 1.

Subp. 4. **Eligibility; prohibited invasive species permit.** An applicant for a prohibited invasive species permit must:

A. have experience in the skills necessary for handling potentially harmful species, including:

(1) knowledge of precautions necessary to prevent spread through handling; or

(2) previous experience handling invasive species without allowing escapes;

B. maintain a facility or transportation equipment that prevents the escape of nonnative species;

C. if the applicant is an individual, be at least 18 years of age at the time the application is received by the department; and

D. if the applicant is a corporation, limited partnership, or other business entity, be qualified to do business in Minnesota as shown by a certificate of authority to transact business in Minnesota or a certificate of limited partnership from the Minnesota secretary of state.

Subp. 5. **Permit application.**

A. Written application for a permit for a prohibited or regulated invasive species shall be made on a form prescribed by the commissioner and shall contain the following:

(1) the legal name, address, daytime and evening telephone numbers, and, if an individual, date of birth of the applicant;

(2) the scientific and common names of either the prohibited invasive species that the applicant desires to propagate, possess, import, purchase, or transport or the regulated invasive species that the applicant desires to introduce;

(3) a detailed description of the activity the applicant will be undertaking;

(4) a detailed description of the facilities or transportation equipment to be used and an explanation of how the equipment is sufficient to prevent an unauthorized introduction of a prohibited invasive species;

(5) a description of the applicant's experience in handling the same or similar species;

(6) a written contingency plan for eradication or recapture in the event of an unauthorized introduction of the prohibited invasive species; and

(7) an agreement to comply with the requirements of this chapter.

B. The commissioner may request additional information from the applicant in writing after the application is received if necessary to evaluate the potential risk to the state's resources.

C. The commissioner shall review the permit applications and respond to the applicant within 30 days of receipt of the application or the additional information requested in item B.

Subp. 6. **Inspection of facilities or equipment.** After receipt of an application for a prohibited invasive species permit, and a determination by the commissioner that the applicant has satisfied all the initial requirements for a permit as described in this part, the commissioner may inspect the applicant's holding facilities or other containment or transportation equipment. Facilities holding prohibited invasive species under permit are subject to inspection by the commissioner at any reasonable time.

Subp. 7. **Transferability.** A permit issued under this part is not transferable.

Subp. 8. **Expiration date and renewal.** All prohibited invasive species and regulated invasive species permits expire at midnight on December 31 of each year, unless otherwise specified in the permit. Applications for renewal of permits shall be made by October 1 of the year the permit expires. Applications for renewal shall describe any changes to the information initially required in subpart 5.

Subp. 9. **Revocation of permit.**

A. The commissioner may revoke all or part of a permit issued under this part when:

(1) the commissioner determines that a permittee has failed to comply with this chapter; or

(2) it is necessary to protect the interests of the public, to protect native plant and animal populations in the state, or to otherwise protect the state's natural resources.

B. Except in an emergency situation when delay would threaten the state's natural resources, the commissioner shall, at least 14 days prior to the effective date of the revocation, inform the permit holder in writing of the nature of the revocation and of the conditions that, in the commissioner's opinion, require revocation.

C. Within 30 days of receipt of a notice of revocation, the permit holder may apply for an amendment to the permit or request a hearing before the commissioner to contest the revocation, to support the permit holder's proposed amendment, or both.

D. The permit shall be revoked on the date stated on the revocation notice until such time that the decision is reversed or modified.

Subp. 10. **Disclaimer of liability.** A prohibited invasive species permit or regulated invasive species permit issued under this part is permissive only. No liability is assumed by the state or any of its officers, agents, or employees by issuing a prohibited or regulated invasive species permit or by any acts or operations of the permittee or any prohibited or regulated invasive species in possession of the permittee.

Subp. 11. **Effective date.** A person possessing, importing, purchasing, selling, propagating, transporting, or introducing a prohibited invasive species on June 2, 1998, must apply for a permit within 60 days of June 2, 1998.

Statutory Authority: *MS s 14.388; 84D.12*

History: *22 SR 2076; L 2004 c 243 s 40; 43 SR 683*

Published Electronically: *January 10, 2019*

6216.0270 UNREGULATED NONNATIVE SPECIES.

Subpart 1. **Designation.** The species in subparts 2 to 5 are designated as unregulated nonnative species. These nonnative species are not subject to regulation under Minnesota Statutes, chapter 84D.

Subp. 2. **Fish.** The following fish are designated as unregulated nonnative species:

A. Atlantic salmon (*Salmo salar*) Linnaeus;

B. brown trout (*Salmo trutta*) Linnaeus;

C. coho salmon (*Oncorhynchus kisutch*) Walbaum;

D. Chinook salmon (*Oncorhynchus tshawytscha*) Walbaum;

E. pink salmon (*Oncorhynchus gorbuscha*) Walbaum;

F. rainbow trout (*Oncorhynchus mykiss*) Walbaum; and

G. subtropical, tropical, and saltwater fish, except anadromous species.

Subp. 3. **Invertebrates.** The following invertebrates are designated as unregulated nonnative species: subtropical, tropical, and saltwater invertebrates.

Subp. 4. **Mammals.** The following mammal is designated as an unregulated nonnative species: rat (*Rattus norvegicus* and *Rattus rattus*).

Subp. 5. **Birds.** The following birds are designated as unregulated nonnative species:

A. chukar partridge (*Alectoris chukar*) Gray;

B. helmeted Guinea fowl (*Numida meleagris*) Linnaeus;

C. house sparrow (*Passer domesticus domesticus*) Linnaeus;

D. Hungarian partridge, gray partridge (*Perdix perdix*) Linnaeus;

E. peafowl (*Pavo cristatus*) Linnaeus;

F. pigeon or rock dove (*Columba livia*) Gmelin;

G. ring-necked pheasant (*Phasianus colchicus*) Linnaeus; and

H. starling (*Sturnus vulgaris vulgaris*) Linnaeus.

Statutory Authority: *MS s 14.388; 84D.12*

History: *22 SR 2076; L 2004 c 243 s 40; L 2014 c 289 s 69; 43 SR 683*
Published Electronically: *January 10, 2019*

6216.0280 ESCAPE OF NONNATIVE SPECIES.

Subpart 1. **Reporting.** To report an unauthorized introduction of prohibited invasive animal species, regulated invasive animal species, or unlisted nonnative animal species, in compliance with Minnesota Statutes, section 84D.08, a person shall notify the department's area or regional conservation officer or the invasive species program staff in the department's St. Paul office by telephone within 48 hours after learning of the unauthorized introduction.

Subp. 2. **Information required.** The following information shall be provided to the department about the unauthorized introduction:

A. the quantity and species;

B. the location of the introduction;

C. the date and time the introduction occurred or was discovered;

D. the last known location of the species; and

E. the reporter's address and daytime and evening telephone numbers.

Statutory Authority: *MS s 84D.12*

History: *22 SR 2076; L 2004 c 243 s 40*

Published Electronically: *June 11, 2008*

6216.0290 PROCESS FOR REVIEW OF PROPOSED INTRODUCTIONS OF UNLISTED NONNATIVE SPECIES.

Subpart 1. **Applications and information required.**

A. A person who seeks to introduce an unlisted nonnative species in the state according to Minnesota Statutes, section 84D.06, shall submit an application on a form prescribed by the commissioner. The form shall request the following information:

(1) the name, address, and telephone number of the applicant;

(2) the scientific and common names, family, and reference used for the scientific name of the unlisted nonnative species proposed for introduction;

(3) the number of individual plants or animals proposed for introduction;

(4) the reason and need for the proposed introduction;

(5) the potential to use native species for the same purpose;

(6) the location for the proposed introduction;

(7) scientific-based information about the native range of the unlisted nonnative species;

(8) the source of the actual individual organisms proposed to be introduced;

(9) scientific-based information about the ability of the unlisted nonnative species to naturalize, displace native species, and harm natural resources or their use in similar climates and latitudes; and

(10) an assessment of the potential adverse impacts on native Minnesota species and ecosystems, including scientific-based information about:

(a) the potential to introduce disease or parasites to native fish or wildlife populations;

(b) the potential for interbreeding or hybridizing with native fish or wildlife;

(c) the potential predation on native fish or wildlife; and

(d) any possible competition with native fish, wildlife, or aquatic plants for food, habitat, water, or other resources.

B. The commissioner may request additional information in writing after the application is received if necessary to assess the potential impacts of an introduction.

Subp. 2. **Application review.** The commissioner shall reject an application within ten working days after receipt of the application if the application does not contain the information required in subpart 1.

Subp. 3. **Review period.** Within 60 days of receipt of an application that contains the information in subpart 1, the commissioner shall assess the apparent risk of the introduction in the state and classify the species according to Minnesota Statutes, section 84D.04, subdivision 2. If the commissioner determines during the 60-day period that there should be a public comment period for the proposed introduction, or the commissioner determines that additional information is necessary to adequately evaluate the proposed introduction, the commissioner may extend the review period and state the basis of the extension in writing to the applicant. The review period may be extended to a date 30 days from the end of the public comment period or receipt by the department of the additional information requested from the applicant.

Subp. 4. **Review process.** Prior to classification of an unlisted nonnative species and making a final assessment on a proposed introduction, the commissioner may:

A. seek information and opinions from technical experts;

B. solicit public comment and hold public hearings on the proposed introduction;

C. consult with other potentially affected jurisdictions; and

D. in the case of an animal species, request a certificate of veterinary inspection or other appropriate certification that the animal is pathogen-free.

Subp. 5. **Comment period and comments.** If the commissioner determines that a public comment period is necessary on the proposed introduction, the commissioner shall promptly proceed to publish a notice in the EQB Monitor, which is published by the Environmental Quality Board. A 30-day period for review and comment begins the day a notice of the public comment period is published in the EQB Monitor. Written comments to the commissioner during the public comment period may address the accuracy and completeness of material contained in the application, additional information regarding the proposed introduction that is not contained in the application, or potential impacts that may warrant further investigation before the commissioner acts on the proposed introduction.

Subp. 6. **Designation and notification.** After completing the review of a proposal to introduce an unlisted nonnative species and determining the appropriate classification, the commissioner shall designate the species and notify the applicant as required under Minnesota Statutes, section 84D.06.

Statutory Authority: *MS s 14.388; 84D.12*

History: *22 SR 2076; L 2004 c 243 s 40; L 2014 c 289 s 69; 43 SR 683*

Published Electronically: *January 10, 2019*

6216.0300 LISTING, NOTICE, AND MARKING OF INFESTED WATERS.

Subpart 1. **Listing of infested waters and notice.** The commissioner shall maintain a list of infested waters and provide access to a copy of the listed waters. The department shall post signs describing the infestation at all public accesses to listed water bodies. At any time, the commissioner may list additional water bodies or remove from listing those water bodies which no longer are infested waters.

Subp. 2. [Repealed, 24 SR 1849]

Subp. 3. [Repealed, 24 SR 1849]

Statutory Authority: *MS s 14.388; 84.9691; 84D.03; 84D.12*

History: *20 SR 2292(NO. 43); 22 SR 2076; 24 SR 1849; L 2014 c 289 s 69; 43 SR 683*

Published Electronically: *January 10, 2019*

6216.0350 [Repealed, 34 SR 474]

Published Electronically: *November 10, 2009*

6216.0400 RESTRICTED ACTIVITIES ON INFESTED WATERS; PERMITS.

Subpart 1. **Taking bait from infested waters.** Taking wild animals from infested waters for bait or aquatic farm purposes is prohibited, except:

A. by permit according to part 6254.0200 and Minnesota Statutes, sections 84D.03, subdivision 3, and 84D.11, subdivision 2a;

B. harvest for bait purposes from waters that are listed as infested waters solely because they contain Eurasian watermilfoil is allowed for noncommercial personal use; and

C. harvest of rainbow smelt or cisco for bait purposes from Lake Superior or its tributaries below the posted boundaries, except those streams listed in part 6262.0300, subpart 4, item C, for use as fresh, dead, frozen, or preserved bait only on Lake Superior or its tributaries below the posted boundaries, in accordance with Minnesota Statutes, section 97C.341, paragraph (c).

Subp. 1a. **Permit application.**

A. Written application for a permit to harvest wild animals from infested waters for bait or aquatic farm purposes shall be made on a form provided by the commissioner and shall contain:

(1) the applicant's legal name, business name, license number, address, and daytime and evening telephone numbers;

(2) the names of the waters and counties where the applicant desires to harvest wild animals for bait or aquatic farm purposes; and

(3) a description of the harvest and transportation equipment to be used, including boats, motors, and trailers.

B. An application for a permit according to part 6254.0200 and Minnesota Statutes, sections 84D.03, subdivision 3, and 84D.11, subdivision 2a, must be mailed or delivered to the Minnesota DNR-Commercial Fisheries Program Coordinator, 500 Lafayette Road, St. Paul, MN 55155-4012.

C. An application for a permit under this part must be submitted by March 1 to be considered for permits that are effective on April 10 of the same year.

Subp. 1b. **Expiration; renewal; transferability.** Permits issued under this part expire at midnight on April 9 of each year, unless otherwise specified in the permit. An application for renewal shall describe any changes to the information submitted in the prior year. A permit issued under this part is not transferable.

Subp. 1c. **Revocation of permit.**

A. When the commissioner determines that a permittee has failed to comply with conditions of the permit, the commissioner may issue a warning or, if deemed necessary for the protection of the aquatic resources, revoke all or part of a permit. The commissioner may revoke the permit if deemed necessary for the protection of the aquatic resources. When it is determined that a third offense has occurred, the commissioner must revoke the permit.

B. Except in an emergency situation when delay would threaten the state's natural resources, the commissioner shall, at least seven days before the effective date of the revocation, inform the permit holder in writing of the nature of the revocation and of the conditions that, in the commissioner's opinion, require revocation.

C. Upon notice of revocation, the permit holder may apply for an amendment to the permit or request a contested case hearing to contest the revocation. The permit is revoked on the date stated in the revocation notice until such time that the decision is reversed or modified.

Subp. 2. **Restrictions on sport gill netting for whitefish and cisco in infested waters.** If the commissioner lists waters that are open to sport gill netting for whitefish and cisco as infested waters, the commissioner may close the gill netting season for the listed water body, require that gill nets used in the infested waters not be used in other water bodies, or require that nets used in infested waters must be dried for a minimum of ten days or frozen for a minimum of two days before they are used in noninfested waters. The commissioner shall publish the names of listed water bodies and new requirements or closures in the State Register and provide notice through media releases and other available means where practical. In addition, the commissioner shall post notice of the restrictions at public access points to listed water bodies.

Subp. 3. [Repealed, L 2004 c 243 s 41]

Subp. 4. [Repealed, 24 SR 1849]

Statutory Authority: *MS s 14.388; 84.9691; 84D.12; 97A.045; 97C.341*

History: *20 SR 2292(NO. 43); 22 SR 2076; 24 SR 1849; L 2004 c 243 s 41; L 2014 c 289 s 69; 39 SR 1619; 43 SR 683*

Published Electronically: *January 10, 2019*

6216.0500 TRANSPORTING AND APPROPRIATING WATER FROM INFESTED WATERS.

Subpart 1. [Repealed, 32 SR 724]

Subp. 1a. **Diverting, appropriating, and transporting.**

A. Water from listed infested waters may not be diverted to other waters, transported on a public road, or transported or appropriated off property riparian to infested waters except:

(1) in emergencies that threaten human safety or property;

(2) as specified in a water appropriation or public waters work permit issued by the commissioner according to Minnesota Statutes, chapter 103G; or

(3) under a permit issued according to this part.

B. For newly listed infested waters or infested waters that are newly listed with an additional invasive species, the commissioner shall review active water appropriation or public waters work permits issued under Minnesota Statutes, chapter 103G, and may amend permits to include conditions that prevent the spread of invasive species.

C. The following conditions may be included in permits issued under this part or Minnesota Statutes, chapter 103G, to prevent the spread of invasive species:

(1) seasonal or other timing restrictions;

(2) requirements to treat water, including chemical, ultraviolet, heat, filtering, or other treatment; and

(3) requirements for discharge or disposal of water.

Subp. 2. **Disposing water used to transport wild animals from infested waters.** Water used to transport wild animals from infested waters, including water from waters or facilities permitted to hold fish from infested waters, may be disposed of only at sites approved in writing by the commissioner.

Subp. 3. [Repealed, 43 SR 683]

Subp. 4. [Repealed, 32 SR 724]

Subp. 5. **Fish hatchery or aquatic farm operations in infested waters.**

A. Natural lakes or wetland basins that are listed as infested waters will not be licensed by the department pursuant to Minnesota Statutes, section 17.4984, for aquatic farms or pursuant to Minnesota Statutes, section 97C.211, as private fish hatcheries.

B. Artificial water basins that have populations of prohibited or regulated invasive species may be used for aquatic farm or private hatcheries under license by the department. After notifying a licensee that an artificial water basin has a prohibited or regulated invasive species, the commissioner may require that nets, traps, buoys, stakes, and lines that have been used in such

artificial water basins must be dried for a minimum of ten days, or frozen for a minimum of two days, before they are used in noninfested waters. All aquatic plants must be removed from nets and other equipment that are removed from the artificial water basins.

C. The commissioner may license aquatic farm or private fish hatchery facilities to use infested waters as a source for the facilities' water. The commissioner may require that the waters be treated to eliminate prohibited or regulated invasive species.

D. Fish raised in artificial water basins that have populations of prohibited or regulated invasive species, or in any facility using infested water as a source, must be sold directly to a wholesale buyer for processing, except:

(1) the commissioner may by permit allow the stocking or transport of such fish where the receiving waters contain populations of the same prohibited or regulated invasive species as the source facility's waters; or

(2) the commissioner may by permit allow the stocking or transport of such fish in water bodies that do not contain populations of prohibited or regulated invasive species if the source facility uses adequate treatment to remove the prohibited or regulated invasive species from the facility.

Subp. 6. **Infested waters diversion or transportation permits.** Applications for permits issued pursuant to this part, to divert or transport water from infested waters, shall be made on forms obtained from the commissioner and shall contain information as the commissioner may prescribe. The department shall act upon the application within 90 days of receipt. Failure on the part of the department to act upon the permit within the required time shall not be construed as approval of the application. Permits shall state all the conditions and limitations upon which they are based. A permit may be modified at any time by the department.

Statutory Authority: *MS s 84.9691; 84D.12*

History: *20 SR 2292(NO. 43); L 1996 c 385 art 2 s 7; 22 SR 2076; 24 SR 1849; L 2004 c 243 s 40; 32 SR 724; L 2014 c 289 s 69; 20 SR 2292(NO. 43); L 1996 c 385 art 2 s 7; 22 SR 2076; 24 SR 1849; L 2004 c 243 s 40; 32 SR 724; L 2014 c 289 s 69; 43 SR 683*

Published Electronically: *January 10, 2019*

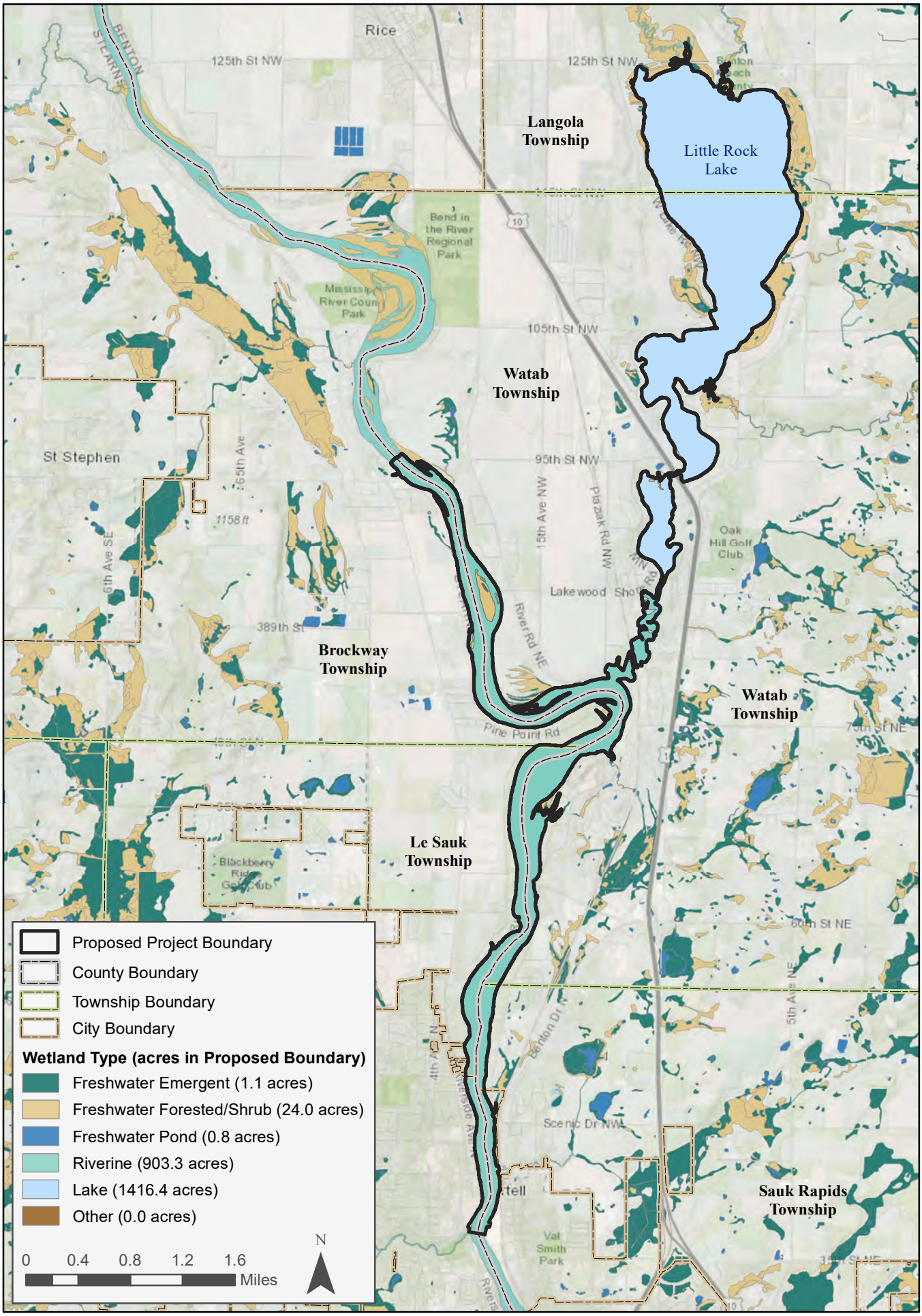
6216.0600 VIOLATIONS; CONFISCATIONS.

Unless a different penalty is prescribed, a violation of parts 6216.0265, 6216.0280 to 6216.0290, or 6216.0400 to 6216.0500 is a misdemeanor as set forth in Minnesota Statutes, section 84D.13. Where a violation has occurred, the department may confiscate the prohibited invasive species, regulated invasive species, or unlisted nonnative species immediately upon discovery wherever found and, at the department's discretion, destroy it. Where infested water is being appropriated, or diverted or transported without a permit, or otherwise contrary to the provisions of parts 6216.0100 to 6216.0600, the department may order that the activities cease. Any expense or loss in connection with enforcement of the order shall be borne by the permittee or responsible person.

Statutory Authority: *MS s 84.9691; 84D.12*

History: *20 SR 2292(NO. 43); 22 SR 2076; L 2004 c 243 s 40*
Published Electronically: *June 11, 2008*

APPENDIX 4.6.2-1 Wetlands in the Vicinity of the Project



Service Layer Credit: US FWS National Wetlands Inventory

APPENDIX 4.7.2-1 **Sartell Project IPaC List**

IPaC Information for Planning and Consultation **U.S. Fish & Wildlife Service**

IPaC resource list

We are experiencing intermittent network issues causing large delays in species lists and letters. This is a known issue and we are working to fix it. Thank you for your patience.

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

Location

Benton and Stearns counties, Minnesota

Local office

Minnesota-Wisconsin Ecological Services Field Office

(952) 252-0092
(952) 646-2873

MAILING ADDRESS
4101 American Blvd E
Bloomington, MN 55425-1665

PHYSICAL ADDRESS
4101 American Blvd E

-
Bloomington, MN 55425-1665

http://www.fws.gov/midwest/Endangered/section7/s7process/step1.html

Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population, even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Draw the project location and click CONTINUE.
2. Click DEFINE PROJECT.
3. Log in (if directed to do so).
4. Provide a name and description for your project.
5. Click REQUEST SPECIES LIST.

Listed species

[1] and their critical habitats are managed by the Ecological Services Program of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries[2]).

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact NOAA Fisheries for species under their jurisdiction.

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1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the listing status page for more information.
2. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

The following species are potentially affected by activities in this location:

Mammals

NAME	STATUS
Northern Long-eared Bat Myotis septentrionalis No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/9045	Threatened

Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

THERE ARE NO CRITICAL HABITATS AT THIS LOCATION.

Migratory birds

Certain birds are protected under the Migratory Bird Treaty Act [1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.

Additional information can be found using the following links:

- Birds of Conservation Concern http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php
- Measures for avoiding and minimizing impacts to birds http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php
- Nationwide conservation measures for birds http://www.fws.gov/migratorybirds/pdf/management/nationwidestandardconservationmeasures.pdf

The birds listed below are birds of particular concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ below. This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the E-bird data mapping tool (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are

available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found below.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON (IF A BREEDING SEASON IS INDICATED FOR A BIRD ON YOUR LIST, THE BIRD MAY BREED IN YOUR PROJECT AREA SOMETIME WITHIN THE TIMEFRAME SPECIFIED, WHICH IS A VERY LIBERAL ESTIMATE OF THE DATES INSIDE WHICH THE BIRD BREEDS ACROSS ITS ENTIRE RANGE. "BREEDS ELSEWHERE" INDICATES THAT THE BIRD DOES NOT LIKELY BREED IN YOUR PROJECT AREA.)
Bald Eagle *Haliaeetus leucocephalus* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1626	Breeds Dec 1 to Aug 31

Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ “Proper Interpretation and Use of Your Migratory Bird Report” before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.

2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

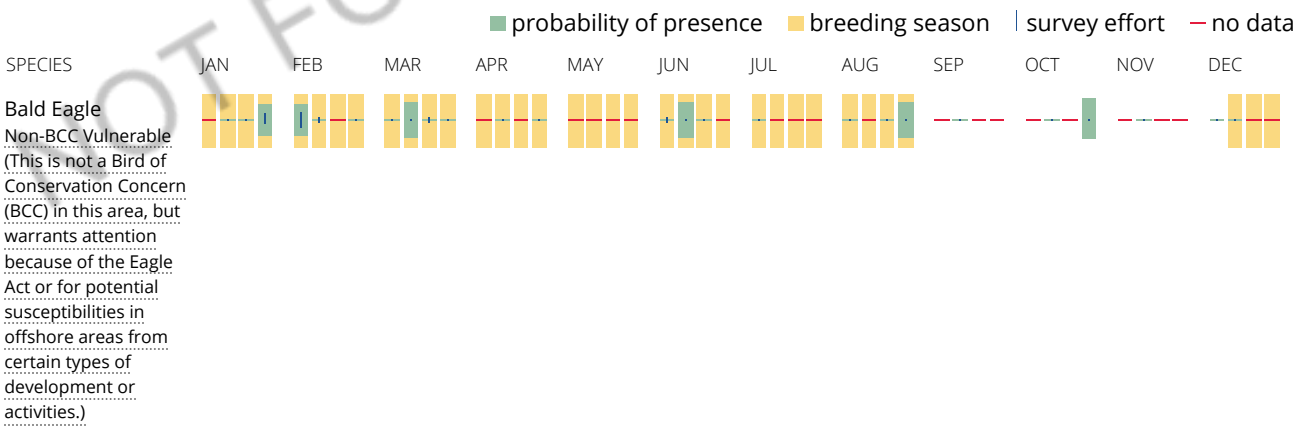
Breeding Season (▪)
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

To see a bar's survey effort range, simply hover your mouse cursor over the bar.

No Data (–)
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe
Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.



Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures and/or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the migratory birds potentially occurring in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the AKN Phenology Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets .

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering, migrating or present year-round in my project area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may refer to the following resources: The Cornell Lab of Ornithology All About Birds Bird Guide, or (if you are unsuccessful in locating the bird of interest there), the Cornell Lab of Ornithology Neotropical Birds guide. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

Facilities

National Wildlife Refuge lands

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS AT THIS LOCATION.

Fish hatcheries

THERE ARE NO FISH HATCHERIES AT THIS LOCATION.

Wetlands in the National Wetlands Inventory

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

WETLAND INFORMATION IS NOT AVAILABLE AT THIS TIME

This can happen when the National Wetlands Inventory (NWI) map service is unavailable, or for very large projects that intersect many wetland areas. Try again, or visit the NWI map to view wetlands at this location.

Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

APPENDIX 4.7.4-1 Northern Long-Eared Bat “4D” Rule

Synopsis

As required by the Paperwork Reduction Act of 1995 (44 U.S.C. 3507), the FCC is notifying the public that it received final OMB approval on December 17, 2015, for the information collection requirements contained in the modifications to the Commission's rules in 47 CFR part 5. Under 5 CFR part 1320, an agency may not conduct or sponsor a collection of information unless it displays a current, valid OMB Control Number. No person shall be subject to any penalty for failing to comply with a collection of information subject to the Paperwork Reduction Act that does not display a current, valid OMB Control Number. The OMB Control Number is 3060–0065. The foregoing notice is required by the Paperwork Reduction Act of 1995, Public Law 104–13, October 1, 1995, and 44 U.S.C. 3507.

The total annual reporting burdens and costs for the respondents are as follows:

OMB Control Number: 3060–0065.

OMB Approval Date: December 17, 2015.

OMB Expiration Date: December 31, 2018.

Title: Radio Experimentation and Market Trials—Streamlining Rules.

Form Number: FCC Form 442.

Respondents: Business or other for-profit entities; not-for-profit institutions, and individuals or household.

Number of Respondents and Responses: 495 respondents; 560 responses.

Estimated Time per Response: 4 hours.

Frequency of Response: On-occasion reporting requirements; recordkeeping requirements; and third party disclosure.

Obligation to Respond: Required to obtain or retain benefits. The statutory authority for this information collection is contained in sections 47 U.S.C. Sections 4, 302, 303, 306, and 307 of the Communications Act of 1934, as amended.

Total Annual Burden: 3,049 hours.

Total Annual Cost: $41,600.

Nature and Extent of Confidentiality: There is no need for confidentiality, except for personally identifiable information individuals may submit, which is covered by a system of records, FCC/OET–1, ''Experimental Radio Station License Files,'' 71 FR 17234, April 6, 2006.

Privacy Act: No impact(s).

Needs and Uses: On January 31, 2013, the Commission adopted a Report and Order, in ET Docket No. 10–236 and 06–155; FCC 13–15, which updates part 5 of the CFR—''Experimental Radio Service'' (ERS). The Commission's recent Report and Order revises and streamlines rules for Experimental licenses. The new rules provide additional license categories to potential licensees. The new license categories are: (1) Program Experimental Radio License; (2) Medical Testing Experimental Radio License; and (3) Compliance Testing Experimental Radio License, including testing of radio frequency equipment in an Open Area Test Site.

Federal Communications Commission.

Sheryl Todd,

Deputy Secretary.

[FR Doc. 2015–33250 Filed 1–13–16; 8:45 am]

BILLING CODE 6712–01–P

DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

50 CFR Part 17

[Docket No. FWS–R5–ES–2011–0024; 4500030113]

RIN 1018–AY98

Endangered and Threatened Wildlife and Plants; 4(d) Rule for the Northern Long-Eared Bat

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Final rule.

SUMMARY: We, the U.S. Fish and Wildlife Service (Service), finalize a rule under authority of section 4(d) of the Endangered Species Act of 1973 (Act), as amended, that provides measures that are necessary and advisable to provide for the conservation of the northern long-eared bat (*Myotis septentrionalis*), a bat species that occurs in 37 States, the District of Columbia, and 13 Canadian Provinces.

DATES: This rule is effective February 16, 2016.

ADDRESSES: This final 4(d) rule, the final environmental assessment, biological opinion, and list of references are available on the Internet at *http://www.regulations.gov* under Docket No. FWS–R5–ES–2011–0024 and at *http://www.fws.gov/midwest/Endangered*. Comments and materials we received, as well as supporting documentation we used in preparing this final 4(d) rule, are available for public inspection at *http://www.regulations.gov*, and by appointment, during normal business hours at: U.S. Fish and Wildlife Service, Twin Cities Ecological Services Field Office, 4101 American Blvd. East, Bloomington, MN 55425; telephone (612) 725–3548, ext. 2201; or facsimile (612) 725–3609.

FOR FURTHER INFORMATION CONTACT: Peter Fasbender, Field Supervisor, U.S. Fish and Wildlife Service, Twin Cities Ecological Services Field Office, 4101 American Blvd. East, Bloomington, MN 55425; telephone (612) 725–3548, ext. 2210; or facsimile (612) 725–3609. Persons who use a telecommunications device for the deaf (TDD) may call the Federal Information Relay Service (FIRS) at 800–877–8339.

SUPPLEMENTARY INFORMATION:

Executive Summary

The need for the regulatory action and how the action will meet that need: Consistent with section 4(d) of the Act, this final 4(d) rule provides measures that are tailored to our current understanding of the conservation needs of the northern long-eared bat.

On April 2, 2015, we published a document that is both a final rule to list the northern long-eared bat as a threatened species and an an interim 4(d) rule to provide measures that are necessary and advisable to provide for the conservation of the northern long-eared bat. At that time, we opened a 90-day public comment period on the interim rule, and we committed to publish a final 4(d) rule by December 31, 2015, and to complete review pursuant to the National Environmental Policy Act (NEPA). Previously, on January 16, 2015, we published a proposed 4(d) rule with a 60-day public comment period. Therefore,we have had two comment periods totaling 150 days on two versions of the 4(d) rule.

Statement of legal authority for the regulatory action: Under section 4(d) of the Act, the Secretary of the Interior has discretion to issue such regulations she deems necessary and advisable to provide for the conservation of the species. The Secretary also has the discretion to prohibit by regulation, with respect to a threatened species, any act prohibited by section 9(a)(1) of the Act.

Summary of the major provisions of the regulatory action: This final species-specific 4(d) rule prohibits purposeful take of northern long-eared bats throughout the species' range, except in instances of removal of northern long-eared bats from human structures, defense of human life (including public health monitoring), removal of hazardous trees for protection of human life and property, and authorized capture and handling of northern long-eared bats by individuals permitted to conduct these same activities for other

bats until May 3, 2016. After May 3, 2016, individuals who wish to capture and handle northern long-eared bats for recovery purposes will need a permit pursuant to section 10(a)(1)(A) of the Act.

Incidental take resulting from otherwise lawful activities will not be prohibited in areas not yet affected by white-nose syndrome (WNS). WNS is a fungal disease affecting many hibernating U.S. bat species. Ninety- to one-hundred-percent mortality has been seen in bats affected by the disease in the eastern United States.

Take of northern long-eared bats in their hibernacula (which includes caves, mines, and other locations where bats hibernate in winter) is prohibited in areas affected by WNS, unless permitted under section 10(a)(1)(A) of the Act. Take of northern long-eared bats inside of hibernacula may include disturbing or disrupting hibernating individuals when they are present as well as the physical or other alteration of the hibernaculum's entrance or environment when bats are not present if the result of the activity will impair essential behavioral patterns, including sheltering northern long-eared bats.

For northern long-eared bats outside of hibernacula, we have established separate prohibitions from take for activities involving tree removal and activities that do not involve tree removal. Incidental take of northern long-eared bats outside of hibernacula resulting from activities other than tree removal is not prohibited. Incidental take resulting from tree removal is prohibited if it: (1) Occurs within a 0.25 mile (0.4 kilometer) radius of known northern long-eared bat hibernacula; or (2) cuts or destroys known occupied maternity roost trees, or any other trees within a 150-foot (45-meter) radius from the known maternity tree during the pup season (June 1 through July 31). Incidental take of northern long-eared bats as a result of the removal of hazardous trees for the protection of human life and property is also not prohibited.

Peer review and public comment: We sought comments on our proposed 4(d) rule from independent specialists to ensure that this rule is based on scientifically sound data, assumptions, and analyses. We also considered all comments and information we received during the comment periods on the proposed and interim 4(d) rules.

Previous Federal Actions

Please refer to the proposed (78 FR 61046; October 2, 2013) and final (80 FR17974; April 2, 2015) listing rules for the northern long-eared bat for a detailed description of previous Federal actions concerning this species. On January 16, 2015, we published a proposed 4(d) rule (80 FR 2371) for the northern long-eared bat and on April 2, 2015, we published an interim 4(d) rule (80 FR 17974) for this species.

Background

The northern long-eared bat is a wide-ranging species that is found in a variety of forested habitats in summer and hibernates in caves, mines, and other locations in winter. WNS is the main threat to this species and has caused a precipitous decline in bat numbers (in many cases, 90–100 percent) where the disease has occurred. Declines in the numbers of northern long-eared bats are expected to continue as WNS extends across the species' range. For more information on the northern long-eared bat, its habitat, and WNS, please refer to the October 2, 2013, proposed listing (78 FR 61046) and the April 2, 2015, final listing (80 FR 17974) rules.

The Act (16 U.S.C. 1531 *et seq.*) does not specify particular prohibitions, or exceptions to those prohibitions, for threatened species. Instead, under section 4(d) of the Act, the Secretary of the Interior has the discretion to issue such regulations as she deems necessary and advisable to provide for the conservation of such species. The Secretary also has the discretion to prohibit by regulation, with respect to any threatened wildlife species, any act prohibited under section 9(a)(1) of the Act with respect to endangered species. Exercising this discretion under section 4(d) of the Act, the Service developed general prohibitions (50 CFR 17.31) and exceptions to those prohibitions (50 CFR 17.32) under the Act that apply to most threatened wildlife species.

In addition, for threatened species, under the authority of section 4(d) of the Act, the Service may develop prohibitions and exceptions that are tailored to the specific conservation needs of the species. In such cases, some of the prohibitions and authorizations under 50 CFR 17.31 and 17.32 may be appropriate for the species and be incorporated into a separate, species-specific, rule under section 4(d) of the Act. These rules will also include provisions that are tailored to the specific conservation needs of the threatened species and may be more or less restrictive than the general provisions at 50 CFR 17.31.

Definitions

This final rule uses several definitions and provisions contained in the Act and its implementing regulations.

The Act and its implementing regulations (50 CFR part 17) define take as harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct.

The term "harass" (50 CFR 17.3) means an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering.

The term "harm" (50 CFR 17.3) means an act which actually kills or injures wildlife. Such act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering.

"Purposeful take" includes the capture and handling of individual bats. Take in this manner includes both capture and handling to remove bats from human structures and take that is for research purposes (*e.g.,* attaching a radiotracking device). Other purposeful take would include intentional removal of bats from hibernacula or the intentional killing or harassing of bats under any circumstance.

"Human structures" are defined as houses, garages, barns, sheds, and other buildings designed for human entry.

"Incidental take" is defined at 50 CFR 17.3 as any taking otherwise prohibited, if such taking is incidental to, and not the purpose of, an otherwise lawful activity. Examples of incidental take (or non-purposeful take as it is sometimes referred to in this rule) include land-management actions, such as implementation of forestry practices, where bats may be harmed, harassed, or killed as a result of those otherwise lawful actions. The actions contemplated in this rule include a wide range of actions for purposes such as right-of-way development and maintenance, forestry, land use for development unrelated to wildlife management, management of lands as habitats other than bat habitat (*e.g.,* prairie), energy production and transmission, and other activities.

Incidental take within the context of this rule is regulated in distinct and separate manners relative to the geographic location of the activity in question. For the purposes of this rule, we have developed a map associated with the occurrence and spread of WNS. This map will be updated by the first of each month as the disease spreads throughout the range of the species and

posted at *http://www.fws.gov/midwest/Endangered.*

"Known hibernacula" are defined as locations where northern long-eared bats have been detected during hibernation or at the entrance during fall swarming or spring emergence.

"Known, occupied maternity roost trees" are defined as trees that have had female northern long-eared bats or juvenile bats tracked to them or the presence of females or juveniles is known as a result of other methods.

"Tree removal" is defined as cutting down, harvesting, destroying, trimming, or manipulating in any other way the trees, saplings, snags, or any other form of woody vegetation likely to be used by northern long-eared bats.

WNS Zone

The WNS zone, as mapped, provides the boundary for the distinction of implementation of this rule. To estimate the area impacted by WNS, we have used data on the presence of the fungus causing the disease, called *Pseudogymnoascus destructans,* or *Pd,* or evidence of the presence of the disease (WNS) in the bats within a hibernaculum. Our final listing determination provides additional information concerning *Pd* and WNS (80 FR 17993; April 2, 2015). Confirmed evidence of infection at a location within a county is mapped as a positive detection for the entire county. In addition, we have added a 150-mile (241-kilometer (km)) buffer to the *Pd*-positive county line to account for the spread of the fungus from one year to the next. In instances where the 150-mile (241-km) buffer line bisects a county, the entire county is included in the WNS zone.

Over the past 5 years, an average of 96 percent of the new *Pd* or WNS counties in any single year were within 150 miles (241 km) of a county that was *Pd*- or WNS-positive in a prior year (Service 2015, unpublished data). *Pd* is generally present for a year or two before symptoms of WNS appear and mortality of bats begins to occur. Given the relatively short amount of time between detection and population-level impacts, it is important that we protect those buffer areas and the bats within them with the same regulations as those in known WNS positive counties. Therefore, the positive counties, plus a buffer around them, are the basis for the WNS zone map.

Summary Comparison of the Interim 4(d) Rule and This Final Rule

Based on information we received in comment periods on the proposed and interim 4(d) rules (see Summary of Comments and Recommendations below), we revised the provisions of the interim 4(d) rule to better reflect the disproportionate effect that the disease, WNS, has had and will continue to have, we believe, on northern long-eared bat populations.

In the interim rule, we used the term "white-nose syndrome buffer zone" to identify "the portion of the range of the northern long-eared bat" within 150 miles (241 km) of the boundaries of U.S. counties or Canadian districts where the fungus *Pseudogymnoascus destructans (Pd)* or WNS had been detected. For purposes of clarification, in this final rule, we have changed the term "white-nose syndrome buffer zone" to "white-nose syndrome zone" or "WNS zone." And we state that the "WNS zone" is "the set of counties within the range of the northern long-eared bat" within 150 miles (241 km) of the boundaries of U.S. counties or Canadian districts where *Pd* or WNS had been detected.

The interim 4(d) rule generally applies the prohibitions of 50 CFR 17.31 and 17.32 to the northern long-eared bat, which means that the interim rule, among other things, prohibits the purposeful take of northern long-eared bats throughout the species' range, but the interim rule includes exceptions to the purposeful take prohibition. The exceptions for purposeful take are: (1) In instances of removal of northern long-eared bats from human structures (if actions comply with all applicable State regulations); and (2) for authorized capture, handling, and related activities of northern long-eared bats by individuals permitted to conduct these same activities for other bat species until May 3, 2016. Under the interim rule, incidental take is not prohibited outside the WNS zone if the incidental take results from otherwise lawful activities. Inside the WNS zone, there are exceptions for incidental take for the following activities, subject to certain conditions: Implementation of forest management; maintenance and expansion of existing rights-of-way and transmission corridors; prairie management; minimal tree removal; and removal of hazardous trees for the protection of human life and property.

This final 4(d) rule does not generally apply the prohibitions of 50 CFR 17.31 to the northern long-eared bat. This rule continues to prohibit purposeful take of northern long-eared bats throughout the species' range, except in certain cases, including instances of removal of northern long-eared bats from human structures and for authorized capture, handling, and related activities of northern long-eared bats by individuals permitted to conduct these same activities for other bat species until May 3, 2016. After May 3, 2016, a permit pursuant to section 10(a)(1)(A) of the Act is required for the capture and handling of northern long-eared bats. Under this rule, incidental take is still not prohibited outside the WNS zone.

We have revised the interim rule's language concerning incidental take inside the WNS zone. Under this final rule, within the WNS zone, incidental take is prohibited only if: (1) Actions result in the incidental take of northern long-eared bats in hibernacula; (2) actions result in the incidental take of northern long-eared bats by altering a known hibernaculum's entrance or interior environment if the alteration impairs an essential behavioral pattern, including sheltering northern long-eared bats; or (3) tree-removal activities result in the incidental take of northern long-eared bats when the activity either occurs within 0.25 mile (0.4 kilometer) of a known hibernaculum, or cuts or destroys known occupied maternity roost trees, or any other trees within a 150-foot (45-meter) radius from the maternity roost tree, during the pup season (June 1 through July 31). Take of northern long-eared bats in their hibernacula may include disturbing or disrupting hibernating individuals when they are in the hibernacula. Take of northern long-eared bat also includes the physical or other alteration of the hibernaculum's entrance or environment when bats are not present if the result of the activity will impair essential behavioral patterns, including sheltering northern long-eared bats. Any take resulting from otherwise lawful activities outside known hibernacula, other than tree removal, is not prohibited, as long as it does not change the bat's access to or quality of a known hibernaculum for the species. This final rule makes these revisions because, in areas impacted by WNS, the most important conservation actions for the northern long-eared bat are to protect bats in hibernacula and maternity roost trees, and to continue to monitor populations in summer habitat (*e.g.,* identify where the species continues to survive after the detection of *Pd* or WNS and determine the factors influencing its resilience), while developing methods to abate WNS as quickly as possible.

Under this rule, we individually set forth prohibitions on possession and other acts with unlawfully taken northern long-eared bats, and on import and export of northern long-eared bats. These prohibitions were included in the interim 4(d) through the general application of the prohibitions of 50 CFR 17.31 to the northern long-eared bat. Under this rule, take of the northern

long-eared bat is also not prohibited for the following: Removal of hazardous trees for protection of human life and property; take in defense of life; and take by an employee or agent of the Service, of the National Marine Fisheries Service, or of a State conservation agency that is operating a conservation program pursuant to the terms of a cooperative agreement with the Service. Regarding these three exceptions, take in defense of life was not included in the interim 4(d) rule, but the other two exceptions were, either through the general application of 50 CFR 17.31 or through a specific exception included in the interim 4(d) rule.

Provisions of the 4(d) Rule for the Northern Long-Eared Bat

For a threatened species, the Act does not specify prohibitions, or exceptions to those prohibitions, relative to take of the species. Instead, under Section 4(d) of the Act, the Secretary has discretion to issue regulations deemed to be necessary and advisable for the conservation of a threatened species. By regulation, the Secretary has determined that take prohibitions for endangered species are also applicable to threatened species unless a special rule is issued under section 4(d) for a particular threatened species. Under this 4(d) rule, we have applied several of the prohibitions specified in the Act for endangered species and the provisions of 50 CFR 17.32 (permit regulations) to the northern long-eared bat as described below.

For this 4(d) rule, the Service has completed a biological opinion under Section 7 of the Act on our action of finalizing this rule. In addition, the biological opinion provides for streamlined consultation for all federal agency actions that may affect the northern long-eared bat; therefore, the scope of the biological opinion included the finalization and implementation of the 4(d) rule. The biological opinion resulted in a non-jeopardy determination. Provided Federal action agencies follow the criteria outlined in this rule and implement the streamlined consultation process outlined in the biological opinion, their section 7 consultation requirements will be met. If unable to follow these criteria, standard section 7 procedures will apply.

Exceptions to the Purposeful Take Prohibition

We have exempted the purposeful take of northern long-eared bats related to the protection of human health and safety. A very small percentage of bats may be infected with rabies or other diseases that can be transmissible to humans. When there is the possibility that a person has been exposed to a diseased bat, it is important that they coordinate with medical professionals (*e.g.,* doctor, local health department) to determine the appropriate response. When warranted to protect human health and safety, we have exempted from the take prohibition of northern long-eared bats in defense of one's own life or the lives of others, including for public health monitoring purposes (*i.e.,* collecting a bat after human exposure and submitting for disease testing).

We have also exempted the purposeful take of northern long-eared bats related to removing the species from human structures, but only if the actions comply with all applicable State regulations. Northern long-eared bats have occasionally been documented roosting in human-made structures, such as houses, barns, pavilions, sheds, cabins, and bat houses (Mumford and Cope 1964, p. 480; Barbour and Davis 1969, p. 77; Cope and Humphrey 1972, p. 9; Amelon and Burhans 2006, p. 72; Whitaker and Mumford 2009, p. 209; Timpone et al. 2010, p. 119; Joe Kath 2013, pers. comm.). We conclude that the overall impact of bat removal from human structures is not expected to adversely affect conservation and recovery efforts for the species. In addition, we provide the following recommendations:

- Minimize use of pesticides (*e.g.,* rodenticides) and avoid use of sticky traps as part of bat evictions/exclusions.
- Conduct exclusions during spring or fall unless there is a perceived public health concern from bats present during summer and/or winter.
- Contact a nuisance wildlife specialist for humane exclusion techniques.

We have exempted the purposeful take that results from actions relating to capture, handling, and related activities for northern long-eared bats by individuals permitted to conduct these same activities for other species of bats until May 3, 2016. Under the interim rule, for a period of 1 year from the interim rule's effective date (May 3, 2016), we had exempted the purposeful take that is caused by the authorized capture, handling, and related activities (*e.g.,* attachment of radio transmitters for tracking) of northern long-eared bats by individuals permitted to conduct these same activities for other bats. We have continued the exemption through the expiration date established by the interim rule. After May 3, 2016, a permit pursuant to section 10(a)(1)(A) of the Act is required for the capture and handling of northern long-eared bats,except that associated with bat removal from human structures. We determined that it was important to regulate the intentional capture and handling of northern long-eared bats through the Act's scientific permit process to help ensure that the surveyor's qualifications and methods used are adequate to protect individual bats and provide reliable survey results.

Incidental Take Outside of the WNS Zone Not Prohibited

Incidental take in areas that have not yet been impacted by WNS (*i.e.,* in areas outside the WNS zone) is not prohibited by this final rule. We believe the level of take associated with on-going land management and development actions, including all actions that may incidentally take the northern long-eared bat, do not individually or cumulatively affect healthy bat populations. As noted in our decision to list the northern long-eared bat as a threatened species, WNS is the primary cause of the species' decline, and we would not have listed the northern long-eared bat if not for the impact of WNS. In addition, we conclude that regulating incidental take in areas not affected by WNS is not expected to change the rate at which WNS progresses across the range of the species. In other words, regulating incidental take outside the WNS zone will not influence the future impact of the disease throughout the species' range or the status of the species. For these reasons, we have concluded that the prohibition of incidental take outside of the WNS zone is not necessary and advisable for the protection and recovery of the species. Incidental take, therefore, is not prohibited outside of the WNS zone.

Prohibitions and Exemptions Related to Incidental Take Inside the WNS Zone

Our approach to designing the regulatory provisions for the northern long-eared bat inside the WNS zone reflects the significant role WNS plays as the central threat affecting the species. For other threatened species, habitat loss or other limiting factors usually contribute to the decline of a species. In these situations, regulations are needed to address either the habitat loss or the other limiting factors.

The northern long-eared bat is not habitat-limited and has demonstrated a great deal of plasticity within its environment (*e.g.,* living in highly fragmented forest habitats to contiguous forest blocks from the southern United States to Canada's Yukon Territory) in the absence of WNS. For the northern long-eared bat, land management and

development actions that have been ongoing for centuries (*e.g.*, forest management, forest conversion) have not been shown to have significant negative impacts to northern long-eared bat populations.

As WNS continues to move across the range of the species, northern long-eared bat populations have declined and will continue to decline. Declines in northern long-eared bat populations in WNS-positive regions have been significant, and northern long-eared bats are now relatively rare on those landscapes. As populations decline as a result of WNS, the chances of any particular activity affecting northern long-eared bats becomes more remote. Therefore, in the WNS zone, we focused the regulatory provisions on sensitive life stages at known, occupied maternity roost trees and hibernacula.

We developed regulations that provide some level of protection to the species where it persists in the face of WNS. However, we have provided flexibility so that the regulated public will seek to conserve the species and foster its recovery at sites where it has been lost should tools to address WNS become available or where the species shows signs of resilience. Further, because we believe recovery of this species will require many partnerships across the species' range, minimizing regulatory impacts on activities inconsequential to northern long-eared bat populations provides an important step in building partnerships for the species' recovery.

The northern long-eared bat is a forest-dependent species, typically roosting in trees. In establishing regulations that are necessary and advisable for the conservation of the species, we have tailored species-specific regulatory provisions toward potential impacts to trees. For the incidental take of bats outside of hibernacula, we have specifically established two sets of provisions: the first set applies to activities that do not involve tree removal and the second applies to activities that do involve tree removal. By tree removal, we mean cutting down, harvesting, destroying, trimming, or manipulating in any other way the trees, saplings, snags, or any other form of woody vegetation that is likely to be used by the northern long-eared bat.

In this final 4(d) rule, we have limited the prohibition of incidental take of northern long-eared bats to specific circumstances. This does not mean that all activities that could result in the incidental take of the northern long-eared bat will do so. The relative exposure of the species and the species response to a potential stressor are critical considerations in evaluating the potential for incidental take to occur. For example, under the discussion of tree removal, below, we describe what is prohibited by the final 4(d) rule in the WNS zone and provide examples of how other activities could be implemented in a way that avoids the potential for incidental take.

Hibernacula

Northern long-eared bats predominantly overwinter in hibernacula that include caves and abandoned mines. For additional details about the characteristics of the hibernacula selected by northern long-eared bats, see the final listing determination (80 FR 17974; April 2, 2015). Northern long-eared bats have shown a high degree of philopatry (using the same site over multiple years) for a hibernaculum (Pearson 1962, p. 30), although they may not return to the same hibernaculum in successive seasons (Caceres and Barclay 2000, p. 2).

Hibernacula are so significant to the northern long-eared bat that they are considered a primary driver in the species distribution (*e.g.*, Kurta 1982, p. 302). Northern long-eared bats are documented in hibernacula in 29 of the 37 states in the species' range. Other States within the species' range have no known hibernacula, which may reflect that no suitable hibernacula are present, a limited survey effort, or the northern long-eared bat's use of sites not previously identified as suitable.

In general, bats select hibernacula because they have characteristics that allow the bats to meet specific life-cycle requirements. Factors influencing a hibernaculum's suitability include its physical structure (*e.g.*, openings, interior space, depth), air circulation, temperature profile, and location relative to foraging sites (Tuttle and Stevenson 1978, pp. 108–121).

Overwinter survival can be a particularly challenging period in the northern long-eared bat's life cycle. Hibernating bats appear to balance their physical condition (*e.g.*, fat reserves upon entering hibernation), hibernacula characteristics (*e.g.*, temperature variation, humidity), social resources (*e.g.*, roosting singly or in groups), and metabolic condition (*i.e.*, degree of torpor, which is the state of mental or physical inactivity) to meet overwinter survival needs. The overwinter physiological needs of the species include maintaining body temperature above freezing, minimizing water loss, meeting energetic needs until prey again become available, and responding to disturbance or disease. Because of this complex interplay of hibernacula characteristics and bat physiology, changes to hibernacula can significantly impact their suitability as well as the survival of any hibernating bats.

In general, northern long-eared bats arrive at hibernacula in August or September, enter hibernation in October and November, and emerge from the hibernacula in March or April (Caire et al. 1979, p. 405; Whitaker and Hamilton 1998, p. 100; Amelon and Burhans 2006, p. 72). However, hibernation may begin as early as August (Whitaker and Rissler 1992b, p. 56). Northern long-eared bats have been observed moving among hibernacula throughout the winter (Griffin 1940a, p. 185; Whitaker and Rissler 1992a, p. 131; Caceres and Barclay 2000, pp. 2–3). Whitaker and Mumford (2009, p. 210) found that this species flies in and out of some mines and caves in southern Indiana throughout the winter.

Human disturbance of hibernating bats has long been considered a threat to cave-hibernating bat species like the northern long-eared bat. Modifications to bat hibernacula can affect the microclimate (*e.g.*, temperature, humidity) of the subterranean habitat, and thus the ability of the cave or mine to support hibernating bats, including the northern long-eared bat. Anthropogenic modifications to cave and mine entrances may not only alter flight characteristics and access (Spanjer and Fenton 2005, p. 1110), but may change airflow and alter internal microclimates of the caves and mines, eliminating their utility as hibernacula (Service 2007, p. 71). For example, Richter et al. (1993, p. 409) attributed the decline in the number of Indiana bats at Wyandotte Cave, Indiana (which harbors one of the largest known population of hibernating Indiana bats (*Myotis sodalis*)), to an increase in the cave's temperature resulting from restricted airflow caused by a stone wall erected at the cave's entrance. In addition to the direct access modifications to caves discussed above, debris buildup at entrances or on cave gates can also significantly modify the cave or mine site characteristics by restricting airflow and the course of natural water flow. Water-flow restriction could lead to flooding, thus drowning hibernating bats (Amelon and Burhans 2006, p. 72). Thomas (1995, p. 942) used infrared detectors to measure flight activity in hibernating northern long-eared bats and little brown bats in response to the presence of a human observer. Flight activity significantly increased with the presence of an observer, beginning within 30 minutes

of the visit, peaking 1.0 to 7.5 hours later, and remaining significantly above baseline level for 2.5 to 8.5 hours. These results suggest that hibernating bats are sensitive to non-tactile stimuli and arouse and fly following human visits. Boyles and Brack's (2009) model predicted that the survival rate of hibernating little brown bats drops from 96 percent to 73 percent with human visitations to hibernacula. Prior to the outbreak of WNS, Amelon and Burhans (2006, p. 73) indicated that "the widespread recreational use of caves and indirect or direct disturbance by humans during the hibernation period pose the greatest known threat to [the northern long-eared bat]."

Hibernacula and surrounding forest habitats play important roles in the life cycle of the northern long-eared bat beyond the time when the bats are overwintering. In both the early spring and fall, the hibernacula and surrounding forested habitats are the focus of bat activity in two separate periods referred to as "spring staging" and "fall swarming."

During the spring staging, bats begin to gradually emerge from hibernation, exit the hibernacula to feed, but re-enter the same or alternative hibernacula to resume daily bouts of torpor (Whitaker and Hamilton 1998, p. 100). The staging period for the northern long-eared bat is likely short in duration (Whitaker and Hamilton 1998, p. 100; Caire et al. 1979, p. 405). In Missouri, Caire et al. (1979, p. 405) found that northern long-eared bats moved into the staging period in mid-March through early May. In Michigan, Kurta et al. (1997, p. 478) determined that by early May, two-thirds of the *Myotis* species, including the northern long-eared bat, had dispersed to summer habitat.

Beginning in mid to late summer, after their young have gained some level of independence, northern long-eared bats exhibit a behavior near hibernacula referred to as swarming. Both male and female northern long-eared bats are present at swarming sites (often with other species of bats). During this period, heightened activity and congregation of transient bats around caves and mines is observed, followed later by increased sexual activity and bouts of torpor prior to winter hibernation (Fenton 1969, p. 601; Parsons et al. 2003, pp. 63–64; Davis and Hitchcock 1965, pp. 304–306). The purposes of swarming behavior may include introduction of juveniles to potential hibernacula, copulation, and stopping over sites on migratory pathways between summer and winter regions (Kurta et al. 1997, p. 479; Parsons et al. 2003, p. 64; Lowe 2012, p. 51; Randall and Broders 2014, pp. 109–110). The swarming season for some species of the genus *Myotis* begins shortly after females and young depart maternity colonies (Fenton 1969, p. 601). For the northern long-eared bat, the swarming period may occur between July and early October, depending on latitude within the species' range (Fenton 1969, p. 598; Kurta et al. 1997, p. 479; Lowe 2012, p. 86; Hall and Brenner 1968, p. 780; Caire et al. 1979, p. 405). The northern long-eared bat may investigate several cave or mine openings during the transient portion of the swarming period, and some individuals may use these areas as temporary daytime roosts or may roost in forest habitat adjacent these sites (Kurta et al. 1997, pp. 479, 483; Lowe 2012, p. 51). Little is known about northern long-eared bat roost selection outside of caves and mines during the swarming period (Lowe 2012, p. 6).

Based on the importance of hibernacula to northern long-eared bats, take is prohibited in and around the hibernacula within the WNS zone, including activities that may alter the hibernacula at any time of the year. Further, we have determined that when the conservation measures for the northern long-eared bat included in this final 4(d) rule are applied to areas within 0.25 mile (0.4 km) of the hibernacula, the potential for negative impacts to individuals is significantly reduced.

Activities Not Involving Tree Removal Are Not Prohibited

Under this final 4(d) rule, activities within the WNS zone not involving tree removal are not prohibited provided they do not result in the incidental take of northern long eared bats in hibernacula or otherwise impair essential behavioral patterns at known hibernacula. In our final listing determination (80 FR 17974; April 2, 2015), we identified a number of activities not involving tree removal that may have direct or indirect effects on northern long-eared bats. These activities have the potential to cause the incidental take of northern long-eared bats and include activities such as the operation of utility-scale wind-energy turbines, application of pesticides, and prescribed fire (this is not an exhaustive list; it is merely representative of activities that may result in take of northern long-eared bats).

At the time of our listing determination and the interim 4(d) rule (80 FR 17974; April 2, 2015), we stated that we had no compelling evidence that these activities would have significant effects on the northern long-eared bat when considered alone. However, we thought these factors may have a cumulative effect on this species when considered in concert with WNS. After additional consideration and our review of public comments received on the proposed and interim 4(d) rules, we did not find compelling evidence that regulating these potential cumulative effects would result in significant impacts at the species level. Effects to relatively small numbers of individuals are not anticipated to impair conservation efforts or the recovery potential of the species.

Wind-Energy Facilities

Wind-energy facilities are found scattered throughout the range of the northern long-eared bat, and many new facilities are anticipated to be constructed over the next 15 years (United States Department of Energy 2008, unpaginated). We reviewed post-construction mortality monitoring studies conducted at various times from 1998 through 2014 at 81 unique operating wind-energy facilities in the range of the northern long-eared bat in the United States and Canada (Service 2015, unpublished data). In these studies, 43 northern long-eared bat mortalities were documented at 19 of the sites. The northern long-eared bat fatalities comprised less than 1 percent of all documented bat mortalities. In most cases, the level of effort for most post-construction monitoring studies is not sufficient to confidently exclude the possibility that infrequent fatalities are being missed, but finding none or only small numbers over many sites and years can suggest the order of what may be missed. Thus while sustained mortality at particular facilities could potentially cause declines in local populations of the northern long-eared bat, if that is in fact occurring, it does not appear to be wide-spread at least when compared to other bat species which are nearly always found in fatality monitoring at wind facilities. At those sites with a northern long-eared bat fatality where multiple years of monitoring data were also available for review (n = 12), fatalities of northern long-eared bats were only reported in multiple years at two of the sites and for the other 10 sites only a single fatality was reported over multiple years of monitoring. For example, one site reported one northern long-eared bat fatality in 2008, but none in 2009, 2010, or 2011. Further, the number of fatalities of northern long-eared bats found at any given site has been relatively small (*e.g.*, most often a single fatality was found, but in all cases no more than six), and typically most sites (62 out of 81) found

no northern long-eared bat fatalities at all. There is a great deal of uncertainty related to extrapolating these numbers to generate an estimate of total northern long-eared bat mortality at wind-energy facilities due to variability in post-construction survey effort and methodology (Huso and Dalthorp 2014, pp. 546–547). Further, bat mortality can vary between years and between sites, and detected carcasses are only a small percentage of total bat mortalities. However, even with those limitations, northern long-eared bats were rarely detected as mortalities, even when they were known to be common on the landscape around the wind-energy facility.

We recognize that several wind energy facilities have completed, or are currently working to complete, habitat conservation plans (HCPs; permit pursuant to section 10(a)(1)(B) of the Act) for other listed bat species where the number of fatalities reported is also very low. When the take of an endangered species is reasonably certain to occur, we recommend that a project proponent secure incidental take coverage pursuant to section 10 of the Act. Over the operational life of a wind energy facility (typically anticipated to be at least 20 to 30 years), the take of listed species may be reasonably certain to occur, even if the level of mortalities annually is anticipated to be quite low. However, this does not mean that prohibiting that incidental take in the case of a threatened species is necessary and advisable for the conservation of such a species. For the northern long-eared bat, we do not anticipate that the fatalities that will be caused by wind energy would meaningfully change the species' status in the foreseeable future.

In addition, the wind industry has recently published best management practices establishing voluntary operating protocols, which they expect "to reduce impacts to bats from operating wind turbines by as much as 30 percent" (AWEA 2015, unpaginated). Given the large numbers of other bat species impacted by wind energy (Hein et al. 2013, p. 12) and the economic importance of bats in controlling agricultural or forest pest species (Boyles et al. 2011, pp. 41–42; Maine and Boyles, 2015, p. 12442), we anticipate that these new standards will be adopted by the wind-energy sector and ultimately required by wind-energy-siting regulators at State and local levels. We recommend that wind facilities adopt these operating protocols.

Our primary reason for not establishing regulatory criteria for wind-energy facilities is that the best available information does not indicate significant impacts to northern long-eared bats from such operations. We conclude that there may be adverse effects posed by wind-energy development to individual northern long-eared bats; however, there is no evidence suggesting that effects from wind-energy development has led to significant declines in this species, nor is there evidence that regulating the incidental take that is occurring would meaningfully change the conservation or recovery potential of the species in the face of WNS. Furthermore, with the adoption by wind-energy facilities of the new voluntary standards, risk to all bats, including the northern long-eared bat, should be further reduced.

Environmental Contaminants

Environmental contaminants, in particular insecticides, pesticides, and inorganic contaminants, such as mercury and lead, may also have detrimental effects on individual northern long-eared bats. However, across the wide-range of the species, it is unclear whether environmental contaminants, regardless of the source (*e.g.*, pesticide applications, industrial waste-water), would be expected to cause population-level impacts to the northern long-eared bat either independently or in concert with WNS. Historically, the most intensively-studied contaminants in bats have been the organochlorine insecticides (OCs; O'Shea and Clark 2002, p. 238). During wide-spread use of OCs in the 1960s and 1970s, lethal pesticide poisoning was demonstrated in gray bats (*Myotis grisescens*), Mexican free-tailed bats (*Tadarida brasiliensis*), and Indiana bats (*Myotis sodalis*) (O'Shea and Clark 2002, p. 239, 242). Since the phasing out of OCs in the United States, the effects of chemical contaminants on bats have been less well studied (O'Shea and Johnston 2009, p. 501); however, a few recent studies have demonstrated the accumulation of potentially toxic elements and chemicals in North American bats. For instance, Yates et al. (2014, pp. 48–49) quantified total mercury (Hg) levels in 1,481 fur samples and 681 blood samples from 10 bat species captured across 8 northeastern U.S. States and detected the highest Hg levels in tri-colored bats (*Perimyotis subflavus*), little brown bats (*Myotis lucifugus*) and northern long-eared bats. More recently, Secord et al. (2015) analyzed tissue samples from 48 northeastern bat carcasses of four species, including northern long-eared bats, and detected accumulations of several contaminants of emerging concern (CECs), including most commonly polybrominated diphenyl ethers (PDBEs; 100 percent of samples), salicylic acid (81 percent), thiabendazole (50 percent), and caffeine (23 percent). Digoxigenin, ibuprofen, warfarin, penicillin V, testosterone, and N,N-diethyl-meta-toluamide (DEET) were also present in at least 15 percent of samples. Compounds with the highest concentrations were bisphenol A (397 ng/g), PDBE congeners 28, 47, 99, 100, 153, and 154 (83.5 ng/g), triclosan (71.3 n/g), caffeine (68.3 ng/g), salicylic acid (66.4 ng/g), warfarin (57.6 ng/g), sulfathiazole (55.8 ng/g), tris(1-chloro-2-propyl) phosphate (53.8 ng/g), and DEET (37.2 ng/g).

Although there is the potential for direct and indirect contaminant-related effects, mortality or other population-level impacts have not been reported for northern long-eared bats. Long-term sublethal effects of environmental contaminants on bats are largely unknown; however, environmentally relevant exposure levels of various contaminants have been shown to impair nervous system, endocrine, and reproductive functioning in other wildlife (Yates et al. 2014, p. 52; Köhler and Triebskorn 2013, p. 761; Colborn et al. 1993, p. 378). Moreover, bats' high metabolic rates, longevity, insectivorous diet, migration-hibernation patterns of fat deposition and depletion, and immune impairment during hibernation, along with potentially exacerbating effects of WNS, likely increase their risk of exposure to and accumulation of environmental toxins (Secord et al. 2015, p. 411, Yates et al. 2014, p. 46, Geluso et al. 1976, p. 184; Quarles 2013, p. 4, O'Shea and Clark 2002, p. 238). Following WNS-caused population declines in northeastern little brown bats, Kannan et al. (2010) investigated whether exposure to toxic contaminants could be a contributing factor in WNS-related mortality. Although high concentrations of polychlorinated biphenyls (PCBs), PBDEs, polybrominated biphenyls (PBBs), and chlordanes were found in the fat tissues of WNS-infected bats in New York, relative concentrations in bats from an uninfected population in Kentucky were also high (Kannan et al. 2010, p. 615). The authors concluded that the study's sample sizes were too small to accurately associate contaminant exposure with the effects of WNS in bats (Kannan et al. 2010, p. 618), but argued that additional research is needed. Despite the lack of knowledge on the effects of various contaminants on northern long-eared bats, we recognize the potential for direct and indirect consequences.

However, contaminant-related mortality has not been reported for northern long-eared bats. Additionally, Ingersoll (2013, p. 9) suggested it was unclear what other threats or combination of threats other than WNS (*e.g.*, changes to critical roosting or foraging habitat, collisions, effects from chemicals) may be responsible for recent bat declines.

Prescribed Fire

Prescribed fire is a useful forest-management tool. However, there are potential negative effects from prescribed burning, including direct mortality to the northern long-eared bat. Therefore, when using prescribed burning as a management tool, fire frequency, timing, location, and intensity all need to be considered to lower the risk of incidental take of bats. Carter et al. (2002, pp. 140–141) suggested that the risk of direct injury and mortality to southeastern forest-dwelling bats resulting from summer prescribed fire is generally low. During warm temperatures, bats are able to arouse from short-term torpor quickly. Northern long-eared bats use multiple roosts, switch roost trees often, and could likely use alternative roosts in unburned areas, should fire destroy the current roost. Non-volant pups are likely the most vulnerable to death and injury from fire. Although most eastern bat species are able to carry their young for some time after they are born (Davis 1970, pp. 187–189), the degree to which this behavior would allow females to relocate their young if fire threatens the nursery roost is unknown. The potential for death or injury resulting from prescribed burning depends largely on site-specific circumstances, *e.g.*, fire intensity near the maternity roost tree and the height above ground of pups in the maternity roost tree. Not all fires through maternity roosting areas will kill or injure all pups present.

Bats are known to take advantage of fire-killed snags and continue roosting in burned areas. Boyles and Aubrey (2006, pp. 111–112) found that, after years of fire suppression, initial burning created abundant snags, which evening bats (*Nycticeius humeralis*) used extensively for roosting. Johnson et al. (2010, pp. 115) found that after burning, male Indiana bats roosted primarily in fire-killed maples. In the Daniel Boone National Forest, Lacki et al. (2009, p. 5) radio-tracked adult female northern long-eared bats before and after prescribed fire, finding more roosts (74.3 percent) in burned habitats than in unburned habitats. Burning may create more suitable snags for roosting through exfoliation of bark (Johnson et al. 2009a, p. 240), mimicking trees in the appropriate decay stage for roosting bats. In addition to creating snags and live trees with roost features, prescribed fire may enhance the suitability of trees as roosts by reducing adjacent forest clutter. Perry et al. (2007, p. 162) found that five of six species, including northern long-eared bat, roosted disproportionately in stands that were thinned and burned 1 to 4 years prior but that still retained large overstory trees.

The use of prescribed fire, where warranted, will, in any given year, impact only a small proportion of the northern long-eared bat's range during the bats active period. In addition, there are substantial benefits of prescribed fire for maintaining forest ecosystems. For example, the U.S. Forest Service's Southern Region manages approximately 10.9 million acres (4.4 million hectares (ha)) of land, and the maximum estimate of acres where prescribed fire is employed annually during the active period of northern-long eared bats (April through October) was 320,577 acres (129,732 ha), which is less than 3 percent of the National Forest regional lands. Similarly, the Forest Service's Eastern Region manages 15 Forests in 13 States that include about 12.2 million acres (4.88 million ha), of which 11.3 million acres (4.52 million ha) are forested habitat. The U.S. Forest Service anticipates applying prescribed burning to 107,684 acres (43,073 ha) or about 1percent of the forested habitat across the eastern region annually. In addition, only 17,342 acres (6937 ha) (*i.e.*, 0.15 percent of the forested habitat) of prescribed burning annually is anticipated to occur during the non-volant period on the eastern forests.

Further, there are substantial benefits of prescribed fire for maintaining forest ecosystems, such as providing the successional and disturbance processes that renew the supply of suitable roost trees (Silvis et. al. 2012, pp.6–7), as well as helping to ensure a varied and reliable prey base (Dodd et. al. 2012, p. 269). There is no evidence that prescribed fire has led to population-level declines in this species nor is there evidence that regulating the incidental take that might occur would meaningfully change the conservation status or recovery potential of the species in the face of WNS.

Hazardous Tree Removal Is Not Prohibited

Under this final 4(d) rule, incidental take that is caused by removal and management of hazardous trees is not prohibited. The removal of these hazardous trees may be widely dispersed, but limited, and should result in very minimal incidental take of northern long-eared bats. We recommend, however, that removal of hazardous trees be done during the winter, wherever possible, when these trees will not be occupied by northern long-eared bats. We conclude that the overall impact of removing hazardous trees is not expected to adversely affect conservation and recovery efforts for the species.

Activities Involving Tree Removal

We issued the interim species-specific rule under section 4(d) of the Act in recognition that WNS is the primary threat to the species' continued existence. We further recognized that all other (non-WNS) threats cumulatively were not impacting the species at the population level. Therefore, we apply the take prohibitions only to activities that we have determined may impact the species in its most vulnerable life stages, allowing for management flexibility and a limited regulatory burden.

In this final 4(d) rule, we have determined that the conservation of the northern long-eared bat is best served by limiting the prohibitions to the most vulnerable life stages of the northern long-eared bat (*i.e.*, while in hibernacula or in maternity roost trees) within the WNS zone and to activities, tree removal in particular, that are most likely to affect the species. We have also revised some of the conservation measures. To further simplify the regulation, we have established separate prohibitions for activities involving tree removal and those that do not involve tree removal. Within the WNS zone incidental take outside of hibernacula that results from tree removal is only prohibited when it (1) Occurs within 0.25 miles (0.4 km) of known northern long-eared bat hibernacula; or (2) cuts or destroys known occupied maternity roost trees, or any other trees within a 150-foot (45-meter) radius from the known occupied maternity trees, during the pup season (June 1 through July 31).

Forest Management

Forest management maintains forest habitat on the landscape, and the impacts from management activities are, for the most part, temporary in nature. Forest management is the practical application of biological, physical, quantitative, managerial, economic, social, and policy principles to the regeneration, management, utilization, and conservation of forests to meet specified goals and objectives (Society of American Foresters, *http://dictionaryofforestry.org/dict/term/forest_*

management). It includes a broad range of silvicultural practices and this discussion specifically addresses tree-removal practices (*e.g.*, timber harvest) associated with forest management. Timber harvesting includes a wide variety of practices from selected removal of individual trees to clearcutting. Impacts to northern long-eared bats from forest management would be expected to range from positive (*e.g.*, maintaining or increasing suitable roosting and foraging habitat within northern long-eared bat home ranges) to neutral (*e.g.*, minor amounts of forest removal, forest management in areas outside northern long-eared bat summer home ranges, forest management away from hibernacula) to negative (*e.g.*, death of adult females or pups or both resulting from the removal of maternity roost trees).

The best available data indicate that the northern long-eared bat shows a varied degree of sensitivity to timber-harvesting practices. For example, Menzel et al. (2002, p. 112) found northern long-eared bats roosting in intensively managed stands in West Virginia, indicating that there were sufficient suitable roosts (primarily snags) remaining for their use. At the same study site, Owen et al. (2002, p. 4) concluded that northern long-eared bats roosted in areas with abundant snags, and that in intensively managed forests in the central Appalachians, roost availability was not a limiting factor. Northern long-eared bats often chose black locust and black cherry as roost trees, which were quite abundant and often regenerate quickly after disturbance (*e.g.*, timber harvest). Similarly, Perry and Thill (2007, p. 222) tracked northern long-eared bats in central Arkansas and found roosts were located in eight forest classes with 89 percent occurring in three classes of mixed pine-hardwood forest. The three classes of mixed pine-hardwood forest that supported the majority of the roosts were partially harvested/thinned, unharvested (50 to 99 years old), and group-selection harvested (Perry and Thill 2007, pp. 223–224).

Certain levels of timber harvest may result in canopy openings, which could result in more rapid development of young bats. In central Arkansas, Perry and Thill (2007, pp. 223–224) found female bat roosts were more often located in areas with partial harvesting than males, with more male roosts (42 percent) in unharvested stands than female roosts (24 percent). They postulated that females roosted in relatively more open forest conditions because they may receive greater solar radiation, which may increase developmental rates of young or permit young bats a greater opportunity to conduct successful initial flights (Perry and Thill 2007, p. 224). Cryan et al. (2001, p. 49) found several reproductive and non-reproductive female northern long-eared bat roost areas in recently harvested (less than 5 years) stands in the Black Hills of South Dakota in which snags and small stems (diameter at breast height (dbh)) of 2 to 6 inches (5 to 15 centimeters) were the only trees left standing; however, the largest colony (n = 41) was found in a mature forest stand that had not been harvested in more than 50 years.

Forest size and continuity are also factors that define the quality of habitat for roost sites for northern long-eared bats. Lacki and Schwierjohann (2001, p. 487) stated that silvicultural practices could meet both male and female roosting requirements by maintaining large-diameter snags, while allowing for regeneration of forests. Henderson et al. (2008, p. 1825) also found that forest fragmentation affects northern long-eared bats at different scales based on sex; females require a larger unfragmented area with a large number of suitable roost trees to support a colony, whereas males are able to use smaller, more fragmented areas. Henderson and Broders (2008, pp. 959–960) examined how female northern long-eared bats use the forest-agricultural landscape on Prince Edward Island, Canada, and found that bats were limited in their mobility and activities are constrained when suitable forest is limited. However, they also found that bats in a relatively fragmented area used a building for colony roosting, which suggests an alternative for a colony to persist in an area with fewer available roost trees.

In addition to impacts on roost sites, we considered effects of forest-management practices on foraging and traveling behaviors of northern long-eared bats. In southeastern Missouri, the northern long-eared bat showed a preference for contiguous tracts of forest cover (rather than fragmented or wide open landscapes) for foraging or traveling, and different forest types interspersed on the landscape increased likelihood of occupancy (Yates and Muzika 2006, p. 1245). Similarly, in West Virginia, female northern long-eared bats spent most of their time foraging or travelling in intact forest, diameter-limit harvests (70 to 90 year-old stands with 30 to 40 percent of basal area removed in the past 10 years), and road corridors, with no use of deferment harvests (similar to clearcutting) (Owen et al. 2003, p. 355). When comparing use and availability of habitats, northern long-eared bats preferred diameter-limit harvests and forest roads. In Alberta, Canada, northern long-eared bats avoided the center of clearcuts and foraged more in intact forest than expected (Patriquin and Barclay 2003, p. 654). On Prince Edward Island, Canada, female northern long-eared bats preferred open areas less than forested areas, with foraging areas centered along forest-covered creeks (Henderson and Broders 2008, pp. 956–958). In mature forests in South Carolina, 10 of the 11 stands in which northern long-eared bats were detected were mature stands (Loeb and O'Keefe 2006, p. 1215). Within those mature stands, northern long-eared bats were more likely to be recorded at points with sparse or medium vegetation rather than points with dense vegetation, suggesting that some natural gaps within mature forests can provide good foraging habitat for northern long-eared bats (Loeb and O'Keefe 2006, pp. 1215–1217). However, in southwestern North Carolina, Loeb and O'Keefe (2011, p. 175) found that northern long-eared bats rarely used forest openings, but often used roads. Forest trails and roads may provide small gaps for foraging and cover from predators (Loeb and O'Keefe 2011, p. 175). In general, northern long-eared bats appear to prefer intact mixed-type forests with small gaps (*i.e.*, forest trails, small roads, or forest-covered creeks) in forest with sparse or medium vegetation for forage and travel rather than fragmented habitat or areas that have been clearcut.

Impacts to northern long-eared bats from forest management would be expected to vary depending on the timing of tree removal, location (within or outside northern long-eared bat home range), and extent of removal. While bats can flee during tree removal, removal of occupied roosts (during spring through fall) may result in direct injury or mortality to some percentage of northern long-eared bats. This percentage would be expected to be greater if flightless pups or inexperienced flying juveniles were also present. Forest management outside of northern long-eared bat summer home ranges or away from hibernacula would not be expected to affect the conservation of the species.

Forest management is not usually expected to result in a permanent loss of suitable roosting or foraging habitat for northern long-eared bats. On the contrary, forest management is expected to maintain a forest over the long term for the species. However, localized temporary reductions in suitable roosting and/or foraging habitat can occur from various forest practices (*e.g.*,

clearcuts). As stated above, northern long-eared bats have been found in forests that have been managed to varying degrees, and as long as there is sufficient suitable roosting and foraging habitat within their home range and travel corridors between those areas, we would expect northern long-eared bat colonies to continue to occur in managed landscapes. However, in areas with WNS, northern long-eared bats may be less resilient to stressors and maternity colonies are smaller. Given the low inherent reproductive potential of northern long-eared bats (one pup per female per year), death of adult females or pups or both during tree felling could reduce the long-term viability of some of the WNS-impacted colonies if they are also in the relatively small percentage of forest habitat directly affected by forest management.

As we documented in the interim 4(d) rule, forestry management and silviculture are vital to the long-term survival and recovery of the species. Based on information obtained during comment periods, approximately 2 percent of forests in States within the range of the northern long-eared bat are impacted by forest management activities annually (Boggess et al., 2014, p.9). Of this amount, in any given year, a smaller fraction of forested habitat would be impacted during the active season when female bats and pups are most vulnerable. Therefore, we have determined that when the prohibitions for the northern long-eared bat included in this final 4(d) rule are applied to forest management activities, the potential impacts will be significantly reduced.

Forest Conversion

In our listing determination for the northern long-eared bat, we noted that current and future forest conversion may have negative additive impacts where the species has been impacted by WNS (80 FR 17991; April 2, 2015). Our assessment was based largely on the species' summer-home-range fidelity and the potential for increased energetic demands for individuals where the loss of summer habitat had been removed or degraded (*e.g.*, fragmentation). We noted that forest conversion "can result in a myriad of effects to the species, including direct loss of habitat, fragmentation of remaining habitat, and direct injury or mortality" (80 FR 17993; April 2, 2015). In the interim 4(d) rule we exempted most forest-management activities except for the conversion of mature hardwood or mixed forest into intensively managed monoculture-pine plantation stands, or non-forested landscape (80 FR 18025; April 2, 2015).

Many of the comments on the proposed and interim 4(d) rules noted that habitat is not limiting for the northern long-eared bat. As we documented in the final listing determination (80 FR 1802; April 2, 2015), the extent of conversion from forest to other land cover types has been fairly consistent with conversion to forest (cropland reversion/plantings). Further, the recent past and projected amounts of forest loss to conversion was, and is anticipated to be, only a small percentage of the total amount of forest habitat. For example by 2060, 4 to 8 percent of the forested area found in 2007 across the conterminous United States is expected to be lost (U.S Forest Service 2012, p. 12). The northern long-eared bat has been documented to use a wide variety of forest types across its wide range. Therefore, we agree that the availability of forested habitat does not now, nor will it likely in the future, limit the conservation of the northern long-eared bat.

We have determined that when the prohibitions for the northern long-eared bat included in this final 4(d) rule are applied to forest-conversion activities, the potential for negative additive impacts to individuals or colonies is significantly reduced. As WNS impacts bat populations, unoccupied, suitable forage and roosting habitat will be increasingly available for remaining bats.

Tree-Removal Conservation Measures

Under this final 4(d) rule, incidental take within the WNS zone involving tree removal is not prohibited if two conservation measures are followed. The first measure is the application of a 0.25 mile (0.4 km) buffer around known occupied northern long-eared bat hibernacula. The second conservation measure is that the activity does not cut or destroy known occupied maternity roost trees, or any other trees within a 150-foot (45-m) radius around the maternity roost tree, during the pup season (June 1 through July 31). The rationale for these measures is discussed below.

Conservation Measure 1: Tree Removal Near Known Northern Long-eared Bat Hibernacula

"Known hibernacula" are defined as locations where one or more northern long-eared bats have been detected during hibernation or at the entrance during fall swarming or spring emergence. Given the documented challenges of surveying for northern long-eared bats in the winter (use of cracks, crevices that are inaccessible to surveyors), any hibernacula with northern long-eared bats observed at least once, will continue to be considered "known hibernacula" as long as the hibernacula remains suitable for the northern long-eared bat. A hibernaculum remains suitable for northern long-eared bats even when *Pd* or WNS has been detected.

We have adopted the 0.25-mile (0.4-km) buffer around known northern long-eared bat hibernacula for several reasons: (1) It will help to protect microclimate characteristics of the hibernacula; (2) for many known hibernacula, bats use multiple entrances that may not be reflected in the primary location information (*e.g.*, bats may use other smaller entrances that are often spread out from the main entrance accessed for surveys or other purposes) and the hibernacula may have extensive underground features that extend out from known entrances; (3) in the late summer and fall when bat behavior begins to center on hibernacula (swarming), it appears that northern long-eared bats may roost in a widely dispersed area, which may reduce the potential that any activity outside of this buffer would significantly affect the species; (4) outside of the maternity period, northern long-eared bats have demonstrated the ability to adapt to forest-management-related and other types of disturbances; and (5) regardless of the buffer size, bats will remain fully protected from take while in the hibernacula, when they are most vulnerable.

The microclimate, temperature, humidity, and air and water flow within a hibernaculum are all important variables that could potentially be impacted by forest management or other activities when conducted in proximity to a hibernaculum. A 0.25-mile (0.4-km) buffer will protect the hibernaculum's microclimate. Studies that have evaluated the depth of edge influence from forest edge or tree removal on temperature, humidity, wind speed, and light penetration suggest that although highly variable among forest types and other site-specific factors (such as aspect and season), the depth of edge influence can range from 164 feet (50 m) (Matlack 1993, p. 193) to over 1,312 feet (400 m) (Chen et al. 1995, p. 83). However, the hibernacula often selected by northern long-eared bats are "large, with large passages" (Raesly and Gates 1987, p. 20), and may be less affected by relatively minor surficial micro-climatic changes that might result from the limited exempted activities outside of the 0.25-mile (0.4-km) buffer. Further, bats rarely hibernate near the entrances of structures (Grieneisen 2011, p. 10), as these areas can be subject to greater

predation (Grieneisen 2011, p. 10; Kokurewicz 2004, p. 131) and daily temperature fluctuations (Grieneisen 2011, p. 10). Davis et al. (1999, p. 311) reported that partial clearcutting ''appears not to affect winter temperatures deep in caves.'' Caviness (2003, p. 130) reported that prescribed burns were found to have no notable influence on bats hibernating in various caves in the Ozark National Forest. All bats present in caves at the beginning of the burn were still present and in ''full hibernation'' when the burn was completed, and bat numbers increased in the caves several days after the burn. There were minute changes in relative humidity and temperature during the burn, and elevated short-term levels of some contaminants from smoke were noted.

Northern long-eared bat hibernacula can be large and complex and, spatially, may not be fully represented in locational information contained in species records by State or Federal agencies or by natural heritage programs. A 0.25-mile (0.4-km) buffer will help protect the spatial extent of many known hibernacula. For example, one limestone mine in Ohio used by northern long-eared bats had approximately 44 miles (71 km) of passages and multiple entrances (Brack 2007, p. 740). In northern Michigan, bats (including northern long-eared bats) occupied mines that were more structurally complex and longer (1,007 ft ± 2,837 ft (307m ± 865 m) than mines that were unoccupied, and the occupied mines had a total length of passages that ranged from 33 feet to 4 miles (10 meters to 6.4 kilometers) (Kurta and Smith 2014, p. 592).

Only a relatively small proportion of the areas where swarming northern long-eared bats may occur are likely to be affected by tree-removal activity. There are over 1,500 known hibernacula for the species in the United States (Service 2015, unpublished data), several known in Canada, and potentially many others yet to be identified. Lowe (2012, p. 58) reported that the roosts of northern long-eared bats were evenly distributed over distances within 4.6 miles (7.3 km) from a swarming site. If the northern long-eared bat's potential swarming habitat (including foraging habitat during that period) can be approximated as the forest habitat within 5 miles (8.1 km) of hibernacula, that equates to a 50,265 acre (20,342 ha) area per hibernaculum. In any given year, only a small proportion of the forest habitat within the potential swarming habitat is likely to be impacted by tree-removal activities (*e.g.*, generally 2 percent of forests are managed in any given year and over 1,500 hibernacula documented as used by the species). Similarly, forest conversion is anticipated to be relatively small compared to available habitat; therefore, based on our current understanding of potential swarming-habitat, on the scale of 50,000 acres (20,342ha) per hibernaculum, the relatively small foot-print of activities not prohibited by this final rule are unlikely to affect the conservation or recovery potential of the species. Raesly and Gates (1987, p. 24) evaluated external habitat characteristics of hibernacula and reported that for the northern long-eared bat the percentage of cultivated fields within 0.6 miles (1 km) of the hibernacula was greater (52.6 percent) for those caves used by the species, than for those caves not used by the species (37.7 percent), suggesting that the removal of some forest around a hibernacula can be consistent with the species needs.

Outside of the maternity period, northern long-eared bats have demonstrated the ability to respond successfully to forest-management-related and other types of disturbances. Therefore, the limited disturbance associated with incidental-take exceptions outside of the 0.25-mile (0.4-km) buffer on hibernacula is consistent with the conservation of the species. For example, Silvis et al.'s (2015, p.1) experimental removal of roosts suggested that the ''loss of a primary roost or 20 percent of secondary roosts in the dormant season may not cause northern long-eared bats to abandon roosting areas or substantially alter some roosting behaviors in the following active season when tree-roosts are used.''

Prior to WNS, the most significant risk identified for northern long-eared bat conservation was direct human disturbance while bats are hibernating (*e.g.*, Olson et al. 2011, p. 228; Bilecki 2003, p. 55; Service 2012, unpublished data). This final 4(d) rule (within the WNS zone) addresses these impacts.

We have prohibited incidental take of northern long-eared bats under specific tree-removal circumstances; however, that does not mean that all activities involving tree-removal activities within the 0.25-mile (0.4-k) buffer of hibernacula will result in take. For example, a timber harvest might be conducted within 0.25 miles (0.4 km) of a hibernaculum at a time when bats are unlikely to be roosting in trees within the buffer (*e.g.*, winter), which fully protects any bats in the hibernaculum as well as the hibernaculum's suitability for bats (*i.e.*, access, microclimate), and does not significantly change the suitability of the habitat for foraging by northern long-eared bats or perhaps even improves prey availability. In such a case, the timber harvest, although closer than 0.25 miles (0.4 km) to the hibernaculum, is not likely to result in incidental take so we would not recommend that the harvester seek authorization for incidental take pursuant to the Act. For activities planned within 0.25 miles (0.4 km) of hibernaculum, we encourage you to contact the local Ecological Services Field Office (*http://www.fws.gov/offices*) to help evaluate the potential for take of northern long-eared bats.

Conservation Measure 2: Tree Removal Near Known Maternity Roost Trees

Female northern long-eared bats roost communally in trees in the summer (Foster and Kurta 1999, p. 667) and exhibit fission-fusion behavior (Garroway and Broders 2007, p. 961), where members frequently roost together (fusion), but the composition and size of the groups is not static, with individuals frequently departing to be solitary or to form smaller or different groups (fission) (Barclay and Kurta 2007, p. 44). As part of this behavior, northern long-eared bats switch tree roosts often (Sasse and Pekins 1996, p. 95), typically every 2 to 3 days (Foster and Kurta 1999, p. 665; Owen et al. 2002, p. 2; Carter and Feldhamer 2005, p. 261; Timpone et al. 2010, p. 119). In Missouri, the longest time spent roosting in one tree was 3 nights (Timpone et al. 2010, p. 118). Bats switch roosts for a variety of reasons, including temperature, precipitation, predation, parasitism, sociality, and ephemeral roost sites (Carter and Feldhamer 2005, p. 264).

Maternity colonies, consisting of females and young, are generally small, numbering from about 30 (Whitaker and Mumford 2009, p. 212) to 60 individuals (Caceres and Barclay 2000, p. 3); however, one group of 100 adult females was observed in Vermilion County, Indiana (Whitaker and Mumford 2009, p. 212) and Lereculeur (2013, p. 25) documented a colony of at least 116 northern long-eared bats. In West Virginia, maternity colonies in two studies had a range of 7 to 88 individuals (Owen et al. 2002, p. 2) and 11 to 65 individuals, with a mean size of 31 (Menzel et al. 2002, p. 110). Lacki and Schwierjohann (2001, p. 485) found that the number of bats within a given roost declined as the summer progressed. Pregnant females formed the largest aggregations (mean=26) and post-lactating females formed the smallest aggregation (mean=4). Their largest overall reported colony size was 65 bats.

Northern long-eared bats change roost trees frequently, but use roost areas repeatedly and to a lesser extent, reuse specific roosts (*e.g.*, Cryan et al. 2001, p. 50; Foster and Kurta 1999, p. 665). The northern long-eared bat appears to be somewhat flexible in tree-roost selection, selecting varying roost tree species and types of roosts throughout its range. Females tend to roost in more open areas than males, likely due to the increased solar radiation, which aids pup development (Perry and Thill 2007, p. 224). Fewer trees surrounding maternity roosts may also benefit juvenile bats that are starting to learn to fly (Perry and Thill 2007, p. 224). Female roost-site selection, in terms of canopy cover and tree height, changes depending on reproductive stage; relative to pre- and post-lactation periods, lactating northern long-eared bats have been shown to roost higher in tall trees situated in areas of relatively less canopy cover and lower tree density (Garroway and Broders 2008, p. 91).

The northern long-eared bat's tendency for frequent roost switching may help them avoid or respond effectively to disturbance by people outside of the maternity season. The frequent-roost-switching behavior of northern long-eared bat suggests that they are adapted to responding quickly to changes in roost availably (ephemeral roosts), changing environmental conditions (temperature), prey availability, or physiological needs (torpor, reproduction). In a study of radio-tracked northern long-eared bats responding to the disturbance from prescribed fire (Dickinson et al. 2009, pp. 55–57), the bats appeared "to limit their exposure to conditions created by fire. At no point did they fly outside of their typical home range area, nor did they travel far from the burn itself." While some of the bats soon returned to areas recently burned, by day 6 and 7 post burn, they "appeared to return to pre-burn norms in terms of emergence time, length of foraging bouts, and use of the burn unit and adjacent habitats." Carter et al. (2000, pp 139–140), noted that "During the summer months, bats are able to arouse quickly as the difference between the ambient temperature and active body temperature of bats is less. Most bat species utilizing trees and snags have multiple roosts throughout the forest (Sasse and Pekins 1996; Callahan et al. 1997; Menzel et al. 1998; Foster and Kurta 1999, Menzel et al. 2001), providing alternate roosts should the current roost be destroyed by fire." Sparks et al. (2008, pp. 207–208) documented that northern long-eared bats released in the open during the day demonstrated a successful rapid "flight-to-cover" response.

Adult females give birth to a single pup (Barbour and Davis 1969, p. 104). Birthing within the colony tends to be synchronous, with the majority of births occurring around the same time (Krochmal and Sparks 2007, p. 654). Parturition (birth) likely occurs in late May or early June (Caire et al. 1979, p. 406; Easterla 1968, p. 770; Whitaker and Mumford 2009, p. 213), but may occur as late as July (Whitaker and Mumford 2009, p. 213). Upon birth, the pups are unable to fly, and females return to nurse the pups between foraging bouts at night. In other *Myotis* species, mother bats have been documented carrying flightless young to a new roosting location (Humphrey et al. 1977, p. 341). The ability of a mother to move young may be limited by the size of the growing pup. Juvenile volancy (flight) often occurs by 21 days after birth (Krochmal and Sparks 2007, p. 651; Kunz 1971, p. 480) and has been documented as early as 18 days after birth (Krochmal and Sparks 2007, p. 651). Prior to gaining the ability to fly, juvenile bats are particularly vulnerable to tree-removal activities. Based on this information, we have determined that the most sensitive period to protect pups at maternity roost trees is from June 1 through July 31 (the "pup season").

Known occupied maternity roost trees are defined as trees that have had female northern long-eared bats or juvenile bats tracked to them or the presence of female or juvenile bats is known as a result of other methods. Once documented, northern-long eared bats are known to continue to use the same roosting areas. Therefore, a tree will be considered to be a "known, occupied maternity roost" as long as the tree and surrounding habitat remain suitable for northern long-eared bats. The incidental take prohibition for known, occupied maternity roosts trees applies only during the during the pup season (June 1 through July 31).

In addition to protecting the known roosts, we have also included in this conservation measure avoiding the cutting or destroying of any other trees within a 150-foot (45-meter) radius from the known, occupied maternity roost tree during the pup season (June 1 through July 31). Leaving a buffer of other trees around the maternity roost tree will help to protect the roost tree from damage or destruction that may be caused by other nearby trees being removed as well as helping protect the roost tree from wind throw and micro-climate changes. O'Keefe (2009 p. 42) documented that a 39-foot (12-meter) buffer around a maternity roost tree during a harvest in May allowed the roost to be successfully used through late July and that one buffered tree was used 2 years in a row. We have adopted a standard for exception of take that is almost four times that which proved effective in this example, in order to better account for the variation in forest types used by the northern long-eared bat and a variety of slopes that might influence how large a buffer may need to be in order to prove effective. Roost trees used by northern long-eared bats are often in fairly close proximity to each other within the species' summer home range. For female northern long-eared bats, the mean distance between roosts was reported as 63m to 600m from a variety of studies published 1996 through 2014 (Foster and Kurta 1999 p. 665; Cryan et al. 2001, p. 46; Swier 2003, pp. 58–59; Jackson 2004, p. 89; Henderson and Broders 2008, p. 958; Johnson et al. 2009, p. 240; Badin 2014, p. 76; Bohrman and Fecske, unpublished data). Further, within that data, the distance between roosts was reported as small as 5 meters in one study (Badin 2014, p. 76) and 36 meters in another (Jackson 2004, p. 89). As Sasse 1995, p. 23, noted "some roost sites appeared to be 'clustered' together." Therefore, even this modest additional buffer may also protect other roosts trees used by female northern long-eared bats during the maternity period that have not yet been documented. In addition, because colonies occupy more than one maternity roost in a forest stand and individual bats frequently change roosts, in some cases a portion of a colony or social network is likely to be protected by multiple 150-foot buffers during the maternity season.

Currently, since most States and natural heritage programs do not track roosts and many have not tracked any northern long-eared bat occurrences, we recognize that not all northern long-eared bat maternity roost sites are known. Therefore, this measure will not protect an unknown maternity roosts unless it falls under one of the buffers related to protecting a known roost or hibernaculum.

Although not fully protective of every individual, the conservation measures identified in this final rule help protect maternity colonies. This final species-specific rule under section 4(d) of the Act provides the regulatory flexibility for certain activities to occur that have not been the cause of the species' imperilment, while allowing us to focus conservation efforts on WNS, promoting

conservation of the species across its range.

Additional Prohibitions and Exceptions

In this final 4(d) rule we carry forward other standard prohibitions and exceptions that are typically applied to threatened species and are currently applicable under the interim rule for the northern long-eared bat. These prohibitions included the possession of and other acts with unlawfully taken northern long-eared bats, as well as import and export. We also included standard exemptions, including all the permitting provisions of 50 CFR 17.32 and the exemption for employees or agents of the Service, of the National Marine Fisheries Service, or of a State conservation agency when acting in the course of their official duties to take northern long-eared bats covered by an approved cooperative agreement to carry out conservation programs.

Summary of Comments and Recommendations on the Proposed and Interim 4(d) Rules

The northern long-eared bat was listed as a threatened species under the Act, with an interim rule under section 4(d) of the Act, on April 2, 2015 (80 FR 17974). At that time, the Service invited public comments on the interim 4(d) rule for 90 days, ending July 1, 2015. The Service had already received comments for 60 days on its proposed 4(d) rule (80 FR 2371, January 16, 2015). In total, the Service received approximately 40,500 comments on the proposed and interim 4(d) rules. We discuss them below.

Peer Reviewer Comments

1. *Comment:* Peer reviewer(s) commented that the 0.25-mile (radius) around hibernacula is an inadequate buffer. There were additional suggestions for alternative buffer distances as well as more detail on how activities might be limited within those buffers. A specific suggestion of a 1.6-mile buffer was made, with a statement that most forest practices could occur within the buffer provided that the trees were not completely removed (conversion). In addition, a suggestion of 0.5-mile buffer was made.

Our Response: We have revised the approach used in this final 4(d) rule to ensure that hibernating northern long-eared bats in the WNS zone are protected from incidental take independent of the buffer size used in the conservation measure. In addition, all northern long-eared bats both in and outside of the WNS zone are protected from purposeful take (*e.g.*, killing or intentionally harassing northern long-eared bats), including while in the hibernacula where they are most vulnerable. We have retained the 0.25-mile buffer (0.25-mile radius around known hibernacula entrance/access points used by bats) to further protect the hibernaculum and associated forested habitat for several reasons (see discussion above under *Conservation Measure 1: Tree Removal Near Known Northern Long-eared Bat Hibernacula*). Some of the peer-reviewers recommended that within the hibernacula buffer that certain limited activities should be allowed (*e.g.*, timber harvest that only removes a small percentate of the forest habitat when bats are not active). As discussed above under *Conservation Measure 1: Tree Removal Near Known Northern Long-eared Bat Hibernacula,* not all tree-removal activities within the buffer of hibernacula will result in take. For example, a timber harvest might be conducted within the buffer when bats are unlikely to be roosting in trees (*e.g.*, winter) that fully protects any bats in the hibernaculum as well as the hibernaculum's suitability for bats (*i.e.*, access, microclimate), and does not significantly change the suitability of the habitat for foraging by northern long-eared bats or perhaps even improves prey availability. In such a case, the timber harvest, although within the buffer, is not likely to result in incidental take so we would not recommend that the harvester seek authorization for incidental take pursuant to the Act. Because the buffer only applies to actions that result in incidental take of the northern long-eared bat, we determined that there was no need to attempt to exempt activities (*e.g.*, a limited timber harvest) where incidental take is unlikely.

2. *Comment:* Peer reviewer(s) commented that the WNS buffer zone should be removed and protections should occur throughout the range of the species.

Our Response: We have established prohibitions on the purposeful take of northern long eared bats throughout the species range. However, because WNS is the most significant threat known to be imperiling the species, we have determined that in areas where WNS has not been detected, additional prohibitions are not warranted. We recognize that the WNS zone will change over time. We remain committed to regularly updating the WNS zone map as new information about the spread of the *Pd* fungus becomes known.

3. *Comment:* Peer reviewer(s) commented that the WNS buffer zone should be expanded and/or changed to accommodate a more site-specific approach, based on proximity to hibernacula, for example.

Our Response: We reevaluated the approach to the WNS zone in this final rule and determined that the 150-mile buffer used for the interim 4(d) rule appears to be very effective in capturing counties where new *Pd* detections are reported, in particular when looking at the new occurrences over the last 5 years. For more details of this analysis, please see our discussion in the WNS Zone section of this rule.

4. *Comment:* Peer reviewer(s) commented that the Service's definitions relative to forestry practices should be more precise and should use silviculture terminology.

Our Response: We have revised the prohibitions to no longer use specific forestry practices or silviculture terminology. Take of the northern long-eared bat within the context of forest management is not prohibited provided that conservation measures to protect hibernacula and known maternity roost trees are implemented as described in this rule.

5. *Comment:* Peer reviewer(s) recommended that the seasonal restrictions for the northern long-eared bat ''pup season'' be expanded and/or based on climate and geography within the species' range.

Our Response: We recognize that in some areas or in some years the period when young northern long-eared bats are non-volant may be earlier or later than the June and July timeframe. The timing of when northern long-eared bats give birth is likely a complex interplay of a variety of factors affecting fetal development (*e.g.*, condition of the mother, temperature, prey availability), and similar factors may also influence the time required for young to develop the ability to fly. In addition, a study in West Virginia documented that the peak pregnancy and lactation dates shifted post WNS (Francl et al. 2012, p. 36). However, looking across a variety of studies, the June and July timeframe appears to generally capture what is typically reported as the non-volant period for northern long-eared bats across much of their range within the United States. We have determined that a single timeframe for implementing the prohibition on maternity roost tree removal provides clarity for the regulated public. In addition, while it does not modify the incidental take prohibition established in these regulations, our local field offices may be able to provide more refined local estimates of the non-volant period for specific areas. Project planners may choose to use these local estimates for

planning purposes where they are available.

6. *Comment:* Peer reviewer(s) recommended year-round protections for maternity roost trees or conversely that we remove entirely the protections for maternity trees because it is ineffective and serves as a disincentive for conducting surveys.

Our Response: Although northern long-eared bats have been documented to use some roost trees over multiple years, in many cases it is because the tree is dead or dying or has structural defects that provides the roosting features attractive to the species. Further, maternity roost trees are used only briefly (*e.g.*, northern long-eared bats typically change roosts every few days, and only a relatively small percentage of those are used more than once in any one season). Given that maternity roosts trees are ephemeral on the landscape and used for very short periods of time in the active season, we determined that year-round protections for known, occupied maternity roost trees are not warranted. We considered removing the protections for known, occupied maternity roosts as recommended by another peer reviewer, but instead modify the protection so as to minimize the disincentive for conducting surveys. In developing this final rule, we kept protections for known, occupied maternity roosts for two reasons: (1) While it may be unlikely, in cases where a tree was about to be removed, but was known to be occupied by northern long-eared bats, they would have some protections while the young could not fly; and (2) we wanted known, occupied maternity roosts to be given consideration because they help to signal to project planners an area that is likely to be used by northern long-eared bats in the future (as this species has a high degree of site fidelity). We refined the protection for known, occupied maternity roosts to make it as practical to implement as possible in order to minimize the disincentive created for conducting surveys. Many forest managers implement similar types of relatively small seasonal buffers to protect other species of sensitive wildlife (*e.g.*, around nesting raptors) and therefore we do not view this provision as a real disincentive to conducting surveys. Please see the *Conservation Measure 2: Tree Removal Near Known Maternity Roost Trees* section of this rule for additional details. We believe that the seasonal restriction helps to protect the most vulnerable life stages, in this case the non-volant pups, and is adequate for the purposes of this rule.

7. *Comment:* Peer reviewer(s) recommended that pregnant females should be protected as part of the seasonal restriction criteria.

Our Response: We recognize that pregnant females may be in torpor or less able to flee in early spring. However, we did not have information on how pregnancy in northern long-eared bats influenced the degree of torpor or their ability to flee from disturbance. As discussed in this rule, we expect only a small percentage of the species' forested habitat to be affected by activities (*e.g.*, tree removal, prescribed fire) that might impact a pregnant northern long-eared bats in torpor and, therefore, we expect only small proportion of the species' population to be potentially exposed to these activities. Because of the relatively small exposure and uncertainty about how pregnancy affects degree of torpor or ability to flee, we have not expanded the seasonal protections for this purpose. We believe that seasonal restrictions help protect the vulnerable pup stage, when young pups cannot fly, and are adequate for the purposes of this rule.

8. *Comment:* Peer reviewer(s) stated that the conservation efforts will not be effective because the natural heritage data are limited with respect to known maternity roost trees and hibernacula.

Our Response: We agree that the data are limited and this can be challenging from the implementation and/or project planning perspective. However, we have purposefully limited protections where possible, to minimize the potential disincentive to continue to survey for the species. However, we anticipate that information in State natural heritage data bases will continue to improve post-listing.

9. *Comment:* Peer reviewer expressed concern with allowing lethal take of northern long-eared bats from human dwellings.

Our Response: We encourage the non-lethal removal of northern long-eared bats from human structures, preferably by excluding them outside of the maternity period, whenever possible. However, because of the potential for human health considerations, we have not required this as part of the exception to the purposeful take prohibition. We have limited this take to houses, garages, barns, sheds, and other buildings designed for human entry.

Public Comments

General

10. *Comment:* Commenters from many development sectors requested that their activities be included in the suite of exempted activities under the 4(d) rule (specific sectors addressed below).

Our Response: In general, this final rule has been restructured to clarify prohibitions to take rather than to rely on a list of excepted activities. Prohibitions are applied in this final rule where necessary and advisable for the conservation of the species. Therefore, the various "sectors" do not need to be identified or "excepted" to apply rule provisions.

Forest Management

11. *Comment:* Several commenters recommended that forest conversion be included as an excepted activity. Comments were specific to conversion of hardwood forests to pine plantations, managed pine forest, pine ecosystem, and the Service's characterization of pine stands as monoculture stands representing poor bat habitat.

Our Response: Incidental take resulting from forest management, including forest conversion, is not a prohibited action pursuant to this final 4(d) rule provided conservation measures to protect known hibernacula and known, occupied maternity roost trees are employed. Please see sections above titled Forest Management and Forest Conversion.

12. *Comment:* Commenters stated that forest management must occur to avoid habitat deterioration to poor quality bat habitat. They further stated that forest health depends upon active management including tree removal and clearcutting.

Our Response: We agree that forest management can be very important in creating or maintaining forest successional patterns that help to ensure suitable trees are available for roosting northern long-eared bats. Further, forest management can help to increase prey availability or suitability of foraging habitat. Please see our discussion above under Forest Management for additional details. Incidental take resulting from forest management is not prohibited pursuant to this final 4(d) rule provided conservation measures to protect known hibernacula and known maternity roost trees are employed.

13. *Comment:* Commenters suggested that the Service consider exemptions for sustainable forest practices implemented under a sustainable forest management plan or sustainable forestry certificate program.

Our Response: We considered incorporating other possible conservation measures related to forest management and conversion. However, given the overall small percentage of the species' range potentially affected by

these activities in any given year, it was not clear that additional conditions related to incidental take from forest management or conversion would meaningfully change the conservation outlook for the species. Further, adding protections with uncertain benefits, but with large potential public impacts can hinder support for species conservation. Incidental take resulting from forest management is not prohibited pursuant to this final 4(d) rule provided conservation measures to protect known hibernacula and known, occupied maternity roost trees are employed.

14. *Comment:* Commenters stated that the Service should focus on the elimination of WNS rather than regulating timber harvest in summer habitat.

Our Response: Efforts to address the threat posed by WNS are on-going by the Service and many partners across the species range. Incidental take resulting from forest management or forest conversion is not prohibited pursuant to this final 4(d) rule provided conservation measures to protect known hibernacula and known, occupied maternity roost trees are employed.

15. *Comment:* A commenter stated that the Service should halt commercial timber harvest and another commenter suggested restricting the removal of snags and coarse woody debris in areas populated by the species.

Our Response: The northern long-eared bat is not limited in terms of habitat availability for feeding, breeding, and sheltering in the summer (non-hibernating) months. Please see the discussions under Forest Management and Forest Conversion above in this rule. We have carefully considered the value of habitat protection for the species. We have determined that protection of summer habitat is not required for species conservation except where trees may be occupied by young, non-volant (flightless) pups and for areas immediately surrounding hibernacula where they swarm and feed just prior to hibernation and when they emerge from hibernation in the spring. Due to this swarming behavior and the vulnerability of bats when hibernating, we have determined that take prohibitions are necessary and advisable in winter habitat (hibernacula), where bats are subject to the effects of WNS. In addition, we have determined that protection of known, occupied maternity roost trees is necessary and advisable in order to protect young pups.

16. *Comment:* The Service should increase protections to avoid impacts to bats from the point that they emerge from hibernation to the end of the maternity/pup season. Forest management should only be done in a manner that retains sufficient vegetative cover and protects northern long-eared bats at the maternity colony level.

Our Response: We considered incorporating other possible conservation measures related to forest management and conversion. However, given the overall small percentage of the species' range potentially affected by these activities in any given year, it was not clear that additional conditions related to the incidental take from forest management or conversion would meaningfully change the conservation outlook for the species. Further, adding protections with uncertain benefits, but with large potential public impacts can hinder support for the species conservation. We have determined that protection of known, occupied maternity roost trees during the months of June and July is an adequate conservation measure for the protection of non-volant pups.

17. *Comment:* Commenter(s) suggested an exemption for invasive species management in forested landscapes.

Our Response: Outside of hibernacula, this final rule does not prohibit take from activities other than tree removal. Therefore, incidental take associated with management of invasive species using pesticides or other interventions is not prohibited. Where intervention involves tree removal, conservation measures must be followed to comply with this rule. However, entities that cannot apply the required conservation measures have other means to have take excepted, such as section 10 permits or section 7 incidental take authorization.

Human Structures

18. *Comment:* Commenters suggested expansion of the definition of human structures/dwellings to include bridges, culverts, cattle passes, and other human-made structures.

Our Response: This final rule does not prohibit direct take of northern long-eared bats occupying human structures defined as houses, garages, barns, sheds, and other buildings designed for human entry. While we encourage landowners and project proponents to find other mechanisms to avoid killing or injuring bats that occupy bridges, culverts, and other structures, incidental take is not prohibited by this rule. While bridge and culvert use for the species has been documented, it is relatively uncommon compared to tree or other types of roost sites (*e.g.*, barns) and, therefore, did not warrant specific provisions in this final rule. Within the WNS zone, however, project proponents must apply conservation measures to avoid habitat removal around hibernacula and to avoid cutting or destroying known, occupied maternity roost trees or any other trees within a 150-foot radius from the maternity roost tree during June and July.

19. *Comment:* Commenters stated that take of northern long-eared bat in human dwellings should not be exempted and requested that the Service provide rationale for determining that this exemption is necessary.

Our Response: We encourage the non-lethal removal of northern long-eared bats from human structures whenever possible, preferably by excluding them from the structure outside of the maternity period. However, because of the potential for human health considerations, we have not required this as part of the exception to the purposeful take prohibition. Please see the discussion under Exceptions to the Purposeful Take Prohibition in this rule for additional details. Take of northern long-eared bats to remove them from human structures is not prohibited.

Hazardous Tree Removal

20. *Comment:* Several comments requested clarification and/or expansion of the exception to take for removal of hazardous trees.

Our Response: Our intent is to provide for the removal of hazardous trees for the protection of human life and property. This is not the same as hazard tree removal within the context of forest management or rights-of-way management where hazard trees are identified as trees that are in danger of falling. Incidental take of northern long-eared bats from hazardous tree removal in the context of rights-of-way management is not prohibited by the final 4(d) rule provided conservation measures to protect known hibernacula and known, occupied maternity roost trees are applied.

Minimal Tree Removal

21. *Comment:* Several commenters requested that minimal tree removal be expanded to a larger acreage.

Our Response: Conversion of forested cover to alternate uses is not prohibited under this final rule, provided that conservation measures are followed when those activities occur within the WNS zone. For a discussion of this issue, please see Forest Conversion section in this rule.

22. *Comment:* Several commenters stated that the exemption for minimal tree removal should be expanded to other (non-forest) industry entities and should include all activities that have a

minimal effect on the northern long-eared bat.

Our Response: Conversion of forested acreages to alternate uses is not prohibited under this final rule, provided that conservation measures are followed. This is applicable to all entities that may engage in activities that remove trees or convert forested acres. See the Forest Conversion section in this rule.

Oil and Gas Industry

23. *Comment:* A number of commenters from the oil and gas industry stated that the industry should be included within exemptions from take prohibitions because: (1) Their impact on northern long-eared bat habitat is small compared to forest management impacts; (2) habitat is re-vegetated following pipeline installation; (3) oil and gas exploration and transport are not the stated primary threat to the species (WNS is the primary threat); and (4) adequate regulatory mechanisms exist for mitigating industry environmental impacts.

Our Response: Take of northern long-eared bats attributable to habitat conversion and habitat loss is not prohibited under this final 4(d) rule, provided that developers and project proponents follow conservation measures described herein when activities occur within the WNS zone. See the Forest Conversion section in this rule.

Rights-of-Way

24. *Comment:* Commenter(s) stated that loss of habitat attributable to clearing for linear projects is miniscule compared to habitat conversion due to forest management.

Our Response: Incidental take attributable to maintenance, development, and rights-of-way expansion is not prohibited by this final 4(d) rule, provided conservation measures contained herein are followed when activities occur within the WNS zone.

25. *Comment:* Commenter(s) stated that the exception, as proposed and implemented via the interim rule, should be expanded to greater than 100-feet and should be clarified.

Our Response: Incidental take attributable to maintenance, development, and rights-of-way expansion is not prohibited by this final 4(d) rule, provided conservation measures contained herein are followed when activities occur within the WNS zone.

26. *Comment:* Commenter(s) stated that the exception for rights-of-way should be expanded to include new rights-of-way and transmission corridors.

Our Response: Incidental take attributable to maintenance, development, and rights-of-way expansion is not prohibited by this final 4(d) rule, provided conservation measures contained herein are followed when activities occur within the WNS zone.

27. *Comment:* Commenter(s) disagree with the Service's assertion that vegetation removal within or adjacent to rights-of-way is a small-scale alteration of habitat.

Our Response: It is within the context of the species range and potential for available habitat that right-of-way development, maintenance or expansion are small scale alterations of forest habitat. The extent of conversion from forest to other land cover types has been fairly consistent with conversion to forest (cropland reversion/plantings). Further, the recent past and projected amounts of forest loss to conversion from all sources was and is anticipated to be only a small percentage of the total amount of forest habitat. For example by 2060, 4 to 8 percent of forest area found in 2007 across the conterminous United States is expected to be lost (U.S Forest Service 2012, p. 12). We have not broadened the incidental prohibition related to habitat loss because WNS is the predominant threat to the species. Summer habitat does not now or in the future appear likely to be a limiting factor for the species; therefore, we have focused the protections on vulnerable individuals in summer habitat and protecting the winter habitat, where sensitivity to the effects of WNS is heightened.

28. *Comment:* Commenter(s) requested that the Service expand the rights-of-way exemption to include access roads and infrastructure required to deliver services.

Our Response: Incidental take attributable to maintenance, development, and rights-of-way expansion is not prohibited by this final 4(d) rule, provided conservation measures contained herein are followed when activities occur within the WNS zone. This includes related activities such as access road clearing and facilities related to delivery of services. In the case where tree removal is the activity in question, incidental take is not prohibited provided that the conservation measures herein are followed when those activities occur within the WNS zone.

29. *Comment:* Commenter suggested that the final 4(d) rule should prohibit all tree clearing activities related to the maintenance, repair, and creation of rights-of-way.

Our Response: The northern long-eared bat is not limited in terms of habitat availability for feeding, breeding, and sheltering in the summer (non-hibernating) months. We have carefully considered the value of habitat protection for the species. We have determined that protection of summer habitat is not required for species conservation except where trees are known to be occupied by northern long-eared bats when the young are non-volant (flightless) and for areas immediately surrounding hibernacula where they swarm and feed just prior to hibernation and when they emerge from hibernation in the spring.

Solar Energy

30. *Comment:* Commenter(s) requested that solar energy development be provided an exemption under the 4(d) rule.

Our Response: Solar energy developers will need to consider the impacts of their development and operations in light of the prohibitions of this rule. Incidental take outside of the WNS zone is not prohibited. Incidental take from tree-removal activities within the WNS zone is prohibited under specific conditions related to known hibernacula and known, occupied maternity roost trees (see Activities Involving Tree Removal section above for details).

Agriculture

31. *Comment:* Commenter(s) requested that agricultural activities be included in the suite of exempted activities under the 4(d) rule.

Our Response: We have substantially revised the prohibitions and exceptions in this final rule that may apply to agricultural activities. Agricultural producers/operators will need to consider the impacts of their activities in light of the prohibitions of this rule. Incidental take outside of the WNS zone is not prohibited. Incidental take from tree removal activities within the WNS zone is prohibited under specific conditions related to known hibernacula and known, occupied maternity roost trees (see Activities Involving Tree Removal, above, for details). This final rule has been restructured in a manner that it applies prohibitions where necessary and advisable for conservation of the species. Therefore, agricultural development and operations do not need to be specifically "excepted" in order to apply the rule's provisions.

Caves and Mines

32. *Comment:* Commenter(s) requested an exemption for show caves and cave tours.

Our Response: Hibernating bats are very sensitive to disturbance as discussed in greater detail under the Hibernacula section of this document. This final rule prohibits the incidental take of northern long-eared bats in hibernacula inside the WNS zone as well as the purposeful take (*e.g.*, purposefully harassing or killing) of northern long-eared bats in hibernacula both inside and outside of the WNS zone. When this species occupies caves or mines used by people regardless of the purpose, the provisions of this 4(d) rule apply. Show cave or mine activities inside the WNS zone that do not result in the incidental take of northern long-eared bats are not prohibited. In other words, if northern long-eared bats are not being disrupted from their normal hibernation behaviors (*e.g.*, by avoiding areas with hibernating bats, limiting noise and lighting in areas used by bats), we do not consider human use of the cave or mine to be a "take" of the bats.

33. *Comment:* Commenter(s) stated that an exemption should be made available for mining, mineral exploration, and coal extraction activities.

Our Response: Incidental take of northern long-eared bats that results from tree-removal activity, including mining operations, is prohibited in some circumstances (see Activities Involving Tree Removal, above). However, hibernating bats are very sensitive to disturbance, as discussed in greater detail under the Hibernacula section of this rule. This final rule prohibits the incidental take of northern long-eared bats in hibernacula inside the WNS zone as well as the purposeful take (*e.g.*, purposefully harassing or killing) of northern long-eared bats in hibernacula both inside and outside of the WNS zone. Inside the WNS zone, the take of northern long-eared bats in mines and man-made tunnels for mineral or coal extraction includes any activity that kills, injures, harms, or harasses the species. Mining, mineral exploration, and coal extraction activities will need to work with the Service to find alternative means to authorize take, such as through a section 10 permitting process or section 7 process where applicable. Mining activities inside the WNS zone that do not result in the incidental take of northern long-eared bats are not prohibited. In other words, if northern long-eared bats are not being killed, injured, or otherwise disrupted from their normal hibernation behaviors by the mining operations, we do not consider those activities to be a "take" of the bats.

34. *Comment:* Commenter(s) suggested that activities designed to reclaim abandoned mines or maintain cave environments for the benefit of wildlife species should be exempt under the 4(d) rule.

Our Response: We agree that beneficial reclamation and maintenance should be encouraged. However, exception from take prohibitions through a species-specific 4(d) rule is not the appropriate mechanism for authorizing this activity. Where abandoned mines and cave environments are in use by northern long-eared bats, take associated with maintenance is prohibited; however, we encourage project proponents to work with the Service to implement best management practices to avoid or minimize the effects of their actions in the interest of habitat improvement. We will work with project proponents to determine alternate ways to authorize activities, such as section 10 permits or section 7 incidental take authorization.

Mosquito Control

35. *Comment:* Commenter challenges the Service's assertion that chemicals used in mosquito control (malathion and others of comparable risk to mammals) pose a risk to northern long-eared bats; commenter further requests an exemption for mosquito control activities, especially where there is a public health risk.

Our Response: Please see the Environmental Contaminants section of this rule for details concerning our evaluation of the risks from pesticide applications. After careful consideration of the available information, we do not include in this rule a prohibition on the incidental take of northern long-eared bats as result of pesticide application provided the application is a "lawful activity," that is, it must comply all applicable State laws. Any northern long-eared bat unlawfully taken pursuant to a State pesticide law would be a violation of this final 4(d) rule.

Adequacy and Clarity of 0.25 Mile Hibernacula Buffer

36. *Comment:* Commenter(s) suggested that this buffer is too restrictive for landowners.

Our Response: The Service has determined that a protective buffer around known hibernacula is necessary and advisable for the conservation of the species. Please see the discussion under *Conservation Measure 1: Tree Removal Near Known Northern Long-eared Bat Hibernacula* of this rule for our explanation of the need for this buffer. As described in that section, we have prohibited incidental take of northern long-eared bats under specific tree-removal circumstances; however, that does not mean that all activities involving tree-removal activities within the 0.25-mile (0.4-km) buffer of hibernacula will result in take. For example, a timber harvest might be conducted within 0.25 miles (0.4 km) of a hibernaculum at a time when bats are unlikely to be roosting in trees within the buffer (*e.g.*, winter) that fully protects any bats in the hibernaculum as well as the hibernaculum's suitability for bats (*i.e.*, bat's access, microclimate), and does not significantly change the suitability of the habitat for foraging by northern long-eared bats or perhaps even improves prey availability. In such a case, the timber harvest, although closer than 0.25 miles (0.4 km) to the hibernaculum, is not likely to result in incidental take, so we would not recommend that the timber harvester seek authorization for incidental take pursuant to the Act. Further, while incidental take of northern long-eared bats within that buffer is prohibited (in the WNS zone), it may be authorized on a case-by-case basis with further coordination with the Service at a local level. Take may be authorized through section 10 or section 7 of the Act. In addition, it is our expectation that project modifications may be made that would protect the hibernaculum and allow for the project proponent's objectives to be met.

37. *Comment:* Commenter(s) seek clarification on whether the buffer and prohibition to clearcutting (within the buffer) is a year-round restriction.

Our Response: Yes, the protection of the hibernaculum and a buffer around it is a year round protective measure and applies to all types of tree-removal activities in the WNS zone.

38. *Comment:* Commenter(s) suggested that the buffer around hibernacula be limited to fall swarming and spring emergence when northern long-eared bats are present.

Our Response: We have determined that protective measures must be considered year-round for several reasons, including that habitat lost outside of the spring emergence and fall swarming period could affect the suitability of those habitats later during spring emergence or fall swarming. Further, we have included the buffer on hibernacula for several reasons beyond protecting foraging habitat during fall swarming and spring emergence. In particular, the buffer will help to protect the micro-climate characteristics of

hibernacula and other entrances used by bats that may not be reflected in the primary location information for hibernacula. For example, many caves or abandoned mines used may have entrances used by bats that are not reflected in the general location information for those sites that are used by people; a buffer helps to protect less prominent features that may be important to bats. Projects may be able to be planned or modified within those buffer areas to retain sufficient habitat and avoid harm; however, the Service considers coordination on a case-by-case basis to be important to assure necessary conservation.

39. *Comment:* Several commenter(s) suggested an increased buffer area around hibernacula would be more appropriate.

Our Response: We have revised the approach used in this final 4(d) rule to ensure that hibernating northern long-eared bats in the WNS zone are protected from incidental take independent of the buffer size used in the conservation measure. In addition, all northern long-eared bats both inside and outside of the WNS zone are protected from purposeful take (*e.g.*, killing or intentionally harassing northern long-eared bats), including while in hibernacula where they are most vulnerable. We have retained the 0.25-mile buffer (0.25-mile radius from known hibernacula entrance/access points used by bats) to further protect the hibernacula and associated forested habitat for several reasons (see discussion above under *Conservation Measure 1: Tree Removal Near Known Northern Long-eared Bat Hibernacula*).

40. *Comment:* Commenter(s) expressed concern with implementing measures when they do not have data/information on known hibernacula.

Our Response: The Service recognizes the challenges associated with data sharing and data management. Many states share data management concerns and guard data carefully. We encourage landowners to continue to work with your State natural resources and natural heritage staff to evaluate your ownership for the presence of these important resources. When seeking information on the presence of hibernacula within your project boundary, our expectation is that a project proponent will complete due diligence to determine available data. However, if information is not available, we recognize that the project proponent that has made reasonable efforts to determine whether there are known hibernacula on the property is in the position of not knowing if no data have been provided.

Maternity Roost Tree Restrictions

41. *Comment:* Commenter(s) expressed concerns about having adequate information to identify maternity roost trees.

Our Response: We recognize the challenges associated with data sharing. Please see response to Comment 40. While not required by this rule, the Service recommends summer surveys to definitively locate maternity roost trees.

42. *Comment:* Commenter(s) requested that we clarify that roost trees means maternity roost trees.

Our Response: We have made this final 4(d) rule specific to maternity roost trees.

43. *Comment:* Commenter(s) expressed disagreement with the 0.25 mile buffer around known, occupied roost trees. Some commented that this buffer was too small, while some commented that it was too large.

Our Response: In the interim 4(d) rule (80 FR 17974; April 2, 2015), the buffer around known, occupied roost trees applied only to some types of tree-removal activities (*e.g.*, forest management, rights-of-ways, prairie management) and excluded only clearcuts (and similar harvest methods). Given the relatively small percent of forest habitat anticipated to be impacted by forest management or conversion (see Forest Management and Forest Conversion, above of this rule for more details), we revised the buffer around the known maternity roost trees. As explained in more detail under *Conservation Measure 2: Tree Removal Near Known Maternity Roost Trees,* we have made the buffer more broadly applicable to all tree-removal activities, but have narrowed it in size to provide protection for the maternity roost tree, while minimizing the potential that the protective measure would serve as impediment to conducting new surveys. We have reduced the buffer around known, occupied maternity roost trees to a radius of 150 feet around the known, occupied maternity roost tree.

44. *Comment:* Commenter(s) stated that the Service should require surveys to determine where roost trees are located.

Our Response: The Act does not require a private landowner to survey his or her property to determine whether endangered or threatened wildlife and plants occupy their land. We encourage landowners to voluntarily seek additional information to conserve natural resources in their land use/land management actions; however, we will not require surveys to locate northern long-eared bats and maternity roost trees on private property.

Residential Housing Development

45. *Comment:* Commenter(s) requested that northern long-eared bat take be excepted for the purposes of residential housing development.

Our Response: Take resulting from removal of summer habitat (tree removal) is not prohibited provided the conservation measures set forth in this rule are followed when the habitat removal occurs within the WNS zone. The provisions of this final rule have been restructured to clarify prohibitions rather than rely on a list of excepted activities.

Wind Energy Development

46. *Comment:* Commenter(s) requested that northern long-eared bat take be excepted for the purposes of renewable energy development and operation (wind energy).

Our Response: Incidental take resulting from wind energy development and operation is not prohibited, provided that the conservation measures set forth in this rule are followed to protect hibernacula and known, occupied maternity roost trees. We strongly encourage voluntary conservation measures and best management practices such as feathering or elevated cut-in speeds to reduce impacts to northern long-eared bats and other bats; however, we have not prohibited incidental take attributable to wind energy in this final rule. Please see the Wind Energy Facilities section of this rule for additional details.

Natural Resource Management

47. *Comment:* Commenter(s) requested that northern long-eared bat take be excepted when activities are included in Department of Defense integrated natural resource management plans, providing for activities such as recreational activities, burns, and other temporary but insignificant effects on the northern long-eared bat.

Our Response: Incidental take resulting from activities described as recreational activities and beneficial wildlife habitat management/maintenance is not prohibited, provided that the conservation measures set forth in this rule are followed when the activity occurs inside the WNS zone. We have completed a section 7 analysis on the provisions of this final 4(d) rule to ensure that actions completed in accordance with the final rule are not likely to jeopardize the continued existence of the species. Where these resource management activities do not fit within the final rule, section 7 consultation would need to be

completed to authorize incidental take of the northern long-eared bat.

Compliance and Monitoring

48. *Comment:* Commenter(s) recommended that surveys be required and that landowners be required to report on their activities in order to receive the benefits of the 4(d) rule.

Our Response: While we welcome landowners' efforts to determine where bats may be located on their property, the Act does not require that a landowner survey his or her property to find species. We are not mandating that surveys be completed as part of this rule.

Alternate Section 4(d) Provisional Language

49. *Comment:* One organization commented on behalf of its members and 14 other environmental organizations (collectively referenced as "the Center") in support of the adoption of a different 4(d) rule and in opposition of the Service's proposed and the interim 4(d) rules.

Our Response: The remaining paragraphs (under the heading Summary of Comments and Recommendations on the Proposed and Interim4(d) Rules) pertain to the comments we received from the Center. With respect to the overarching comment that our 4(d) rule does not conserve the species, we believe that our final 4(d) rule provides for the "necessary and advisable" conservation of the species, as described herein. For further information, please see our Determination section, below.

With respect to the Center's proposed 4(d) language, we note that the proposed language defines specific prohibitions and would make a regulatory determination of "take" to include a number of actions. These include cave and mine entry without implementing decontamination protocols; transporting equipment into caves and mines or between caves and mines between the WNS zone and non-WNS zone; cave and mine entry during hibernation periods; activities associated with hydraulic fracturing within 5 miles of a hibernaculum, within 1.5 miles of an occupied roost tree, or within 3 miles of an acoustic detection or bat capture record; noise disturbance activities within a 0.5-mile radius of a hibernaculum during the hibernation period; and disruption of water sources within hibernacula. With respect to protection of hibernacula, take of northern long-eared bats is prohibited. Establishing the causal connection between a variety of activities such as those the Center proposed to be defined as prohibitions is beyond the scope of this rule. We have addressed hibernacula protection provisions in this rule under the section entitled *Conservation Measure 1: Tree Removal Near Known Northern Long-eared Bat Hibernacula.* Protections in this final rule are adequate to protect the species.

In addition to the Center's suggested language for hibernacula prohibitions, they recommended language regarding prohibitions for prescribed burning and aerial spraying. Based on our analysis, we conclude that prescribed burning and aerial spraying do not have a measurable population-level impact on the species and regulation of those activities will not meaningfully impact the species' ability to recover. For further information on prescribed fire impacts, see Prescribed Fire above. For further information on aerial spraying of pesticides, please see the Environmental Contaminants section above.

The final prohibition suggested by the Center was the operation of utility-scale wind projects, specifically during the hours from dusk to sunrise during the fall swarming season, at low wind speeds, and within 5 miles of a hibernaculum. Incidental take resulting from the operation of wind energy facilities is not prohibited by this final 4(d) rule and a complete discussion of known impacts to the species may be found in the Wind Energy Facilities section above.

Finally, the Center provided suggested regulatory text for exemptions from prohibitions that included language for seasonal restrictions, clearing restrictions, mandatory measures for hibernacula protection (gate installation), water quality protection measures, and data collection and reporting requirements. We recognize the effort that has gone into the development of this alternative language. However, we have carefully considered the measures that are necessary for the protection of the species. Our final rule has been developed based on the Service's desire to implement protective measures that will make a meaningful impact on species conservation and recovery. As stated elsewhere in this document (see Determination section, below), we have provided regulatory flexibility while implementing protective measures where we have determined those measures to be necessary and advisable for conservation of the species.

Determination

Section 4(d) of the Act states that "the Secretary shall issue such regulations as she deems 'necessary and advisable to provide for the conservation' " of species listed as threatened species. Conservation is defined in the Act to mean "to use and the use of all methods and procedures which are necessary to bring any endangered species or threatened species to the point at which the measures provided pursuant to [the Act] are no longer necessary."

The courts have recognized the extent of the Secretary's discretion under this standard to develop rules that are appropriate for the conservation of a species. For example, the Secretary may find that it is necessary and advisable not to include a taking prohibition, or to include a limited taking prohibition. See Alsea Valley Alliance v Lautenbacher, 2007 U.S. Dist. Lexis 60203 (D. Or. 2007); Washington Environmental Council v. National Marine Fisheries Service, 2002 U.S. Dist. Lexis 5432 (W.D. Wash. 2002). In addition, as affirmed in State of Louisiana v. Verity, 853 F. 2d 322 (5th Cir. 1988), the rule need not address all the threats to the species. As noted by Congress when the Act was initially enacted, "once an animal is on the threatened list, the Secretary has an almost infinite number of options available to him [her] with regard to the permitted activities for those species. [She] may, for example, permit taking, but not importation of such species," or she may choose to forbid both taking and importation but allow the transportation of such species, as long as the prohibitions, and exceptions to those prohibitions, will "serve to conserve, protect, or restore the species concerned in accordance with the purposes of the Act" (H.R. Rep. No. 412, 93rd Cong., 1st Sess. 1973).

Section 9 prohibitions make it illegal for any person subject to the jurisdiction of the United States to violate any regulation pertaining to any threatened species of fish or wildlife listed pursuant to section 4 of the Act and promulgated by the Secretary pursuant to authority provided by the Act. Under this final 4(d) rule, incidental take of the northern long-eared bat will not be prohibited outside the WNS zone. Incidental take also will not it be prohibited within the WNS zone, outside of hibernacula, provided that it occurs more than 0.25 miles (0.4 km) from a known hibernacula and does not result from an activity that cuts or destroys known occupied maternity roost trees, or any other trees within a 150-foot (45-m) radius from the maternity tree, during the pup season (June 1 through July 31).

Accordingly, we have determined that this provision is necessary and advisable for the conservation of the northern long-eared bat as explained below.

Although not fully protective of every individual, the conservation measures identified in this final rule help protect maternity colonies. This final species-specific rule under section 4(d) of the Act provides the flexibility for certain activities to occur that have not been the cause of the species' imperilment, while still promoting conservation of the species across its range.

The northern long-eared bat was listed as a threatened species under the Act, with an interim rule under section 4(d), on April 2, 2015 (80 FR 17974). At that time, the Service invited public comment on the interim 4(d) rule for 90 days, ending July 1, 2015. The Service had already received comments for 60 days on its proposed 4(d) rule (80 FR 2371; January 16, 2015). In total, the Service received approximately 40,500 comments on the proposed and interim 4(d) rules. For a complete discussion of the comments, as well as the Service's response to comments, see Summary of Comments and Recommendations on the Proposed and Interim 4(d) Rules, above.

Because the primary threat to the northern long-eared bat is a fungal disease known as WNS, the Service has tailored the final 4(d) rule to prohibit the take of northern long-eared bats from certain activities within areas where they are in decline, as a result of WNS, and within these areas we apply incidental take protection only to known, occupied maternity roost trees and known hibernacula. These protections will help to conserve the northern long-eared bat during its most vulnerable life stages (from birth to flight, or volancy) and during spring and fall swarming (near hibernacula).

In summary, this 4(d) rule is necessary and advisable to provide for the conservation of the northern long-eared bat because it provides for protection of known maternity roost trees and known hibernacula within the WNS zone. In addition, promulgation of this rule allows the conservation community to provide for species conservation where it can affect change, namely during the northern long-eared bat's most vulnerable life stages and where hibernation occurs. This final 4(d) rule allows the regulated public to manage lands in a manner that is lawful and compatible with species' survival, and it allows for protection of the species in a manner that the Secretary deems to be necessary and advisable for the conservation of the northern long-eared bat. By this rule, the Secretary deems that the prohibition of certain take, which is incidental to otherwise lawful activities that take bat habitat, is not necessary for the long-term survival of the species. Furthermore, she acknowledges the importance of addressing the threat of WNS as the primary measure to arrest and reverse the decline of the species. Nothing in this 4(d) rule affects other provisions of the Act, such as designation of critical habitat under section 4, recovery planning under section 4(f), and consultation requirements under section 7.

Required Determinations

Regulatory Planning and Review

(Executive Orders 12866 and 13563)

Executive Order 12866 provides that the Office of Information and Regulatory Affairs (OIRA) in the Office of Management and Budget will review all significant rules. OIRA has determined that this rule is not significant. Executive Order 13563 reaffirms the principles of E.O. 12866 while calling for improvements in the nation's regulatory system to promote predictability, to reduce uncertainty, and to use the best, most innovative, and least burdensome tools for achieving regulatory ends. The executive order directs agencies to consider regulatory approaches that reduce burdens and maintain flexibility and freedom of choice for the public where these approaches are relevant, feasible, and consistent with regulatory objectives. E.O. 13563 emphasizes further that regulations must be based on the best available science and that the rulemaking process must allow for public participation and an open exchange of ideas. We have developed this final 4(d) rule in a manner consistent with these requirements.

Regulatory Flexibility Act (5 U.S.C. 601 *et seq.*)

Listing and status determinations under the Endangered Species Act of 1973, as amended (Act; 16 U.S.C. 1531 *et seq.*), and any prohibitions or protective measures afforded the species under the Act are exempt from the Regulatory Flexibility Act (RFA; 5 U.S.C. 601 *et seq.*, as amended by the Small Business Regulatory Enforcement Fairness Act (SBREFA) of 1996). However, as this final 4(d) rule is being promulgated following the final listing of the northern long-eared bat, we evaluate whether the Regulatory Flexibility Act applies to this rulemaking.

Under the Regulatory Flexibility Act, whenever an agency must publish a notice of rulemaking for any proposed or final rule, it must prepare and make available for public comment a regulatory flexibility analysis that describes the effects of the rule on small entities (small businesses, small organizations, and small government jurisdictions). However, no regulatory flexibility analysis is required if the head of the agency certifies the rule will not have a significant economic impact on a substantial number of small entities. SBREFA amended the RFA to require Federal agencies to provide a statement of the factual basis for certifying that the rule will not have a significant economic impact on a substantial number of small entities. Thus, for a regulatory flexibility analysis to be required, impacts must exceed a threshold for "significant impact" and a threshold for a "substantial number of small entities." See 5 U.S.C. 605(b). Based on the information that is available to us at this time, we certify that this rule will not have a significant economic impact on a substantial number of small entities. The following discussion explains our rationale.

On April 2, 2015 (80 FR 17974), we published the final determination to list the northern long-eared bat as a threatened species and an interim 4(d) rule. That rule became effective on May 4, 2015, and the interim 4(d) rule will remain in effect until this final rule becomes effective (see **DATES**, above). The interim 4(d) rule generally applies the prohibitions of 50 CFR 17.31 and 17.32 to the northern long-eared bat, which means that the interim rule, among other things, prohibits the purposeful take of northern long-eared bats throughout the species' range, but the interim rule includes exceptions to the purposeful take prohibition. The exceptions for purposeful take are: (1) In instances of removal of northern long-eared bats from human structures (if actions comply with all applicable State regulations); and (2) for authorized capture, handling, and related activities of northern long-eared bats by individuals permitted to conduct these same activities for other bat species until May 3, 2016. Under the interim rule, incidental take is not prohibited outside the WNS zone if the incidental take results from otherwise lawful activities. Inside the WNS zone, there are exceptions for incidental take for the following activities, subject to certain conditions: Implementation of forest management; maintenance and expansion of existing rights-of-way and transmission corridors; prairie management; minimal tree removal; and removal of hazardous trees for the protection of human life and property.

This final 4(d) rule does not generally apply the prohibitions of 50 CFR 17.31 to the northern long-eared bat. This rule continues to prohibit purposeful take of

northern long-eared bats throughout the species' range, except in certain cases, including in instances of removal of northern long-eared bats from human structures and for authorized capture, handling, and related activities of northern long-eared bats by individuals permitted to conduct these same activities for other bat species until May 3, 2016. After May 3, 2016, a permit pursuant to section 10(a)(1)(A) of the Act is required for the capture and handling of northern long-eared bats. Under this rule, incidental take is still not prohibited outside the WNS zone. Within the WNS zone, incidental take is prohibited only if: (1) Actions result in the incidental take of northern long-eared bats in hibernacula; (2) actions result in the incidental take of northern long-eared bats by altering a known hibernaculum's entrance or interior environment if the alteration impairs an essential behavioral pattern, including sheltering northern long-eared bats; or (3) tree-removal activities result in the incidental take of northern long-eared bats when the activity either occurs within 0.25 mile (0.4 kilometer) of a known hibernaculum, or cuts or destroys known, occupied maternity roost trees or any other trees within a 150-foot (45-meter) radius from the maternity roost tree during the pup season (June 1 through July 31). This approach allows more flexibility to affected entities and individuals in conducting activities within the WNS zone. Under this rule, we individually set forth prohibitions on possession and other acts with unlawfully taken northern long-eared bats, and on import and export of northern long-eared bats. These prohibitions were included in the interim 4(d) through the general application of the prohibitions of 50 CFR 17.31 to the northern long-eared bat. Under this rule, take of the northern long-eared bat is also not prohibited for the following: Removal of hazardous trees for protection of human life and property; take in defense of life; and take by an employee or agent of the Service, of the National Marine Fisheries Service, or of a State conservation agency that is operating a conservation program pursuant to the terms of a cooperative agreement with the Service. Regarding these three exceptions, take in defense of life was not included in the interim 4(d) rule, but the other two exceptions were, either through the general application of 50 CFR 17.31 or through a specific exception included in the interim 4(d) rule. Therefore, this final 4(d) rule will result in less restrictive regulations under the Act than those set forth in the interim 4(d) rule.

We completed an analysis of the forested land area that may be impacted by this rulemaking. There are approximately 400,000,000 acres (161,874,256 ha) of forested habitat across the range of the northern long-eared bat, which includes 37 States and the District of Columbia. This rule may restrict land use activities on approximately 200,000 acres (80,937 ha). This area constitutes less than 0.05 percent of all forested habitat across the extensive range of the northern long-eared bat. Any impact in this very small portion of forested habitat is not expected to affect a substantial number of entities in any given sector, nor result in a significant economic impact on any given entity. For the above reasons, we certify that the final rule will not have a significant economic impact on a substantial number of small entities. Therefore, a final regulatory flexibility analysis is not required.

Energy Supply, Distribution, or Use—Executive Order 13211

Executive Order 13211 (Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use) requires agencies to prepare Statements of Energy Effects when undertaking certain actions. For reasons discussed within this final rule, we believe that the rule will not have any effect on energy supplies, distribution, or use. Therefore, this action is not a significant energy action, and no Statement of Energy Effects is required.

Unfunded Mandates Reform Act

In accordance with the Unfunded Mandates Reform Act (2 U.S.C. 1501 *et seq.*), we make the following findings:

(1) This final rule will not produce a Federal mandate. In general, a Federal mandate is a provision in legislation, statute, or regulation that would impose an enforceable duty upon State, local, or Tribal governments, or the private sector, and includes both ''Federal intergovernmental mandates'' and ''Federal private sector mandates.'' These terms are defined in 2 U.S.C. 658(5)–(7). ''Federal intergovernmental mandate'' includes a regulation that ''would impose an enforceable duty upon State, local, or [T]ribal governments'' with two exceptions. It excludes ''a condition of Federal assistance.'' It also excludes ''a duty arising from participation in a voluntary Federal program,'' unless the regulation ''relates to a then-existing Federal program under which $500,000,000 or more is provided annually to State, local, and [T]ribal governments under entitlement authority,'' if the provision would ''increase the stringency of conditions of assistance'' or ''place caps upon, or otherwise decrease, the Federal Government's responsibility to provide funding,'' and the State, local, or Tribal governments ''lack authority'' to adjust accordingly. At the time of enactment, these entitlement programs were: Medicaid; AFDC work programs; Child Nutrition; Food Stamps; Social Services Block Grants; Vocational Rehabilitation State Grants; Foster Care, Adoption Assistance, and Independent Living; Family Support Welfare Services; and Child Support Enforcement. ''Federal private sector mandate'' includes a regulation that ''would impose an enforceable duty upon the private sector, except (i) a condition of Federal assistance or (ii) a duty arising from participation in a voluntary Federal program.''

(2) This final 4(d) rule will result in less restrictive regulations under the Act, as it pertains to the northern long-eared bat, than would otherwise exist without a 4(d) rule or under the interim 4(d) rule. As a result, we do not believe that this rule will significantly or uniquely affect small government entities. Therefore, a Small Government Agency Plan is not required.

Takings

In accordance with Executive Order 12630, this final rule will not have significant takings implications. We have determined that the rule has no potential takings of private property implications as defined by this Executive Order because this 4(d) rule will result in less-restrictive regulations under the Act than would otherwise exist. A takings implication assessment is not required.

Federalism

In accordance with Executive Order 13132, this final 4(d) rule does not have significant Federalism effects. A federalism summary impact statement is not required. This rule will not have substantial direct effects on the State, on the relationship between the Federal Government and the State, or on the distribution of power and responsibilities among the various levels of government.

Civil Justice Reform

In accordance with Executive Order 12988, the Office of the Solicitor has determined that this final rule does not unduly burden the judicial system and meets the requirements of sections 3(a) and 3(b)(2) of the Order.

Paperwork Reduction Act of 1995 (44 U.S.C. 3501 et seq.)

This rule does not contain collections of information that require approval by the Office of Management and Budget (OMB) under the Paperwork Reduction Act. This rule will not impose recordkeeping or reporting requirements on State or local governments, individuals, businesses, or organizations. An agency may not conduct or sponsor and a person is not required to respond to a collection of information unless it displays a currently valid OMB control number.

National Environmental Policy Act (42 U.S.C. 4321 et seq.)

We have prepared a final environmental assessment, as defined under the authority of the National Environmental Policy Act of 1969. For information on how to obtain a copy of the final environmental assessment, see **ADDRESSES**, above. The final environmental assessment will also be available on the Internet at *http://www.regulations.gov* and at *http://www.fws.gov/midwest/Endangered.*

Government-to-Government Relationship With Tribes

In accordance with the President's memorandum of April 29, 1994 (Government-to-Government Relations with Native American Tribal Governments; 59 FR 22951), Executive Order 13175 (Consultation and Coordination With Indian Tribal Governments), and the Department of the Interior's manual at 512 DM 2, we readily acknowledge our responsibility to communicate meaningfully with recognized Federal Tribes on a government-to-government basis. In accordance with Secretarial Order 3206 of June 5, 1997 (American Indian Tribal Rights, Federal-Tribal Trust Responsibilities, and the Endangered Species Act), we readily acknowledge our responsibilities to work directly with tribes in developing programs for healthy ecosystems, to acknowledge that tribal lands are not subject to the same controls as Federal public lands, to remain sensitive to Indian culture, and to make information available to tribes.

In October 2013, Tribes and multi-tribal organizations were sent letters inviting them to begin consultation and coordination with the service on the proposal to list the northern long-eared bat. In August 2014, several Tribes and multi-tribal organizations were sent an additional letter regarding the Service's intent to extend the deadline for making a final listing determination by 6 months. A conference call was also held with Tribes to explain the listing process and discuss any concerns. Following publication of the proposed rule, the Service established three interagency teams (biology of the northern long-eared bat, non-WNS threats, and conservation measures) to ensure that States, Tribes, and other Federal agencies were able to provide input into various aspects of the listing rule and potential conservation measures for the species. Invitations for inclusion in these teams were sent to Tribes within the range of the northern long-eared bat and a few tribal representatives participated on those teams. Two additional conference calls (in January and March 2015) were held with Tribes to outline the proposed species-specific 4(d) rule and to answer questions. Through this coordination, some Tribal representatives expressed concern about how listing the northern long-eared bat may impact forestry practices, housing development programs, and other activities on Tribal lands.

References Cited

A complete list of references cited in this document is available on the Internet at *http://www.regulations.gov* and upon request from the Twin Cities Ecological Services Field Office (see **FOR FURTHER INFORMATION CONTACT**).

Authors

The primary authors of this document are the staff members of the Midwest Region of the U.S. Fish and Wildlife Service.

List of Subjects in 50 CFR Part 17

Endangered and threatened species, Exports, Imports, Reporting and recordkeeping requirements, Transportation.

Regulation Promulgation

Accordingly, we amend part 17, subchapter B of chapter I, title 50 of the Code of Federal Regulations, as follows:

PART 17—ENDANGERED AND THREATENED WILDLIFE AND PLANTS

■ 1. The authority citation for part 17 continues to read as follows:

Authority: 16 U.S.C. 1361–1407; 1531–1544; and 4201–4245, unless otherwise noted.

■ 2. Amend § 17.40 by revising paragraph (o) to read as follows:

§ 17.40 Special rules—mammals.

* * * * *

(o) Northern long-eared bat (*Myotis septentrionalis*). The provisions of this rule are based upon the occurrence of white-nose syndrome (WNS), a disease affecting many U.S. bat populations. The term "WNS zone" identifies the set of counties within the range of the northern long-eared bat within 150 miles of the boundaries of U.S. counties or Canadian districts where the fungus *Pseudogymnoascus destructans* (*Pd*) or WNS has been detected. For current information regarding the WNS zone, contact your local Service ecological services field office. Field office contact information may be obtained from the Service regional offices, the addresses of which are listed in 50 CFR 2.2.

(1) *Prohibitions.* The following prohibitions apply to the northern long-eared bat:

(i) Purposeful take of northern long-eared bat, including capture, handling, or other activities.

(ii) Within the WNS zone:

(A) Actions that result in the incidental take of northern long-eared bats in known hibernacula.

(B) Actions that result in the incidental take of northern long-eared bats by altering a known hibernaculum's entrance or interior environment if it impairs an essential behavioral pattern, including sheltering northern long-eared bats.

(C) Tree-removal activities that result in the incidental take of northern long-eared bats when the activity:

(*1*) Occurs within 0.25 mile (0.4 kilometer) of a known hibernaculum; or

(*2*) Cuts or destroys known occupied maternity roost trees, or any other trees within a 150-foot (45-meter) radius from the maternity roost tree, during the pup season (June 1 through July 31).

(iii) Possession and other acts with unlawfully taken northern long-eared bats. It is unlawful to possess, sell, deliver, carry, transport, or ship, by any means whatsoever, any northern long-eared bat that was taken in violation of this section or State laws.

(iv) Import and export.

(2) *Exceptions from prohibitions.* (i) Any person may take a northern long-eared bat in defense of his own life or the lives of others, including for public health monitoring purposes.

(ii) Any person may take a northern long-eared bat that results from the removal of hazardous trees for the protection of human life and property.

(iii) Any person may take a northern long-eared bat by removing it from human structures, but only if the actions comply with all applicable State regulations.

(iv) Purposeful take that results from actions relating to capture, handling, and related activities for northern long-eared bats by individuals permitted to

conduct these same activities for other species of bat until May 3, 2016.

(v) All of the provisions of § 17.32 apply to the northern long-eared bat.

(vi) Any employee or agent of the Service, of the National Marine Fisheries Service, or of a State conservation agency that is operating a conservation program pursuant to the terms of a cooperative agreement with the Service in accordance with section 6(c) of the Act, who is designated by his agency for such purposes, may, when acting in the course of his official duties, take northern long-eared bats covered by an approved cooperative agreement to carry out conservation programs.

* * * * *

Dated: January 7, 2016.

Karen Hyun,

Acting Principal Deputy Assistant Secretary for Fish and Wildlife and Parks.

[FR Doc. 2016–00617 Filed 1–13–16; 8:45 am]

BILLING CODE 4333–15–P

APPENDIX 4.8.3.1-1 Minnesota Statewide Comprehensive Outdoor Recreation Plan

MINNESOTA STATEWIDE COMPREHENSIVE OUTDOOR RECREATION PLAN, 2020-2024

November 2019

A report submitted in fulfillment of requirements for Minnesota's continued eligibility for the Land and Water Conservation Fund (LWCF).

DEPARTMENT OF NATURAL RESOURCES

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ACKNOWLEDGMENTS

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PHOTO CREDITS

Fall landscape photo of Maplewood State Park on page 32 is by Don Del Greco.

All other photos are Minnesota Department of Natural Resources.

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EXECUTIVE SUMMARY

The Minnesota State Comprehensive Outdoor Recreation Plan 2020-2024 (SCORP) provides guidance and direction to the state's outdoor recreation providers for their work in protecting, maintaining and enhancing outdoor recreation opportunities for the state's residents and visitors. This SCORP is intended to meet the requirements for continued eligibility to receive matching Land and Water Conservation Funds.

Minnesota has a long history of preserving lands for public use and recreation, from the efforts to preserve the lands around Minnehaha Falls beginning in 1885 (eventually becoming a Minneapolis city park) and the establishment of Itasca State Park in 1891, one of the earliest state parks in the nation.

Today, Minnesota enjoys a system of outdoor recreation that provides residents and visitors opportunities for a wide array of experiences across the state. A host of public agencies provides these opportunities, including the federal and state governments, regional organizations, counties and municipalities. Non-profit organizations and the private sector also play an important role in land preservation and recreation in Minnesota. Together, these groups provide a diverse suite of outdoor recreation opportunities: hiking, biking, camping, picnicking, swimming, boating, wildlife watching, horseback riding, cross-country skiing, rock climbing, fishing, hunting, snowmobiling, ATV riding, team sports and more.

The SCORP 2020-2024 continues to build on the previous work set out in the *Parks and Trails Legacy Plan* (2011) and Minnesota's previous State Comprehensive Outdoor Recreation Plan 2014-2018. The SCORP 2020-2024 is structured around **four Strategic Directions,** with strategies that provide guidance for outdoor recreation providers over the next five years. This SCORP process used Information from public engagement efforts and a survey of local recreation providers to develop, refine and prioritize the strategies within each Strategic Direction.

SCORP 2020-2024 Strategic Directions

- *Connect People and the Outdoors*
- *Acquire Land, Create Opportunities*
- *Take Care of What We Have*
- *Coordinate Among Partners*

The plan also identifies several current and future trends that are expected to continue to affect outdoor recreation in Minnesota: issues around public health; addressing diversity, equity and inclusion challenges; demographic changes in Minnesota's population; climate change impacts; and accessibility.

Taken together, these trends and the strategies within the four Strategic Directions represent both challenges and opportunities for Minnesota's outdoor recreation providers for the next five years. The intention is that SCORP 2020-2024 will aid these agencies and organizations as they plan for, and invest in, facilities and programs to meet the outdoor recreation interests of Minnesota's residents and visitors.

INTRODUCTION

FRAMEWORK FOR THE 2020 – 2024 STATE COMPREHENSIVE OUTDOOR RECREATION PLAN

Minnesota's State Comprehensive Outdoor Recreation Plan 2020-2024 (SCORP) is based on a consistent framework to address the state's outdoor recreation needs. This plan continues the direction set out in the *Parks and Trails Legacy Plan* and Minnesota's previous SCORP (2014-2018).

The parks and trails "legacy" planning process was an effort initiated by the Minnesota State Legislature to provide guidance for how funds generated by the newly created Parks and Trails Legacy Fund should be used. As with the previous SCORP, the planning process for the SCORP 2020-2024 utilized additional public engagement to build on the foundation laid out in the *Parks and Trails Legacy Plan* and to identify strategies to guide the next five years of outdoor recreation efforts in Minnesota. The goals and strategies in the SCORP 2020-2024 continue to reinforce the vision and four strategic directions that comprise the *Parks and Trails Legacy Plan.*

The SCORP 2020-2024 gives outdoor recreation decision-makers and managers a set of priorities and suggested actions to guide them as they make decisions about outdoor recreation.

The National Park Service (NPS) requires completion of the SCORP to maintain Minnesota's eligibility to participate in the federal Land and Water Conservation Fund (also known as LWCF, or "LAWCON").

BACKGROUND

In 2018, Minnesota marked the tenth anniversary of the passage of the Clean Water, Land and Legacy Amendment to enhance funding for the protection of natural resources, outdoor recreation, the arts and cultural heritage. In 2008, voters approved raising the state sales tax by 3/8 of 1 percent (from 6.5 percent to 6.875 percent) for 25 years, to contribute to a dedicated fund. Often called the Legacy Fund, this dedicated fund is divided into four parts that receive the proceeds from the sales tax increase, with 33% of the revenue going to the Outdoor Heritage Fund, 33% of the revenue going to the Clean Water Fund, 19.75% to the Arts and Culture Fund, and 14.25% to the Parks and Trails Fund.

Parks and Trails Legacy Plan Vision Statement

"A Parks and Trails Vision for Minnesotans: In 2035, our world-class parks and trails connect everyone to the outdoors. They create experiences that inspire a legacy of stewardship for the natural world and they provide fun outdoor recreational opportunities that strengthen friendships, families, health, and spirit, now and into the future. Minnesotans experience the full range of benefits that outdoor recreation provides, reinforcing our identity as an outdoor culture."

Over these first ten years, the Parks and Trails Fund has collected approximately $360 million in revenue. The Parks and Trails Fund is distributed among three implementing agencies: Department of Natural Resources (DNR), Metropolitan Council (Met Council), and Greater Minnesota Regional Parks and Trails Commission (GMRPTC). These three agencies meet regularly with the Parks and Trails Legacy Advisory Committee (PTLAC). The PTLAC was established to provide recommendations to enhance

promotion, coordination, and accountability throughout the implementation of the 25-year Legacy Plan. This advisory committee is composed of private citizens appointed by the three implementing agencies involved with the distribution of Parks and Trails Legacy Funds (DNR, Met Council and GMRPTC).

To recognize the first ten-year anniversary of this 25-year constitutional amendment, the implementing agencies held a series of nine regional public events in 2018 to celebrate, educate and listen as citizens shared their perspectives on, and aspirations for, Minnesota's comprehensive system of state and regional parks and trails. A team of PTLAC members, with leadership and staff from the Legacy agencies, planned and executed the events with volunteer assistance from a host of parks and trails friends from across the state. Over 12,500 Minnesotans participated in these events. An overview of the event locations is provided in **Public Engagement** and in **Appendix C**.

BUILDING ON THE PARKS AND TRAILS LEGACY PLAN AND SCORP 2014-2018

With the passing of the Clean Water, Land, and Legacy Amendment, the Minnesota State Legislature mandated that the DNR commissioner develop a plan to guide the use of the Parks and Trails Fund and other traditional sources of funding. In response to this new opportunity and legislative direction, DNR developed a collaborative planning process that relied heavily on public involvement to develop and finalize the *Parks and Trails Legacy Plan.*

The *Parks and Trails Legacy Plan* was organized around four Strategic Directions that provide a framework for the strategies and actions identified in the plan. The four Strategic Directions are:

- ***Connect People and the Outdoors***: develop Minnesota's stewards of tomorrow through efforts to increase life-long participation in outdoor recreation and appreciation for our natural heritage.
- ***Acquire Land, Create Opportunities***: expand and create new park and trail opportunities to satisfy current customers as well as to reach out to new ones.
- ***Take Care of What We Have***: provide safe, high-quality park and trail experiences by regular re-investment in park and trail infrastructure, and natural resource management.
- ***Coordinate Among Partners***: enhance coordination across the large and complex network of public, private and non-profit partners that support Minnesota's parks and trails to ensure seamless, enjoyable park and trail experiences for Minnesotans.

The *Parks and Trails Legacy Plan* was used as the foundation for the previous SCORP, and we have retained the structure around four Strategic Direction's structure in SCORP 2020-2024. Although the scope of the *Parks and Trails Legacy Plan* was focused primarily on parks and trails of state and regional significance, the issues and concerns raised also relate to local parks and trails and other outdoor recreation facilities and lands.

Some recreation uses and facilities, such as athletic fields and playgrounds, are important elements for local park systems but are not as common in regional or state parks. To make sure that a

broad range of recreational uses and demands are reflected in the SCORP, additional information from local park providers was sought to complement the more regional and state-focused perspectives in the *Parks and Trails Legacy Plan.*

Several sources of information were used during the planning process to evaluate the directions set out in the previous SCORP, and to determine the strategies and priorities to include in the SCORP 2020-2024. Among the information sources used during this planning process were:

- *Greater Minnesota Regional Parks and Trails Strategic Plan* – prepared for the GMRPTC and last updated in 2015.
- Minnesota Outdoor Recreation Household Survey – conducted by the DNR in 2017.
- Local Outdoor Recreation Provider Survey – conducted by the DNR in 2019.
- Parks and Trails Legacy 10-Year Celebration Events – held throughout Minnesota in 2018.
- Parks and Trails Legacy Grant Program Requests – review of ongoing local provider grant program requests.
- Research studies – relating to recreational trends, impacts of climate change on recreation and natural lands, etc.

Several of these sources are further described in **Public Engagement** and in the **Appendices**.

PUBLIC ENGAGEMENT

An important part of developing Minnesota's SCORP 2020-2024 is public and stakeholder input. To better understand patterns and priorities for outdoor recreation in Minnesota, several efforts were used to gather information and feedback from outdoor recreation providers and from the public.

RESIDENTS AND USERS

MINNESOTA OUTDOOR RECREATION HOUSEHOLD SURVEY 2017

In 2017, the Minnesota DNR updated a statewide outdoor recreation household survey that had previously been conducted in 2004. The survey invited a random sample of 8,000 Minnesotans to share about their participation in outdoor activities, what motivates them to get outdoors, factors that limit participation, and preferences for communication. A total of 1,987 Minnesotans shared responses online, over the phone, and via paper surveys.

Key findings from the survey included positive news that outdoor activities are an increasingly important part of most Minnesotan's lives. In 2004, data suggested that outdoor recreation participation was declining, causing concern for public agencies charged with providing outdoor recreation. Fortunately, the 2017 survey results indicate that from 2004 to 2017, the percentage of Minnesotans who reported that outdoor activities are very important increased from 57 to 70 percent. And, most Minnesotans reported that they participate in outdoor activities frequently: nearly two-thirds of Minnesotans reported recreating, on average, more than twice per week over the past year.

Findings also revealed that "Minnesotans see the outdoors as a place to rest and relax, connect with family and friends, and improve their health." Favorite activities were broken up into seasonal categories, with activities such as "relaxing in the outdoors," "walking or hiking," "relaxing by the water," and "picnicking outdoors" identified as highly popular year-round and three-season activities. In winter, top activities were "sledding and snow tubing," and "ice fishing." These findings suggest a

number of interesting possibilities: that Minnesotans prefer activities that require less equipment or advanced skills, and/or that they have not had the opportunity to develop interests and skills to participate in other activities. This is an area for additional exploration.

In terms of barriers to getting outdoors, findings were consistent with past data suggesting that pests, time, and convenience were primary reasons people are not spending more time outdoors. More information about this survey and its findings are available in **Appendix A** and at www.mndnr.gov.

PARKS AND TRAILS LEGACY 10-YEAR ANNIVERSARY CELEBRATION EVENTS

In 2018, Minnesota's Parks and Trails Legacy Fund marked its tenth anniversary. The PTLAC hosted a series of events statewide to:

- Celebrate the anniversary
- Listen to the public about their "Legacy stories" and ideas for the future
- Educate the public about what the Parks and Trails Legacy Fund is and why it's important

Staff representing the ten metropolitan regional park agencies, the Metropolitan Council, the Minnesota DNR, and the GMRPTC gathered ideas from the public at nine regional events – including the Minnesota State Fair. All told, 12,500 Minnesotans were engaged in events designed to learn what people know about the Legacy Amendment and what they would like to see in the future.

Staff and consultants analyzed feedback received at regional events and completed a report that presented key findings and recommended next steps. Major *priorities of interest* identified by attendees included:

- Acquire land for parks, trails, and conservation
- Maintain and improve natural resources
- Maintain parks and trails facilities
- Provide more programming and events
- Provide more and improved features (e.g., equipment and accessible infrastructure)
- Create greater awareness and marketing of parks, trails, and programming

Overall *learnings and recommendations* from these public engagement activities were as follows:

- Many people take great pride in Minnesota's quality parks, trails, and natural resources.
- Minnesotans place high value on taking care of facilities and preserving the natural resources already found within existing parks and trails.
- Many Minnesotans see the health and wellness benefits offered by nearby parks and trails as part of their daily lives.
- Parks and trails must become more accessible and welcoming to people of varying abilities.
- More public awareness of these outdoor recreation resources, and marketing of specific parks and trails, is necessary.
- Older participants are concerned about preserving natural resources for younger generations and about teaching them about nature and outdoor activities.

More information about the celebration events can be found in **Appendix C.**

OUTDOOR RECREATION PROVIDERS

LOCAL RECREATION PROVIDER SURVEY

While Parks and Trails Legacy partners represent a large number of outdoor recreation systems statewide, they do not administer local systems. In order to ensure Minnesota's SCORP is effectively comprehensive in its scope, a local recreation provider questionnaire was distributed to city and county recreation departments. The responses received from 56 entities, 22 cities and 34 counties, were analyzed to help inform this SCORP.

The most relevant feedback received from the responses is as follows:

- The large majority of providers reported increased visitation to their parks and facilities in the past five years (77%).
- Amongst local providers, there is not consistent direction around acquiring land for the next five years. However, some common needs identified were trail development (predominantly non-motorized), open space (e.g., athletic fields), and expanded parking and dog parks.
- Lack of funding, lack of capacity to manage more land, and a sense that their system is already developed were the main reasons some departments were not planning to acquire new land.
- Most respondents plan to develop new infrastructure in the next five years. Priorities for new development are trails, playgrounds (including nature play), athletic fields, and trailhead amenities (e.g., restrooms).
- Respondents ranked natural resource management-related activities as the highest priority for the next five years.
- Local providers are taking actions to respond to climate change impacts, such as relocating or rerouting trails to avoid flooding, making energy-efficiency improvements, and modifying how they provide winter activities.

- Other priorities local providers would like to see addressed in the SCORP include:
    - Focusing on trails
    - Funding to take care of what we have
    - Health connections of recreation, such as fitness programs
    - Inclusion and diversity efforts
    - Flexibility that allows for different needs and interests across the state

More information about the local recreation providers survey can be found in **Appendix B.**

SCORP STEERING COMMITTEE

PURPOSE AND MEMBERSHIP

The Minnesota DNR convened a Steering Committee to help guide the development of the SCORP 2020-2024. The twelve members of the committee were selected to represent a broad array of interests in outdoor recreation in Minnesota. The Steering Committee included local and regional park agency staff, members of outdoor recreation advocacy groups, and community leaders involved with health, youth, and accessibility issues. The Steering Committee met several times with the DNR Planning Team during the SCORP planning process.

ROLE AND TASKS

The Steering Committee played several important roles during the planning process:

- Ensuring that the diverse perspectives on outdoor recreation are represented in the plan
- Reviewing information and data to be included in the plan, and suggesting additional information sources
- Reviewing the draft plan and providing feedback on its structure and content

An important task for the Steering Committee was to review the strategies to be included in the plan. This involved recommending revisions to existing strategies and the development of new strategies to address emerging issues. The Steering Committee provided recommendations for prioritizing the strategies to be included in each of the four Strategic Directions in the SCORP.

OVERVIEW OF MINNESOTA'S OUTDOOR RECREATION SYSTEM

Minnesota's outdoor recreation system includes lands owned or managed by local, regional, state and federal governments, as well as some owned by nonprofit and for-profit entities. All play different roles in managing and maintaining Minnesota's outdoor recreation system. The system includes everything from neighborhood playgrounds, to regional parks, to state parks, to national forests. About one-fourth of the land in Minnesota is in some form of public ownership, and the vast majority is administered by federal, state or county governments. Almost all of this land provides conservation benefits as well as some kind of outdoor recreation opportunity. Managing this land for public benefits is an important responsibility and requires significant resources.

FEDERAL GOVERNMENT

Federal lands providing outdoor recreation in Minnesota include two national forests, the Boundary Waters Canoe Area Wilderness, five units managed by the National Park Service (Voyageurs National Park, Mississippi National River and Recreation Area, St. Croix National Scenic Riverway, Pipestone National Monument, and Grand Portage National Monument), and 13 national wildlife refuges.

The Chippewa National Forest, established in 1908, was the first national forest east of the Mississippi River. The Superior National Forest, established in 1909, contains the largest wilderness area east of the Rocky Mountains and north of the Everglades. The Boundary Waters Canoe Area Wilderness is the most heavily used of all federal wilderness areas.

The U.S. Fish and Wildlife Service manages nine national wildlife refuges and nine wetland management districts. These units provide hunting, fishing, bird watching and photography opportunities.

For more than 50 years, the federal government has had a funding partnership with the state and local governments in Minnesota through the Land and Water Conservation Fund program. The impact of this program on the outdoor recreation system in Minnesota has been significant. This program is further described in **The Land and Water Conservation Fund** section of this report**.**

STATE GOVERNMENT

Itasca State Park, established in 1891, is one of the earliest state parks in the country. Many other state parks in Minnesota were established during the 1930s with help from the federal government through the Civilian Conservation Corps, Works Progress Administration, and other federal Depression-era programs. There are currently 75 state parks and recreation areas, over 1,300 miles of state trails, more than 1,500 DNR-managed water access sites, and over 4,500 miles of waterways designated as state water trails. Minnesota's first state forest was created in 1900. Today there are 58 state forests totaling nearly 4 million acres. These lands provide many opportunities for camping, fishing, hunting, bird watching, canoeing, boating and other natural resource-based outdoor recreation. State trails and other trails in these units support a wide variety of recreational uses. Some support multiple uses while others cater to a specific use, such as single-track mountain bike or all-terrain vehicle (ATV) riding trails. Other state-owned lands and

managed areas that provide opportunities for some types of outdoor recreation include wildlife management areas, aquatic management areas, and scientific and natural areas.

In 1963, the Minnesota Outdoor Recreation Resources Commission was created to help determine state outdoor recreation needs and guide state investments to meet those needs. A cigarette tax was enacted to help fund outdoor recreation investments through the state Future Resources Fund. The commission later became the Legislative Citizen Commission on Minnesota Resources (LCCMR), and now allocates some of the proceeds from the Minnesota State Lottery (the state's Environmental and Natural Resources Trust Fund) to natural resource-related initiatives and projects. The commission has recommended projects and programs for funding to the legislature for the past five decades, resulting in hundreds of millions of dollars of investment in both state and local outdoor recreation lands and facilities. The outdoor recreation system in Minnesota owes much of its existence to this multi-decade effort. Other major state investments in outdoor recreation acquisition and facilities have come through state capital bonding and the Clean Water Land and Legacy Act funds (the "Legacy Amendment"), described on pages 4-5 here.

METROPOLITAN COUNCIL REGIONAL GOVERNMENT

The Minneapolis-St. Paul seven-county area's Metropolitan Council coordinates and plans for the Twin Cities' regional outdoor recreation system in the form of regional parks, trails and park reserves. The Metropolitan Council provides state and regional funding for acquisition and development of the system through grants to ten county and city implementing agencies, which are responsible for operating and maintaining the park and trail facilities. The system, begun in 1974, now includes 56 regional parks and park reserves, eight special recreation areas, over 400 miles of interconnected trails, and more than 54,000 acres of land throughout the seven-county area.

GREATER MINNESOTA REGIONAL PARKS AND TRAILS COMMISSION (GMRPTC)

The Greater Minnesota Regional Parks and Trails Commission was established in 2013 to carry out system planning and provide recommendations to the state legislature for grants funded by the Legacy Parks and Trails Fund to counties and cities outside the seven-county metropolitan area for parks and trails of regional significance. Previously, recreation providers in greater Minnesota had not been formally organized like the metropolitan area regional providers and state park and trail organizations have been.

The Commission is now legislatively established and includes 61 facilities across several categories, including natural resource-based parks, special recreation feature parks, non-motorized trails, motorized trails and mixed-use trails.

LOCAL GOVERNMENTS

Minneapolis and St. Paul have extensive park systems dating back to the 1800s, as do many of the older and larger cities throughout the state. As suburbs arose in the Minneapolis-St. Paul area, they acquired and developed increasingly extensive park and trail systems. Several counties throughout the state also began to acquire and develop county parks in the last half of the Twentieth Century.

These facilities primarily provide close-to-home outdoor recreation opportunities and often focus more attention on youth-related outdoor recreation, such as playgrounds, athletic fields, community centers, swimming pools and beaches. While most of these facilities have been acquired and developed with locally generated funds, a significant number have been assisted by state and federal grants through the years.

PRIVATE SECTOR AND NON-GOVERNMENT ORGANIZATIONS

The private resort industry has been particularly important in Minnesota for water-related recreation such as fishing, canoeing, boating and swimming. Larger resorts also have added golf courses, tennis courts, and other facilities. A few resorts offer downhill and cross-country skiing. Apart from the resort industry, the private sector is also a major provider of golfing and downhill skiing opportunities. There are some privately operated hunting reserves, horse riding stables, and similar facilities in the state. Businesses also support outdoor recreation by renting bicycles, canoes, snowmobiles, ATVs and other equipment. These private businesses are an important part of the larger tourism industry, one of the most important economic engines of the state.

Private landowners also play an important role in helping support outdoor recreation in Minnesota. Several types of facilities – including some state trails and large portions of the grant-in-aid snowmobile trail system, as examples – rely on access to private lands via easements or other agreements. These trail opportunities would not be possible without use of these private lands.

Non-profit organizations also support outdoor recreation in the state. The Parks and Trails Council of Minnesota, a non-profit organization dedicated to supporting the state's park and state trail systems, dates back to 1954. It has helped the state acquire about $10 million of state park and trail land. Organizations such as the Trust for Public Land, Pheasants Forever, Ducks Unlimited, and the Nature Conservancy have also played key roles in supporting funding for state, regional and local outdoor recreation land; protection and restoration of natural areas; wetland protection; water quality and other natural resource and outdoor recreation-related purposes. Other non-profit organizations play an important role as partners for building and maintaining trails through volunteers, such as local equestrian, horse-riding, ATV and snowmobile clubs.

CURRENT AND FUTURE TRENDS

This section provides an overview of the most pressing current and future trends and issues that impact how we plan for, manage, and enjoy the outdoor recreation system in Minnesota. These trends include recognition of 1) the public health benefits of outdoor recreation; 2) the need to serve all Minnesotan's equitably in outdoor recreation spaces; 3) Minnesota's changing population demographics; 4) climate change impacts on our natural world and recreational facilities; and 5) continued accessibility challenges at our outdoor recreation facilities.

PUBLIC HEALTH

WHAT DO WE KNOW?

Although many people can speak to the health benefits of nature from personal experience, the scientific community had not spent much energy investigating those connections until relatively recently. As of 2019, there are now more than 400 studies that demonstrate the numerous health benefits that nature provides.

Physiological Health

Most of the research on health and nature has focused on physical health benefits. Many of the benefits discovered are helpful in preventing leading causes of chronic disease, including stress reduction; reduced blood pressure; faster healing; addiction recovery; and reduced cardiovascular, respiratory and long-term illness.

Cognitive Development

Benefits of nature exposure for cognitive development is increasingly recognized in the fields of education and human development, among others. Studies illustrate nature's positive effects on attentional restoration, reduced mental fatigue, improved academic performance, improved cognitive function in children and improved productivity.

Psychological Well-being

Studies detailing the positive effects of nature on mental processing have no doubt inspired practices such as forest bathing and other newly popular wellness-based outdoor programs in recent years. Increased self-esteem, improved mood, reduced anger/frustration and reduced anxiety are some of the key examples of the improvements documented by research on nature interactions for mental health.

Social Effects

Finally, a less well-known, but critically important benefit of time outdoors is the positive social effects at an individual or community public health scale. Several articles have found that nature facilitates social interaction, enables social empowerment, reduces crime rates and violence, and enables interracial interaction, among other positive social behaviors.

WHAT DOES IT MEAN?

Research shows that spending time outdoors is good for us. However, do Minnesotans view nature as an "alternative" healthcare system? The 2017 Minnesota Outdoor Activities Survey found that top motivations for spending time outdoors were to feel healthier (69%), rest mentally (65%) and be physically fit (64%).

The research supports, and the public is seemingly ready to embrace, a healthier outdoor lifestyle. Public agencies and healthcare systems just have to catch-up. Outdoor recreation providers have only recently begun to formalize partnerships and programs focused on the "healthy" aspects of being outside. Park prescriptions, wellness-inspired outdoor programs, and nature-based therapy are just some of the initiatives that have taken off because of new data on this subject. There is an international movement underway to better understand how we can promote being outside as a way to live longer, be happier and spend less on healthcare costs. Several national leaders of the movement, have envisioned a future where health insurance companies will fund park entry fees and equipment needed to recreate outdoors.

Moving forward, outdoor recreation providers should consider how to enhance their operations in ways that promote visitor health and well-being. Leveraging this connection is important for outdoor organizations of all scales, because it has potential for innovative programs, new funding, fresh marketing and improved infrastructure. The end goal of all these efforts is better, healthier lives for all people.

DIVERSITY, EQUITY AND INCLUSION

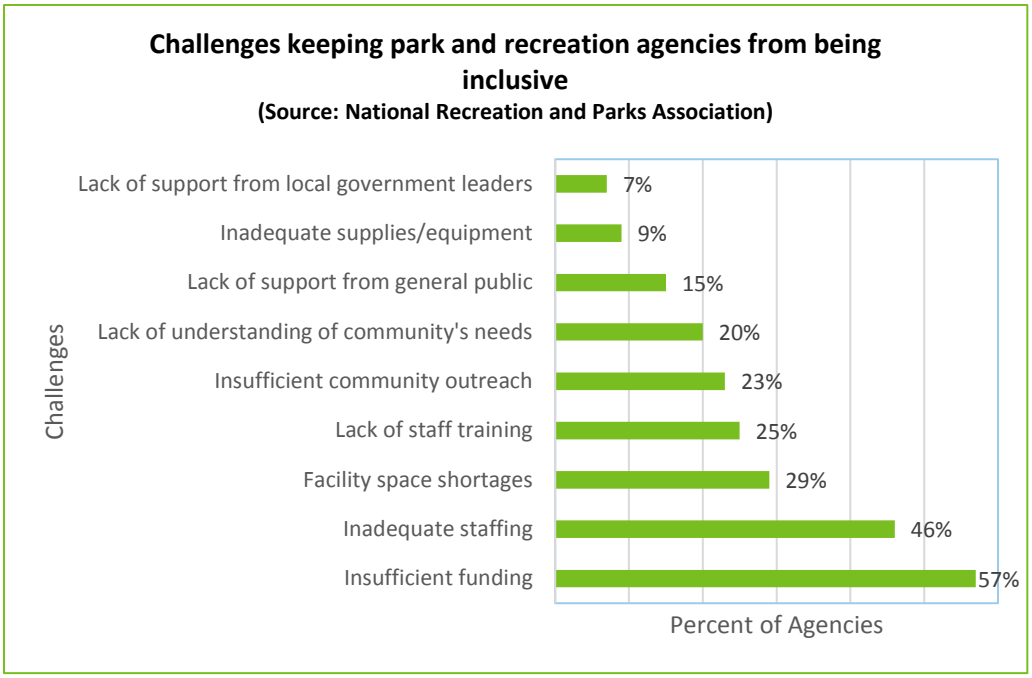
WHAT DO WE KNOW?

As evidenced by the current and projected demographic trends in the United States, including Minnesota, outdoor recreation providers will need to enhance programs, services, and opportunities to embrace and advance the principles of diversity, equity and inclusion.

Programming and Facilities

A National Recreation and Park Association (NRPA) survey found that park and recreation agencies across America provide programming and activities for many community members. This included 74% that provided programs and activities specifically designed for individuals with physical disabilities; 71% for members of multicultural, racial and ethnic communities; 62% for individuals with cognitive disabilities; 30% for members of LGBTQ communities; and 27% for members of refugee/immigrant communities.

The NRPA survey identified insufficient funding, inadequate staffing, facility space shortages, and lack of staff training as among the most common challenges that park and recreation agencies face when trying to build more inclusive environments for all members of their communities. Findings also suggest that agencies also need to be aware how well these groups are represented, or not represented, by stakeholder organizations or through traditional public input processes.



Policy Integration

To be effective, social equity must be integrated into policy and structure, so accountability for making improvements that address equity can be shared across all levels of an organization. Yet, only two in five park and recreation agencies in the United States have a formal inclusion policy.

Partnerships

Schools, non-profit organizations, agencies on aging and disabilities, and local law enforcement are some of the most likely organizations that park and recreation agencies partner with to develop and enhance inclusion in programming and activities to better serve all members of their communities.

Outcomes

Creating equal, equitable and inclusive outdoor recreation spaces for individuals of all abilities, backgrounds and identities can enhance outcomes in neighborhood development, health and education across all groups.

WHAT DOES IT MEAN?

Minnesota's nature-based recreation providers must continue to develop more programs and facilities that serve everyone, including individuals with disabilities; members of multicultural, racial and ethnic communities; individuals identifying as LGBTQ; and refugees and new immigrants. There are many challenges and obstacles to overcome when establishing equal, equitable and inclusive outdoor recreation opportunities. However, providers can find and develop new ways of mitigating these challenges through policy integration, accountability and partnerships, where solutions and positive outcomes are comprehensive, long lasting and sustainable. Agencies should seek out opportunities to connect with under-served and under-represented communities, and enhance outreach efforts to better address their needs and ideas.

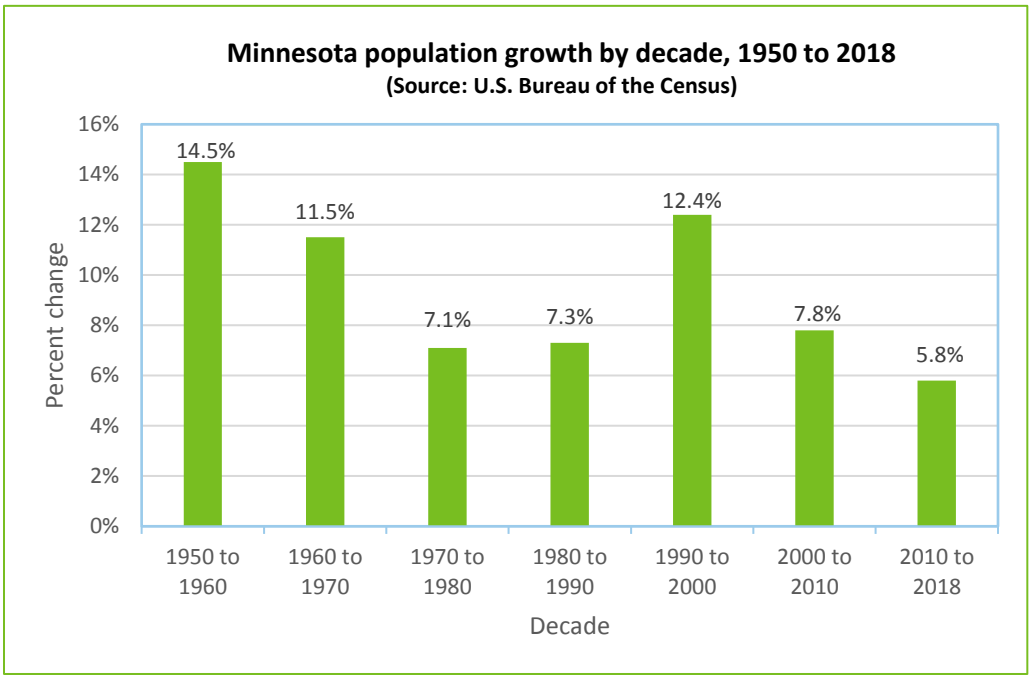
MINNESOTA'S CHANGING POPULATION

WHAT DO WE KNOW?

Declining population growth rates, increasing numbers of older people, and expanding communities of color are all evidence of Minnesota's changing population. These changes will play an important role in the demand for, and value placed on, outdoor recreation opportunities, and how nature-based recreation providers choose to serve their communities over the next five years and beyond.

Declining Population Growth

Minnesota added nearly 310,000 residents between 2010 and 2018, a 5.8% increase over 8 years, contributing to an estimated total population of more than 5.5 million. However, the growth rate in Minnesota's population has declined overall in the post-war period, with the exception of the 1990s when there was a 12.4% increase in population over 10 years. These rates are projected to decline further through the decades of the 2020s, 2030s and 2040s.



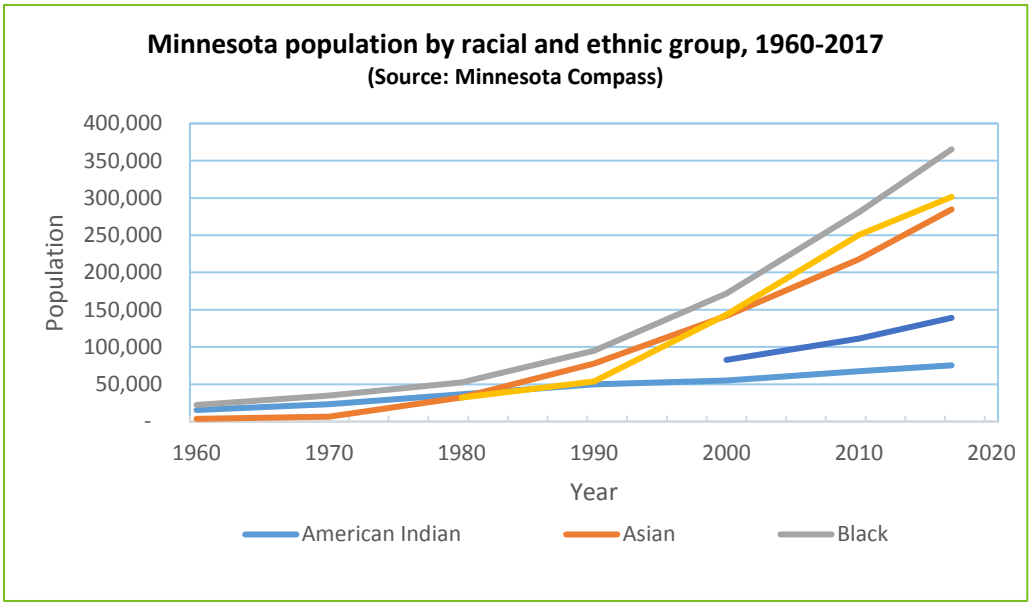
Aging Minnesotans

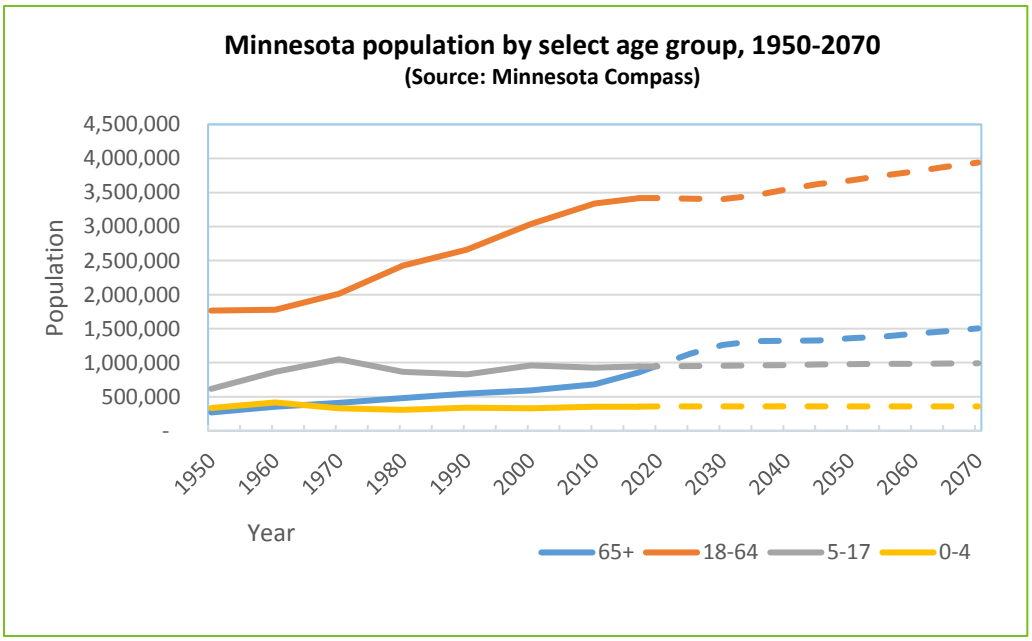
About 285,000 Minnesotans will have turned 65 years old between 2010 and 2020, which will be more than in the last four decades combined. "Empty nesters" are now the most common household type in Minnesota, followed by households consisting of older adults living alone. Projections indicate that the total number of adults 65 and older living in Minnesota will double between 2010 and 2030, and most of this growth will take place in metropolitan areas, specifically suburban communities in and around Minneapolis and St. Paul.

Growing Multicultural, Racial, and Ethnic Groups

Between 2010 and 2017, the populations of Black or African American and Asian Minnesotans grew by 29%, and the population of Hispanic Minnesotans grew by 20%, helping contribute to five times more

people of color being added to the total state population than non-Hispanic, white residents. Additionally, in 2017, the largest group of foreign-born Minnesotans were born in Mexico, followed by those born in Somalia, India, Laos (including Hmong), Vietnam, China (excluding Hong Kong and Taiwan), Ethiopia and Thailand (including Hmong). Growing multicultural, racial and ethnic groups will continue to diversify Minnesota into the future. One report suggests that 24.8% of Minnesota's population will be nonwhite or Latino by 2035, making for a 121% increase in this portion of the state's population between 2005 and 2035.





WHAT DOES IT MEAN?

Although the population in Minnesota is growing, the rate of growth has slowed since the 1950s and is projected to continue to decline. This translates into lower outlooks for population-driven increases in recreation outcomes, including urban expansion-driven park and trail development; near-home parks and

trails demand; and potential participants in nature-based outdoor recreation. Because Minnesota's demographics are skewing older, outdoor recreation providers should consider how their services will need to adapt in order to reach and provide for an older audience in the upcoming decades. Although the overall trend is that older adults participate less in outdoor recreation as they age, this growing age cohort also represents an opportunity for providers – a group that may have more free time and interest in programming and activities that promote the health and wellness benefits of outdoor recreation.

Additionally, the growth in populations of color presents an opportunity for outdoor recreation providers to connect to a new, more diverse audience. Providers should seek ways to better serve a more diverse suite of communities by increasing access to, and seeking a greater understanding of, the recreation opportunities desired by a wide spectrum of communities. Recreational providers will also need to consider what changes they could make in the type of activities they support that may be more attractive to a more diverse, next generation of users. For example, programs such as the DNR Parks and Trail's "I Can!" series teach outdoor skills for activities like camping, paddling, and fishing. These kinds of programs can help with outreach to groups that are infrequent participants in outdoor recreation and build interest and awareness among new audiences.

CLIMATE CHANGE

WHAT DO WE KNOW?

Climate change is already occurring in Minnesota, affecting natural landscapes and outdoor recreation resources across the state. Increasing precipitation, more frequent extreme rain events, and substantially warmer winter temperatures are among the most well documented climate change impacts.

Warmer and Wetter

Between 1895 and 2017, Minnesota has warmed by 2.9 degrees Fahrenheit and has received an annual average of 3.4 inches of additional precipitation. The most dramatic changes have happened in the past several decades. Each of the top-10 combined warmest and wettest years on record have occurred within the last 20 years.

More Damaging Rainfalls

Heavy rainfall events are more common and more intense now than any time on record. The frequency of heavy rainfall events has increased 42% in the last 50 years. Mega rain events are also increasing – these are storms that deliver more than 6 inches of rain over a 1,000 square mile area.

Warming Winter Temperatures

The most significant impacts of warming related to climate change in Minnesota are happening in the winter. Although Minnesota will always see periodic severe cold spells, the overall trend is for warmer winter temperatures. Minnesota's winter temperatures have warmed 13 times faster than summer temperatures since 1970.

These trends are expected to continue and likely intensify in the decades ahead.

WHAT DOES IT MEAN?

Climate change will continue to have profound impacts on how agencies manage natural landscapes and provide outdoor recreation opportunities to Minnesotans and visitors. Recreation providers will need to adjust their programs and facilities to adapt to these climate change impacts. Some examples of impacts to outdoor recreation from climate change that have already been documented include:

- Shorter winter seasons - shorter and more inconsistent conditions for winter activities such as cross-country skiing, snowshoeing, ice fishing, and snowmobiling.
- Longer shoulder seasons - some recreational activities may benefit as temperatures warm more quickly in the spring and stay warm longer in the fall.
- More storm event impacts to recreation facilities – wind and flooding damages trails, beaches and other facilities.
- Greater damage to natural communities and cultural resource sites – erosion along rivers and destabilizing slopes are causing loss of historic sites and impacts to rare natural communities.
- Higher prevalence of invasive species - increasing spread of invasive species that are suited to changing conditions and the arrival of new invasive species.
- Additional ecological impacts affecting other activities – changes to fish and animal populations affect fishing, hunting and wildlife watching.

Recreation providers will need to adapt to these changing conditions and seek to mitigate climate change impacts. Visitors and the public increasingly expect park and recreation agencies to communicate and demonstrate how they are addressing climate change. Some possible actions may include practices like adopting non-carbon-based energy sources (e.g., solar and wind power); using electric vehicles for facility operations; reducing energy and water use at facilities; and providing charging stations for privately owned electric vehicles. Agencies can take actions that reduce their climate impacts, and in some cases reduce long-term costs, in concert with promoting environmental stewardship messages to their visitors.

ACCESSIBILITY

WHAT DO WE KNOW?

With the enactment of various state and federal laws and guidelines, and the recognition of barriers to all Minnesotans benefiting from nature-based recreation, many public agencies - including those providing nature-based recreation services - are now offering more opportunities to Minnesotans with disabilities.

Prevalence

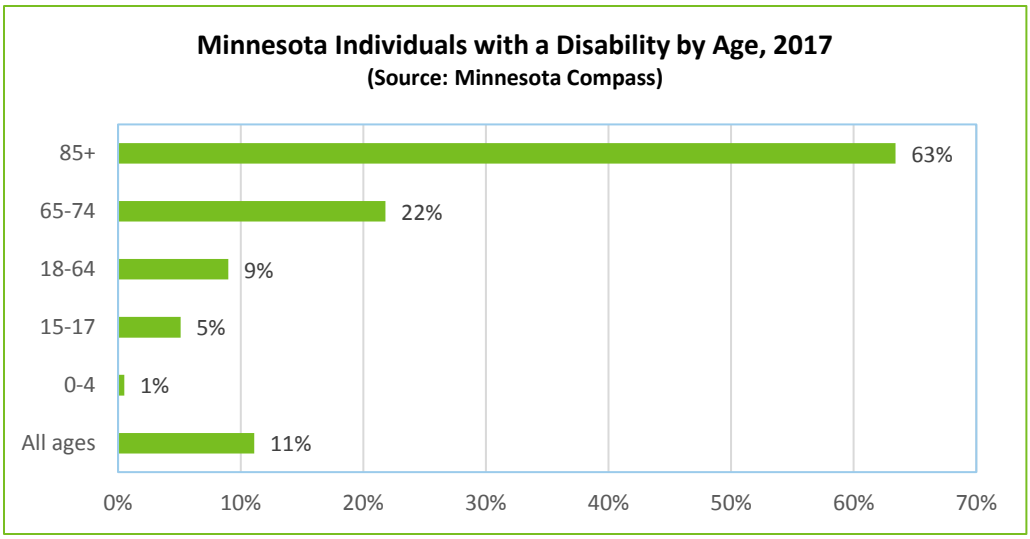
In 2017, a reported 584,974 Minnesotans had a disability, which is an estimated 10.8% of the total civilian non-institutionalized population for that year. The most common type of disability among Minnesotans is ambulatory difficulty, with 5.1% of people having this type of disability. The second most common type of disability is independent living difficulty, at 4.6%, followed by cognitive difficulty, at 4.5%. The percentage of those with a disability who are American Indian and Alaska Native, Native Hawaiian and Other Pacific Islander, and Black or African American is higher than other racial groups. The percentage of those with a disability increases significantly with age, an important factor in light of Minnesota's aging population.

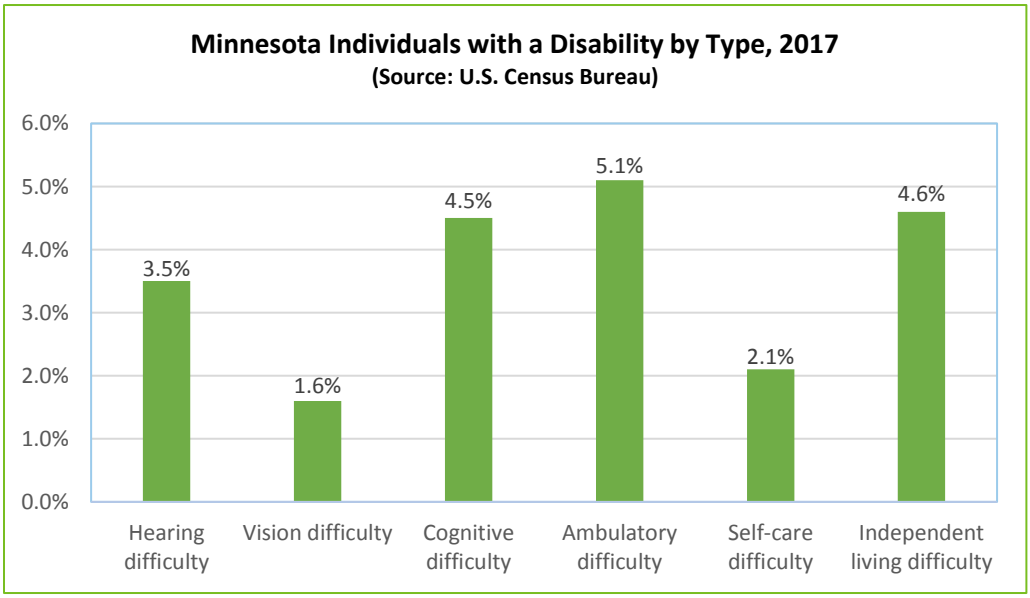
Law

Federal and state law prohibits discrimination by state and local government services against persons with disabilities. These laws are applied to federal- and state-funded outdoor recreation and education programs, services and activities. Recreation providers must make reasonable modifications to ensure equal opportunities for access and participation.

Development and Redevelopment

State and local outdoor recreation providers are developing and updating public spaces, programs and services to improve access for all and meet state and federal accessibility standards. Public outdoor spaces include forests, parks, trails, and wildlife areas. Programs include camping, fishing and hunting, while services include technology and access to trip planning information and resources.





WHAT DOES IT MEAN?

Minnesota's outdoor recreation providers will need to continue developing and updating their programming, facilities and services to facilitate more and better access to opportunities for people with disabilities. Since being enacted, the Americans with Disabilities Act and other similar laws and guidelines have been an important part of planning and development of publicly funded outdoor recreation programs and services in Minnesota. With a wide range of disabilities, providing accessible facilities and opportunities will be an important consideration for nature-based recreation providers.

The percentage of Minnesotans with a disability will increase over the next few decades as the average age of Minnesota's population continues to get older. The prevalence of disabilities will be much higher among older age groups. Agencies will need to significantly increase their investments for accessibility improvements to keep pace with Minnesota's growing need for facilities and opportunities that accommodate, and are welcoming for, people with disabilities.

THE LAND AND WATER CONSERVATION FUND

LAND AND WATER CONSERVATION FUND STATE GRANT PROGRAM

The Land and Water Conservation Fund (LWCF), created by Congress in 1964, has an important place in the history of the United States' outdoor recreation and conservation funding efforts. The program has provided $3.9 billion for the LWCF State Grants program nationwide through 42,000 matching grants. The states have matched this amount with another $3.9 billion, for a total of at least $7.8 billion, to acquire and improve parks and natural areas in every county in the nation.

Revenue for the LWCF comes primarily from offshore oil and gas lease receipts received by the federal government. Since offshore drilling for oil and gas depletes a valuable natural resource, Congress determined that it was appropriate to invest the proceeds from offshore leases to protect America's natural resources and provide land and facilities for outdoor recreation experiences.

In 2019, Congress voted to reauthorize the LWCF permanently in the John D. Dingell, Jr. Conservation, Management and Recreation Act (S.47). This was a definitive statement in support of the LWCF as a unique program dedicated to the protection of our recreation lands and outdoor places.

The LWCF State Grants Program has had a large impact on the outdoor recreation infrastructure of Minnesota, with investments of more than $81 million, most of it during the late 1960s to mid-1980s, in the state's outdoor recreation system for close-to-home recreational opportunities. The federal dollars have leveraged more than $81 million in matching state and local dollars. Adjusted for inflation, the total investment is in the hundreds of millions of dollars, funding projects in 157 DNR-managed outdoor recreation units; three Minnesota Historical Society recreation sites; three University of Minnesota recreation sites; and over 800 hundred local government park and trail projects throughout the state. This investment has created a permanent legacy of parks and trails throughout Minnesota.

The LWCF in Minnesota supports a state program and a local program, each getting 50 percent of the federal appropriation. The state program supports the acquisition and development of the State Outdoor Recreation System as defined in Minnesota Statutes, Chapter 86A. The local program, funded through the Outdoor Recreation and Natural and Scenic Area Grant Programs, provides matching grants to local units of government for acquisition, development and/or redevelopment of outdoor recreation and natural areas.

MINNESOTA'S FINANCIAL NEEDS

Minnesota's estimated annual financial needs for the acquisition, development and redevelopment of outdoor recreation facilities are shown below, grouped by the four different types of Minnesota providers:

1. Local governments (cities, counties and townships)
2. State (state parks, state trails, water access sites and natural areas)
3. Metropolitan Council (regional parks and trails in the seven county Minneapolis-St. Paul metropolitan area)
4. Greater Minnesota Regional Park and Trail Commission (regional parks outside of the seven county Minneapolis-St. Paul metropolitan area)

Annual Financial Needs by Outdoor Recreation Provider	Requested Funding ($)
Local governments (cities, counties, townships) Local parks and trails 2019 Application Requests through DNR grant programs	19,000,000
State agencies (state parks, state trails, water access sites and natural areas) Department of Natural Resources 2019 10-Year Capital Asset Need Document - annual need for recreational areas, water accesses, trails, bridges and roads	90,000,000
Metropolitan Council (regional parks and trails in the seven county Minneapolis-St. Paul metropolitan area) Metropolitan Council 2019 Regional Park and Trails Capital Improvement Plan	30,000,000
Greater Minnesota Regional Parks and Trails Commission (regional parks outside of the seven county Minneapolis-St. Paul metropolitan area); Greater Minnesota Regional Parks and Trails 2019 Application Requests	20,000,000
Total	**$159,000,000**

These figures only represent an approximate annual request/need for funding. Minnesota has a **backlog of financial needs in the billions of dollars** to take care of the existing facilities and expand the system to meet current and future demand. We are seeing an increasing demand from communities to renovate or replace their existing facilities to meet current safety and accessibility standards. Demand for the limited available funding is significant. Additional funding is needed so that outdoor recreation facilities can fulfill their vital role in connecting people to the outdoors and creating the next generation of natural resource stewards. Both destination and close-to-home experiences are essential if the vision is to be achieved.

STRATEGIC DIRECTIONS

Four strategic directions organize the strategies included in SCORP 2020-2024. These strategic directions are the same as those articulated in the *Parks and Trails Legacy Plan* and SCORP 2014-2018. This structure is well known by outdoor recreational providers in Minnesota and provides a consistent framework for understanding the priorities and activities of groups involved in these efforts throughout the state.

Within each strategic direction, strategies are grouped together to provide further structure. Strategies from the previous SCORP were reviewed and edited or discarded, and new strategies were developed during the planning process to reflect priorities for outdoor recreation for the next five years.

STRATEGIC DIRECTION: CONNECT PEOPLE AND THE OUTDOORS

WELCOMING ENVIRONMENT

1. Mentor, recruit, and hire employees and volunteers who reflect the population of the users they serve.
2. Provide ongoing diversity, equity and inclusion training to employees.
3. Build relationships with groups that are underrepresented as users of public lands to increase their awareness of opportunities and comfort in outdoor spaces.
4. Help visitors, through information and education, feel comfortable, stay safe and understand rules.

ACCESS

1. Design and redevelop outdoor recreation facilities so that they can accommodate varying forms of transportation to sites (e.g., driving, walking, biking, ATV riding)
2. Work with other organizations to provide transportation to programs and special events tailored as first experience (trial) opportunities.
3. Design, develop, rehabilitate and manage outdoor recreation facilities to encourage use by people with all abilities and backgrounds.
4. Continue to keep costs affordable.

AWARENESS

1. Promote the outdoor recreation experiences, programs and activities that visitors may enjoy, so that potential and current users are aware of, and motivated to use, them.
2. Maintain ongoing market research to better understand current and potential visitors' motivations, attitudes, beliefs and preferred ways of receiving information.
3. Use technology to communicate conditions and site information with visitors in real-time to ensure visitor expectations are met and exceeded.

QUALITY

1. Provide high-quality experiences to visitors through thoughtful design, interpretation and innovative programming.
2. Repair and maintain high-demand facilities.
3. Invest in professional development practices that lead to exceptional staff.

PROGRAMMING AND SPECIAL EVENTS

1. Increase development and promotion of social and health-related outdoor activities.
2. Expand introductory experience programs to attract new users and provide intermediate- and advanced-experience programs to retain existing users.
3. Recruit and welcome organizations and businesses that want to conduct programs at Minnesota outdoor recreation lands and facilities when those interests are compatible to provider missions.
4. Ensure that programming and special events cater to visitors' interests and needs, including incorporation of new opportunities and technology where logical.
5. Use program and special events as a method of attracting users during non-peak times.

Addressing the Trends:
Connect People and the Outdoors

Recreational providers in Minnesota can address the current and future trends highlighted in this plan as they implement strategies within each of the Strategic Directions. Progress toward addressing the trends does not have to be a separate effort, but can be part of core work of our agencies. Examples in this Strategic Direction include:

Public Health –
Promote the physical and mental wellness benefits of nature, and encourage people to get outside.

Diversity, Equity, and Inclusion –
Design and host activities and programming meant to attract new visitors and to welcome the broadest array of people and groups in our communities.

PARTNERSHIPS

1. Build relationships with community organizations and leaders that help providers better reach new visitors.
2. Develop partnerships with "friends of" groups that will help maintain, promote and support Minnesota outdoor recreation opportunities.
3. Develop partnerships with private industry, such as tourism providers and other companies that share goals and/or target markets and can enhance the image of the provider.

STRATEGIC DIRECTION: ACQUIRE LAND, CREATE OPPORTUNITIES

STRATEGIC ACQUISITION

1. Place a priority on near-home acquisition of natural resource-based lands in densely settled and rapidly growing areas.
2. Place a priority on natural resource-based lands near regional centers that lack near-home opportunities.
3. Accelerate the acquisition of private in-holdings and add lands to existing parks to enhance resource protection and recreational opportunities.
4. Focus acquisitions of new state parks on high-quality natural resource areas, particularly where ecological subsections are not represented by the state park system or comparable land holding.
5. Focus on acquiring priority trail segments according to established criteria.
6. Place a priority on new trail opportunities that are closer to the concentration of users – including snowmobilers, off-highway vehicle riders, horseback riders, and canoeists/kayakers.
7. Acquire permanent trail easements within critical grant-in-aid trail corridors so they are not lost to development or other land use changes.

8. Acquire exceptional one-time opportunities of unique, high-quality natural resources that meet critical needs outside of regional centers.
9. Acquire the land needed for support facilities for trail systems (e.g., accesses, portages, rest areas, trailheads). Prioritize facilities that serve multiple interests.
10. Place a priority on protecting important water resources including lakes, rivers, wetlands, shoreline and critical watersheds.
11. Acquire land to connect protected and high-quality natural resource corridors.
12. Acquire land to mitigate the loss of recreational opportunities caused by unavoidable conversions of existing parkland to non-recreational use.

Addressing the Trends:
Acquire Lands, Create Opportunities

Recreational providers in Minnesota can address the current and future trends highlighted here as they implement strategies within each of the Strategic Directions. Progress toward addressing the trends does not have to be a separate effort, but can be part of core work of our agencies. Examples in this Strategic Direction include:

Minnesota's Changing Population –
When acquiring or developing new facilities, add amenities that cater to the interests and abilities of the state's aging and more diverse population – responding more specifically to how this trend is playing out in individual communities.

Diversity, Equity, and Inclusion –
Seek out acquisition and development opportunities that, because of their location or connections with transportation options, can help serve groups that have less access to outdoor recreation opportunities or that are underrepresented among our current visitors.

Accessibility –
Design new facilities and rehabilitate existing ones to serve people across a wide range of abilities. Consider how the recreational activities being provided can create a range of opportunities for people with disabilities. Recognize the variety of recreation experiences and personal challenges people with disabilities may be seeking.

DEVELOPMENT AND REDEVELOPMENT

1. Place a priority on development in the densely settled and rapidly growing parts of the state that have the fewest opportunities per person now and into the future.
2. Place a priority on regional centers that lack a near-home outdoor recreation opportunity.
3. Design, develop and redevelop facilities that meet the differing outdoor recreation needs for people of all abilities.
4. Create an accessible environment that is open and flexible to accommodate new and emerging nature-based recreation uses, such as nature play areas.
5. Develop infrastructure and amenities that meet the needs and interests of future generations and diverse communities.
6. Establish sustainable trail systems to provide high-quality and compatible opportunities for specialized trail interests that take into account existing user groups.
7. Design and construct sustainable and resilient infrastructure. Rely on up-to-date green infrastructure and best practice design.
8. Seek opportunities to use renewable or low-carbon energy sources (such as solar and wind) to meet the needs of park and recreation facilities.

STRATEGIC DIRECTION: TAKE CARE OF WHAT WE HAVE

PROTECT THE PUBLIC'S INVESTMENT IN BUILT INFRASTRUCTURE AND NATURAL RESOURCES

1. Prioritize investment in existing infrastructure to ensure high quality and safe experiences for the public.
2. Maintain capital asset management plans to ensure protection and full utilization of facilities.
3. When proposing new acquisitions and facilities, communicate operational, maintenance and capital management costs based on lifecycles of assets.

MAINTAIN THE QUALITY OF NATURAL RESOURCES

1. Preserve existing high-quality natural areas and water resources. It is more cost-effective to preserve existing natural communities than it is to restore or reconstruct them.
2. Restore and reconstruct natural communities that have been degraded or lost due to agriculture or development. Prioritize locations where success of restoration is likely.

Addressing the Trends:
Take Care of What You Have

Recreational providers in Minnesota can address the current and future trends highlighted here as they implement strategies within each of the Strategic Directions. Progress toward addressing the trends does not have to be a separate effort, but can be part of core work of our agencies. Examples in this Strategic Direction include:

Minnesota's Changing Population –
Evaluate ways that existing facilities could meet the needs of older visitors and attract new visitors as part of renovation and rehabilitation projects.

Climate Change –
Mitigate impacts from flooding and other climate-related changes by relocating trails and other infrastructure. Reduce our contribution to climate change by improving energy and resource efficiency in our buildings, vehicle fleets, and other systems. Manage our lands, waters, and other natural systems in ways that increase resilience and reduce the impacts of invasive species.

Accessibility –
Prioritize projects to increase accessibility at existing facilities, and invest in accessibility-related improvements as part of maintenance and rehabilitation work.

STRATEGIC DIRECTION: COORDINATE AMONG PARTNERS

ENHANCED, INTEGRATED AND ACCESSIBLE INFORMATION FOR OUTDOOR RECREATION USERS

1. Maintain and enhance a comprehensive, integrated, standardized and accessible database of statewide recreational assets.
2. Continue to collaborate and improve on providing an experience where users can locate essential recreation information, do trip planning, and create customized maps.
3. Incentivize coordination and cooperation among providers, such as cross-promoting local, regional, state and other opportunities for outdoor recreation and its diverse benefits.

ENHANCED COORDINATION AT THE REGIONAL AND SITE LEVELS

1. Support projects that incorporate multi-jurisdictional planning efforts to create a seamless recreational system.
2. Develop best practices for enhancing coordination, e.g., technical information about how to set up joint powers agreements that support coordination efforts.
3. Provide technical assistance for developing grant proposals.
4. Provide funding for research and monitoring to measure progress according to benchmarks.

ENHANCED COORDINATION AMONG THE FOUR LEGACY FUNDS

1. Share the goals and strategies of the four Legacy Funds with outdoor recreation providers and others, so they can find overlapping opportunities.
2. Encourage coordination among the Legacy Funds to work together at the funding, landscape and project levels.

ENHANCED COORDINATION WITH OTHER AGENCIES, ORGANIZATIONS, AND NONPROFITS

1. Continue partnering with transportation interests and regional and local transportation authorities to support access to outdoor recreation as well as expand opportunities to develop new trails, enhance trail use and increase access to transit.
2. Continue partnering with health agencies, health maintenance organizations and providers to support shared health and wellness goals.
3. Build stronger relationships with schools and increase the level of service provided to schools. Outdoor recreation providers are an important resource for schools in teaching lifelong recreation skills and environmental stewardship.
4. Continue partnering with tourism, chambers of commerce and other local tourism

Addressing the Trends:
Coordinate Among Partners

Recreational providers in Minnesota can address the current and future trends highlighted here as they implement strategies within each of the Strategic Directions. Progress toward addressing the trends does not have to be a separate effort, but can be part of core work of our agencies. Examples in this Strategic Direction include:

<u>Public Health</u> –
Work with health care providers, community health agencies, and other partners to promote outdoor recreation as part of pursuing healthy lifestyles – linking health outcomes and the outdoor activities in ways that attract more people to participate in outdoor recreation.

<u>Diversity, Equity, and Inclusion –</u>
Outdoor recreation providers can work together to expand their connections to diverse audiences, to share contacts with leaders and influencers in under-represented communities, and to coordinate outreach efforts.

providers. They play a key role in providing information about outdoor recreation providers to promote opportunities.

5. Continue partnering with grant-in-aid groups and local communities that are actively promoting outdoor recreation opportunities.
6. Continue partnering with natural resource conservation groups, non-profits, and other key stakeholders.
7. Facilitate discussion among different trail user groups across the state to find balance and cooperation on recreational trail use demands and management.

OPEN PROJECT SELECTION PROCESS FOR LWCF PROPOSALS

The Open Project Selection process is a systematic approach for administering the Land and Water Conservation Fund financial assistance programs. It ensures equal opportunity for all eligible projects by establishing public notification of the availability of funding, application assistance, and an objective review system based on the priorities established in the SCORP.

The criteria and standards for prioritizing and selecting projects are based on the first three strategic directions. The fourth strategic direction is not directly utilized in evaluating grant proposals.

For the state-level program, projects are solicited from managers of the State Outdoor Recreation System on a periodic basis. The State Outdoor Recreation System is established in state statutes and includes an array of outdoor recreation areas and facilities owned and managed by the State of Minnesota and the Minnesota Historical Society.

For grants to local units of government, project applications are solicited annually from cities, counties, townships and recognized tribal governments. The Department of Natural Resources manages the program and applications, which are due by March 31 of each year.

MINNESOTA'S 2020-2024 OPEN PROJECT SELECTION PROCESS

1. PUBLIC NOTIFICATION

For the state-level program, potential grantees are made aware of the availability of funding (Minnesota departments of Natural Resources and Transportation and the Minnesota Historical Society).

For grants to local units of government, the Department of Natural Resources local grants staff informs all potential project sponsors each November about the availability of funding. This is done through e-mail, news releases and notice on the DNR website. Potential applicants can request application materials that include Minnesota's selection criteria for use of the funds during the current funding cycle, the types of areas and facilities eligible for funding and an explanation of how the open project selection process works. Potential applicants may obtain application materials by e-mail, by visiting the DNR website at www.mndnr.gov, or by calling the DNR public information number at (651) 296-6157 or (888) 646-6367.

2. PROGRAM ASSISTANCE

For grants to local units of government, DNR local grants staff assists potential applicants with the preparation of applications, including prerequisite requirements such as the need to pass a public resolution before submitting the proposal and the preparation of proposed site plans. Grants staff will review draft applications and provide comments prior to the application deadline.

3. THE PRIORITY RANKING AND PROJECT SELECTION SYSTEM

Minnesota has an objective, two-part process to evaluate, rank and select state and local projects for LWCF dollars.

The first part of the process is an evaluation based on the Minnesota's SCORP strategies and the associated priority actions. A number of specific criteria derived from these priorities are included in the evaluation sheet used in reviewing each application.

In the second part of the evaluation, applications are evaluated on site-level design criteria including accessibility, quality of design and safety. Other criteria include: quality of the application, level of local government commitments, environmental impact, etc. This evaluation ensures that projects selected for funding are viable, well designed and in conformance with current laws and standards.

Minnesota allocates 50% of its LWCF apportionments to state agencies and 50% to local units of government. Minnesota's state agency apportionment has gone toward statewide facilities including state parks, historical interpretive sites, state trails, wildlife management areas and water access sites. Most of these state grants have been used by the DNR, though some have also been used by the MN Historical Society, the University of Minnesota, and MN Department of Transportation. The local government apportionment has been awarded via grants to counties, cites, and townships throughout the state.

DNR is responsible for overseeing the LWCF program in Minnesota and is the liaison between the state and the National Park Service. DNR staff conduct separate funding competitions for the state agency and local government apportionments and recommend the highest-ranking proposals to the Commissioner of Natural Resources for final approval.

STATE AND LOCAL LAND AND WATER CONSERVATION FUND SELECTION GUIDELINES

The state and local LWCF programs use the following selection guidelines to evaluate project applications. These guidelines are based on three of the four strategic directions and associated priority goals and strategies in the SCORP. The fourth strategic direction dealing with coordination among partners is not directly utilized in evaluating grant proposals.

SCORP PRIORITIES

The answers to the following questions, based on the priority actions for each strategy, will be used to evaluate project applications.

Does the Project Connect People to the Outdoors?

- Does the proposed project design and redevelop outdoor recreation facilities so that they can accommodate varying forms of transportation to sites (e.g., driving, walking, biking)?
- Does the proposed project design, develop, rehabilitate and manage outdoor recreation facilities to encourage use by people with all abilities?
- Does the proposed project design, develop, rehabilitate and manage outdoor recreation facilities to encourage use by people of diverse backgrounds and experience?
- Does the proposed project provide high-quality experiences to visitors through thoughtful design, programming, and interpretation?

Does the Project Acquire Land and/or Create Opportunities?

- Is the proposed project located in a densely settled area or area of rapid population growth?
- Does the proposed project accelerate the acquisition of private in-holdings and add lands to existing parks to enhance resource protection and recreational opportunities?
- Does the proposed project acquire exceptional one-time opportunities of unique, high-quality natural resources that meet critical needs outside of regional centers?
- Does the proposed project acquire land to connect protected and high-quality natural resource corridors?
- Does the proposed project acquire land that protects important water resources including lakes, rivers, wetlands, shoreline and critical watersheds?
- Does the proposed project design, develop, and/or redevelop facilities that meet the differing outdoor recreation needs for people of all abilities?
- Does the proposed project create an accessible environment that is open and flexible to accommodate new and emerging nature-based recreation uses?
- Does the proposed project develop infrastructure and amenities that meet the needs and interests of future generations and diverse communities?
- Is the proposed project designed and constructed with sustainable and resilient infrastructure, (rely on up-to-date green infrastructure and best practice designs)?

Does the Project Take Care of What We Have?

- Does the proposed project result in redevelopment, renovation or rehabilitation of existing infrastructure to ensure high quality and safe experiences for the public?
- Does the project sponsor maintain a capital asset management plan to ensure protection and full utilization of the proposed facilities?
- Does the proposed project preserve existing high-quality natural areas and water resources?
- Does the proposed project restore and reconstruct natural communities that have been degraded or lost due to agriculture or development?

MINNESOTA'S WETLANDS

The National Park Service requires each SCORP to address wetlands as an important outdoor recreation resource. This section articulates this value for Minnesota's SCORP 2020-2024

There are many types of wetlands in Minnesota, each with widely varying characteristics. Some wetlands are dry for much of the year; others are almost always covered by several feet of water. Some wetlands have grasses and sedges, shrubs, or trees. They may be small confined basins or extend for hundreds of miles. It is estimated that Minnesota has lost about 50 percent of its original wetland acreage.

Minnesota recognizes the multiple benefits that wetlands provide, including:

- Erosion control: Wetland vegetation reduces lakeshore wave damage and stream bank erosion.
- Flood control: Wetlands can slow and retain runoff, reducing the frequency of flooding along streams and rivers.
- Groundwater recharge and discharge: Some wetlands recharge groundwater by holding surface water and allowing it to slowly filter into the groundwater reserves. Some wetlands are discharge areas; they receive groundwater even during dry periods, and help maintain flows in nearby rivers and streams.
- Water quality: Wetlands protect the water quality of downstream lakes, streams and rivers by removing pollutants and moderating flow.
- Rare species habitat: 43 percent of threatened or endangered species in the U.S. live in or depend on wetlands.
- Recreation: Wetlands are a great place to canoe, hunt, fish or watch wildlife.
- Economic value: Wetlands provide economic commodities such as wild rice and bait fish.

MINNESOTA WETLANDS CONSERVATION PLAN

The *Minnesota Wetlands Conservation Plan* (MWCP) sets directions for managing and regulating the state's wetlands and examines the way to consolidate the many different existing wetland programs. As stated in the plan, the goal for wetland conservation in Minnesota is to maintain and restore the quality and diversity and increase the overall quantity of wetlands in the state, varying regionally in accordance with differences in the character and health of the wetland resource, in order to promote ecologically, socially, and economically sustainable communities.

Implementation of the MWCP is further guided by a memorandum of understanding that includes state and federal agencies whose work impacts wetland issues. Signing agencies to the memorandum are Minnesota Department of Natural Resources, the Minnesota Board of Water and Soil Resources, the Minnesota Department of Transportation, the Minnesota Pollution Control Agency, and the Minnesota Department of Agriculture as "Sponsoring State Agencies"; and the U.S. Environmental Protection Agency, the U.S. Army Corps of Engineers, and the U.S. Fish and Wildlife Services collectively as the "Cooperating Federal Agencies."

Further description of the status of wetland resources in the state, the *Minnesota Wetlands Conservation Plan,* and the Memorandum of Understanding are available on the Minnesota DNR website: https://www.dnr.state.mn.us/wetlands/index.html.

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APPENDICES

APPENDIX A. OUTDOOR RECREATION HOUSEHOLD SURVEY 2017

INTRODUCTION

The Minnesota Department of Natural Resources (DNR) conducted an Outdoor Recreation Household Survey between October of 2017 and February of 2018. The survey, also known as the 2017 Minnesota Outdoor Activities Survey, serves as a tool to better understand and respond to Minnesotans' needs and preferences for outdoor recreation. The information gathered from the survey was used to update the 2004 Outdoor Recreation Participation Survey, define current trends in adult recreation and factors that motivate and create barriers to recreation, and establish a baseline dataset on outdoor activities participation across the state. Outdoor recreation providers throughout Minnesota are able to reference this information to better serve their communities.

METHODOLOGY

SURVEY INSTRUMENT DEVELOPMENT

The survey and related communication materials were developed by the survey project team following a cross-division meeting with DNR staff and a key informant review process. Staff representing different divisions within the DNR helped to develop high-level goals and priorities for the survey, and establish how the information would be used. The key informant group consisted of members from Minnesota's Somali, Hispanic/Latinx, African American, Southeast Asian, and Native American communities with expert knowledge in both recreation and the communities they represent. This group reviewed the survey instrument and communication materials to ensure they were developed using appropriate and respectful language that would be understood by individuals within their communities. Additionally, the group shared knowledge related to how best to deliver messages and generally reduce barriers to completing the survey.

SURVEY INSTRUMENT DESCRIPTION

The finalized survey instrument instructed participants that 'outdoor activities' were defined as "anything you do outside during your free time," and consisted of 22 scale, list, and open-ended response questions. Questions related to a wide variety of topics, including but not limited to, participation in outdoor activities and motivating factors, barriers to participation in outdoor activities, and preferences for communication related to outdoor activities. The survey also asked participants general demographic questions.

SAMPLING STRATEGY FOR THE HOUSEHOLD SURVEY

A stratified random sample of 8,000 Minnesota households was purchased for the study, and after initial surveys were sent out, 468 were returned as non-deliverable, making for a true sample size of 7,532. To maintain consistency with the 2004 survey, sampling was based on five regions, four of which represent greater Minnesota, and the fifth representing the Minneapolis-St. Paul seven-county metropolitan area. Proportionality was distributed the same in both the 2017 and 2004 surveys, meaning the four greater Minnesota regions each represent 18 percent of the total sample size, while the Minneapolis-St. Paul region represents 28 percent of the total sample size.

ADMINISTRATION OF THE HOUSEHOLD SURVEY

Participants could complete the survey using one of three modes—online, on paper, or by phone. The survey and many of the communication materials were available in English, Somali, and Spanish. Those who shared their responses to the survey were entered into a series of drawings for Visa gift cards.

Each household was first sent a postcard letting them know they were selected to participate. The postcard included a web address to complete the survey online. Those who did not complete the survey online after initial contact were sent paper copies of the survey via mail on two separate occasions. The paper version of the survey included a cover letter explaining the survey's purpose, a pre-paid, pre-addressed reply envelope, as well as a web address to complete the survey online. Following the mailings, selected participants were contacted by telephone interviewers to complete the survey over the phone. A final mailing of the paper survey was distributed to those households who had not yet completed the survey.

ANALYSIS

Following data collection, all completed survey responses were combined into a single dataset. Following the removal of all duplicate responses from a single household and unusable partial responses, the final dataset included 1,987 respondents, making for an overall response rate of 26 percent. Because the data showed heavier response rates from those identifying as male, as well as those who were older, weighting was applied to both gender and age, helping the data more closely represent the general population of Minnesota. Weighting was also applied according to the state regions to improve proportionality between responses and the population of each region.
Overall, the resulting weighted dataset is reflective of the age, gender and geographic distributions in Minnesota's population, with slight over-representations of people age 18 to 34 and of females. However when comparing to the total population of Minnesota, the final weighted dataset still underrepresents people from communities of color. Weighting to account for this underrepresentation would have been inappropriate given the low number of responses from some of these groups in the dataset.

APPENDIX B. LOCAL RECREATION PROVIDERS SURVEY 2019

INTRODUCTION

To help inform this SCORP, the Minnesota Department of Natural Resources (DNR) distributed an on-line survey to local outdoor recreation providers throughout the state of Minnesota in November 2018. The intent of the survey was to gather information from local providers – primarily counties and cities – about issues they see for outdoor recreation and how they anticipate prioritizing their efforts for the next five years. The survey results would supplement information about local-level outdoor recreation that was already available from other sources, including the Greater Minnesota Park and Trail Commission.

METHODOLOGY

SURVEY INSTRUMENT DEVELOPMENT

The survey instrument and communication materials were developed by the DNR SCORP project team. Survey topics were selected to collect data that could be compared with information about state-level and regional level priorities. The team also looked at survey instruments used by other states as part of their SCORP planning processes.

SURVEY INSTRUMENT DESCRIPTION

The survey instrument consisted of 29 scale, list, and open-ended response questions. Topics addressed by survey questions included visitation trends, funding sources, types and conditions of facilities managed, and plans for acquisition, development and rehabilitation activities. Open-ended questions included inquiries about climate change impacts and adaptations, and priorities for the next SCORP.

ADMINISTRATION OF THE LOCAL RECREATION PROVIDERS SURVEY

The notice of the online survey was distributed to local recreation providers with the assistance of several groups. The survey notice was distributed by the Minnesota Parks and Recreation Association to its member organizations. The notice was also distributed via the Association of Minnesota Counties and League of Minnesota Cities. The project team realized there would be some overlap – with some organizations possibly receiving multiple notices – when distributing the survey through these three groups, but preferred that situation to potentially not reaching some local providers.

ANALYSIS

A total of 56 survey responses were received – 34 from counties and 22 from cities. Overall, the information shared by local recreation providers about recreational trends and their plans for providing opportunities over the next five years was consistent with the directions heard from state and regional entities, and with the input that had been gathered from the Parks and Trails Legacy 10-Year Celebration events and other sources.

APPENDIX C. LEGACY AMENDMENT 10th ANNIVERSARY – PARKS AND TRAILS CELEBRATION EVENTS

In 2018, Minnesota marked the tenth anniversary of the passage of the Clean Water, Land and Legacy Amendment to enhance, but not replace, existing funding for the protection of natural resources, outdoor recreation, the arts and cultural heritage. To recognize the first ten years of this 25-year constitutional amendment, a series of nine regional public events were held around the state to celebrate, educate, and listen as citizens shared their perspectives on, and aspirations for, Minnesota's comprehensive system of state and regional parks and trails. These public engagement events were held at the following locations:

1. Silverwood Park

Location: (North Twin Cities) St. Anthony (Three Rivers Park District)
Date: Saturday, January 27, 2018
Number of public attendees: 200

2. Saint John's University

Location: (Central Minnesota) Collegeville
Date: Friday, April 27, 2018
Number of public attendees: 20

3. City of Marshall

Location: (Southwest Minnesota) Red Baron Arena, Marshall
Date: Sunday, April 29, 2018
Number of public attendees: 65

4. City of Bloomington

Location: (South Twin Cities) Hyland-Bush-Anderson Lakes Park Reserve, Normandale Lake Band Shell, Bloomington (City of Bloomington Parks/Three Rivers Park District)
Date: Friday, May 11, 2018
Number of public attendees: 85

5. City of Rochester

Location: (Southeast Minnesota) 125 LIVE Center for Active Adults, Rochester
Date: Saturday, May 19, 2018
Number of public attendees: 20

6. Itasca State Park

Location: (Northwest Minnesota) Itasca State Park, Park Rapids
Date: Saturday, June 2, 2018
Number of public attendees: 200

7. City of Fergus Falls

Location: (West-Central Minnesota) Prairie Wetland Environmental Learning Center, Fergus Falls
Date: Saturday, June 16, 2018
Number of public attendees: 20

8. City of Duluth

Location: (Northeast Minnesota) Essentia Health Duluth Heritage Sports Center, Duluth
Date: Wednesday, June 27, 2018
Number of public attendees: 1,000

9. Minnesota State Fair

Location: Minnesota State Fair, MN DNR Building, Falcon Heights
Dates: August 23 to September 3, 2018
Number of public attendees: 2,400+ (recorded interactions)
Note: Several thousand more fairgoers provided feedback on Legacy priorities through an engagement activity at the fair. This attendance number does not reflect those interactions.

APPENDIX 4.8.3.2-1 **Benton County Master Plan for Parks, Trails, and Open Space**

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Executive Summary

The following Master Plan for Parks, Trails and Open Space is an outgrowth of Benton County's recently completed 1999 Comprehensive Plan. The Comprehensive Plan called for creating a blueprint for open space planning a top priority of the County and its residents. The over-arching concerns of the public are reflected in the General Goals, Land Use Goals, Public Facilities Goals, and Environmental Goals of the 1999 Comprehensive Plan, with specific attention directed toward the County's respectful and orderly growth while protecting natural areas, agricultural interests, and private property rights. It is important to note that this Master Plan for Parks, Trails and Open Space (Master Plan) accomplishes a portion of the intent of the 1999 Comprehensive Plan by offering a specific direction for the County to take in planning for the future. However, and almost equally important, is to clearly state that this Master Plan will provide recommendations for open space, parks and trails, but stops short of providing the detailed design information necessary for implementation. Other clarifications include:

The plan is built upon the input of residents and concerned citizens. These people spent time together discussing and identifying the needs of a growing county while imagining a place where park, trails and natural areas could co-exist with urban development and agriculture. In this, the Master Plan is a great success. On the other hand, the plan is not meant to "target" specific properties and landowners for future acquisition or other action by the County or other governmental bodies (although a few properties have been clearly identified as possibilities – either by the current landowner, or by long-standing public request). It is truly an inventory of citizen interest that, with recommendations from the consultant, points the way to where the County should focus its plans to development areas for parks, trails and natural areas projects.

The plan also identifies and prioritizes existing parks, trails and natural resource areas within the county that have a high potential for public use and enjoyment. General concept plans serve as a springboard for creative thinking. Presenting these

concepts does not mean that existing parks will be developed according to the plans presented, or even changed at all. Those decisions are to be made at a later date and would certainly involve and require significant public input and comment.

Finally, some areas within the County are such a high resource value that they should simply be preserved and passively enjoyed. The planning team recognizes the importance of these areas and discusses their desires for these areas in the minutes and meeting proceedings included in the Appendix.

It is the planning team's sincere hope that this Master Plan for Parks, Trails and Open Space will serve as a first step to identify, preserve, enhance and develop the parks, trails and natural areas of the county for the enjoyment of future generations.

Introduction

Benton County, one of the nine original counties in the State, was established in 1849. Today, it is a moderate-sized county totaling about 410 square miles. Benton County is located in central Minnesota approximately 75 miles northwest of Minneapolis-St. Paul, and includes the northeastern part of the St. Cloud metropolitan area. The Mississippi River identifies its western boundary between Stearns County, the counties of Morrison to the north, Mille Lacs to the east and Sherburne to the south comprise its remaining boundaries. Benton County is growing, and because of that growth the County realizes its economy and land use are changing. Agriculture is still the largest land use in the County, but is losing ground to urbanization.

Residents are concerned that their high quality of life may be threatened by uncontrolled growth. Benton County is part of Minnesota's "Golden Triangle" Growth Corridor – one of the fastest growing areas in the Midwest. In fact, Benton County has grown more than 13 percent in the last 10 years. Most of the rapid residential expansion is occurring in the western region near the Mississippi River, Little Rock Lake area, and the U.S. Highway 10 corridor, and is associated with urban sprawl from the cities of St. Cloud, Sauk Rapids, Sartell and Rice.

According to the 2000 Census, the population of the county is 34,226. This represents a population increase of 35.9 percent over the last 20 years. Only Sherburne County grew at a faster rate during this same time period. According to state population projections, Benton County will continue to grow at a similar rate, with a population of 47,010 expected in 2020.

Additional census data indicates that the number of established housing units has risen faster than the population, with the average household size actually reducing over time. It is important to note that the number of persons in "group quarters" (multiple housing) has also increased significantly. New construction is competing with open space, parks and trail corridors, and it is the County's desire to protect some of its unique natural features during this phase of rapid development.

The County completed a Comprehensive Plan in 1999. While drafting the comp plan, residents ranked parks and open space as their third highest concern. It is because of this concern that the County sought to develop a Master Plan for Parks, Trails, and Open Space. According to the Comprehensive Plan, residents placed significant value on developing/ maintaining a high quality of life by preserving Benton County's rural character and all that traditionally goes with it. The presence of quality parks, trails and open space is recognized as an important component of a perceived quality of life.

This Master Plan for Parks, Trails, and Open Space helps identify areas of the county that should be protected in a park or open space setting, or acquired for future trail corridors. It also examines if and how the County's existing parks can be improved.

Comprehensive Plan — An Overview of Goals and Policies

The Master Plan For Parks, Trails and Open Space emerged from the County's solid efforts displayed when developing the 1999 County Comprehensive Plan Update. This policy document established an overall vision for Benton County and is used as an important planning tool to guide other County planning and implementation projects. One of the proposed outcomes included in the Plan Implementation Section recommends that the County develop a Master Plan for Parks and Open Space that identifies areas appropriate for recreation or for preservation as open space. This recommendation serves as the foundation for the current master parks plan.

The Comprehensive Plan was created through a one-year planning effort by County Staff, elected and appointed officials and community volunteers. The process included research and analysis, and encouraged public participation throughout the plan development, refinement and adoption phases. Concerns were identified, and goals and policies were established to address them. According to the document, "A County's Goals and Policies are a detailed expression of its aspirations for the future and can be considered the heart of the Comprehensive Plan."

The goals and policies outlined in the Comprehensive Plan identify several issues that served as the backbone for the master park plan. Some of these goals are general; others are more specific. Below is a list of the goals considered pertinent to the Open Space, Parks and Trails Master Plan development process:

General Goals

General goals are over-arching statements of community aspirations that indicate a broad social, economic, or physical state of conditions the community officially agrees to strive to achieve in a variety of ways. The following general goals apply to all planning and implementation work performed in Benton County:

- Maximize the potential of Benton County as a thriving center for agriculture, business, and recreation, while maintaining and enhancing its livability.

- Provide, maintain, and enforce standards for development that will enhance public health and the maintenance of a high quality standard of living.
- Maximize public service efficiencies at the local level both through effective planning and management practices, and by exercising strong fiscal responsibility.

Specific Goals

Specific goals identify functional areas of the planning process that are supported by the community to achieve specific actions that pertain to the Open Space, Parks and Trails Master Plan development process. These are as follows:

Land Use

- Support the long-term protection of agriculture in the County.
- Plan for the orderly and efficient growth of commercial and industrial development in the County.
- Plan for the orderly and efficient growth of residential development in the County.
- Identify, protect, and preserve the County's high quality natural areas and open space.

Public Facilities

- Continue to maintain and improve all community facilities.
- Work to achieve an equitable distribution of the cost of providing County services.
- Maintain adequate active and passive open space to meet the needs of the community.

Environmental

- Promote environmental stewardship for the County's long-term environmental benefit.

These goals guided the Bonestroo Team in the development of Benton County's Master Plan for Parks, Trails and Open Space.

Other Past Plans

In addition to previous plans completed by Benton County, there are several other planning efforts and resources influencing recreational opportunities offered to residents. The municipalities within the County have varying degrees of parks, trails, and open space as part of their plans. In addition, recreational and environmental issues have been identified by state agencies and through regional cooperative efforts.

Benton County

Benton County – A Survey of Public Attitudes Towards Park & Open Space Issues (1998)

A survey on the public attitudes toward park and open space planning issues was taken in 1997 by conducting 400 interviews among residents of Benton County 18 years and older. The survey was to explore how residents felt about their existing parks, the parks' uses and future parks and open space.

Results of this survey clearly indicated that the residents of Benton County supported protecting open space for future generations, and that now is the time to begin planning for these new areas so the opportunity is not lost to development. A strong majority also supported a minor tax increase to protect these naturals areas and to improve existing parks. County residents also felt that adding trails would be a strong benefit.

Cities/Municipalities

This county-based Master Plan for Parks, Trails and Open Space will not provide prescribed and precise direction the cities in the County should take. Rather the County plans to work cooperatively with the cities to help ensure that countywide efforts complement local efforts. In addition, as the county park program expands, recommendations on park standards, goals and policies, and acquisition and development priorities can support the communities as they move forward in implementing their own plans.

City of Foley Comprehensive Plan (1993)

The City of Foley has a Comprehensive Plan that provides direction for future growth and redevelopment within the defined boundaries of the City over the next 20 years. The plan is based

on policy planning and design development, and provides guidelines for the decision-makers and recommendations for future open space and recreational facilities.

Foley now has two parks that are centrally located in the community. The City intends to:

- continue ongoing development of the city trail/path system
- pursue park development within new developments, and
- work with the school system regarding the need for additional active recreation.

City of St. Cloud Parks System Plan (1997 and 2002 update)

St. Cloud is in the process of updating its Comprehensive Plan, which includes an update of the parks plan.

This provides a great opportunity to merge the goals of Benton County with the City of St. Cloud around three specific categories:

- Preservation of Open Space and Natural Areas
- Park Development
- Trail System Development

City of Sartell Park and Trail Plan (1997)

This plan was developed to determine whether the existing parks system meets the needs of the growing population and to identify future park needs, resources and locations. This plan was an update to the comprehensive plan and was prepared in conjunction with the City of Sartell's Growth Management Strategy. Community input was the major tool used to create recommendations for the plan.

As in all planning processes, goals were established after first analyzing existing conditions. These goals reflected how the City of Sartell plans to address long-term growth, land use development and the quality of the physical environment.

These goals included, but were not limited to:

- Providing a system of parks and open spaces connected by trails, paths, sidewalks and streets.
- Protecting and preserving the natural setting.
- Providing adequate park, recreation and open space areas to meet the needs of a growing population.

- Maintaining a presence on, and reconnect to, the Mississippi River for public use and enjoyment.
- Identifying a framework that guides the placement of parks and trails.

Using these goals and information gained at workshops held with residents, the principles of development were established and a framework for implementation put into place. This framework identifies both existing and proposed parks, trails and open space.

City of Sauk Rapids Comprehensive Plan Update

Since the 1970s, Sauk Rapids has experienced heavy growth—growth that is expected to continue. There is an increased demand on public facilities and services and a need for additional land suitable for development. This plan helped identify where growth had occurred, and identified issues and established policies and goals that will help the community deal with future growth and meet its long-term goals.

The policies and goals reflect issues related to those of Benton County and are based on five development framework plans:

- Concept plans
- Land use
- Transportation
- Community facilities
- Administration

The development framework establishes the general parameters, issues and goals that are to be achieved.

A parks and trail system plan, and new classifications for future parklands within the community, are currently being developed.

City of Rice (2002)

The City of Rice is currently in the process of developing its comprehensive plan. This plan will include discussions on recreational opportunities and natural resources protection.

The City's only park, Westside Park, is being developed. Some of the planned amenities include skating rinks, a warming house, picnic facilities and trails. Two other undeveloped parcels are available for development.

The City has a park dedication ordinance requiring that the developer donate either land or a fee during the subdivision process. Typically, land is donated within a subdivision, resulting in an opportunity to develop neighborhood or community parks.

Regional

Central Minnesota Regional Parks and Trails Coordinating Board (1999 – ongoing)

The Central Minnesota Regional Parks and Trails Coordinating Board members include representatives from the counties of Benton, Sherburne and Stearns. Although all cities are represented through their respective counties, representatives from the cities of Sauk Rapids, St. Cloud, St. Joseph, Sartell and Waite Park are also board members due to their geographic location in the fast growing St. Cloud metropolitan area.

This Coordinating Board was established by the Legislature in 1999, with its general purpose being to develop a regionally significant parks and trails plan that includes existing and proposed projects. In developing, enhancing, and maintaining the plan, the Parks and Trails Coordinating Board must develop priorities for spending grant monies.

Benton County has not previously had the benefit of comprehensive parks, open space, and trails planning focused specifically on itself. However, the Central MN Regional Parks and Trails Coordinating Board developed a Central MN Regional Parks and Trails Plan for the Tri-County Area. Although the plan was not formally adopted, it suggested development of two major trail corridors in Benton County. They were:

- A trail extending along the Mississippi River along the western edge of the County.
- A trail from St. Cloud following Highway 23 and the abandoned rail corridor eastward through Foley and Ronneby to the eastern edge of the County.

State

MN DNR County Biological Survey (Draft map as of 2002)

During the 1990's, staff from the Minnesota Department of Natural Resources County Biological Survey (MCBS) underwent a process to identify the best remaining examples of natural communities in Benton County. Although there is a substantial amount of land that is not developed in Benton County, the

MCBS project sought to look at only the highest quality remaining natural communities— that is to say those areas that exhibit the least human disturbance and most resemble natural communities that would have been found in the area at the time of Euro-American settlement.

Because the MCBS looked only at the very best quality areas, there are many natural areas of lesser quality that are not represented in the work they completed. Natural areas that MCBS staff did not inventory may still retain predominantly native species and/or have the ability to be managed back to a higher quality through ecological restoration.

The general purpose of the Master Plan for Parks, Trails and Open Space is to guide future park planning, acquisition and development activities. Specific objectives include:

- Fulfill the requirements identified in the 1999 Benton County Comprehensive Plan.
- Help ensure the General and Specific Goals identified in the Comprehensive Plan are adhered to and that the public has ample opportunity to build a plan that addresses both the General and Specific Goals.
- Serve as a road map for enhancing current facilities and creating new parks, natural areas and trails.

Process and Committee Structure

The Planning Team used a facilitated, committee-based, public participation process to engage citizens, landowners and public officials in a respectful dialogue concerning open space, parks and trails planning. As noted in the Introduction, three committees were created to help guide the planning process:

- The Technical Advisory Committee (TAC) was populated with persons who had a special expertise that could benefit the planning process. A Staff Conservationist for the Benton County Soil and Water Conservation District would be a typical committee member.
- The Policy Advisory Committee (PAC) was comprised of locally elected officials such as County Commissioners, Parks Commission officials and citizens interested in developing park policy.
- The Citizens Advisory Committee (CAC) was made up of interested county residents.

In addition to the committees, concerned citizens provided input to the process in varying degrees. For example, some attended citizen open-house meetings while others filled out surveys.

Facilitation Process

The public meetings were designed to provide a safe and respectful environment where participants' comments were respectfully considered. At least one Benton County

Commissioner attended all of the public meetings—a statement of support that did not go unnoticed by the participants. All outputs from this approach were presented to the subcommittees and the general citizenry, and included:

- Meeting Minutes, Agendas and Small Group Exercises
- Maps and Diagrams
- Concept Plans and Drawings

Local leadership and community desires were the cornerstone of the planning process. All meetings—from the initial Kick-off Meeting in March to the Visioning and Goal Setting Meeting in April to the Open House in June—were designed to build on the information given to the Planning Team by the committee members and incorporated into the planning process in easy-to-understand language.

Kick Off Meeting

The initial Kick-off meeting was held on March 5, 2002, at the County Courthouse Building in Foley.

Purpose:

To identify expectations of the planning process.

Outcome:

A synopsis of the results of the small group exercises identified a few general assumptions. In general, the group felt:

- Glad about the quality of life and the funding and support for the parks, trails and open spaces of the County.
- Sad about the land and facility uses currently and the lack of cooperation among the various stakeholder groups.
- Mad about the land and facility uses currently and the lack of cooperation among the various stakeholder groups.

Therefore, the people were:

- Mostly happy with the quality of life in Benton County.
- Concerned about losing the things that contribute to that quality; namely, natural resources and recreation areas.
- Frustrated with the past lack of cooperation among the various agencies and groups.
- Happy about the current focus on the open space, parks and trail development planning.

A full set of Kick-off Meeting notes can be found in the Appendix.

Visioning and Goal Setting

This meeting was held April 11, 2002, at the Benton County Courthouse.

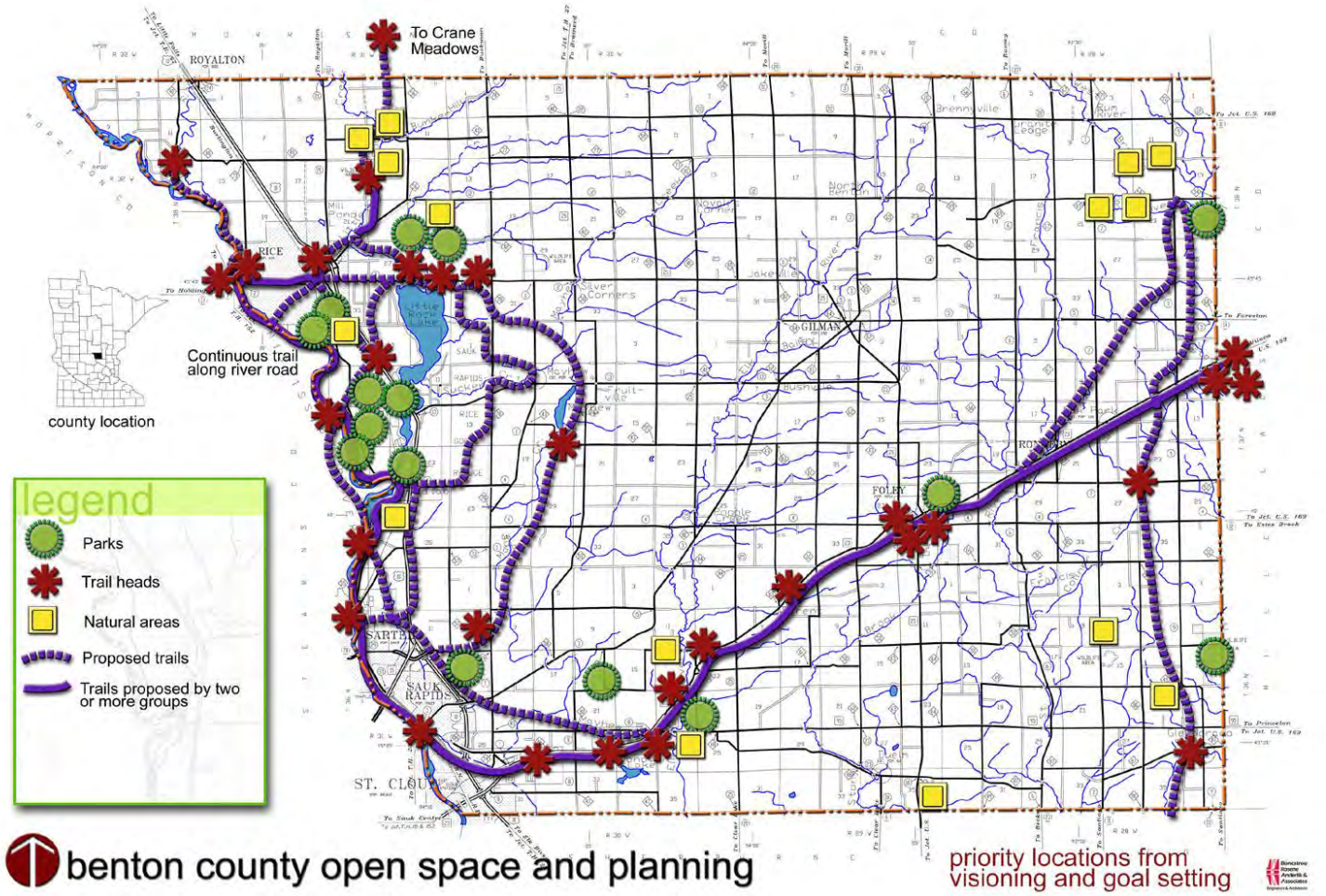
Purpose:

To explain current County conditions as they related to natural resources and open space, parks and facilities, and trails, and to identify future opportunities for expansion.

Outcome:

Using maps depicting existing conditions, the Bonestroo Team presented a short explanation of each of the existing natural resources and open spaces, parks and facilities, and trails and connectors. Small groups were then asked to identify new opportunities, and then to rank them by priority. These proposed future sites were placed on maps and displayed for the general public. The citizens of the County were asked to add any additional sites to the maps

The priority Locations Map is provided on the next page and the narrative results of this process will be found in the Appendix.


To Crane Meadows
ROYALTON
RICE
GILMAN
FOLEY
SARTELL
ST. CLOUD
Continuous trail along river road
county location
legend
Parks
Trail heads
Natural areas
Proposed trails
Trails proposed by two or more groups
benton county open space and planning
priority locations from visioning and goal setting

Open House at Benton Beach Park

The open house was held June 18, 2002

Purpose:

Provide an opportunity for County residents to review the work of the advisory committees. This included identifying future opportunities for natural resources and open space, parks and facilities, and trails and connectors. The open house also provided the opportunity to address the County's current existing parks system and development options.

Outcome:

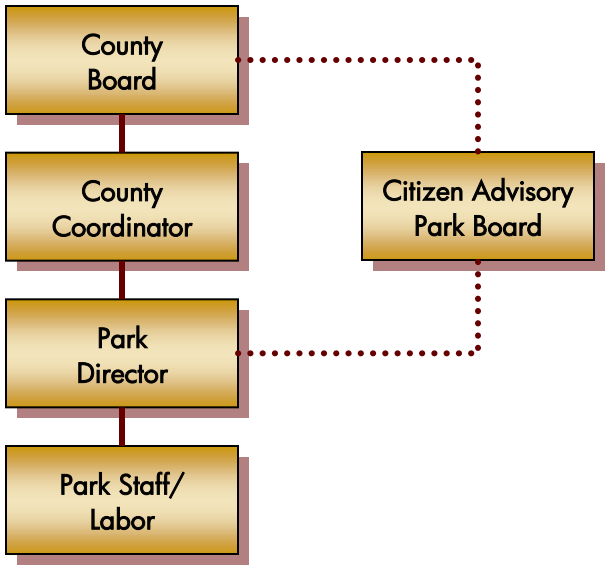
The participants engaged in a Group Design Exercise where they each were given a schematic map of Benton Beach Park and asked to add, delete or otherwise alter the park to make it a better place to camp, recreate, swim or otherwise use. The results were outstanding. Each group had very strong feelings about how the park could be improved and recorded their suggestions on the maps provided.

Current Park Program

As a result of the strong citizen interest expressed in parks, trails and open spaces during the county comprehensive planning process in 1999, the Benton County Board of Commissioners approved the establishment of a separate Park Department. A full-time Park Director was appointed in 2001.

This new structure created the foundation necessary to support the development of the county park program and reinforced the need to plan, manage and maintain a park, trail and open space system designed to meet the growing needs of the county.

The following organizational chart portrays the line of authority governing the park program:



Status of Parks, Trails and Open Space

Natural Resources and Open Space

Benton County supports a wide variety of natural communities and landforms resulting from its rich geologic, ecological, and human history. Natural resources include the soils, water, plants, animals and people that are found in any given place. The particular features present in an area and their patterns in the landscape are the result of historical processes including climate, hydrology, plant and animal migrations and interactions, and more recently human decisions and activities. To get a clearer picture of why the area supports this array of natural communities, we need to take a look into the past. This section describes the role these interactions have played in determining the present day composition of natural communities found in Benton County.

The physical record in the local landscape begins more than 500 million years ago when much of Minnesota was covered by water and the sedimentary and metamorphic rock layers that lie under the area were formed. This bedrock lies buried under glacial sediments in the immediate area. Although much of the bedrock in Benton County is buried, there are some areas where it is exposed. Most notable among these are rock outcrops along the Mississippi River, including Peace Rock, and a large area in Granite Ledge Township where granite lies at or close to the surface.

Glacial Landscapes.

The vast majority of topography in the area was shaped by the last period of glaciation, which ended in this region of Minnesota about 10,000 years ago. It is referred to as the "Wisconsin Stage." The glaciers sculpted the landscape and left behind a variety of deposits, including drift/till and outwash composed of sand and gravel, and also windblown deposits of very fine sediment, called loess. Drumlins formed by ice flowing around previous deposits, and serpentine-like hills called Eskers, are common in Benton County, and account for some of the most interesting landscape features.

After numerous advances into the region, the Superior Lobe of the Wisconsin glacier retreated permanently about 20,000 years ago. Most of Benton County is gently rolling as a result of being

part of the Brainerd-Pierz Drumlin Field and Mississippi River Terrace landforms. The streams that deposited the sands on the Mississippi River terraces were less powerful in the Benton County area, but were stronger and flowed more swiftly as they flowed southeast.

The topography, soils, and pattern of streams, lakes and wetlands that resulted from glacial activity greatly influenced the pattern of vegetation and plant communities that developed later in Benton County. Existing plant communities such as Oak Woodland and Savannas and Prairies are well adapted to the droughty soils and rolling topography of this area, while wetlands occur in depressions and swales with denser, hydric soils. In the northeast portion of the County, conditions are favorable to support larger stands of forest, including White Pine-Hardwood forest stands.

Post-glacial Vegetation.

Immediately after the glaciers melted, spruce trees and tundra colonized the periglacial environment. This was later followed by pine barrens and forests with a bracken fern dominated ground layer. As the climate of the region warmed about 9,000 years ago, pines began to decline and prairie plants increased along with elm and oak forests. The climate remained in this warm period until about 7,000 years ago when midgrass prairie reached its maximum extent in Minnesota, to a line northeast of Benton County.

Prairie, oak woodlands and brushlands, and oak savanna consisting of scattered trees with a prairie-like ground cover dominated the Region until about 4,000 years ago when the climate continued to become gradually cooler and more moist. Oak thickets spread, and oak woodlands gradually dominated upland areas, interspersed with tall grass and wet prairies. White pines also migrated into the area from the north as the climate cooled. About 300 years ago, the climate became especially moist and cool, and fires became less frequent. As a result, forests and white pine trees became more common in the area.

Government Land Office Surveyor Notes:

One of the best sources of information regarding the area's vegetation can be found in the notes of surveyors for the General Land Office (GLO). At about the time of settlement, private crews

contracted by the U.S. GLO surveyed the area. These crews established section lines, corners and townships before the area was widely settled. The surveyors were directed to mark or "blaze" as many as four trees at section corners and half section lines. The diameter and species of each of these trees was then recorded in a surveyors log. When these crews worked in Benton County they found the northeast portion of the county included more continuous tracts of deciduous forest, with wet prairie and conifer bogs common in low-lying areas. They encountered a relatively open landscape in the west and southern parts of the county that was dominated by prairie, brush prairie, oak openings and barrens, and wet prairie.

In 1821, Henry Schoolcraft described the prairies along the Mississippi River about 20 river miles southeast of the current Benton County line and noted that American Indians commonly burned prairies along the river to corner bison. The fires Schoolcraft described, once started, spread rapidly on the nearly level terrain, helping to maintain the open and treeless landscape until Euroamerican settlers arrived. This scenario was also likely along the Mississippi in Benton County and would account for the dominance of prairie and savanna in the south and western parts of the county at the time of settlement.

Native Americans:

Ideas about the history of American Indians and their influence on the local landscape are still evolving. American Indians have probably inhabited and hunted in the area for more than 10,000 years. While the level of impacts were not as great as those of European settlers, American Indians used a wide variety of plants and animals for food, and altered vegetation patterns by cultivating and frequently burning the landscape.

The Indians (and European fur traders) used fire to hunt game; create desired wildlife habitat; clear the landscape for travel, communication and defense; and to obtain firewood. While some fires in the region occurred naturally, the activities of American Indians increased the frequency of fires such that much of the prairie in the southwestern half of Minnesota may have been burned annually, or every few years. Prairies and savannas are fire-dependent plant communities, and may not have been present in Benton County at the time of European settlement without the influence of fire acting in concert with large grazers.

Current Natural Areas

At the time of settlement, around 1850-60, the landscape in the area included a rich variety of plant communities including various types of wetlands in low areas, prairie and oak savanna in the south and west, with deciduous forests, wet prairie and bogs common in the northeast. As the patchwork of agricultural uses of the land increased after settlement, more intense human activities began to change the landscape and natural communities. More recently, metropolitan expansion and rural development have impacted remaining natural areas. Overall, in Benton County today, it is estimated that more than 90 percent of the native landscape has been significantly altered from its original state, or lost when converted to uses such as rowcrop agriculture and development. Many of the remaining natural areas have persisted because they occur on soils that are shallow, droughty, saturated, or nutrient poor, or sites that occur on steep slopes.

Minnesota DNR County Biological Survey

During the 1990's the MN DNR County Biological Survey documented a number of high-quality natural areas as they worked in Benton County (please see the Minnesota County Biological Survey map included at the end of this section). It should be noted that while the MCBS documents only the highest-quality remaining natural areas, there are numerous lesser-quality areas within Benton County that could be managed to improved quality. With a few exceptions, the remaining high-quality natural areas are concentrated in a few areas in the county.

- One of these concentrations is at the confluence of the Platte and Mississippi rivers in the northwest part of the county. In the Platte River valley, slopes are steep and soils tend to be droughty as a result of sandy river terrace deposits. Here, there is an occurrence of quality dry oak savanna and a few small dry prairies.
- Further down the river, southeast of Rice, there are high-quality areas including wet meadow, shrub swamp and floodplain forest. Moving again down the river, just downstream from the confluence of Little Rock Lake with the Mississippi is a relatively large dry oak savanna, and several scattered granite outcrops that were noted by MCBS as high quality. Significant in this area, too, are the natural areas that occur on the Graves Property. This

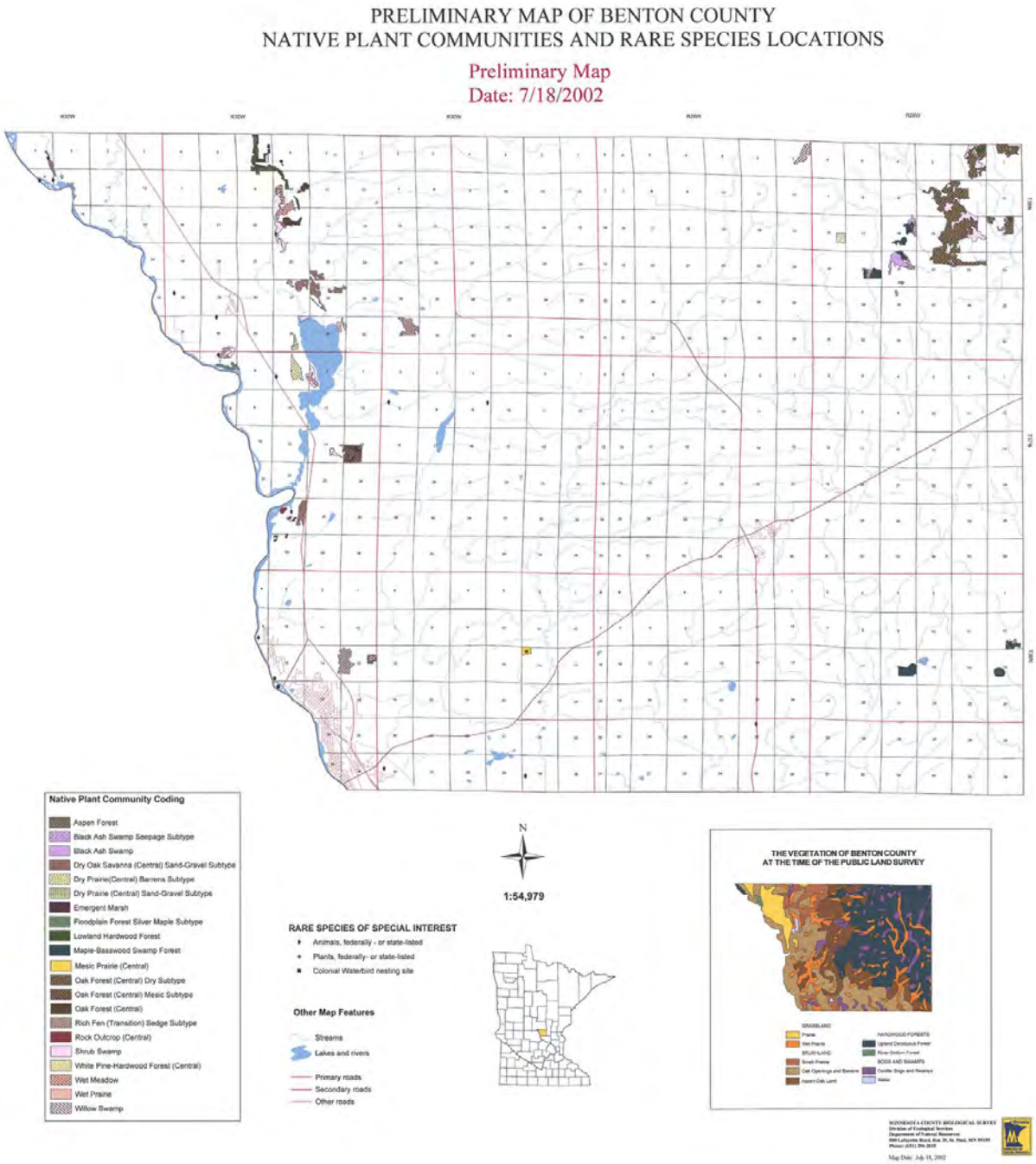
property was strongly supported for parkland acquisition during the early stages of this planning process, and was actually purchased before completing this master park plan.

- The corridor along Little Rock Creek, both north and south of Little Rock Lake, hosts the greatest variety of high-quality natural community types found in the county. This broad corridor includes such varied natural communities as maple-basswood forest, oak forest, dry oak savanna, dry prairie, shrub swamp, and rich fen.
- Just northeast of Sauk Rapids and Highway 10, MCBS staff documented a rich fen, oak forest, and wet meadow. Together these total a sizeable 250-300 acres. This area is part of the orderly annexation agreement for Sauk Rapids, and is at high risk for development; however, the County owns 40 acres of this natural area. The county-owned property is "landlocked" lowland and is not likely to be suitable for development.
- Minden Township hosts the only occurrence of mesic prairie in Benton County. This area, known as Thielen Prairie, supports a population of the state-listed tubercled-rein orchid Platanthera flava, and occurs adjacent to other open, grassy areas that have been pastured and have the potential to serve as a larger prairie/savanna natural area.
- Granite Ledge Township supports the largest and most contiguous parcels of deciduous forest in the County, including oak, maple-basswood, and white pine-hardwood forests, and a few wetland areas of significant quality. This township also hosts the best example of White Pine-hardwood forest in Benton, Mille Lacs, and Morrison County. MCBS staff thought so highly of this stand that they recommended it be used as a reference stand for restoration of white-pine hardwood forests elsewhere. Since the MCBS staff visited the forests in the Granite Ledge area, rural development and logging have occurred on a number of parcels. These activities resulted in lowering the overall quality of those particular tracts—for decades in the case of logging, and more permanently for those with structures placed in them.
- Glendorado Township in the southeast part of the county has several maple-basswood forests that are considered to

be high quality. One of these was apparently logged in about 1998, but was reported to have been selectively cut in a way that did not substantially harm the overall quality of the site.

- Conspicuously absent from the MCBS map are high-quality natural communities within Maywood, Gilmanton, Mayhew Lake, St. George Township, and most of Alberta and Graham Township.

Natural community types that were noted by MCBS staff are listed in the Appendix. These correspond to the MCBS map included on the next page. These are DRAFT descriptions obtained in July 2002 while DNR staff was in the process of internal review of the information.


PRELIMINARY MAP OF BENTON COUNTY
NATIVE PLANT COMMUNITIES AND RARE SPECIES LOCATIONS
Preliminary Map
Date: 7/18/2002
Native Plant Community Coding
Aspen Forest
Black Ash Swamp Seepage Subtype
Black Ash Swamp
Dry Oak Savanna (Central) Sand-Gravel Subtype
Dry Prairie(Central) Barrens Subtype
Dry Prairie (Central) Sand-Gravel Subtype
Emergent Marsh
Floodplain Forest Silver Maple Subtype
Lowland Hardwood Forest
Maple-Basswood Swamp Forest
Mesic Prairie (Central)
Oak Forest (Central) Dry Subtype
Oak Forest (Central) Mesic Subtype
Oak Forest (Central)
Rich Fen (Transition) Sedge Subtype
Rock Outcrop (Central)
Shrub Swamp
White Pine-Hardwood Forest (Central)
Wet Meadow
Wet Prairie
Willow Swamp
N
1:54,979
RARE SPECIES OF SPECIAL INTEREST
Animals, federally - or state-listed
Plants, federally- or state-listed
Colonial Waterbird nesting site
Other Map Features
Streams
Lakes and rivers
Primary roads
Secondary roads
Other roads
THE VEGETATION OF BENTON COUNTY
AT THE TIME OF THE PUBLIC LAND SURVEY

Other Natural Areas

Despite the apparently few high-quality natural communities mapped by the MCBS, there is a significant amount of land in the county that supports natural communities of lesser quality. These lesser-quality areas have, in some way, had their characteristic species composition, three-dimensional structure, or overall function, altered. Some of the activities that may impact quality include things such as logging, intensive long-term grazing, ditching, road building, development and others. Some influences such as logging and grazing have the potential to be corrected through natural processes or with active management. Activities such as plowing, road building and development cause a permanent loss. Because most natural areas have some potential to improve in quality with time and/or active management, these somewhat lower quality natural areas play an important role in the big picture of natural areas within Benton County. Similar to the overall character of the County, the most common lesser-quality natural areas in the south and west are savanna-like areas, woodlands, wet meadows and prairie, with forested areas being most common in the north and east.

Geologic Features

There are number of geologic features within the county that 1) occur in association with high-quality plant communities, 2) are known to have historical significance, or 3) stand as unique features on their own. Below is a brief list of some of the most prominent geologic features in the county.

- Peace Rock – along the Mississippi River in Watab Township, Peace Rock has historical significance as a neutral meeting place for Native American tribes, and as supporting a significant (MCBS-mapped) plant community type. It is also significant because it occurs within the Mississippi River corridor.
- Granite Ledge Township – this area has shallow soils and substantial areas where bedrock is at the surface. These occur with significant stands of forest and in the vicinity of a small waterfall on the Rum River.
- Eskers – These glacial features are serpentine-like hills that form as meltwater stream sediments stack upward from the ground, under a glacial ice sheet. There appear to be

several of these interesting glacial features in the south and east part of the county. These sharp, short hills are typically droughty and often support savanna-like areas with scattered, open-grown oak trees.

- Drumlins – although not prominent, these hills are scattered across the landscape in western Benton County. They are teardrop-shaped hills that are oriented from east to west and result from glacial ice flowing around previous deposits. Because the drumlins in Benton County are relatively low-lying, many of them are farmed across, or inconspicuous in wooded areas.
- Langdon Terrace – is the large terrace along the Mississippi River. It has typically sandy soils and supports a variety of quality natural communities. It forms the broad expanse seen from Highway 10, looking toward the Mississippi River. This landform supports some of the best remaining examples of savanna and prairie in the county.

Major Stream Corridors and Surface Water Features

There are several major streams, including the Mississippi River, in Benton County that serve as important corridors for wildlife. These surface water features serve to connect natural areas and enable the movement of plants and animals and the chance for isolated natural areas to maintain their quality and function. Below is a brief summary of the major stream corridors in Benton County:

- Mississippi River – Chief among the corridors in the county is the Mississippi River, a migratory corridor of national significance used by migratory birds, fish, far-ranging mammals, plants, and others. The river provides added significance to natural features that occur near it.
- Little Rock Creek/Lake – this corridor supports a wide variety of natural communities and provides a relatively continuous tract of natural areas from Little Rock Lake to north of the Benton County line.
- Mayhew Creek/Mayhew Lake – although much of this watershed is under cultivation and portions are ditched, the area immediately adjacent to the stream itself is mostly in permanent cover. This provides wildlife opportunity for travel. Also of interest is Mayhew Lake and the shared watershed/stream channel with Little Rock Creek to the north of the lake (known as a stream bifurcation). Although

not mapped by the MN DNR MCBS, the confluence of Mayhew Creek and Elk River supports a large, contiguous tract of moderate-quality natural communities of local significance.

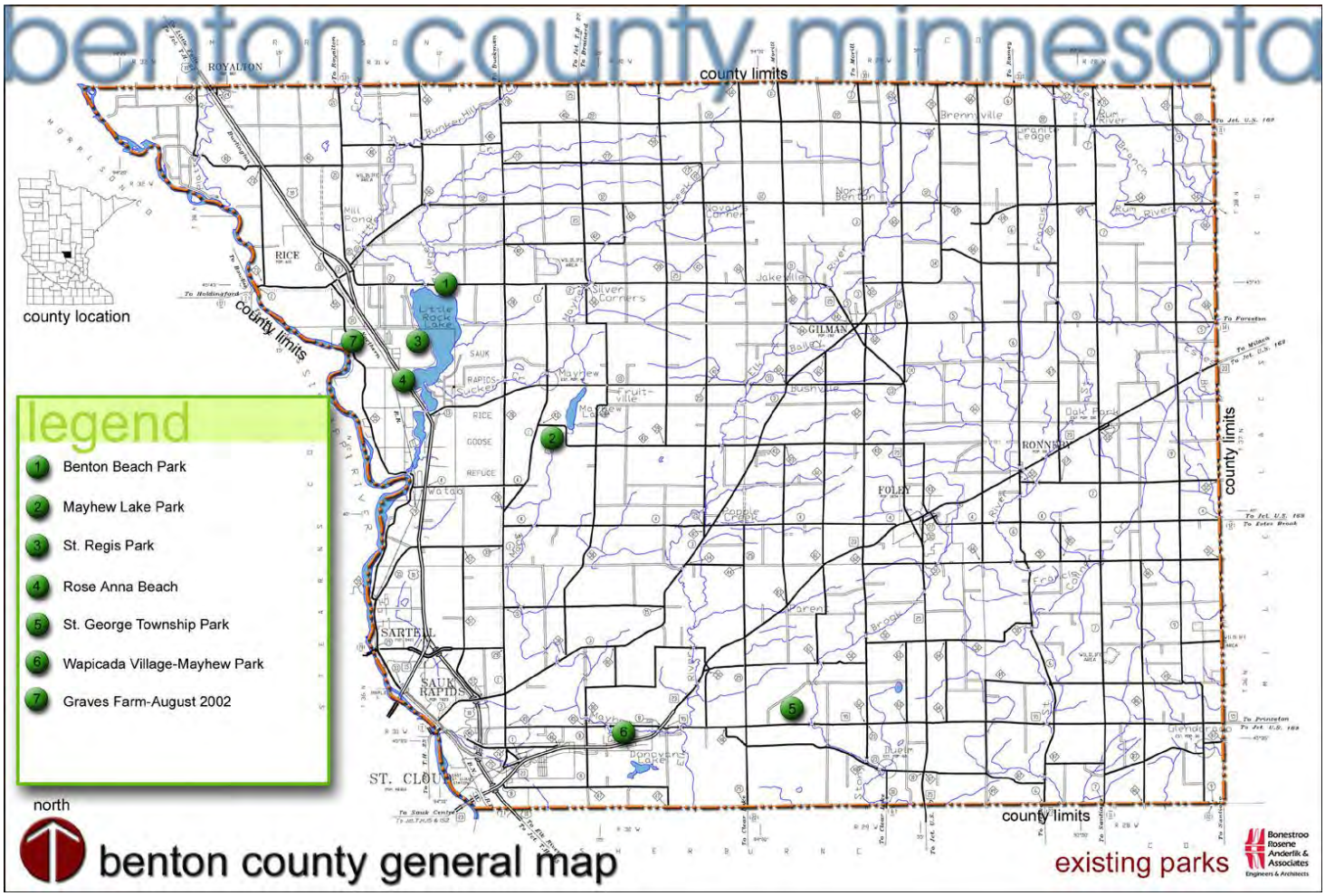
- Elk River – this watershed originates north of Benton County and ends well to the south, in the City of Elk River. It constitutes the major watershed in the central portion of the county. It supports a relatively unbroken network of moderate-quality natural areas and permanent agricultural cover such as pastures through the county. As noted in the Mayhew Creek description, the confluence of Mayhew Creek and Elk River supports a large, contiguous tract of natural communities of local significance.
- St. Francis River – the watershed for this small river represents a significant portion of eastern Benton County with the headwaters in Alberta Township. The immediate area around the river supports a wide variety of wetlands, forest, and grassland, as well as areas in permanent nonnative plant cover and rowcrops for agriculture. The stream corridor is significant in a regional sense because it serves as a connection between areas inside Benton County and Sherburne National Wildlife Refuge to the south.
- West Fork Rum River – this is a tributary for one of the major river systems in central Minnesota that extends from Lake Mille Lacs to the Mississippi River in Anoka. The portion of the Rum River watershed that occurs in Benton County is small but supports a significant portion of the county's remaining quality natural communities—in particular oak forest. It also occurs in an area with significant granite bedrock near the surface that forms the falls area in Granite Ledge Township.
- Donovan Lake – this small lake significantly represents the only natural, deep marsh/shallow lake in Benton County. It occurs in a somewhat secluded area that is visually isolated from surrounding roads. The immediate area around the lake has a number of moderate-quality natural communities, including a deciduous woodland and a planted pine stand, that have the potential to be managed to an improved quality. These natural areas help to buffer the lake from surrounding land uses.

Parks and Facilities

The Benton County Park System currently consists of four developed parks and three undeveloped parks. They are:

- Benton Beach Park (30 +/- acres): This is the largest and most popular park in the county system. Its primary recreational features include a swimming beach, campground with both tent and RV sites, restroom and shower house, boat launch area, picnic facilities, playgrounds and a conference center complete with a two-story deck overlooking Little Rock Lake. The two picnic shelters and the conference center are available to rent.
- Mayhew Lake Park (4.4+/- acres): This park provides public access onto Mayhew Lake. Amenities include an improved boat launch, picnic tables and grills. Portable restrooms are provided.
- St. Regis Park (0.6 acres): This relatively small neighborhood park provides picnic tables and grills and portable restrooms. During the summer, the gate is closed to prevent erosion in the Shoreland Zone; however, visitors can easily walk in from the parking area. During winter months, the gate is open and it is a popular access onto Little Rock Lake for ice fishing.
- RoseAnna Beach (0.6 acres): This relatively small neighborhood park includes a picnic table and grill, and provides winter access onto Little Rock Lake.
- St. George Township Park (17 +/- acres): This parkland is undeveloped at this time. County residents donated this land, and deed restrictions indicate that it can be only used for wildlife habitat and nature study.
- Wapicada Village / Mayhew Park (12.5+/- acres): This parkland is undeveloped at this time. The terrain and location in the Watab Creek floodplain make it difficult to access or develop. An abandoned railroad right-of-way (now privately owned) goes through this property.
- Graves Farm: This land was purchased Aug 12, 2002. It consists of 289 acres, including 3,300 feet of undeveloped shoreline on the Mississippi River, a rare feature. High banks provide scenic views of a river bend and islands.

A map of the county's existing parks is provided on the next page.


benton county minnesota
county limits
county location
county limits
legend
1 Benton Beach Park
2 Mayhew Lake Park
3 St. Regis Park
4 Rose Anna Beach
5 St. George Township Park
6 Wapicada Village-Mayhew Park
7 Graves Farm-August 2002
north
benton county general map
existing parks
county limits
county limits
ROYALTON
RICE
SARTELL
ST. CLOUD
GILMAN
RONNEBY
FOLEY
Little Rock Lake
Mayhew Lake
Donovans Lake
Bonestroo Rosene Anderlik & Associates
Engineers & Architects

Trails and Connectors

This section provides an inventory of existing trails in Benton County. However, it is important to note that this section does not address trails within parks and open spaces, as those are covered in other sections of this plan.

Municipal/Community Trails

The only existing trails within Benton County fall under municipal jurisdiction.

Benton County

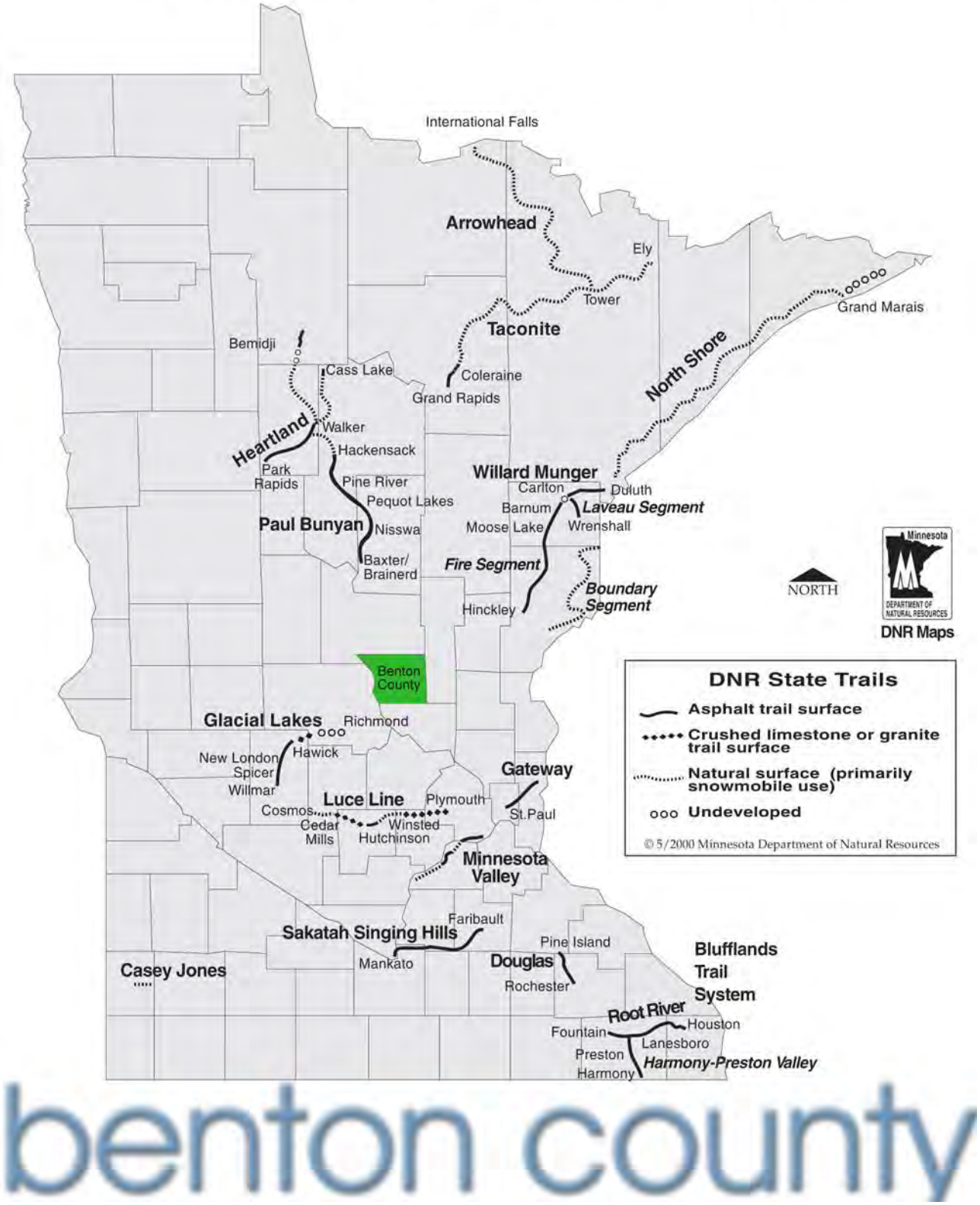
There are no existing trails in the county that are part of a countywide park and trail program.

Regional and State Trails

While there are not currently any state trails in Benton County, nor are there links to any state trails, there are connection opportunities to existing trails in adjacent counties. A map of the state's existing trails is provided on the next page.

- Morrison County has acquired the abandoned Soo Line Rail Corridor between Genola and the Stearns County line, and intends to develop this corridor as the Soo Line Railroad Corridor Recreational Trail. This portion of trail will connect to the existing trail running northeast from Genola to Moose Lake (connecting with the Willard Munger State Trail to Duluth and the North Shore). This same trail will also travel southwest to connect with the Lake Wobegon Trail in Stearns County stretching to Albany, Melrose and Sauk Center to the west.
- The Glacial Lakes State Trail, which travels northeast from Willmar toward Cold Spring in Stearns County, does not enter Benton County but is on a trajectory consistent with connecting to and extending through the County along Highway 23 or the abandoned rail corridor to Milaca and beyond.
- Connections to the north along the Mississippi River could also provide links to the Paul Bunyan State Trail in Brainerd.

Minnesota's State Trails



benton county

Other Trails

A network of snowmobile trails traverses Benton County, providing recreational opportunities and connections to Morrison, Mille Lacs, and Sherburne counties. These trails fall along roadways and across private lands. Because permanent easements have not been obtained for trails that cross private land, these trails are subject to change. Agreements for trail use, mapping, and distribution of snowmobile trail information is done by the private sector, without formal involvement by the County, although the County acts as the fiscal agent for state grants. Equestrian trails do not exist within the County, but interest exists.

Roadway System

Benton County has the following existing roadway system:

- Minnesota Trunk Highways – 82 miles
- County Roads – 227 miles
- County State Aid Highways – 226 miles
- Township Roads – 298 miles

The County could be instrumental in developing trails along selected County Roads and CSAHs, and work with the State and local communities to complete trail segments falling along roadways outside of the County's jurisdiction.

Natural Resources and Open Space

During the process established for creating this plan, information about existing natural areas and opportunities for protection were shared with members of the Technical Advisory Committee, Policy Advisory Committee, and Citizens Advisory Committee. After this information was shared with the these groups, they were asked to provide recommendations to the County on what areas they felt were the highest priority natural areas for integration into the park system. Below is a summary of the comments received from these groups.

High Priority Natural Areas Recommended for Protection by TAC/PAC/CAC

- Granite Ledge Township
  - Protection of forest tracts and falls area
  - Mentioned as high priority by all 5 groups
- Little Rock Creek/Natural Communities north of Little Rock Lake
  - Various natural features mentioned in this area
  - Sand dunes/savanna north of lake (MCBS)
  - Confluence of Bunker Hill Creek and Little Rock Creek
  - As connection to Crane Meadows National Wildlife Refuge
- Confluence of Elk River and Mayhew Creek
  - Mentioned by two groups as high priority
- Peace Rock
- Graves Property/MCBS area
- Platte River (floodplain, hardwood forest, oaks, MCBS sites and eagle nest)
- Peat swamp by Sartell WMA
- Southeast corner areas (general interest in Glendorado Township)

Other natural areas listed as potential sites for protection by TAC/PAC/CAC (not in priority order):

- Theilen Prairie (this site supports population of Tubercled-rein orchid)
- Pull Meadows on east side of Sauk Rapids
- Small rivers throughout the county

- Ridge line from heavy soils to sand areas in southern part of county
- Wetland south of Honda House
- North of Bibles slough – Maple-basswood forest
- Bifurcating stream (Mayhew Creek north of Mayhew Lake)
- Natural area on south edge of Watab Township, southeast of Jack Frost Feed Mill

Public Participation

During an open meeting, the public had an opportunity to view recommendations made by TAC/PAC/CAC. The several dozen citizens who attended were then invited to prioritize natural areas and to write down their comments supporting their selection. In general, the areas the public indicated as high priority natural areas coincided with those of the TAC/PAC/CAC.

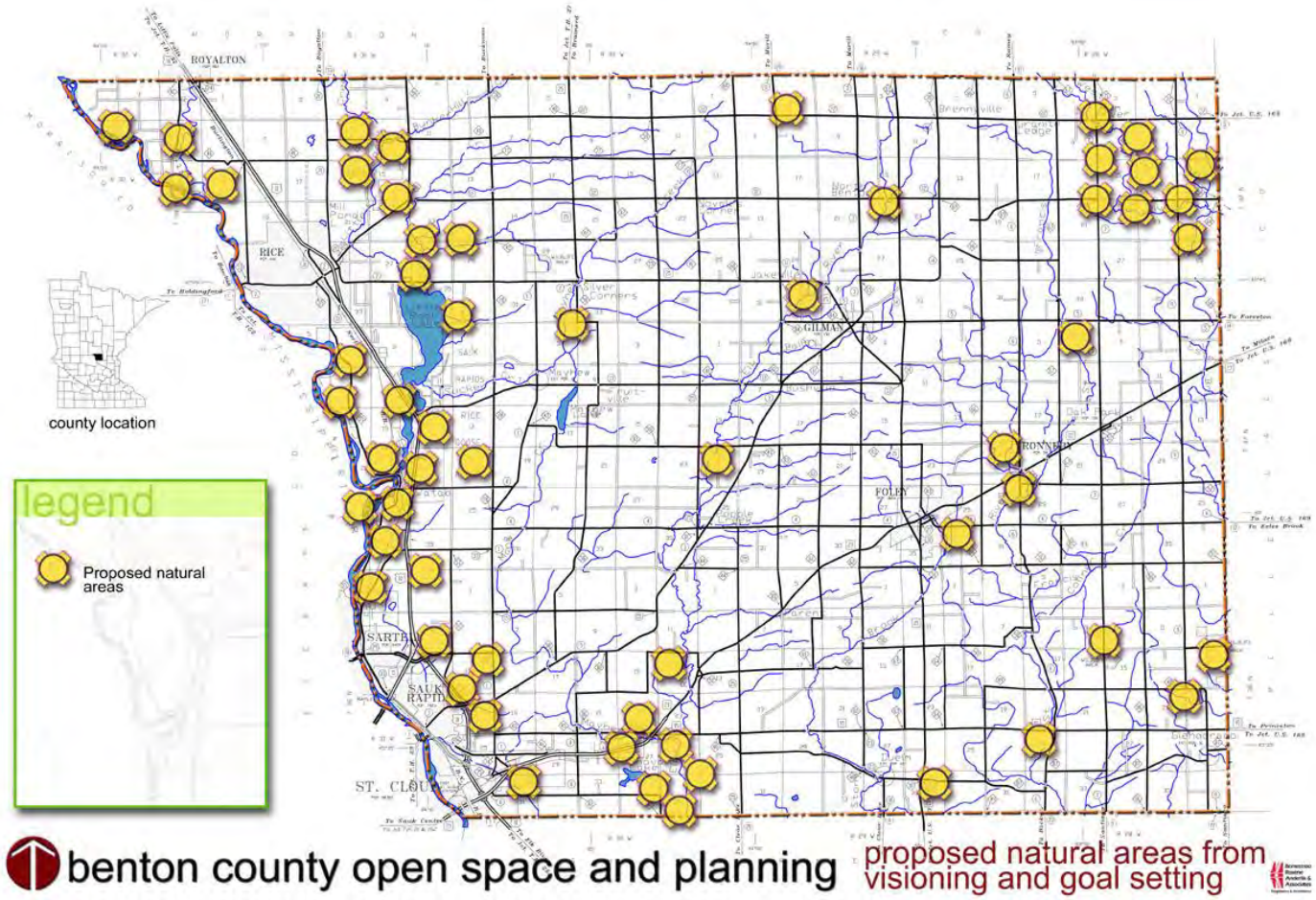
These include:

High Priority Natural Areas Listed by Public Participants

- Mayhew Creek/Elk River confluence area
- All Natural Areas in Granite Ledge Township
- Sauk Rapids area
- Natural area just northeast of Foley

It should be noted that this meeting provided a forum for both positive and negative input from the public. As such, there were two comments submitted in writing during the public meeting against the idea of a publicly owned natural area in Granite Ledge Township, and one written comment against a park in that area.

A map of the proposed natural areas from the vision and goal setting process is provided on the next page.


ROYALTON
RICE
GILMAN
FOLEY
SARTELL
SAUK RAPIDS
ST. CLOUD
county location
legend
Proposed natural areas
benton county open space and planning
proposed natural areas from visioning and goal setting

Existing Parks and Facilities

All parks have a purpose and function. In Benton County they are the preserves, the open areas, the recreation areas that serve the residents of more than one municipality. The parks provide opportunities for passive recreation and minimize the impact on the land's natural features.

During the process established for creating this master plan, information about existing parks and facilities were shared with members of the TAC/PAC/CAC. After this information was shared with the these groups, they were asked to provide recommendations to the County on what amenities they felt were the highest priority for the existing parks and facilities.

Benton Beach Park, located on the north side of Little Rock Lake is the most used park in the system. The water quality of Little Rock Lake is not a part of this project, although residents have made comments to address this issue. The Redwood Inn, bought in 1997, needs a great deal of work that may outweigh the benefits, and legally may not be possible due to regulations within the Flood Plain Management Ordinance.

Improvements and amenities rated the highest in priorities residents wish to see are:

- Lakeview Center – increase use, consider concessions
- Upgrade the restroom/shower facility
- Add pedestrian and bicycle trails
- Upgrade play equipment as necessary for the different age groups and make ADA accessible
- Picnic areas to be more defined, possible council ring or barbecues
- Defined open space for activities such as volleyball, horseshoes, bocce, lawn bowling and croquet. Have the ability to check out equipment needed for activities.
- Add a water feature such as splash pad area
- Improve lake water quality – install shower for swimming
- Camping improvements, new layout plan w/landscape used for screening.
- Upgrade shelters

Other amenities recommended but not suggested as high priorities include:

- Develop the pond near the Redwood Inn as a interpretive area, garden area or fishing pond
- Add fishing pier
- Establish educational/interpretive markers

Please refer to Concept A & B developed as a culmination of concepts derived in a small group exercise listed as Benton Beach Concept A & B on the following pages.


upgrade
upgrade
upgrade
gardens
earth berm
PAVED ENTRANCE
entry feature
earth berm
open space
educational pavillion
interpretative marker
interpretative marker
interpretative marker
splash pad
picnic area
picnic area
picnic area
game courts/ bocce/ horse shoe
10 plus playground
splash pad
play area
K-5 playground
seating node
seating node
seating node
sand dunes
Fishing pier to be located with help of DNR
LITTLE ROCK LAKE
undisturbed area
COUNTY ROAD 2
benton beach park concept A


new trails
along woods
seating node
gardens
earth berm
K-5 playground
splash pad
play area
10 plus playground
SOFT BALL
SMALL SHELTER
interpretative marker
PAVED ENTRANCE
GRAVEL ROAD
entry feature
earth berm
open space
educational pavillion
EDUCATIONAL PAVILION
POND
OLD MINE
interpretative marker
picnic area
splash pad
picnic area
game courts/ bocce/ horse shoe
DECK
CANOEING CENTER
sand dunes
Fishing pier to be located with help of DNR
LITTLE ROCK LAKE
undisturbed area
CORNER IN WATER AT TIME OF SURVEY
seating node
seating node
seating node
COUNTY ROAD 2
benton beach park concept B

Mayhew Lake Park

Mayhew Lake Park, located on the south side of Mayhew Lake, is currently used for boat access onto the lake and as a picnic area.

Improvements and amenities rated the highest in priorities residents wish to see are:

- Install fishing pier
- Add pedestrian trails
- Add seating areas
- Create improved picnic area
- Install low maintenance plantings
- Educational/interpretive markers
- Additional parking
- Acquire additional land around the lake

St. Regis Park

This park is located midway on west side of Little Rock Lake. Improvements and amenities rated the highest in priorities that residents wish to see are:

- Install low maintenance plantings
- Educational/interpretive markers
- Add canoe launch
- Restore shoreline

RoseAnna Beach

RoseAnna Beach is located on the southwest side of Little Rock Lake and used primarily for winter access. Improvements and amenities rated the highest in priorities that residents wish to see are:

- Install low maintenance, habitat enhancement plantings
- Upgrade parking
- Educational/interpretive markers
- Picnic area should be defined more

St. George Township Park

- St. George Township Park is undeveloped at this time and currently landlocked by other properties. State Highway 95 is to the south of the park and county state aid 25 to the west of the park. Improvements and amenities rated the highest in priorities that residents wish to see in the future are:

- Pedestrian trails used for nature study and education.

Wapicada Village

Wapicada Village – Mayhew Park is undeveloped at this time. State Highway 23 is to the south of the park and County State Aid 8 to the north and west of the park. Improvements and amenities rated the highest in priorities that residents wish to see in the future are:

- Bicycle/Pedestrian trail with bridge for access
- Develop primitive camping/picnicking

Future Parks and Facilities

During the process established for creating this master plan, information about land use, DNR Inventory, program requirements and site characteristics (what makes a good park) were shared with members of the TAC/PAC/CAC. After this information was shared with the these groups, they were asked to provide recommendations to the County on what areas they felt were the highest priority for new parks and facilities.

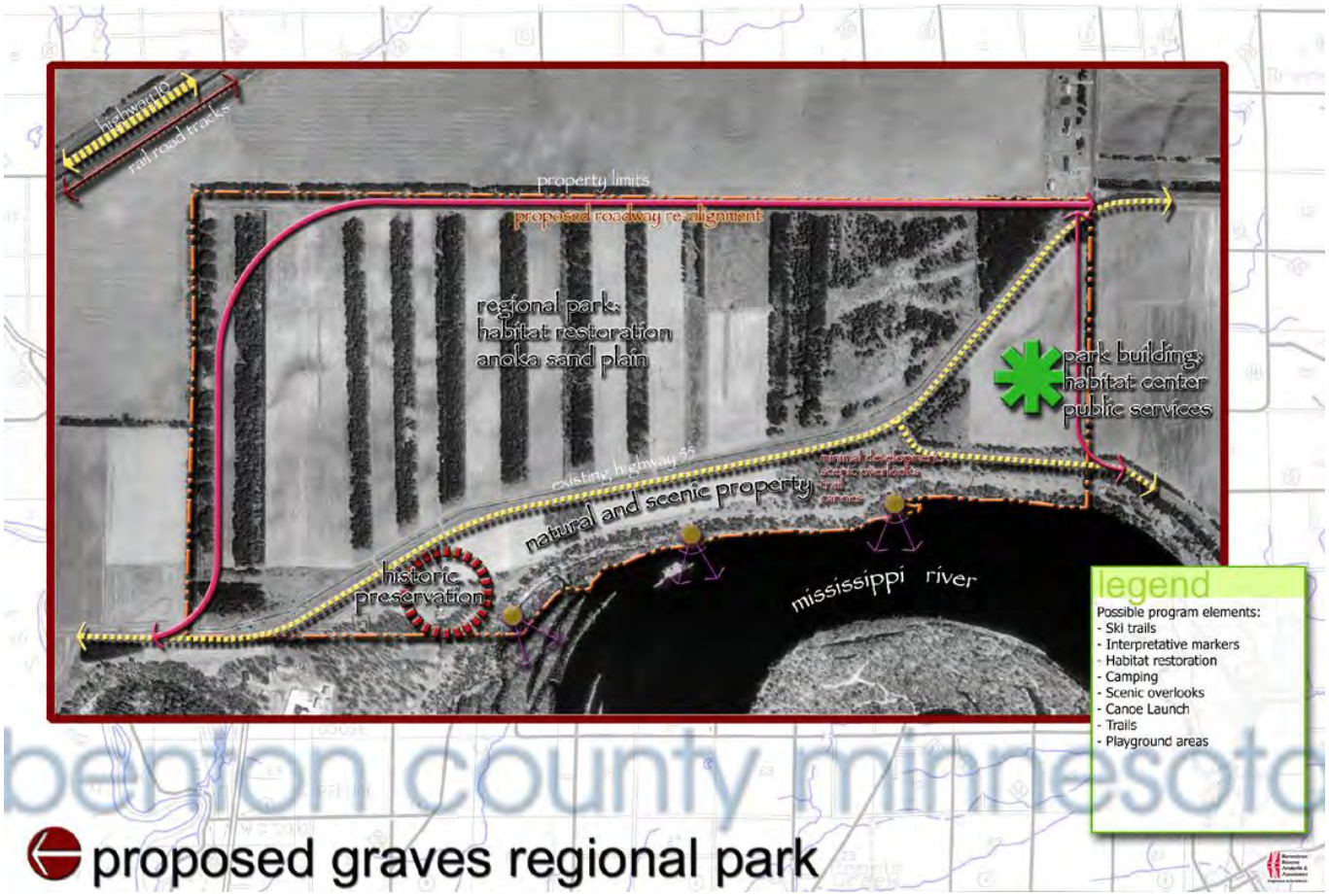
Where in Benton County do the residents want to see additional parks? Our groups in their visioning selected many areas of the county for future parks and facilities.

The Appendix contains the meeting minutes from our visioning and goal setting meeting, all comments and locations are listed, and the priorities are:

- The 289-acre Graves Farm is located in the Watab Township on the east side of the Mississippi adjacent to a 220-acre wildlife refuge.
  - Use as a Historical Preservation Site
  - Maintain natural areas and restore fields to pre-settlement vegetation
  - Provide trails with interpretive markers

(Note: This property was acquired by the County after the Visioning and Goal Setting Meeting.)

Refer to Proposed Graves Regional Park map on the following page.

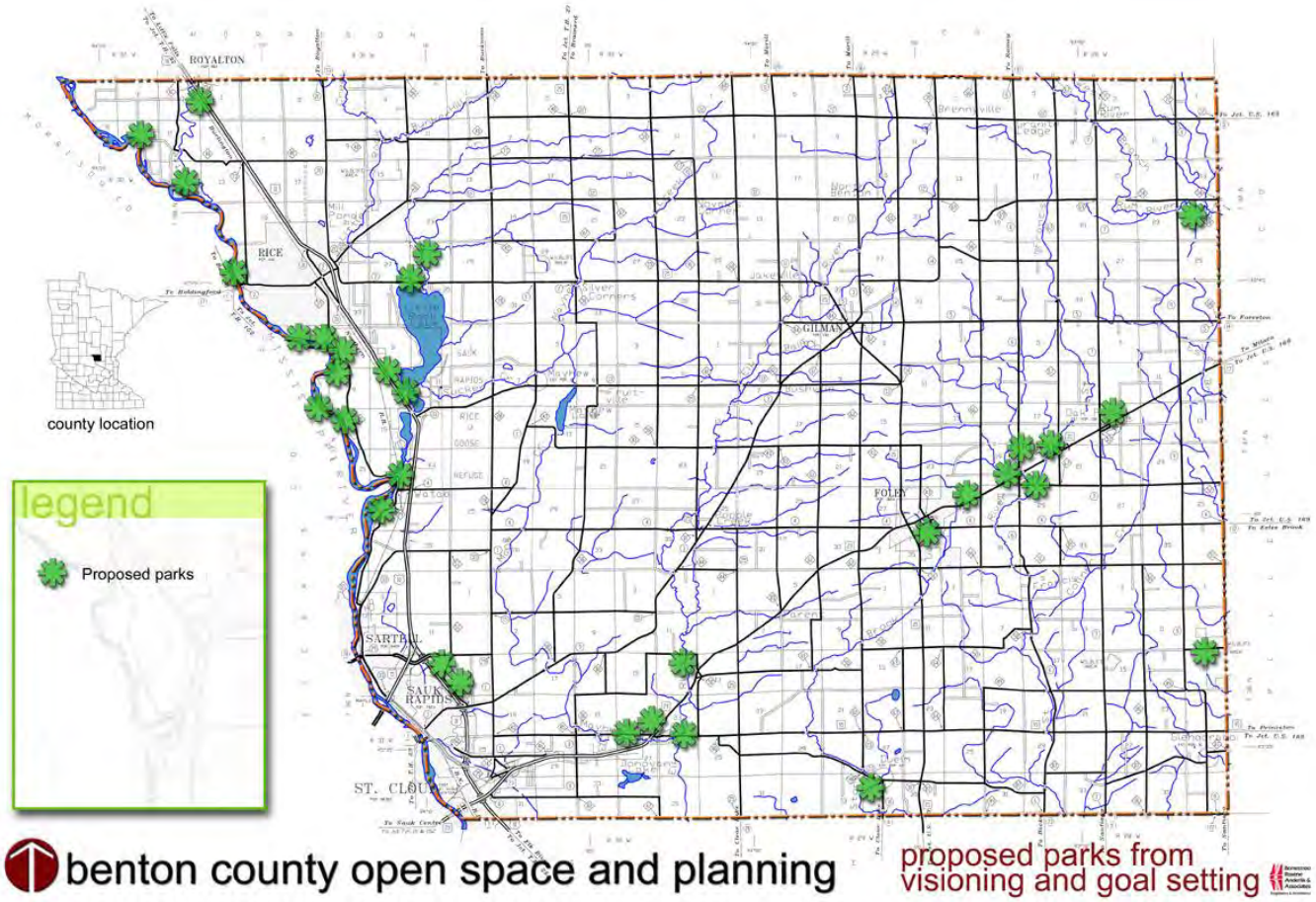

highway 10
rail road tracks
property limits
proposed roadway re-alignment
regional park:
habitat restoration
anoka sand plain
park building:
habitat center
public services
existing highway 55
natural and scenic property
historic preservation
mississippi river
legend
Possible program elements:
- Ski trails
- Interpretative markers
- Habitat restoration
- Camping
- Scenic overlooks
- Canoe Launch
- Trails
- Playground areas
proposed graves regional park

- Mayhew Creek area at Elk River, located in the Minden Township near State Highway 23 and County Road 47.
  - Make use of gravel pits
  - Hardwood forest area
  - Provide trails
- Park located east of Foley adjacent/near State Highway 23.
  - At present no existing County Park exists in the east side of county.

Other park areas listed as potential by TAC/PAC/CAC (not in priority order):

- Sauk Rapids City Park and High School Area
- Granite Ledge Area – Waterfalls
- Harms property – 55 acres, on the Mississippi River
- Benton Beach – Although listed as an existing park, participants felt strongly about this park being expanded as well as improved
- Zuleger Creek
- North of Little Rock Lake at Little Rock Creek

Please see Proposed Parks from Visioning and Goal Setting map on the next page.


ROYALTON
RICE
GILMAN
FOLEY
SARTELL
SAUK RAPIDS
ST. CLOUD
county location
legend
Proposed parks
benton county open space and planning
proposed parks from visioning and goal setting

Future Trails and Connectors

Recommended Trail Segments and Major Destinations

The PAC/TAC/CAC committee meetings and public input sessions suggested a number of trail segments connecting places and features within the County. Refer to the Proposed Trails from Visioning and Goal Setting map on the following page.

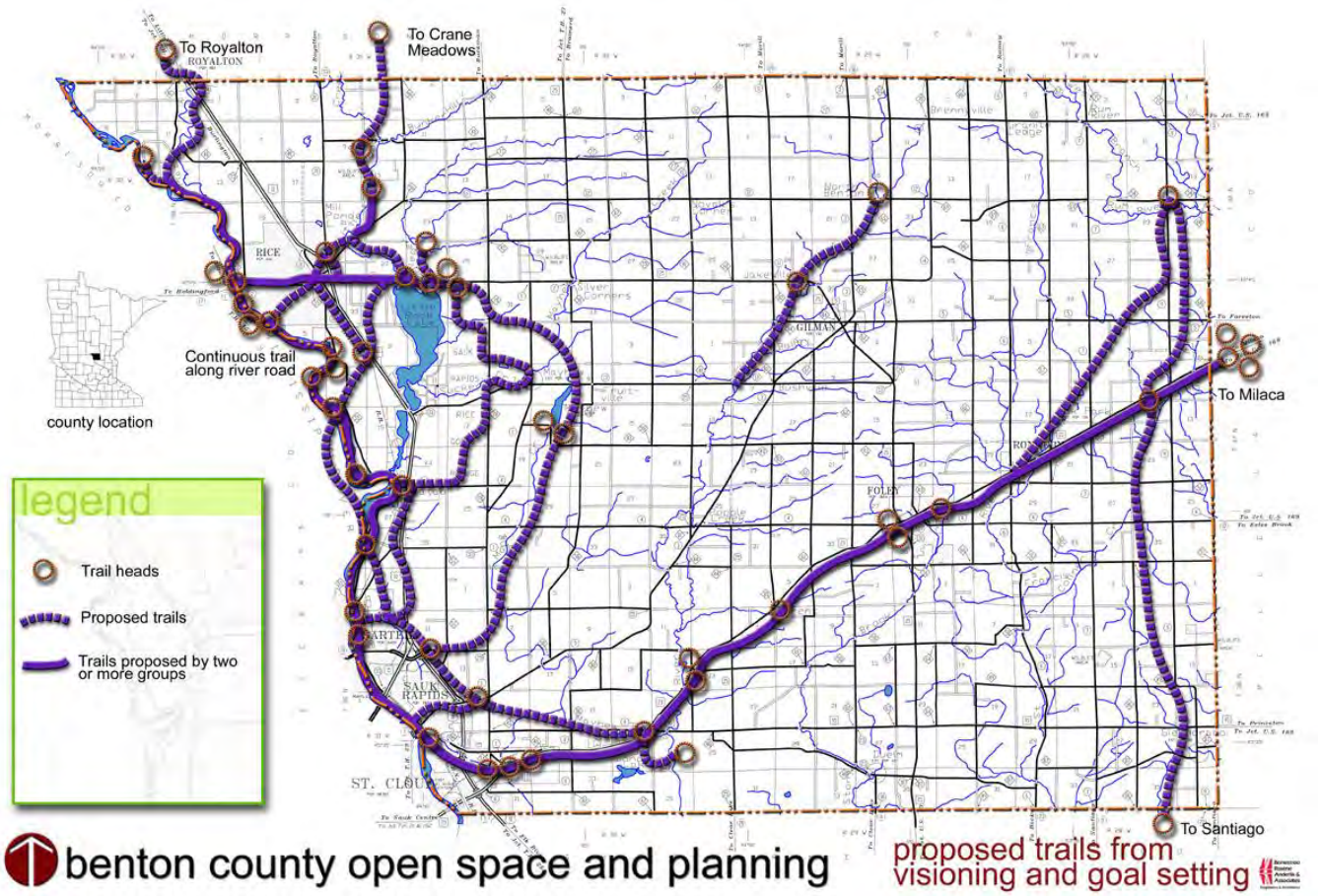
These include:

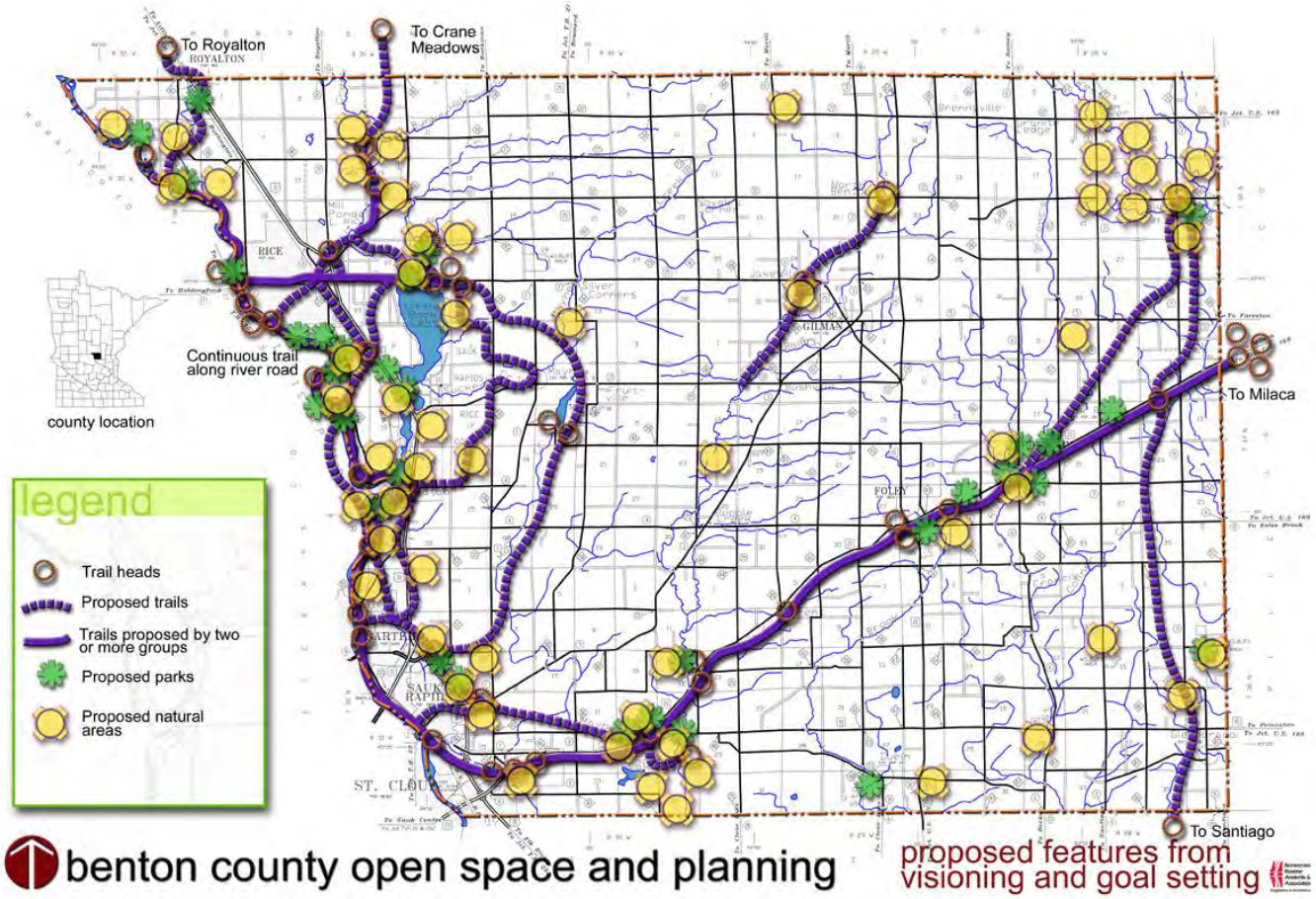
1. Trail from Mayhew Lake Park to Benton Beach Park
2. Trail from Benton Beach to the Graves Farm Property/Mississippi River through Rice (possibly along County Road 2 with a crossing of Highway 10)
3. Trail from Mayhew Lake Park to Foley
4. Trail along the length of the Mississippi River through the County with lookouts at Peace Rock, the Graves Farm Property, and Pirates Cove
5. Trail along Little Rock Creek
6. Trail along the Elk River
7. Trail along the abandoned railroad corridor paralleling State Highway 23 from St. Cloud toward Milaca.

Two additional trails were suggested that connect park and open space features or communities to connections beyond the County. They are:

8. Trail connection to the Soo Line Corridor Recreation Trail in Morrison County
9. Trail connection to the Sherburne National Wildlife Refuge

Please see proposed features from Visioning and Goal Setting map following the map on the next page. This proposed features map includes all parks, open space and trails selected by the public.


To Royalton
ROYALTON
To Crane Meadows
RICE
Continuous trail along river road
county location
To Milaca
To Santiago
legend
Trail heads
Proposed trails
Trails proposed by two or more groups
benton county open space and planning
proposed trails from visioning and goal setting


To Royalton
To Crane Meadows
Continuous trail along river road
county location
To Milaca
To Santiago
legend
Trail heads
Proposed trails
Trails proposed by two or more groups
Proposed parks
Proposed natural areas
benton county open space and planning
proposed features from visioning and goal setting

Public Survey Results

County staff provided surveys for citizens who could not attend meetings, and evaluation forms to planning participants in order to determine general citizen interests. Following is a summary of those findings:

- Citizens thought that protection /preservation of the county's natural resources and unique features were more important than providing increased recreational opportunities. However, they believe protection can be balanced with appropriate and compatible recreational opportunities.
- Many people do not visit Benton County parks on a regular basis, but would use them more often if the parks were improved or expanded.
- Some of the most common park components or features that citizens would like to see provided in the county park system include:
  - Hiking/walking trails
  - Bicycle trails
  - Cross-country ski trails
  - Equestrian trails
  - Snowmobile trails
  - Opportunities for nature observation
  - Environmental education
  - Historic interpretation
  - Picnic sites
  - Swimming areas
  - Fishing piers
  - Canoe access on rivers and lakes
  - Boat launch areas
  - Camping
  - Dog parks
  - Playgrounds or youth activities

Other suggestions include:

Establishment of a 1000 – 1500 acre Forest Preserve. Combine good forest/ environmental stewardship practices with low impact recreational activities. Include horse trails, walking trails, ski trails and other passive recreational opportunities.

Zone remnant natural communities are permanent open space so there is incentive for landowners to preserve them.

Natural Resources and Open Space

Below is a list of recommended natural areas for protection as provided by Bonestroo staff. The list below is based on current knowledge of natural areas in the county and provides specific examples of geographic locations. These recommendations are presented in priority order.

Rum River Falls Area – Granite Ledge Township

This area provides an opportunity to protect a number of interesting features in a single property, including granite outcrops, oak forest, and a falls area on the Rum River. Although some natural areas in this vicinity have been logged and/or grazed in the past, they still appear to have good potential for maintaining or improving their quality with a minimal amount of active intervention.

Because of the threat of development in this area of the county and the combination of interesting features present, this area represents perhaps the most significant opportunity to protect natural features in the county. Additional insight is offered on this recommendation in the implementation section that follows.

Thielen Prairie and Surrounding Landscape

This mesic prairie and the surrounding pastures are found in and around Sections 22 and 23 of Minden Township. Thielen prairie itself is the only mesic prairie documented by the MN DNR County Biological Survey in Benton County and supports a population of the State-Endangered Tubercled-rein orchid. Importantly, it occurs as part of a larger landscape that includes interconnected pastures of similar character.

Aside from Thielen Prairie, most of the other pastures are dominated by nonnative cool season grass in savanna-like settings, with wet meadows interspersed. These pastures appear to be well managed as of 2002. Minor adjustments in future management have great potential to not only restore the prairie, but increase forage production as well.

Stewarding partners for this prairie and pasture complex may include the Soil and Water Conservation District staff, prairie ecologists, and others. Potential tools for protection include

Prairie Tax Exemption, conservation easements, and other similar tools, and perhaps outright purchase if a landowner is willing.

Natural Areas in the Zuleger Creek and Little Rock Creek Watersheds

There are a number of good- to excellent-quality natural areas mapped by the MN DNR MCBS in the Zuleger Creek and Little Rock Creek watersheds. Many of these are located on the north side of Little Rock Lake and along the creek corridor itself. The Zuleger Creek watershed hosts dry prairie, oak savanna. The Little Rock Creek watershed supports oak forest, black ash swamp, wet meadow/shrub swamp and several other natural community types.

In addition, wise management of the natural areas in the Zuleger Creek watershed, along with identifying problematic areas in the hydrology of the watershed can help to reduce erosion along the lower reaches of the creek and the water quality in Little Rock Lake.

Platte River Corridor

The stretch of the Platte River Valley between Royalton and the Mississippi River hosts a number of high quality natural communities in a relatively narrow valley. The dry soils support quality savanna, prairie, and dry oak forest. Some of these areas were mapped as high quality natural communities by the MN DNR County Biological Survey, while others have a good opportunity for being restored to improved quality. In addition, this area supports a bald eagle nest.

Peace Rock

This feature represents a significant cultural site for the history of the county as well as being an interesting geologic feature. It represents a geographic point of neutrality and meeting place between Native American tribes. Partnering with the landowner to protect and/or interpret this feature will be important. One potential tool for protecting this feature may be assisting the landowner with an easement.

Natural Areas at the Confluence of Mayhew Creek and Elk River

This complex of low-lying ground provides a nice opportunity to protect a large area of interconnected natural areas. Although the natural communities present in this area were not mapped by the MN DNR MCBS, the size of this contiguous habitat represents a significant feature in the county.

Other Opportunities

In addition to these specific locations, there may be other opportunities to protect unique natural features while still in private ownership, or incorporate them into the County Parks system.

Additional opportunities would also be realized if a Natural Resource Inventory (NRI) were conducted that supplements the existing MCBS work completed in a relatively small percentage of the total land cover for the county. Such an NRI would provide a more complete picture of where moderate to excellent quality natural areas occur together as complexes.

Other protection opportunities may include land with one or several of the following characteristics:

- Rare plant and/or animal species
- High quality natural communities
- Natural communities with good ecological restoration potential
- Unique geologic features
- Natural areas adjacent to existing or proposed parks
- Sites that buffer development
- Areas with exceptional vistas

Existing Parks and Facilities

Following are some of the general programming elements used in this planning process to evaluate Benton County's existing parks as well as areas recommended for future parks and facilities.

- Everything must have a purpose, for example – what is the relationship of the park to its surroundings
- Design must be for the people, the residents
- Both function and aesthetics must be satisfied
- Establish a substantial experience, the effects of lines, forms, textures and colors
- Establish an appropriate experience, suited to the personality of the site, user, function and scale.
- Meet the needs for the lowest possible costs, and
- Provide for supervision ease with the balance of use, both freedom and control, circulation and safety

Below is a list of the recommended existing parks and facilities that should have future improvements and expansion as provided by Bonestroo staff.

Benton Beach Park

Benton Beach is a 30-acre park located in section 35 of the Langola Township on the north side of Little Rock Lake. The site encompasses wooded tracts, floodlands, wetlands, Zuleger Creek and shoreline of Little Rock Lake. Existing Facilities include camping, play area, softball field, open space and the Lakeview Center. Additional facilities recommended for development within the park include camping upgrades, restroom upgrades to include shower facility, pedestrian and bicycle trails, upgraded play equipment, splash pad, fishing pier, defined picnic areas, entry feature, native plantings and upgraded shelters.

Mayhew Lake Park

Mayhew Lake Park is a 4.5-acre park located in section 17 of the Mayhew Lake Township. Existing Facilities include public access to Mayhew Lake, picnic tables and grills and portable restrooms. Additional facilities recommended for development within the park include a fishing pier, pedestrian trails, seating areas, defined picnic areas and acquisition of additional land as it becomes available.

Wapicada Village/Mayhew Park

Wapicada Village/Mayhew Park is a 12.5-acre park located in section 25 of Minden Township. State highway 23 is to the south of the park and County State Aid 8 to the north and west. The terrain and location in the Watab Creek floodplain make it difficult to access or develop. An abandoned railroad right-of-way (now privately owned) goes through this property. Facilities recommended for development within this park, (currently there are none), include pedestrian and bicycle trails, picnicking, pedestrian bridge for access, and an area for primitive camping.

The Graves Farm, a recent County acquisition as of August 12, 2002 is talked about in future parks.

Future Parks and Facilities

As the County continues to grow and expand, the existing parks and facilities will fill to capacity. The need for new parks and facilities will become a reality, and the County needs to be proactive. This may include acquiring land before developing parks. Planning for the future now, based on information received

in the master plan process, will help preserve Benton County's "quality of life."

They are:

The Graves Property, 289 acres, located in section 4 of the Watab Township on the east side of the Mississippi adjacent to a 220-acre wildlife refuge. The proposed Graves Park has many possibilities that could include habitat restoration to the original Anoka sand plain, historic preservation, maintain the existing natural areas, provide pedestrian trails with interpretive markers, and scenic overlooks just to mention a few.

Develop Mayhew Regional Park, location in Minden Township. The potential for establishing park and facilities exists here as a cooperative project with the City of Sauk Rapids and Sauk Rapids School District. If this becomes a joint project the park would mix active and passive recreation uses. Proposed facilities for the site from a County perspective could include pedestrian trails, open space areas, play equipment, picnic areas, and outdoor classroom areas.

Donovan Lake Area, location in the Minden Township. The potential for establishing both Park and Open Space exists here and could be a cooperative project with the City of St. Cloud annex. Proposed facilities could include pedestrian trails, open space areas, play equipment and picnic areas.

Other park areas to consider are, (in no priority ranking)

Granite Ledge Area - preservation of forest tracts and falls area

Harm's Property - 55-acres located in section 16 of the Watab Township with approximately 4500 feet of shoreline on the Mississippi River.

A park situated east of Foley —could tie into a proposed trail, establish a trailhead park or possibly be located north of Oak Park, just off of Hwy. 23. There exist many possibilities for a park located in the east side of Benton County.

Future Trails and Connectors

This section discusses the need for, purpose and function of additional trails in Benton County. It also outlines the plan for

developing a countywide trails system to complement the County's park and open space system. This section addresses only those trails that occur outside parks and natural open spaces.

Need for Trails

While developing the 1999 Benton County Comprehensive Plan, workshops with citizens revealed the desire for a countywide trail system. Subsequently, several goals in the Benton County Comprehensive Plan address the need for trails. Specifically, Policy #4 under Public Facilities Goal #3 is "Explore the development of nature walks and bicycle trails." Also, Goal #5 in the transportation component of the plan states that the County will "Participate in area planning that promotes alternative transportation needs such as rail, transit, bicycle, and walking."

Further, in the 1998 Survey of Public Attitudes Towards Parks and Open Space Issues, 55 percent of residents surveyed said the community "needs more trails for hiking, biking, cross county skiing, and rollerblading."

Purpose and Function of Trails

Trails provide opportunities for recreation, transportation, or both. With a countywide trail system, residents could use trails as non-motorized transportation links for traveling from one part of the County to another, perhaps from home to work or shopping. They could also use them to enjoy the many natural and scenic features of the County, to access parks, or for exercise. Residents could also use trails traversing the County and extending beyond it to access other statewide trail systems. Connections to the statewide trail systems also bring people from other parts of the state through, and to, Benton County and its communities for recreation. These non-resident trail users represent economic opportunities in the form of lodging, dining and other services.

Potential trail users include pedestrians, cyclists, in-line skaters, cross county skiers, horseback riders, snowmobile riders, and ATV riders. The surface appropriate for a particular trail depends upon the anticipated trail users. For horses, snowmobiles, and ATVs, a turf or aggregate surface trail may be most suitable. On the other hand, a bituminous trail is generally more suitable for hikers, bikers, and in-line skaters.

Different types of trails also have different spatial requirements. For example, according to AASHTO guidelines, the minimum

width of a trail that provides for two-way bicycle traffic and allows for pedestrian use is eight feet with two-foot shoulders on each side. Where traffic volumes are higher, a more desirable width for a bike path is 10 feet. For motorized trail users, even greater separation between users traveling in opposite directions is generally recommended, which requires greater overall trail corridor width.

Where feasible, it is preferable to develop off-road trails. An off-road trail is one that is physically separated from motorized vehicular traffic by an open space or barrier either within the roadway right-of-way or within an independent right-of-way. Trails along natural corridors such as rivers, or through parks and natural areas, are always highly desirable routes because they provide a more scenic experience for the user. Trails within abandoned railroad rights-of-way are also highly desirable because they generally allow users to travel longer distances, visiting a number of destinations along the way.

In cases where funding or right of way is limited, on-road trails, especially for bicyclists, can present a more economical solution. The provision of an on-road bicycle trail can be accomplished by restriping existing roadways or with extra consideration during the design of a new roadway. Similar to a functional classification of roadways, on-road bikeway facilities also have a hierarchy of structure. The following classification helps to define the different facilities available for on-road bicycle trails:

- Bicycle lanes – One-way bicycle facilities, which travel in the same direction as adjacent vehicle traffic and are striped and signed to distinguish them from adjacent vehicle lanes. Two-way bicycle lanes located on the same side of the roadway tend to promote bike travel against the flow of vehicle traffic. This type of bicycle lane should only be used for short connections when necessary.
- Shared Lanes – Shared lanes consist of roadways with no special provisions for bicyclists. Shared lanes generally require vehicles to cross the center lane in order to pass bicyclists. These types of lanes are usually not signed and can be used in residential areas that have low traffic volumes and speeds of less than 30-mph.
- Widened curb, wide outside lanes or shoulders – Located adjacent to the outermost through traffic lane, experienced bicyclists who are not intimidated by high traffic volumes

and speeds generally use this type of facility. Average-experienced cyclists may use shoulders depending on the speed and amount of traffic on the adjacent roadway.

- Local roadways – Typical urban local or collectors can be used as routes for bicyclists and pedestrians. Traffic calming can be implemented to reduce the speed and of motor vehicles.

County Objectives for a Trail System

The County's primary objectives in establishing trails are:

- To provide connections between the communities within Benton County and the County park system
- To provide connections between the various parks, open spaces, and other recreation resources in the County park system
- To provide connections to state trails and regional recreational and natural resources outside of the County for the benefit of County residents.

To meet these objectives, the County must have:

- A framework of policies that serves as the basis for decision making
- Coordination within the transportation, natural resources, and recreational components of the comprehensive and capital improvement plans
- Coordination among the various government and private parties involved
- An implementation plan addressing priorities and funding for both the near and long term

Recommended Trail Features

Trails should include directional and interpretive signage. For example, a trail along the abandoned rail corridor could include signage about the settlement history of the area and the demise of the rail line. A trail along the river could include signage about the river morphology, watersheds and riparian buffers, habitats and inhabitants, or a number of other topics. Specific sites along the trail, such as Peace Rock, should have their own interpretive signage. Trails to or through natural areas could include signs about the features of the natural area and the importance of natural areas for wildlife and conservation purposes.

Acquisition

The County's highest priority for trails should be funding the acquisition and preservation of the trail system plan's proposed trail corridors. Once preferred routes are lost to development, they are difficult or impossible to recover, and secondary routes along the same general corridor are sometimes so undesirable that the trail corridor is no longer worth pursuing.

The County needs to complete preliminary design of specific routings of the trail corridors identified in this plan. With the trail routings developed, the County can begin the process of land acquisition.

The highest priority corridors for acquisition should be:

Trail corridor along the abandoned railroad paralleling State Highway 23 from St. Cloud toward Milaca.

This corridor represents a significant opportunity for Benton County to create a longer continuous recreational trail connecting points within the County and potentially connecting to statewide trails outside of the County as previously mentioned. The trail corridor would be approximately 23 miles long through Benton County. The original railroad corridor has been lost to private ownership. Therefore, acquisition of segments as they become available and proactively pursuing other segments should be high priority for the County.

Trail corridor along the length of the Mississippi River through the County with lookouts at Peace Rock, the new Graves Farm Property, and Pirates Cove.

Development of a trail corridor along this major recreational resource, the Mississippi River, will be of great benefit to the citizens of Benton County. Because development pressures will only increase in the western edge of the County and land will become less available, the County's long range planning should include early acquisition of property for a trail corridor along the river, even if development of the trail is delayed for a number of years. This corridor would be approximately 22-24 miles long, depending upon its alignment.

Trail corridor connecting Benton Beach Park and the Graves Farm Property.

Connecting the County's two largest park resources with one another and the surrounding population centers in the City of Rice and Watab Township would be a significant advantage. This connection could be made either by traveling west along County Road 2 through Rice and then south, or by traveling south

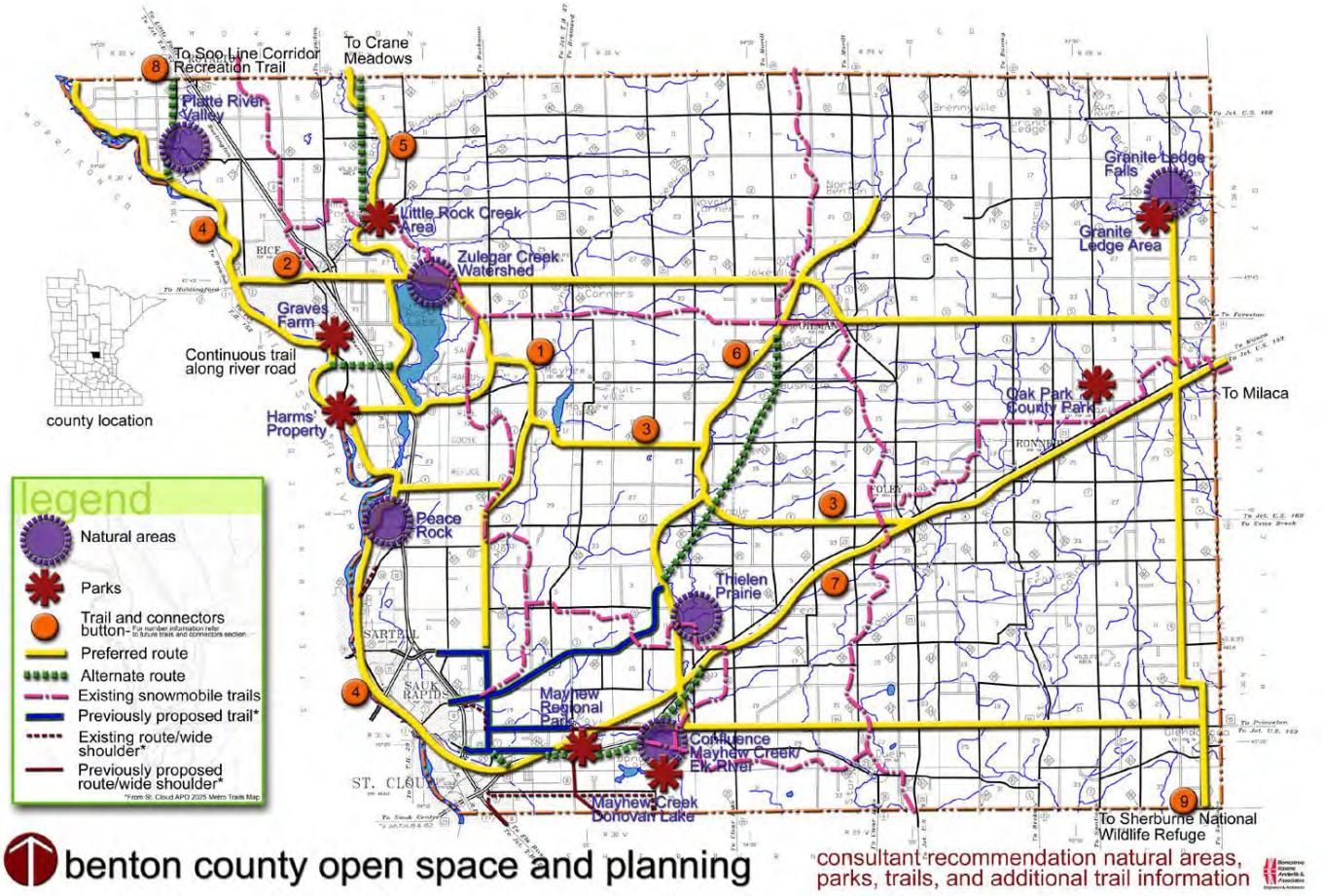
along the western edge of Little Rock Lake and then west, possibly under the Highway 10 bridge over the outlet to Little Rock Lake south of 95th Street.

This second option would create a trail approximately six miles long, a portion of which could overlap with the proposed trail along the Mississippi River. The feasibility of a grade-separated crossing under Highway 10 should be studied further.

Development

After trail corridors are acquired, the County can begin the process of developing trail segments within each of those corridors. For budgeting purposes, general development costs for 10' wide w/2' shoulder aggregate trails is $30,000/mile and for bituminous trails is $60,000/mile. Acquisition costs, special costs associated with constructing trails through difficult terrain, bridges and wetland mitigation costs are in addition to the costs shown. Likewise, special features costs, such as interpretive centers or scenic overlooks, are not included in these costs. Special feature costs should be developed during the preliminary design phase for each of the trail corridors identified.

Please refer to Consultant Recommendations for Parks, Natural Areas and Trails on the next page.


To Soo Line Corridor Recreation Trail
To Crane Meadows
Platte River Valley
Little Rock Creek Area
Zulegar Creek Watershed
Graves Farm
Continuous trail along river road
Harms' Property
county location
Granite Ledge Falls
Granite Ledge Area
Oak Park County Park
To Milaca
Peace Rock
Thielen Prairie
Mayhew Regional Park
Confluence Mayhew Creek/ Elk River
Mayhew Creek Donovan Lake
To Sherburne National Wildlife Refuge
legend
Natural areas
Parks
Trail and connectors button- For number information refer to future trails and connectors section.
Preferred route
Alternate route
Existing snowmobile trails
Previously proposed trail*
Existing route/wide shoulder*
Previously proposed route/wide shoulder*
*From St. Cloud APO 2025 Metro Trails Map
benton county open space and planning
consultant recommendation natural areas, parks, trails, and additional trail information

This Master Planning process makes it apparent that Benton County Residents are very supportive of protecting existing parks and facilities, expanding the open space, and creating connections through a trail system. This is an excellent way to preserve and enhance the quality of life for current and future Benton County residents.

Role of the Park Board

A formal citizen advisory committee can be an effective tool to bridge the gap between the citizens and staff members responsible for implementing projects. The committee helps share concerns and expectations so that the final project mirrors the community's intent. Typically, an effective committee is a diverse mixture of people of various age groups, family status and other demographic criteria, and technical knowledge of the subject.

In 1988, Ordinance Number 186 and Resolution Number 1988-32 established a park board in Benton County. These documents establish the membership and term criteria, but do not detail the mission and role of the Board, nor the specific duties of membership.

It is important to review or establish the mission, role and membership of the Park Board now, to be prepared to effectively implement the park plan.

In general, it is recommended the Park Board focus on larger issues and act in an advisory capacity to County Staff and elected officials to help determine the annual goals and strategies of the park program as prioritized by the master park plan.

Citizen Support

The most successful park and trail programs have active citizen support. In addition to an effective park board, this can be accomplished by establishment of a "Friends of the Park" organization, volunteer opportunities coordinated by the county park staff, or occasional fund-raisers supported by individuals or groups in the communities.

Benton County's General Recommendations for Plan Implementation

As a result of feedback from the public, community leaders, elected officials, environmental organizations and special-interest user groups, and with consideration of technical standards and current recreation trends, the Benton Park Program will emphasize the protection and restoration of natural environments, promote natural resource-based recreational opportunities, preserve culturally significant features and provide opportunities for environmental education.

The following mission statement was developed based on a culmination of goals, policies and public input identified in the county comprehensive plan and this planning forum:

To provide a regionally significant natural resource-based park program that provides multi-use recreational opportunities for all people, in a way that protects or restores the county's natural resources and unique features.

The mission statement reflects the community's desire to:

- Promote our rural heritage
- Enhance the quality of life
- Protect our resources for future generations
- Provide recreational opportunities for all citizens
- Support regional planning and development considerations

It is often difficult to determine just how large a park program must be in order to meet the needs of its citizens and to complement regional efforts. One traditional reference is the National Recreation and Park Association Standards (NRPA). Since the early 1980s, the NRPA established standards for parkland acquisition, and for Counties, the target is 20 acres of parkland per1000 population.

Today, the NRPA has shifted from these traditional standards, and promotes community self-direction where the number of acres proposed for park and recreation land is based on what the citizens determine is best for themselves. However, for the sake of establishing a benchmark for Benton County staff and citizens to use to determine potential future needs, the commonly

accepted NRPA standards were compared to the current situation.

NRPA STANDARD Acres/1000 Population	EXISTING ACREAGE (2002)	RECOMMENDED ACREAGE (2002)	DEVIATION FROM STANDARD (2002)	PROJECTED FUTURE NEEDS (2020)
20	37 Developed 318 Undeveloped	685	-330	940

According to the national standards, the county is well-below target. This technical information supports and validates the citizens' interest to acquire more property for parkland and to develop key properties per the priorities identified in previous sections of this plan.

Further, for future planning and implementation purposes, a chart has been developed to outline the classification of county parks that could support the mission of the Benton County Park Department and meet citizen and consultant recommendations. Please refer to Appendix to see the Classification of Parks that Support Plan Implementation.

In addition, specific goals and strategies have been developed to support the successful implementation of this plan.

Goal No. 1

Preserve or restore the county's natural resources and unique features by acquiring significant properties and integrating the long-term protection or restoration of these resources in park management programs.

Strategies:

- Safeguard existing ecosystems in current county parks and minimize the cumulative effects of recreational use in areas desirable for resource protection.
- Cooperate with, and seek technical assistance from, natural resource management agencies
- Develop policy directives on protecting natural resources and unique features

- Promote advance acquisition of parkland to protect significant properties that would otherwise be lost to development
- Use native plant material to restore disturbed natural areas
- Identify and protect historic and culturally significant sites

Goal No. 2

Provide diverse recreational opportunities for people of all ages, abilities and income.

Strategies

- Develop recreational areas that will incorporate strategies to minimize conflicts between users
- Preserve public swimming and boating access to the county's lakes
- Provide fishing piers to increase the opportunity to participate in this activity
- Develop a network of designated cycling routes on existing roadways
- Develop multi-use trails to accommodate motorized and non-motorized use
- Develop canoe access points and destination water trails on the county's major rivers
- Provide universally accessible park facilities and programs suitable for a variety of physical abilities and age groups
- Develop maps / brochures indicating the location and services of the county park program

Goal No. 3

Promote opportunities for environmental education

Strategies

- Place interpretive signs on trails and in strategic park locations
- Develop facilities which support environmental education opportunities and naturalist programs

Goal No. 4

Promote cost-effective methods of park development and management

Strategies

- Maximize revenue opportunities

- Consider acting as a partner with other governmental agencies
- Consider purchasing services from private sources
- Use other public and private funding sources to support the acquisition, development and maintenance of the Benton County park program.
- Establish a Benton County Park Foundation

Goal No. 5

Encourage citizen involvement in park management activities.

Strategies

- Involve the community in a wide variety of stewardship programs
- Promote volunteer opportunities
- Support the establishment of a "Friends of the Park" organization

Natural Resources and Open Space

The section below briefly summarizes strategies for implementing top recommendations made by committees, the public, and consultant for the protection of natural areas. It includes topics such as amount and sources funding, potential processes, and time frames.

Rum River Falls Area – Granite Ledge Township

The falls area of Granite Ledge Township was consistently mentioned by committee members and citizens alike as a top priority for protection. Conversely, concerns were also raised by a number of property owners in the area over types of facilities and activities that might be considered for a park in this area. As such, it is highly recommended that any efforts to purchase property for a County Park in this area include a public input component, such as a series of town meetings. This will help to gather additional information about the concerns and interests of local citizens and guide future plans if a property is purchased.

The purchase of a property in this vicinity is a good candidate for a MN DNR Scenic and Natural Areas grant. If purchase of the falls area is not possible, protection of the property through tools such as a conservation easement should be presented to the landowner(s) for their consideration.

Since this park might be considered for trails, parking area, foot bridges, and interpretive signs, it would be recommendable to include a Park Master Planning process after purchase, if that occurs. This Master Planning process would allow for more detailed facilities planning, and better cost estimating for ongoing infrastructure and natural communities maintenance.

Activity	Estimated Cost*
Public Planning Process (staff/material cost)	$ 10,000
Land purchase (80 acres)	200,000
Park Master Plan (consultant)	15,000
	$225,000

Thielen Prairie and Surrounding Landscape

This complex of mesic prairie and savanna-like pastures is a good candidate for some type of protection, particularly since mesic prairie - anywhere in Minnesota - is now rare, Additionally, the prairie hosts a population of the State-Endangered Tubercled-rein orchid. Protection of the rare plant population and mesic prairie may be possible without purchase by working with the landowner and conservation partners to establish a long-term management strategy.

This may include something as simple as developing a management plan or more permanent protection such as a conservation easement. As well, if the landowner is interested in selling the property, it represents a great chance to partner with the MN DNR Scientific and Natural Areas Program and others to protect this rare landscape.

Activity	Estimated Cost*
Planning Process (Staff and Consultant)	$ 7,500
Land purchase (~ 80 acres)	160,000
Initial restoration/infrastructure investment	20,000
	$187,500
Ongoing restoration/maintenance	$ 1,500/year

Protection of other Natural Areas

There are a number of other regions in the county where natural areas occur that were recommended for protection. These recommended areas did not include mention of specific properties. Depending on the type of approach used for protecting natural areas in these general regions of the county, the costs for park planning, mode of protection, and long-term maintenance may vary widely.

For this reason, we recommend an adaptive approach that begins by engaging the landowner in a conversation to learn their interest in long-term protection of their land. Depending on landowner interest, a number of partners may be involved in assisting with land protection strategies, including the MN DNR Division of Wildlife, MN DNR Division of Fisheries, MN DNR Scientific and Natural Areas Program, Benton County SWCD. Non-governmental Organizations such as the Minnesota Land Trust, Pheasants Forever, McKnight Foundation, The Nature Conservancy and others may also be important to include, based on the particular interests of a landowner.

Some potential tools for natural areas protection that do not involve the outright purchase of land include:

- Conservation easements
- Land retirement programs
- Property tax relief programs
- Restoration cost share programs
- Registry programs
- Deed restrictions
- Leases
- Management agreements

These land protection options can result in a cost savings of 25-80% compared to outright purchase. A complete description of these and other tools is too lengthy to include in this report, but can be found in the publication "Land Protection Options: A Handbook for Minnesota Landowners" published by The Nature Conservancy, MN DNR, The Trust for Public Land, and The Minnesota Land Trust.

Additional opportunities for the protection of natural areas may be realized outside of the information gathering

Existing and Future Parks and Facilities

The section below briefly summarizes strategies for implementing top recommendations made by committees, the public, and consultant for future parks. It includes topics such as amount and sources funding, potential processes, and time frames.

Benton Beach Park

Benton Beach Park is a much loved park in Benton County and was placed high on the priority list for redevelopment and revitalization. Because of this priority not only from citizens of Benton County but Bonestroo staff we recommend that County proceed to the next level, the development of a Master Plan for Benton Beach.

The opportunities include water and its related recreational facilities and activities, environmental restoration, bank stabilization, interpretive signage, infrastructure improvements and updated play areas. The Master Plan must meet the needs and concerns of the citizens and County from a safety and operations standpoint.

Key issues for Benton Beach Redevelopment include:

- Current recreational needs to be identified. Evaluation of the existing facilities and how they meet those needs.
- The new site amenities and their location must be carefully integrated into the park design
- Adding aquatic amenities such as splash pads or in-water play features could transform the beach into an area more attractive to families.
- The area's demographics make the challenge for design to create a draw for all ages.
- Safety is always important in a public park.
- Priority phasing would look at facilities to be developed in the short and long term.
- Short and long-range facility management looks at the quality of equipment installed as well as maintenance costs for inclusion into the County's capital improvement plan.
- Carefully define the costs for developing the proposed facility.

The tasks for the Master Plan would be as follows:

- Site Inventory
- Site Analysis
- Design Alternatives
- Final Master Plan

These tasks include a public facilitation, presentations, cost estimates, recommendations for implementation and phasing.

The Estimated Cost for Park Master Plan is $15,000 - $20,000.

The table below is a start of the estimated construction costs based on the following elements and gives the County a starting point for including costs for their capital improvements.

Site Name	Proposed Facility Development	Development Cost
Benton Beach Park	Entry Feature	$15,000
	Interpretive Markers	$20,000
	Splash Pad	$75,000
	Restroom Upgrade	$100,000
	Trail	$200,000
	Playground	$100,000
	Basketball Court	$15,000
	Pavillion –2	$50,000
	Pedestrian Bridge	$75,000
	General Development *	$200,000
	Total	$850,000

* General Development includes such activities and facilities such as grading, landscaping, picnic tables and benches.

Zuleger Creek Watershed Study

Zuleger Creek enters Benton Beach Park from the north and drains a watershed of 18.5 square miles. The drainage area is extensively drained and tiled accounting for wide fluctuations in water level in the creek especially during storm events. The "flashy" nature of this stream causes problems within the park during snow melt and storm events by contributing to flooding in the park proper. A regional watershed survey should be conducted to assess the potential of the creek to contribute to flooding in the park during storm events of various intensities.

The consultant recommends a characterization of the Zuleger Creek watershed be done to establish the following:

- Historic wetlands that have been drained

- Potential ponding areas where stormwater could be stored during
  storm events
- Identify bridge crossings that could be analyzed for stormwater storage
- Computer modeling of the watershed to determine water levels during various storm events
- Development of maps that serve as the basis for on-going improvements in the watershed

An analysis of the Zuleger Creek watershed for managing flood water will lead to the development of a management plan for the watershed to prevent or reduce flooding in Benton Beach Park.

The major tasks of such an analysis would be as follows:

- Identification of historic wetland areas
- Hydrologic analysis of the watershed to determine pooling and ponding during various storm events (computer modeling)
- Creation of a GIS layer showing potential storage areas to be developed throughout the watershed to reduce flooding in the park

Estimated Cost is $4,200 to $6,800. Estimate based on preliminary project understanding.

The Graves Farm

The Graves Farm, the County's newest acquisition, is 289 acres of land waiting to be developed into park facilities for the citizens of Benton County. The proposed Graves Park has many possibilities that could include habitat restoration to the original Anoka sand plain, historic preservation, maintain the existing natural areas, provide pedestrian trails with interpretive markers, and scenic overlooks.

A Master Plan should be developed as the next step for the Graves Farm. As part of the master plan process a natural resource inventory of the property should be completed to help guide placement of facilities and management of existing natural communities and areas for ecological restoration. The Master Plan would allow for the overall design of the plan, look at preliminary costs, implementation and phasing.

The tasks for the Master Plan would be as follows:

- Site Inventory
- Site Analysis
- Design Alternatives
- Final Master Plan

These tasks include a public facilitation, presentations, cost estimates, recommendations for implementation and phasing. This Master Plan process would include interaction between agencies necessary to approve the plan for park development as well as the natural resource inventory and management plan.

The Estimated Cost for Park Master Plan is $30,000 - $35,000.

Trails and Connectors

The next step for each of the recommended trail projects is to complete a conceptual study of each corridor specifically identifying the preferred and alternate alignments and assessing feasibility for acquisition and construction, and associated costs. This will enable the County to pursue a plan for acquisition of segments as they become available and identify funding sources, such as Federal Aid Funding under the Enhancements Program or National Park Service funding, for future development of trails in each of the corridors.

To begin developing trails along County and township roads within the County, the trails plan should be compared with the existing County and township roadway capital improvement plans, and opportunities should be identified. Programming and financing agreements will also need to be established between different County departments or between the County and various townships.

Trail Funding

There are several funding alternatives available to Benton County for improvements to parks, trails and natural areas. Below is a list of funding sources that can be utilized for various types of improvements. Please also refer to the Grant Sources listed in the Appendix .

- Federal Aid funding
- State DNR Grants (See Appendix)
- Legislative Commission on Minnesota Resources
- County funding

- City funding

Each of these funding sources has a unique set of requirements and criteria that must be met to receive funding; in some cases this includes successfully competing for limited funding. There are also rules that govern how the money can be used. Below is a more detailed description of the funding sources, how to receive the funds and how the funds can be used.

Federal Aid Funding

States receive federal funding for highways through the Surface Transportation Program of the Federal Highway Trust Fund. Federal Highway Trust Fund revenue is generated from the federal gas tax, taxes on truck sales, use and tires, and from the General Trust Fund. Currently each state receives a minimum amount of federal aid equal to 90 percent of the amount it contributes in taxes.

The Federal Aid or TEA-21 funds are administered through the Minnesota Department of Transportation (Mn/DOT). The federal funding usually covers 80 percent of a project's construction costs. The other 20 percent must come from other funding sources. These sources could include other funds listed within this plan. The federal categories and an explanation is provided below:

Surface Transportation Program (STP)

STP funding is available for roadway construction and reconstruction, capacity projects, safety projects, bikeway or walkway components of projects, transit projects, park and ride facilities and traffic management projects.

Under the STP, projects can be submitted in one of three categories:

- Non-freeway, principal arterial highways
- Projects on the "A: Minor Arterial Highway System" as defined by the Transportation Advisory Board (TAB); and
- Bike and walk projects

A bikeway project must be a major bicycle transportation facility designed pursuant to an overall plan for the transportation use of bicycles, or other vehicles propelled by human power. A walkway project must be a pedestrian transportation facility

designed pursuant to an overall plan and designated for the use of pedestrians.

Congestion Mitigation and Air Quality Improvement Program (CMAQ)

CMAQ provides flexible funding to state and local governments for transportation projects and programs to help meet the requirements on the Clean Air Act of 1990. In general, eligible projects provide some type of reduction in toxic emissions. These include alternative fuel vehicle purchases, traffic flow improvements, transit projects, rideshare activities and telecommuting. CMAQ funding can be used in various fashions to defer the costs of implementing these strategies.

Transportation Enhancement Program (TE)

Transportation Enhancements are transportation-related activities designed to strengthen the cultural, aesthetic and environmental aspects of the nation's intermodal transportation system. The types of projects that are eligible for funding under this category include bicycle and pedestrian facilities, scenic beautification, historic preservation, environmental mitigation and transportation museums. Transportation enhancement funding is the largest potential funding source for trail projects throughout the County.

County Funding

Benton County funding is provided to maintain and construct the county road system. These funds are used for roadways not on the CSAH system and some improvements made to County State Aid Highways. Trails added along county roads during construction or reconstruction can be funded through this source.

City Funding

Each city within the County allocates funding to maintain and construct its roadways. This funding provides the County with its yearly allocation for roadway maintenance and construction.

Additional Project Funding

Friends of the Parks/Benton County Parks Foundation

Benton County could establish a legally separate foundation or a "Friends of the Parks" organization that would be eligible to receive donations as a trust entity. The foundation could accept general donations on an ongoing basis, or receive endowments for specific park features that were designated in the County's master plan in exchange for naming privileges. The County could then also apply to the foundation for money for projects as needs arose.

Grants

Grants are available to help defray the costs of building or rejuvenating parks and open space. We strongly encourage you to contact some of the resources we have provided below to get further information or to check on the submittal process.

DNR

The Department of Natural Resources has an entire book on funding called the DNR Financial Assistance Directory. To obtain a copy, call, write or email:

Emmett Mullin
Office of Department Y& Budget Services
DNR
500 Lafayette Road, Box 10
St. Paul, MN 55155-4010
Phone: 651-297-4831
Email: Emmett.mullin@dnr.state.mn.us

LGEAN

The Local Government Environmental Assistance Network has a website that has a section devoted entirely to funding. Go to:

http://www.lgean.org/financing.cfm

At the end of that Funding Section there is also a "Funding Archive" link. Check that out, too.

LCMR

The Legislative Commission on Minnesota Resources provides grants in four issue areas, including Recreational and Natural Systems. To get information on this program, write, call, email or go to:

LCMR
100 Constitution Avenue
Room 65, State Office Building
St. Paul, MN 55155
651-296-2406

http://www.lcmr.leg.mn

Email: mlcmr@commissions.leg.state.mn.us

Please also refer to the Grant Sources listed in the Appendix.

Capital Improvement Planning (CIP)

The County implementation and acquisition will be successful if the County can allocate money each year through its CIP. We recommend annually devoting $25,000 for acquisition and $25,000 for implementation efforts for a period of 10 – 20 years to develop Benton County's parks and trails.

APPENDIX 4.8.3.3-1 Stearns County Parks, Open Space, and Recreation Plan

Chapter 5. Parks, Open Space and Recreation Plan

Introduction

The Parks, Open Space and Recreation Plan provides a blueprint for Stearns County to follow in meeting regional needs for recreation and open space and working to preserve significant natural resources. The County's role in park and recreation planning is regional – it works to meet needs and provide facilities that are broader than those of an individual city or township. The County also plays a key role in coordinating among federal and state agencies and programs, municipal governments and semi-private or nonprofit organizations such as watershed and lake associations. This plan addresses both County park and recreational facilities and the County's role within the region. It draws upon and updates prior recreation plans. The chapter includes the following sections:

- Background: The Stearns County Park and Recreation System
  - The County Park Commission
  - Previous Park and Recreation Plans
  - Park Classification System
  - Service Areas
  - Recent System Additions
  - Federal and State Open Space Programs and Facilities
  - Public Opinion Survey
  - Park Dedication Requirements
- Issues and Challenges
- Goals and Objectives
- Policies and Action Items

Background: The Stearns County Park and Recreation System

The County Park Commission

The Stearns County Park Commission was created by the County Board on October 20, 1970. Its responsibilities are described as follows:

- To study and determine the park, recreation and open space needs of the County and make recommendations to the Planning Commission and the County Board of Commissioners. Recommendations include "general and specific development standards and criteria for evaluating potential sites, the extent and objectives of county participation in outdoor recreation and a program for coordination with other groups or agencies, all in conjunction with the Stearns County Comprehensive Plan."

- To submit an annual work program and cost estimate to the Planning Commission and the Stearns County Board of Commissioners by July 1 of each year.

The Park Commission's mission statement is as follows: ***To provide natural resource-oriented parks and outdoor recreation opportunities, that enhance the quality of life of Stearns County residents through physical fitness, community building and economic vitality.***

Previous Parks and Recreation Plans

Stearns County's first recreation plan was developed in 1970, and was comprehensively updated in the mid-1980s. The 1970 plan established park acreage needs for local, county and state levels of government:

- State: 45 acres per 1,000 population
- County: 20 acres per 1,000
- Local (City/Township): 10 acres per 1,000

The expectation was that each level of government would provide the specified acreage for their population.

Beginning in 1985, County parks and planning staff conducted background research into growth trends and issues in the County and state. Their findings included the following:

- The greatest deficiency in the outdoor recreation system is in natural resource-oriented parks, and this should be considered the County's primary goal.
- Trends in outdoor recreation are toward preservation of natural resources, environmental education, and linear recreation facilities.
- The park acreage standards of the 1970 plan should be retained.

The *Stearns County Recreation Plan* was adopted by the County Commissioners in 1989 as the recreation component of the Stearns County Comprehensive Plan. This plan was largely incorporated into the 1998 Comprehensive Plan, with minor additions. The plan inventoried the County's recreational resources, established a parks classification system, and detailed existing plans to maintain and expand recreational amenities available to County residents and visitors.

Parks Classification System

The 1989 Recreation Plan categorizes local and county recreation facilities as follows:

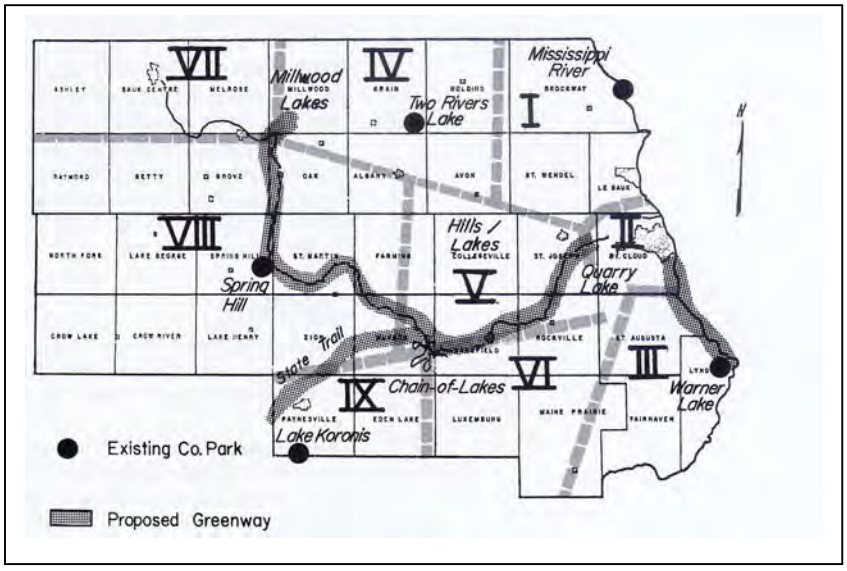
Table 5.1. Parks Classification System

Component	Use	Service Area	Size	Attributes/Location
Local or County				
Linear Park	One or more modes of recreational travel	--	Sufficient width to provide maximum resource protection and use; adequate length for use.	
Special Features	Area for specialized or single-purpose activities – i.e., golf course, nature center, arboretum, historic site, etc.	--	As needed for specific purpose	Appropriate to purpose
Conservancy Land	Area of natural quality, preserved for environmental or aesthetic benefits; to avert negative consequences of develoment	Community	Variable	Significant resources which merit preservation
Open Space	Area preserved as natural buffer within urbanizing environment	Community	Variable	Where resource provides relief from contiguous urbanization'
Local Facilities				
Mini-Park	Specialized facilities that serve a concentrated or limited population or specific groups; most typically playground facilities	Less than ¼ mile	Less than 1 acre	
Neighborhood Park	Area for intense recreational activities such as field or court ames, neighborhood centers, etc.	¼ -- ½ mile radius to serve a population of 4,000 – 5,000	10 – 25 acres	Suitable for intense development; proximity to elementary schools
Community Playfield	Area for intense recreational activities such as athletic fields, swimming pools, etc.	3 – 5 neighborhoods	25 – 50 acres	Suitable for intense development;; proximity to secondary schools and other faciltiies
Community Park	Area of natural or ornamental quality for low-impact outdoor recreation; could include field or court areas	3 – 5 neighborhoods	25 – 50 acres	Natural features with varied physiographic interest; proximity to community facilities

County Facilities				
County Park	Area of natural or scenic quality for nature-oriented outdoor recreation	3-5 communities or 10-mile radius	100 – 500 acres	Complete natural setting, preferably contiguous to water resources
County Park Reserve	Area of natural or scenic quality for nature-oriented outdoor recreation, including significant wildlife habitat and trail access	Countywide	1,000+ acres	Diversity of natural resources

Park Service Areas

The 1989 Recreation Plan identified a ten-mile primary service area for each of the larger parks, resulting in nine service areas.



When county facilities serving each of these service areas were compared to the 1980 population of each area, it was determined that most parts of the county lacked enough park acreage to meet their needs, based on a standard of 20 acres per 1,000 population. The metropolitan area (Area II) and the central and northwest parts of the county (Areas IV, V, VI and VII) were particularly lacking in park acreage.

Recent Park Additions and Expansions, 1989 – 2007

Since the 1989 Parks Plan, the county system has expanded with the following acquisitions:

- **Quarry Park:** Quarry Park, a former granite quarry in Waite Park, has been acquired and developed for multiple uses,

including rock climbing, scuba diving, swimming, nature trails, picnic areas, ski, snowshoe, hiking trails, bike paths, group camping and environmental education. After 1998 the park was expanded by 400 acres to its present size of 643 acres. The park is now home to the Parks Department headquarters.

- **Lake Wobegon Trail:** This 54-mile portion of the 62-mile trail, located on a former Burlington Northern rail corridor and 13 miles of the former Soo Line corridor, currently extends from the City of St. Joseph to the City of Sauk Centre. Eight miles of the trail is within Todd County. The trail also extends from Albany through Holdingford to the Morrison County line where it links to the Soo Line Trail. It is used for non-motorized recreation, and for limited snowmobile use in winter. The trail was a cooperative effort using federal, state, Stearns County and foundation funds and private contributions, with the first segment opening in 1998.
- **Rockville County Park:** This 283-acre parcel was purchased by Stearns County, working with the City of Rockville, in January 2007. Planned facilities include group picnic areas, hiking and equestrian trails, river and fishing access and canoe campsites. Improvements will include preservation of natural areas, reforestation and prairie restoration.
- **Soo Line Corridor:** This 39-mile /485 acre abandoned rail corridor extending from the Morrison County line to Brooten was acquired by Stearns County in 1999. Thirteen miles were developed as an extension of the Lake Wobegon Trail; the remaining 26 miles is currently undeveloped.
- **Beaver Island Trail:** 1.5 miles of former rail corridor was purchased in Lynden Township.

The current park system is summarized in Table 5.2 and shown in Figure 5.1. All County parks can be classified into three of the categories described in Table 5.1: "County Parks" are large multi-use sites, "Special Features" are largely water access facilities without significant upland area or trails, and "Open Space" includes protected but currently undeveloped parkland. Trails constitute a separate "Linear Park" category.

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INSERT FIGURE 5.1, EXISTING PARKS AND TRAILS

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Table 5.2. Park Inventory	Acres	Address/Location	Facilities	Recommended Park Classification	Comment
Quarry Park and Nature Preserve	643	1802 County Road 137, Waite Park	Rock climbing, scuba diving, swimming, nature trails, picnic areas, ski, snowshoe, hiking trails, bike paths, environmental education, group camp	County Park	
Warner Lake County Park	241	1485 County Road 143, Clearwater	Boat access, fishing, group camp, nature trail, picnic area, picnic shelter, play area, prairie, swimming beach	County Park	
Mississippi River County Park	209	41300 County Road 1, Rice	Boat access, fishing, picnic area, nature trail, picnic shelter, play area, prairie, ski trail, disc golf course, group camp	County Park	
Spring Hill County Park	82	31938 County Road 14, Melrose	Canoe access, canoe campground, fishing, picnic area, picnic shelter, play area, prairie, river wayside, snowmobile trail	County Park	
Lake Koronis Regional Park	62	14076 Bluefield Road, Paynesville	Boat access, fishing, nature trail, picnic area, picnic shelter, play area, swimming beach, trailer campground	County Park (inter-county)	Meeker County responsible for management; Stearns contributes financially
Two Rivers Lake Park site	56	N/a	Undeveloped	Open space	Plans for improvements, including fishing pier
Oak Township Park site (New Munich River Wayside)	32	N/A	Open space, canoe access, picnic area	Open space	
Upper Spunk Lake County Park	7	17626 County Road 9, Avon	Fishing, picnic area	Special Feature	
Fairhaven Mill Park	5	5001 Birchdale Road, South Haven	Boat access, fishing, historic site, picnic area	Special Feature	Owned by Wright County and located largely in Stearns; managed jointly with Wright County; costs shared 50/50.
Lake Sylvia Wayside	3	32574 County Road 17, Melrose	Boat access, fishing, picnic area	Special Feature	
St. Martin Canoe Access	1	27427 Sauk Landing Road, Paynesville	Canoe access	Special Feature	
Heims Mill Canoe Access	0.7	32324 County Road 1, St. Cloud	Fishing, canoe access	Special Feature	
Miller Landing	6	7502 County Road 138, St. Cloud	Canoe access, picnic area	Special Feature	May be relocated and expanded as part of new County Service Center plans.

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Federal and State Programs and Facilities

Stearns County works closely with other government agencies on protection of natural and recreational resources. Other types of protected open space (shown in Figure 5.1) within the County include:

- **Wildlife Management Areas** are managed by the Minnesota DNR for wildlife production, public hunting and trapping. Stearns County contains 14 WMAs totaling over 5,200 acres. Many are located in wetlands, where they also help protect water quality.
- **Waterfowl Production Areas** are managed by the U.S. Fish and Wildlife Service to maintain breeding habitat for waterfowl and other wildlife. There are 39 WPAs totaling 9,133 acres within Stearns County. Another 1,051 acres of wetlands are protected by 50 easement agreements with the Fish and Wildlife Service.
- **Scientific and Natural Areas** (SNAs) are managed by the Minnesota DNR to "preserve and perpetuate the ecological diversity of Minnesota's natural heritage, including landforms, fossil remains, plant and animal communities, rare and endangered species, or other biotic features and geological formations, for scientific study and public edification as components of a healthy environment." (MN DNR web site) There are currently 7 SNAs in Stearns County, totaling 1,058 acres:
    - Cold Spring Heron Colony, Wakefield Township, 62 acres
    - Partch Woods, St. Wendel Township, 120 acres
    - Quarry Park (southern section of this County park), City of Waite Park, 323 acres
    - Roscoe Prairie, Zion Township, 53 acres
    - St. Wendel Tamarack Bog and Fen – 700 acres of tax-forfeit land have been released by County Board; additional acquisitions in process
    - Avon Hills Hardwood Forest – 250 acres were recently acquired in Avon Township (north unit) and 102 acres in Collegeville Township (south unit)
    - Sedan Brook Mesic Prairie – North Fork Township near Brooten
- **State Trails:** Stearns County has worked with neighboring counties and the DNR to obtain bonding funds for construction of the Glacial Lakes State Trail from Richmond

to Paynesville (16 miles). The portion south of Paynevsille is currently funded for development; it extends south through Kandiyohi County to Willmar.

Public Opinion Survey

The public opinion poll conducted by Decision Resources in 2006 for Stearns County showed the following findings regarding parks and recreation:

- Walking and biking trails continued to be the top most requested outdoor recreational facility, with 14% of respondents; swimming pools were the second choice (12%)
- The most heavily used Stearns County Park facility used by residents was the Lake Wobegon Trail, with 30% of respondents using the trail.
- The poll indicated that 83% of the respondents felt that the facilities available in county parks satisfied their household needs.
- Sixty-eight percent of respondents felt Stearns County Parks was fulfilling its mission.

The survey indicated the public's interest in further park and trail development:

- The Soo Line corridor was favored for trail use (hiking and biking) with 37% of respondents.
- 54% would support a tax increase for hiking/biking trails on the corridor.
- 68% opposed a tax increase for ATV use on the corridor.
- 54% would support a tax increase to extend the Lake Wobegon Trail to the Mississippi River.
- The typical level of additional taxes that residents would support for park and trail purchase and development is $13/year per household.

Park Dedication Requirements

Following new state statutory requirements, Stearns County adopted Ordinance 334, instituting a parkland dedication fee as part of the County subdivision process. The ordinance establishes a fee of $1,000 for subdivisions of 3 or more lots, or up to 10% of the undeveloped tract's value, whichever is less. (Plats of 1-2 lots are charged a maximum fee of $250 per lot). Seventy-five percent of the funds collected must be spent in Township of origin, unless there is an agreement otherwise, and may be used only for capital improvements. No agreements are currently in place.

Issues and Challenges

The following issues have been drawn from discussion of current planning initiatives with Park staff and Citizens Advisory Committee members, a number of whom are also members of the Park Commission.

Park Acquisition Planning. Opportunities for parkland acquisition can occur at any time, in a variety of locations, and funds are not always available for land acquisition at such times, making it difficult to plan for systematic expansion of the system.

Regional Park Planning and Funding. Although the Central Minnesota Regional Parks and Trails Coordinating Board was established by the State Legislature in 1999, state funds have not been allocated to this regional agency.

Local and Regional Priorities. The County receives a wide range of requests from local governments for assistance in pursuing park and trail projects, but it is difficult to prioritize these without a more detailed regional parks plan.

Park Dedication Requirements. The absence of cooperative agreements between the County and local units of government means that park dedication fees cannot yet be used for projects that benefit more than one jurisdiction.

Goals and Objectives

Goal 1. Provide park and open space areas throughout the County to meet the active and passive recreational needs of current and future residents and to protect significant natural resources and scenic features.

Objective 1. Adopt a park acreage standard of 25 acres of parkland per 1,000 population, consistent with standards used in the Twin Cities Metro area.

Objective 2. Continue to acquire County park sites and expand existing sites in areas of high growth or demonstrated demand.

Objective 3. Partner with cities, townships, adjoining counties and state agencies to broaden the potential pool for park acquisition and improvement. (The recent acquisition of the Rockville County Park is an example of such a partnership.)

Goal 2. Provide a regional trail system, in collaboration with other government agencies and interest groups, in order to support a variety of recreational activities, offer alternative transportation modes, and support tourism and economic development.

Objective 1. Emphasize County trail systems as a resource which the County is in a unique position to provide. Consider natural and/or man-made linear resources such as roads, streams, utility corridors, rights-of-way and drainage ways as opportunities for trail development.

Objective 2. Ensure that County trail systems serve a larger, regional purpose by providing connections to regional and state trails in adjacent counties.

Objective 3. Look for opportunities to connect County trails to city parks and neighborhoods and community facilities such as schools, libraries and commercial/service centers.

Objective 4. Continue to improve and expand specialized trail systems, including the 600-mile snowmobile trail system. Seek to expand the ski touring trail system in County parks and other open space lands.

Objective 5. Integrate water-based routes into the County park and trail system, through designation and improvement of canoe and boating routes and improvement of boat-in campgrounds and access points.

Goal 3. Continue to work with state and federal agencies, local governments and conservation interests to expand or improve regional and County parks and trails, and to protect significant natural resources that may not be suitable for active recreational use or public access, but which are important for scientific or other public purposes.

Objective 1. Pursue the acquisition and/or expansion of priority Scientific and Natural Areas.

Objective 2. Work with the Minnesota Department of Transportation to encourage creation of separated bicycle paths and other facilities as part of road construction or improvement projects.

Goal 4. Coordinate with all Stearns County departments to ensure that all County policies for protection of significant natural areas and for park and trail improvements are consistent with the goals and objectives of this Plan.

Policies and Action Items

1. Update the 1989 Recreation Plan to address the County's existing facilities, current user needs, priorities and opportunities. The 1989 plan established a framework for the growth of the park system by establishing service districts and identifying specific park improvements. While this chapter of the Comprehensive Plan presents a broad picture of the current system, a more detailed update is needed to justify capital improvements and coordinate with other jurisdictions. An updated Park, Recreation and Trails Plan would include more detailed treatment of many of the policies and action items listed in this chapter:

- Updated parks acreage standards and park service districts
- Acquisition of new regional parks in underserved areas
- Expansion of existing County parks
- Expansion of the regional trail system
- Assistance with local trail planning efforts
- Coordination with Federal and State open space protection and recreation programs
- Coordination with other County departments and County policies, such as transportation
- Coordination with townships regarding parkland dedication and acquisition fees
- Coordination with cities on park and open space protection efforts

2. Adopt a new standard for parks acreage. The County park and trails system has grown in size from 527 acres in 1985 to 1,986 acres in 2006. The standard for County park acreage used in the 1989 and 1998 plans was twenty acres per 1,000 residents. The current Metropolitan Council standard for regional parkland is twenty-five acres of regional parkland per 1,000 residents, based on more current research.[1.] This standard should be adopted as the standard for both Stearns County and the St. Cloud Area, since the County system is essentially the regional system, and competes with other regional systems such as those in the Metro area, for funding. This would require approximately 2,450 additional acres of parkland by 2030, to serve the projected population of 177,370.

3. Protect sensitive natural areas through planning and zoning. High priority natural areas include sites identified in the County Biological Survey, with special protection to high priority sites,

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[1] . Cited in"A Regional Park System for Minnesota's New Urban Areas" (Legislative Commission on MN Resources) by George Orning, U of M Forestry. 2006.

abandoned granite quarries and granite outcrops. Methods for protection should include:

- Designations in the Land Use Plan that recognize the presence of sensitive natural resources, using designations such as overlays that apply across a variety of underlying land uses (see Chapter 3, Land Use Plan).
- Use of GIS data (for example, the County's Resource Suitability Model) when assessing sites for rezoning or development proposals.
- Use of zoning techniques such as overlay districts and performance standards to ensure that these resources are protected (see Chapter 10, Implementation).

4. Use the current parks classification system. Table 5.2 categorizes County parks according to the classification system shown in Table 5.1. Note that smaller water access sites without many upland facilities are classified as Special Feature sites.

5. Continue to pursue acquisition of new regional parks in underserved areas. As discussed in the background section of this chapter, large regional parks are not distributed across all of the previously defined park service areas evenly. In particular, the Central, North Central, Northwest and South Central service areas remain under-supplied with parkland, in spite of growing development pressure in many of these areas. High priority 'search' areas for future additions to the current County park system include the following, shown in Figure 5.2:

- **Millwood Township Lakes area**: This area was identified in both the 1970 and the 1989 Recreation Plans as needing a county park. Priorities include preservation of natural lake shoreland from development, and providing facilities for swimming, shoreline fishing, group picnicking, and possibly camping.
- **Sauk River Chain-of-Lakes area:** The Sauk River joins twelve lakes together, resulting in over 3,000 surface acres of water, surrounded by a variety of shoreline types ranging from rolling hills to granite outcrops. This area was identified in the 1989 Recreation Plan because of the high recreational use and relative lack of regional facilities on the Sauk River chain. A park could complement existing commercial recreation operations and protect natural shoreland from increasing pressure for subdivision and development. Facilities could include shoreline fishing, picnicking, and possibly primitive camping.

- **Hills and Lakes Area:** Some of the County's most scenic terrain and highest water-quality lakes are located in this area, also identified as the Avon Hills. A park in this area should include a swimming beach on a lake of adequate size to endure a dry weather cycle, as well as trails and other resource-based recreational facilities. The park would preserve rapidly diminishing natural shoreland from subdivision.
- **Swimming Beach** between St. Cloud & Kimball Prairie – This facility was identified in the 1989 Recreation Plan as a special feature for the South Central area, serving the population in St. Augusta (specifically the Luxemburg Townsite area) and Maine Prairie, since this area is located some distance from the proposed Sauk River Chain-of-Lakes park search area. Water quality is a particularly important factor in selecting a swimming beach.

Other large tracts of natural lands that may become available will also be considered for acquisition, based on their locations and resource quality.

6. Pursue expansion of existing County parks as appropriate. The following County parks have been identified for expansion in order to better serve park users and protect the integrity of existing resources and biological communities within each park:

- **Warner Lake Park:** Expand to the southeast to buffer the existing swimming beach and woodlands from potential development.
- **Mississippi River Park:** Expand to the north to capture scenic bluff view of the river.
- **Quarry Park and Nature Preserve:** Expand to the south to include open field for general park facility development.
- **Spring Hill Park:** Expand to the north and west to include additional river frontage and play area within the park.
- **Two Rivers Lake Park:** Expand to the north to include more lake frontage, protect ravine and create a trail connection to the Lake Wobegon Trail.
- **Rockville County Park:** expand upstream.

7. Continue to develop a regional trails system that links local trails, regional parks, and other activity centers, and that will foster economic development in trail communities. Stearns County will continue to collaborate with cities, townships, adjacent counties, the St. Cloud Area Planning Organization, and state agencies in developing local trail projects. Priority trail projects are

those that connect with existing or planned County parks and trails and those that expand the regional nature of the existing trail system.

Planned trails are shown in Figure 5.1. County and regional trail projects currently in the planning stages include:

The **Lake Wobegon Trail** is the primary regional trail in Stearns County, and is now connected to the Central Lakes State Trail through Todd, Douglas, Grant and Otter Tail counties, to the cities of Alexandria and Fergus Falls. The trail should be extended east to the Mississippi River in cooperation with the cities of Waite Park and St. Cloud.

- **Brooten/Albany (Soo Line) Rail Corridor:** This rail corridor is not proposed for regional trail use at present, but select segments should be developed for specific uses, including hiking, biking, horseback riding and snowmobile use. These segments will be identified through further study and discussion with cities and townships along the corridor.
- The **Glacial Lakes State Trail** is planned to ultimately extend about 40 miles from the City of Willmar in Kandiyohi County to Richmond. Segments south of Paynesville are complete or planned for construction in 2007. Stearns County will continue to encourage funding of trail development from south of Paynesville to the east side of Richmond.

In addition to these specific projects, all power line easements, drainage ditches and abandoned rail corridors provide linear opportunities for potential trail facilities. These land features should be considered as potential recreational or habitat corridors.

8. Support and assist in developing key Local Initiative Trails. These trails are being pursued primarily by individual cities or local government partnerships. The County will collaborate where feasible in developing trails that function as part of the regional system, including the following:

- **Beaver Island Trail:** This trail currently is being developed between St. Cloud and Warner Lake Park.
- **Koronis Trail:** This trail is being extended around Lake Koronis, and should include a connection to the Glacial Lakes State Trail
- **Rocori Trail:** This trail is proposed to extend from Richmond (connecting to the Glacial Lakes Trail) to Rockville, and ultimately could extend to Waite Park

- **River Country Trail:** Primarily in Wright County, this trail is proposed to extend from Warner Lake Park to Clearwater, connecting to the Beaver Island Trail.

Any potential trail route that expands the regional nature of the existing trail system will also be considered for County funding or technical assistance.

9. Continue to partner with Federal and State programs that protect open space, wildlife habitat, or enhance recreational resources. These programs include the following:

- **Scientific & Natural Area Program**: Stearns County will continue to work with the DNR to acquire and expand priority SNAs, including the St. Wendel Tamarack Bog and Fen, the Avon Hills "Big Woods" Hardwood Forest, a calcareous fen near Spring Hill and a tamarack bog in Fairhaven Township. These areas were identified as significant remnant natural communities in the 1999 Minnesota County Biological Survey.
- **Canoe & Boating Routes:** The Sauk River was designated as a canoe & boating route in 2006 by the State Legislature. Stearns County will work with the DNR to improve boat-in campgrounds and access points along the route.
- **Public Water Access program**: Stearns County will support new accesses, including a proposed site on East Lake in Richmond.
- **Winter Grant-in-Aid Trail Program**: The County will continue to sponsor the snowmobile trails and ski trails that are enrolled in this program.
- **Wildlife Management Areas (WMA)**: The County will continue to support the expansion and establishment of WMA's in the county.
- **Minnesota Department of Transportation Rail Abandonment Program**: The County will assist in securing any future abandoned railroad corridors for potential public recreation facilities. This should be coordinated with the Stearns County – City of St. Cloud Regional Rail Authority.
- **Waterfowl Production Areas (WPA):** The County supports the U.S. Fish and Wildlife's goal of 14,000 acres of Waterfowl Production Areas in the county.
- **Scenic Byways Program:** This state/federal program should be explored as a funding source for bicycle facilities along the Great River Road, a National Scenic Byway, and part of the National Mississippi River Trail.

10. Coordinate park and recreation policies with those of other Stearns County departments to ensure that policies, regulations and public improvements are consistent with the goals and policies of this plan. Actions include:

- Encourage the protection of non-SNA quality remnant natural areas, abandoned quarries, and granite outcrops which support unique plant species through County zoning and subdivision regulations.
- Continue to work with the County Highway Department to develop new county/regional trails.
- Work with the County Highway Department when new bridges are proposed over designated canoe routes, in order to identify potential canoe landing sites.
- Continue to implement the goals and routes defined in the 1996 Bikeway Plan.
- Incorporate separated bicycle paths within transportation routes being newly planned. Encourage new construction to include bicycle facilities (Pinecone Road and the proposed Southwest Arterial Alignment south of Quarry Park are examples).
- Encourage the continuation of blacktopping shoulders in the urban area to make "bicycle-friendly" facilities and communities.
- Accommodate grade-separated facilities for bicycles when bridges are reconstructed.

11. Coordinate with townships regarding parkland dedication and acquisition fees: Seek agreements with individual townships on the creation and expansion of regional and local parks through flexible use of the parkland dedication funds. Such agreements could allow funds to be spent either within defined service areas (to be determined in consultation with the townships and cities) or on County-wide park and trail capital improvements. This step would provide many more opportunities for County-township partnerships to improve local and regional parks and trails.

12. Coordinate with cities on park and open space protection efforts. Assist cities in the conservation of large tracts of forests and woodlands or natural lands. For example, work with Waite Park on the creation of a "Chain of Granite Lakes" outdoor recreation facility, as the granite quarries north of Quarry Park & Nature Preserve are abandoned and reclaimed.

Figure 5.2

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Table 5.3. Summary of Implementation Actions

Phasing Priority	Implementation Actions	Lead and Coordinating Agencies
Short-term	Update the 1989 Recreation Plan	**Park Department** Environmental Services Park Commission
Short-term	Adopt a new standard for parks acreage.	**Park Department**
On-going	Protect sensitive natural areas through planning and zoning.	**Environmental Services** Park Department
On-going	Continue to use current parks classification system	**Park Department** Park Commission
On-going	Continue to pursue acquisition of new regional parks in underserved areas.	**Park Department** County Board of Commissioners
On-going	Pursue expansion of existing County parks as appropriate.	**Park Department** County Board of Commissioners
On-going	Continue to develop a regional trails system	**Park Department** St. Cloud APO Cities and townships Other funding partners
Short to medium term	Assist in developing key Local Initiative Trails	**Park Department** Cities and townships Other funding partners
On-going	Continue to partner with Federal and State programs that protect open space, wildlife habitat, or enhance recreational resources.	**Park Department** **DNR** **Fish & Wildlife Service** Other agencies
On-going	Coordinate park and recreation policies with those of other Stearns County departments	**Park Department** **Environmental Services** **Public Works**
Short to medium term	Coordinate with townships regarding parkland dedication and acquisition fees	**Park Department** Township boards Park Commission
On-going	Coordinate with cities on park and open space protection efforts.	**Park Department** Cities Park Commission

APPENDIX 4.8.3.4-1 City of Sartell Comprehensive Plan

PARKS AND OPEN SPACES: HOW WE PLAY
Why This Matters For Sartell: Be Fun and Active

The Sartell area is blessed with an abundance of natural beauty and environmentally sensitive areas. The Mississippi and Watab Rivers flow through the middle of the city and serve as primary sources of natural beauty. The area also provides a home to a variety of plant and animal life and is a source of recreation and enjoyment for residents and visitors alike. As a result, Sartell is committed to preserving, enhancing and providing good stewardship of our parks. The purpose of this chapter is to provide a guiding plan for parks, open space, and natural resources management. Sartell's parks and open space play an important role in making the City a desirable place to live, work and play. Parks improve our physical and psychological health, enhance community life, provide outdoor experience and serve as an anchor for strong neighborhoods.

Sartell has over 27 parks of diverse sizes, amenities, and opportunities for recreation and a number of additional properties that add to the greenspace of Sartell. Residents relied heavily on non-City facilities for their recreation needs, such as the school district's facilities. Sartell has been focused on building additional trails and park systems. The results from this last decade of acquisition and building have been dramatic:

- Increase in open space and park acreage from 150 acres in 2003 to a current total 363 acres
- Construction of new parks: Pinecone Central
- Acquisition of land for future park sites and amenities, such as Pinecone Central Park and Sauk River Regional Park

Not only do residents love the existing parks, but they also have numerous ideas for what to do with them and how to make them better. Now that the City has succeeded in developing its extensive parks system, the City's focus is to keep the parks in excellent condition, make connections between them and the trail network, and enhance the parks with additional amenities (or rebuild aging structures).

Emerging Recreational Trends:

• Increased interest in trail-related activities (walking, biking, in-line skating) and demand for improved safety and security.

• Growing public interest in Environmental Stewardship and environmental sensitive lifestyles.

• More year-round facilities and a need for adequate fields for "non-traditional" sports such as lacrosse, rugby,

kickball, etc.
• Increasing attention to healthy lifestyles.

• Greater demand for adult recreational activities, especially as the baby boom generation continues to age.

• The growth of youth athletic associations.

PARK AND OPEN SPACE CLASSIFICATIONS

The National Recreation and Park Association (NRPA) and the American Academy of Park and Recreation Administration (AAPRA) have developed park and trail system standards-based guidelines to serve as spatial and functional guidelines for communities to use as they develop their park systems. The following is a list of proposed park classifications including Level of Service (LOS) most relevant to Sartell's needs. It is important to note that these standards are general guidelines.

Neighborhood Park

Description: Basic unit of the park system that serves as the recreational and social focus of the neighborhood. Typically developed to provide both active and passive recreation opportunities for residents of all age groups living in the surrounding neighborhoods.

Location Criteria: ¼ mile to ½ mile service area radius

Size Criteria: 2-10 acres (Sizes may be determined as needed to accommodate desired uses)

Site Selection Guidelines: Site should be easily accessible from surrounding neighborhood and should link to a community greenway or trail system. Site development should provide for both active and passive recreation opportunities. The landscape of the site should possess pre-development aesthetic value and not be a "left-over" outlot or located within a 100-year flood-plain or be greater than 25% wetland.

Development Guidelines: Park development should be a balance of 50% active space and 50% passive space for recreational uses on the site and typically not be programmed. Appropriate park elements would include: play equipment, court games, open "non-programmed" play field or open space, tennis courts, volleyball courts, shuffleboard courts, horseshoe pits, ice skating areas, wading pool, or splash pad. Other park facilities should include picnic areas, internal

trail system, and general open space for enjoying the “park scenery.” Neighborhood parks should provide at least 7 to 10 parking spaces, and limited lighting should be provided for facility illumination, security, and safety.

Example Park fitting this category: Wilds Park North

Community Park

Description: Larger in size and serves a broader purpose than the neighborhood park with the purpose of providing recreational opportunities for several neighborhoods or larger sections of the community. Typically developed to provide both active and passive recreation opportunities for larger groups while preserving unique landscapes and open spaces.

Location Criteria: Should serve two or more neighborhoods with a ½ mile to 3.0-mile service area radius

Size Criteria: 5-30 acres (Size may be determined as needed to accommodate desired uses)

Site Selection Guidelines: Site should be easily accessible from the entire service area, should be centrally located, and should have strong connection to other park areas. Site development should provide for both active and passive recreation opportunities. The landscape of the site should possess pre-development aesthetic value and not be a “left-over” outlot or located within a 100-year flood-plain. The site, when possible, should be located adjacent to natural resource areas and greenways. These areas tend to provide landscapes with greater biodiversity thus enhancing the passive recreational experience.

Development Guidelines: While the community park should be designed to accommodate both active and passive recreational opportunities, programming should remain, for the most part, limited. Appropriate active park elements would include: larger play areas with creative play equipment for a range of ages, court games, informal ball fields for youth play, tennis, volleyball and shuffleboard courts, horseshoe pits, ice skating, swimming pools and beaches, archery ranges, and disc golf. Parking lots should be provided to accommodate the use, and limited lighting should be provided for facility illumination, security, and safety development programs.

Example Park fitting this category: Val Smith Park

Regional and Special Use Park

Description: Covers a broad range of parks and recreational facilities oriented toward a single purpose use such as historical, cultural, or social sites. These sites may offer local historical, educational, or cultural, recreational opportunities. Examples of this type of park include historic downtowns, performing arts parks and facilities, arboretums, public gardens, indoor theaters, churches and public buildings. Other examples include community and senior centers, community theaters, hockey arenas, golf courses, aquatic parks, tennis centers, softball complexes, and sports stadiums. Community centers, however, are typically located in neighborhood or community parks.

Location Criteria: Location is primarily based on recreation need, community interest, facility type and availability of land. These type of parks should service the entire community rather than a defined neighborhood or area within a community.
The site should be easily accessible from major transportation routes and locations where possible.

Size Criteria: Facility space requirements should determine the size of the park.

Site Selection Guidelines: No specific site selection standard is recommended due to the diversity of use potential.

Development Guidelines: Due to the unique quality of this type of recreational facility, community input and focus groups should be used to determine the site development program.

Example Park fitting this category: Sauk River Regional Park

Greenways

Description: Link the park system components to create a “cohesive park, recreation, and open space system,” that emphasizes the natural environment. Greenways allow for safe, continuous pedestrian movement between parks throughout a community and can enhance property values.

Location Criteria: Location is primarily based on the availability of land. Typically greenways are linear in nature and follow natural corridors such as waterways. Greenways can also be of the built environment including abandoned railroad beds, areas within residential subdivisions, revitalized riverfronts, reclaimed industrial sites, safe powerline rights-of-way, pipeline easements, transportation rights-of-ways, etc. Boulevards and parkways can also be considered candidates as greenways if they provide a “park-like quality and provide off-street trail opportunities.”

Corridor Width Criteria: 25 feet within a subdivision, 50 feet minimum and 200 feet optimal

Site Selection Guidelines: Site selection is generally based on availability and the trail system plan. Natural corridors should be considered whenever possible, but appropriate “built” corridors are also acceptable with proper design.

Development Guidelines: Greenways provide the opportunity for some recreational travel opportunities such as hiking, walking, jogging, bicycling, and in-line skating. Parkway corridors also provide attractive travel experiences for the motorist and canoeing can occur in “green” waterway corridors.

Park Classification

Table 1 shows park classifications assigned to each of Sartell's parks generally based on use, location, and size. While some of the parks may be smaller in size than a typical standard suggests, their location and current amenities have taken precedence in the classification process.

Park	Classification	Size
Celebration	Community Park	1.75
Creekview Preserve	Neighborhood Park	1.87
Cypress Park	Mini Park	.72
Eastside Kiddie	Neighborhood Park	.55
Fox Run of Avalon Village	Mini Park	.71
Geoffrey	Neighborhood Park	.81
Huntington	Community Park	27.03
Lions	Community Park	7.33
Madison Crossing	Mini Park	.85
Meadowlake	Mini Park	.56
Morningstar	Neighborhood Park	.55
Natures Edge	Mini Park	.25
Northside	Community Park	37.28
Pine Tree Pond	Mini Park	.47
Pinecone Central	Regional Park	113
Pinecone Regional (Bernicks)	Regional Park	73
Rolling Meadows East	Neighborhood Park	1.32
Rolling Meadows West	Neighborhood Park	3.66
Rotary Riverside	Community Park	1.99
Sabre Oaks	Mini Park	.27
Sandstone	Neighborhood	3.33
Sartell Veterans	Community Park	1.84
Sauk River Regional	Regional Park	46
Val Smith	Community Park	16.04
Watab Creek	Community Park	11.88
Wilds Park North	Neighborhood Park	7.32
Wilds Park South	Neighborhood Park	2.40

Table 1

Future Park Needs

Sartell has 363 acres of dedicated park space (not counting greenspaces). Based on the National Park standard of providing 10 acres of park and open space land per 1,000 people and on having a population of 17,000 (170 acres), Sartell exceeds the guideline by 193 acres. It is important to note this is only a rule-of-thumb guideline. While Sartell's parkland acres within the system exceed national guidelines, the ratio alone does not imply that the community is being provided with an adequate range of park types or classifications and recreation facilities.

Table 2 shows park classification acreage ratio guidelines adapted from the National Standards that are most relevant to serving Sartell's needs. These ratios plan for providing an adequate distribution of park types within the system. These standards typically apply to those parks that offer active recreation opportunities. Standards do not apply for park and open space areas that are more specialized or that provide more passive recreational opportunities. These areas are typically more dependent on the location and size of the feature itself. The sizes shown in Table 2 are guidelines. The locations and amenities offered often take precedence in how parks are classified.

Table 2
Park Classification Guidelines

Community Park	5-30 Acres
Neighborhood Park	2-10 Acres
Mini-Park	<2 Acres
Regional and Special Use Park	No Standard
Greenways	No Standard
Natural Resource and Open Space Areas	No Standard

PARKS AND OPEN SPACE GOALS

GOAL 1: VALUE PASSIVE RECREATION

Passive recreation generally enhances the open-space aspect of a park by providing a minimal intensity of development for "unstructured" recreation opportunities, such as walking, picnics, and exercise. Active recreation, on the other hand, involves more intensive development for ball fields or aquatic centers, and typically includes programmed activities. Active recreation is a service provided by others. The Sartell/St. Stephen Community Education provides extensive sports programming, leagues, and recreation facilities at the various parks and other public spaces. By focusing on passive open

spaces, Sartell provides a unique opportunity to connect with nature, and its trail network provides connections to major amenities like a future downtown.

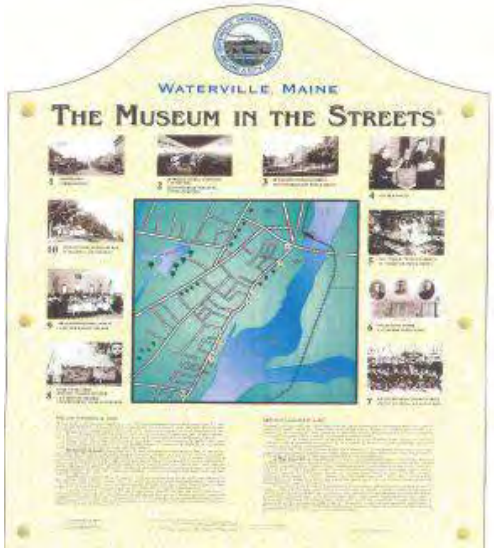
Potential Strategies May Include These And Other Future Cool Ideas:

1.1 Target Funding For Passive Open Spaces

When considering budget allocations for parks, prioritize improvements and development of passive recreation. Ensure all residents of Sartell are within a short walking distance of passive recreation opportunities.

1.2 Encourage Residents To Explore Passive Open Spaces With New Events

Organize trail events like a scavenger hunt, geocaching, history and public art walks to encourage more residents to discover the valuable open space resources available to them.



GOAL 2: PRIORITIZE EXISTING PARKS

Sartell has spent much of the last decade creating new parks to respond to the citizen-approved ½-cent sales tax. While more park spaces are planned, ensure that existing parks are maintained so that they remain attractive assets. New parks

increase the City's operating costs and responsibilities. As such, focus dollars toward enhancing existing parks before creating new ones.

Potential Strategies May Include These And Other Future Cool Ideas:

2.1 Add Amenities And Enhancements To The Parks

Residents noted that some of the trails and existing parks could use more amenities such as benches and other seating, trees and bike racks. Develop a priority list of cost-effective improvements to existing parks. Seek private sponsorship of amenities, such as an Adopt-a-Bench program that engages residents in the upkeep and improvement of these parks. Incorporate artistic, whimsical elements. Install Free Little Libraries in our parks, especially near playground equipment, pools and other areas which may appeal to families or individuals in an effort to bring books and magazines to the people.

2.2 Improve The Parks And Trails For Runners And Avid Walkers

Runners prefer softer surfaces that protect their knees and joints. Allocate space for an unpaved trail for runners separate from a bike trail. Connect and expand existing trail markings that indicate mileage and location. Include points of interest such as sidewalk art or information kiosks.

2.4 Expand Community Gardening

Community gardens are of keen interest to Sartell residents. Seek opportunities to create a range of community gardens, including fruit orchards, U-pick fields like strawberry and pumpkin patches, etc. With resident volunteers, these can be inexpensive, yet impressive, improvements to the parks.

2.5 Construction Of A Skate Park

GOAL 3: ENSURE THE PARKS & TRAILS ARE SAFE

To promote expanded use of the parks and at all times of the day, maintaining park safety is a critical goal for Sartell.

Potential Strategies May Include These And Other Future Cool Ideas:

3.1 Add Video Surveillance To Local Parks

Begin a program to cover major trails and entrances and promote these investments to residents.

3.2 Improve The Maintenance Of Parks And Trails
Ensure that park and trail maintenance concerns are addressed quickly. Create a Google map on the City's website and/or a smartphone app that allows residents to tag areas of the parks that require some level of maintenance or improvement.

GOAL 4: EXPAND THE PARK CONNECTIONS & TRAIL NETWORK

Improving existing parks and ensuring that they are safe is the current priority for Sartell. However, this does not mean we should not think ahead about ways to improve connectivity of the trail network. Sartell's trail system is extensive, but there are a few missing links. An effective trail network is one that is connected and fully integrated into the City's neighborhoods and regionally.

Potential Strategies May Include These And Other Future Cool Ideas:

4.1 Plan For New Trails
New trails should seek specifically to address the missing links in the system. This includes the Lake Francis plans that include new trail connections and amenities that appeal to the use of outdoor spaces such as a fishing pier, water activities, and an outdoor amphitheater.

As warranted, review trails throughout the parks system and consider if connections to the regional trail system or other parks may be appropriate.

Identify high-use trails and consider appropriate trail surface materials to encourage safe, unrestricted use of the trail.

4.2 Organize Walking Groups
New trail connections are not always, what is needed to strengthen connections; sometimes-organized activities can offer residents comfort in using the parks. Encourage groups to offer walking groups and walking school buses to encourage greater use of the facilities.

Market programs and facilities using brochures, cable television, the internet and other available promotional avenues.

4.3 Develop And Redevelop Parks That Focus On Accessibility, Flexibility And Naturalization Where Appropriate.
Integrate practices that meet or exceed established standards for ecological design for landscapes and green building techniques that improve function and minimize long-term maintenance and operating costs. Engage and involve residents in identifying programs, services, and facility needs within the community.

Implement a long-term renewal plan based on a complete inventory of the system, lifecycle cost analysis, and condition assessment of all park facilities.

Build or renew facilities to meet or exceed standards for accessibility.

Build quality facilities that can be adapted to new uses as community needs change.

Accept parkland dedication only if it is consistent with the City's development plans and the City's parks plan.

Maintain zoning and subdivision regulations that provide for and encourage the continued development of parks, trails, recreational opportunities, and preservation of open space.

Apply official controls, such as Parkland Dedication Requirements, to ensure that appropriate and developable park land is provided with new development. Whenever possible, the land dedication should reflect the goals and policies of this Comprehensive Plan.

Evaluate the quality and usability of land for parks, trails, and open space being proposed for parkland dedication by the developer.

Evaluate and plan for the future demand for available youth and adult park areas. Offer new ideas and facilities that will provide the opportunity to expand entertainment programming, athletic leagues, artistic opportunities, family schedule-friendly programs, healthy lifestyle/holistic classes, and community-wide special events.

Provide flexible spaces to accommodate changing trends in demand for park and open space programming.

Systematically upgrade existing park shelters, playground structures, trails and other park amenities to meet the changing needs of the community

Where appropriate consider alternative vegetation management within the City's park areas.

Continue the process of completing energy audits for all park buildings. Utilize audit results when planning for long-term capital improvements to the park buildings.

Using Best Management Practices (BMP's), buffer lakes, ponds, wetlands, and streams with native grasses and other ecologically appropriate plant species. Where possible, use buffers on public lands as demonstration projects to encourage residents, business owners, and developers to emulate best practices.

4.4 Develop Relationships and Partners to Deliver Recreational and Passive Activities

Continue to support the park/school partnership and to coordinate park use with educational providers. If in the future any private or non-profit entity no longer wants to have the shared use park, the City should consider the opportunity to acquire the property for City park purposes.

Continue partnerships with youth organizations to collaborate on park improvements on a shared-use basis.

Continue program to promote volunteer efforts to assist with park amenities and aesthetic appeal.

Involve neighborhoods and the community to help shape park facilities and the use of open spaces within the City.

Enhance park and trail opportunities for the City with partnerships with other governmental agencies including the St. Cloud APO, Regional Active Living Advisory Group and surrounding cities and counties.

GOAL 5: RECOGNIZE THE MISSISSIPPI, WATAB, SAUK AND OTHER RIVERS AND NATURAL AREAS AS A MAJOR RECREATIONAL, ECONOMIC AND OPEN SPACE ASSET TO THE COMMUNITY.

Potential Strategies May Include These and Other Future Cool Ideas:

5.1 Maintain Existing Public Accesses to the rivers and increase public access in new development and redevelopment projects, specifically within the Mill Property area. Continue to develop access along the Rivers that are aesthetically compatible with the riverfront and sensitive to ecological function.

5.2 Work To Connect rivers to neighborhoods, parks and community facilities through trails and greenway corridors. Work with MnDOT to expand the Great River Bike Trail to include amenities within Sartell.

5.3 Work With the DNR and Other Agencies in creating and/or enhancing portages within all the navigable rivers.

The city will preserve and improve the natural, ecological and scenic resources within the park and open space system, including water quality, vegetation, wildlife and other environmentally sensitive resources.

APPENDIX 6-1 Questionnaire Consultation

EAGLE CREEK
RENEWABLE ENERGY
— EXCELLENCE IN HYDRO —

December 2, 2019

Re: Federal Energy Regulatory Commission (FERC) Relicensing
Sartell Hydroelectric Project (FERC Project No. 8315)
Pre-Application Document Information Questionnaire

Dear Stakeholder:

Eagle Creek Sartell Hydro, LLC (Sartell Hydro or Licensee), a wholly owned indirect subsidiary of Eagle Creek Renewable Energy, LLC, intends to relicense the Sartell Hydroelectric Project (Sartell or Project) (FERC Project No. 8315), located in central Minnesota within the city of Sartell in Benton and Stearns Counties, the city of Rice in Benton County, the townships of Langola, Sauk Rapids, and Watab in Benton County, and the townships of Brockway and Le Sauk in Stearns County. The Project is an existing hydroelectric facility located on the Mississippi River. A map showing the general location the Project can be found in Appendix 1. A fact sheet regarding the Sartell Project can be found in Appendix 2.

The current FERC license for the Project expires on February 28, 2025 and with support from Mead & Hunt, Inc., the Licensee is beginning the FERC relicensing process. The Licensee plans to follow FERC's Traditional Licensing Process (TLP) to relicense the Project.

Along with the TLP request, a Notice of Intent to Relicense and a Pre-Application Document (PAD) will be filed with FERC by February 28, 2020. The PAD will provide FERC and other entities with existing, relevant and reasonably available information regarding the Project and other resources in the Project vicinity.

To assist the Licensee in the development of the PAD, Appendix 3 includes a PAD Information Questionnaire that will help to identify any information that you or your organization may have or be aware of that describes the existing or historical surroundings of the Project related to environmental, recreation, and cultural resources. Additionally, the questionnaire will be used to identify resource interests to be considered during relicensing. We kindly request you take some time to fill out and return the questionnaire electronically via email to darrin.johnson@meadhunt.com within 30 days of receipt.

The Licensee is promoting the use of electronic communication and requests that all parties who intend to be engaged in the relicensing process provide an email address via the PAD Information Questionnaire. If you prefer to receive hardcopies, the Licensee will honor those requests.

Eagle Creek Renewable Energy
116 N. State Street, PO Box 167, Neshkoro, WI 54960-0167
Tel: 973-998-8400 – Fax: 920-293-8087
www.eaglecreekre.com

Additionally, the list of stakeholders (Appendix 4) was developed from previous proceedings related to the Project as well as updated FERC service and mailing lists. If you know of any other stakeholder not included on the attached distribution list that may be interested in participating in this proceeding, please forward the questionnaire onto them.

We greatly appreciate your response and assistance in this proceeding

If you have any questions relative to this letter, please contact either of the following:

Ms. Susan Giansante
Eagle Creek Renewable Energy, LLC
(973) 998-8400
susan.giansante@eaglecreekre.com

Mr. Darrin Johnson
Mead and Hunt, Inc.
(608) 443-0313
darrin.johnson@meadhunt.com

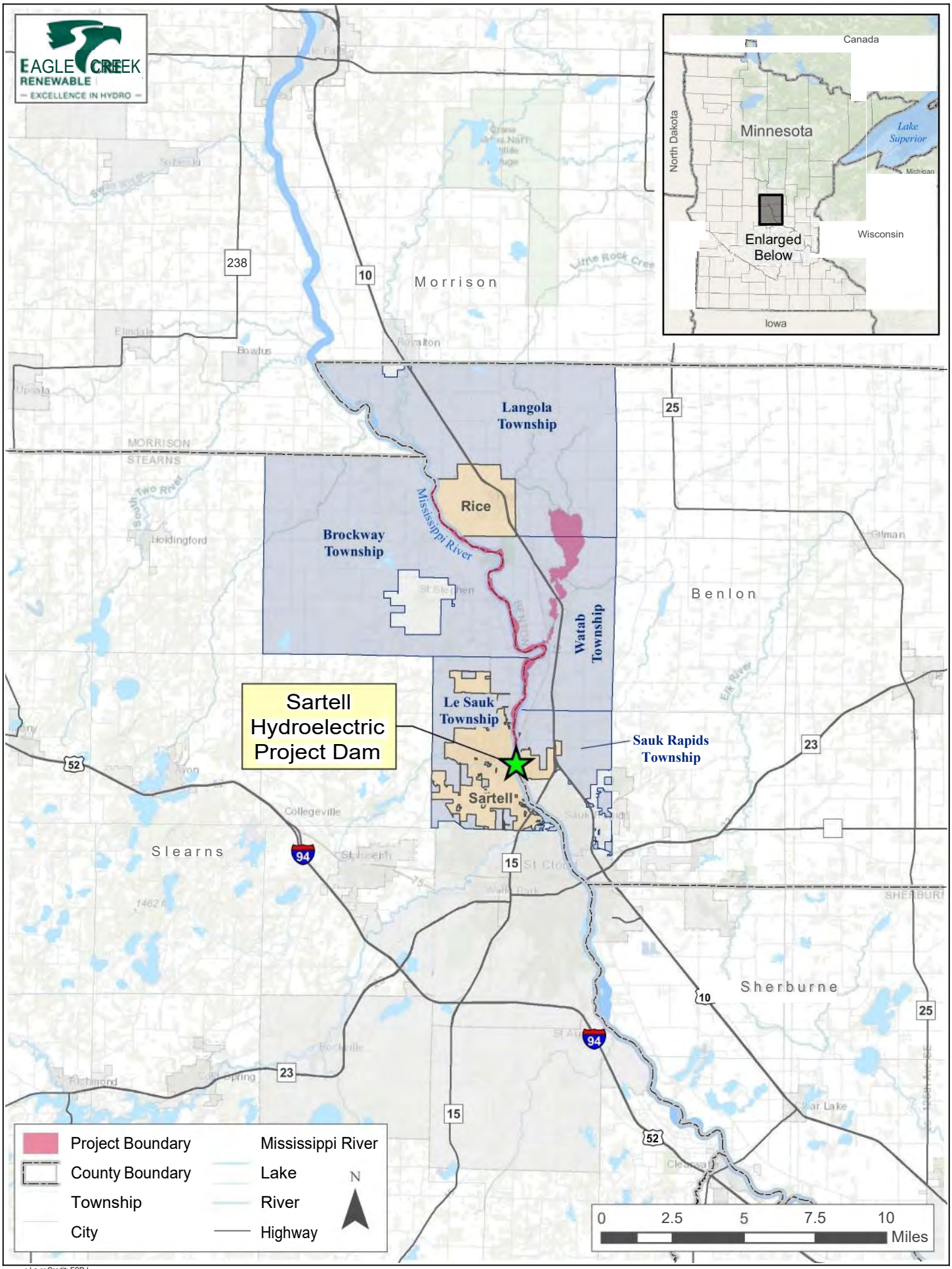
Sincerely,
Eagle Creek Sartell Hydro, LLC

for Michael Scarzello
Regulatory Director

Enclosures: Appendix 1 through Appendix 4

Distribution via email or USPS to Stakeholder List

Appendix 1 – General Location Map



e La er Credit: ESR I

Appendix 2 – Sartell Hydroelectric Project Fact Sheet

Sartell Hydroelectric Project

FERC No. 8315: Mississippi River, Stearns and Benton Counties, Sartell, MN
Licensee: Eagle Creek Sartell Hydro, LLC

License Expires: February 28, 2025

Notice of Intent to Relicense Due: February 28, 2020

Date that Licensee was Acquired: January 5, 2015

Operating Head: 20 feet

Bascule Gate Section: 226 feet long

Tainter Gate Section: 114 feet long

Non-overflow Section: 48 feet long

Project Operation: Run-of-River

Installed Capacity: 9.15 megawatts

Reservoir Target Elevation Requirements: 1014.5 feet M.S.L ± 0.5 feet

Reservoir Surface Area: Approximately 2,400 acres

EAGLE CREEK
RENEWABLE ENERGY
— EXCELLENCE IN HYDRO —

Appendix 3 – Pre-Application Document Questionnaire

Eagle Creek Sartell Hydro, LLC (Sartell Hydro), with assistance from Mead & Hunt, Inc. (Mead & Hunt), is beginning the Federal Energy Regulatory Commission (FERC) relicensing process for the Sartell Hydroelectric Project (Project) located on the Mississippi River in Benton County and Stearns County, Minnesota.

Under FERC regulations, Sartell Hydro must prepare a Notice of Intent (NOI) and Preliminary Application Document (PAD) to provide FERC and other entities with existing, relevant, and reasonably available information pertaining to the Project to help identify additional information needs, develop study requests and study plans, and prepare documents analyzing impacts.

This PAD Information Questionnaire will be used to help identify sources of existing, relevant, and reasonably available information that is not in Sartell Hydro's possession regarding environmental, recreation, and cultural resources in the vicinity of the Projects.

Sartell Hydro is promoting the use of electronic communication and requests all parties who intend to be engaged in the relicensing process provide their email address via this questionnaire. In addition, if you know of any stakeholder(s) not included on the distribution list that may be interested in participating in this proceeding, we kindly ask that you forward the questionnaire on to them. We greatly appreciate your response and assistance with providing information resources and interested parties in this proceeding.

1. Information about the person completing this questionnaire:

   Name:_____ Title: _____

   Organization: _____

   Address: _____

   _____

   Phone:_____ Email: _____

2. Do you or your organization plan to participate in the 3 to 5 year-long licensing proceeding for the Sartell Hydroelectric Project?

   ☐ Yes ☐ No

3. Do you or your organization know of existing, relevant, and reasonably available information that describes the existing or historical environment of the Project (i.e. Project Areas, adjacent Project vicinities or areas upstream of downstream of the Projects)?

☐ Yes ***(Please complete 3a thru 3e)*** ☐ No ***(Proceed to 4 on page 4)***

a. If yes, check box(es) to indicate the specific resource area(s) that the information relates to:

- ☐ Geology and soils
- ☐ Water resources
- ☐ Fish and aquatic resources
- ☐ Wildlife and botanical resources
- ☐ Wetlands, riparian, and littoral habitat
- ☐ Rare, threatened, and endangered species
- ☐ Recreational and land use
- ☐ Aesthetic resources
- ☐ Cultural resources
- ☐ Socio-economic resources
- ☐ Tribal resources
- ☐ Other resource information

b. Briefly describe the information or list available documents:
(Additional information, if any, may be provided on page 4)

_____

_____

_____

_____

_____

_____

c. Where or how can Sartell Hydro obtain this information?

_____

_____

_____

_____

_____

_____

Questions 3d – 3e are continued on the following page

d. Please indicate the representative(s) you wish to designate for potential follow-up contact by Sartell Hydro, or their representative, for the resource area(s) checked in 3a: ***(Additional information, if any, may be provided on page 4)***

Representative Contact Information

Name:_____ Title:_____

Address: _____

_____

Phone:_____ Email: _____

Name:_____ Title:_____

Address: _____

_____

Phone:_____ Email: _____

e. Are you aware of any particular issues pertaining to the specific resource area(s) identified in 3a? ***(Additional information, if any. may be provided on page 4)***

☐ Yes ***(Please list specific issues below)*** ☐ No

Resource Area	**Specific Issue**

4. Sartell Hydro intends to request FERC permission to use the Traditional Licensing Process (TLP) for the Projects, rather than FERC's default Integrated Licensing Process (ILP). Do you support use of the TLP process?

   ☐ Yes ☐ No ***(Please describe concerns below)***

   Traditional Licensing Process Concerns

5. Sartell Hydro is interested in any additional comments, questions, or information you may have regarding the licensing of the Projects. If the additional comments, questions, or information you provide below pertain to a particular question, please indicate the applicable question (such as 3b, 3d, 3e).

   Additional comments, questions, or information

6. If you do not wish to participate in the relicensing process and would like to be removed from the stakeholder list, please check the box below.

   ☐ I do not wish to participate, please remove me from the stakeholder list.

Please return this completed questionnaire to Mead & Hunt within 30 days of receipt to allow for follow-up by Sartell Hydro or its representative. *Not responding within 30 days* will indicate you are not aware of any existing, relevant, and reasonably available information that describes the existing environment or known potential impacts of the Hydroelectric Projects.

Please email your responses and/or questions to: Darrin.Johnson@meadhunt.com

Appendix 4 – Stakeholder List

Sartell (P-8315) Stakeholder List

Indian Tribes

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jamie.arsenault@whiteearth.com

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State (continued)

Joseph Henderson, Director
Minnesota Department of Natural Resources - Division of Lands and Minerals
500 Lafayette Rd.
St. Paul, MN 55155
joseph.henderson@state.mn.us

Jeff Howe, District 13 Senator
Minnesota Senate
3231 Minnesota Senate Building
St. Paul, MN 55155
sen.jeff.howe@senate.mn

John Jaschke, Executive Director
Minnesota Board of Water and Soil Resources
520 Lafayette Rd. N.
St. Paul, MN 55155-0001
john.jaschke@state.mn.us

Andrew Matthews, District 15 Senator
Minnesota Senate
3409 Minnesota Senate Building
St. Paul, MN 55155

Shane Mekeland, District 15b Representative
Minnesota House of Representatives
215 State Office Building
St. Paul, MN 55155
rep.shane.mekeland@house.mn

Tim O'Driscoll, District 13b Representative
Minnesota House of Representatives
237 State Office Building
St. Paul, MN 55155
rep.tim.odriscoll@house.mn

Dave Olfelt, Director
Minnesota Department of Natural Resources - Division of Fish and Wildlife
500 Lafayette Rd. N.
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erika.river@state.mn.us

John L. Stine, Commissioner
Minnesota Pollution Control Agency
520 Lafayette Rd.
St. Paul, MN 55155
john.stine@state.mn.us

Lori Swanson, Attorney General
Minnesota Office of Attorney General
State Capitol Suite 102
St. Paul, MN 55155
lori.swans@state.mn.us

Kent Whitforth, Director and CEO
Minnesota Historic Preservation Office
State Historic Preservation Office
50 Sherburne Ave., Suite 203
St. Paul, MN 55155
kent.whitf@state.mn.us

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Daniel Wolf, Secretary
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121 7th Pl. E., Suite 350
St. Paul, MN 55101-2163
dan.wolf@state.mn.us

Federal

Nannette Bischoff, FERC Coordinator
St. Paul Distict
U.S. Department of the Army Corps of Engineers
190 5th St. E., Suite 700
St. Paul, MN 55101-1638
nannette.m.bischoff@usace.army.mil

Tokey Bosell, Regional Environmental Coordinator
U.S. Department of the Interior
National Park Service
601 Riverfront Dr.
Omaha, NE 68102-4226
tokey_boswell@nps.gov

Tom Emmer, Representative
U.S. Representative from Minnesota District 6
315 Cannon House Office Building
Washington, DC 20515

Field Supervisor
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Fish & Wildlife Service
Green Bay Field Office
2661 Scott Tower Dr.
New Franken, WI 54229-9565
greenbay@fws.gov

Amy Klobuchar, Senior Senator
U.S. Senator from Minnesota
302 Hart Senate Building
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amy.klobu@washingtonate.dc.us

Timothy Lapointe, Regional Director
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Midwest Regional Office
5600 West American Blvd., Suite 500
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Mary Manydeeds, Environmental Specialist
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Norman Pointe II Building
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National Park Service
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Angela Tornes, Midwest Hydropower Coordinator
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National Park Service
626 E. Wisconsin Ave., Suite 100
Milwaukee, WI 53202
angie_tornes@nps.gov

Jen Tyler
Mail Code: E-19J
U.S. Environmental Protection Agency
NEPA Implementation Section, Region V
77 W. Jackson Boulevard, AR-18J
Chicago, IL 60604-3507
tyler.jennifer@epa.gov

Nick Utrup, Fisheries Biologist
U.S. Department of the Interior
Fish & Wildlife Service
4101 American Boulevard E.
Bloomington, MN 55425-1665
Nick_Utrup@fws.gov

Hydro

Dave Brown, Regional Manager
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Robert Gates, Vice President
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Susan Giansante, Project Manager
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Melissa Rondou, Regulatory Supervisor
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Michael Scarzello, Regulatory Director
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Kevin Winkelman, Regional Manager
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Neshkoro, WI 54960-0167
Kevin.Winkelman@eaglecreekre.com

Other

Kellie Gallagher, President
Little Rock Lake Association
P.O. Box 326
Rice, MN 56367
kelliegallagher@yahoo.com

Northwest Regional Planning Commission
1400 S. River St.
Spooner, WI 54801-8692
info@nwrpc.com

City of Sartell Response

Eagle Creek Sartell Hydro, LLC (Sartell Hydro), with assistance from Mead & Hunt, Inc. (Mead & Hunt), is beginning the Federal Energy Regulatory Commission (FERC) relicensing process for the Sartell Hydroelectric Project (Project) located on the Mississippi River in Benton County and Stearns County, Minnesota.

Under FERC regulations, Sartell Hydro must prepare a Notice of Intent (NOI) and Preliminary Application Document (PAD) to provide FERC and other entities with existing, relevant, and reasonably available information pertaining to the Project to help identify additional information needs, develop study requests and study plans, and prepare documents analyzing impacts.

This PAD Information Questionnaire will be used to help identify sources of existing, relevant, and reasonably available information that is not in Sartell Hydro's possession regarding environmental, recreation, and cultural resources in the vicinity of the Projects.

Sartell Hydro is promoting the use of electronic communication and requests all parties who intend to be engaged in the relicensing process provide their email address via this questionnaire. In addition, if you know of any stakeholder(s) not included on the distribution list that may be interested in participating in this proceeding, we kindly ask that you forward the questionnaire on to them. We greatly appreciate your response and assistance with providing information resources and interested parties in this proceeding.

1. Information about the person completing this questionnaire:

Name: Mary Degiovanni Title: City Administrator

Organization: City of Sartell

Address: 125 Pinecone Road North
Sartell MN 56377

Phone: 320-253-2171 Email: mary@sartellmn.com

2. Do you or your organization plan to participate in the 3 to 5 year-long licensing proceeding for the Sartell Hydroelectric Project?

☒ Yes ☐ No

3. Do you or your organization know of existing, relevant, and reasonably available information that describes the existing or historical environment of the Project (i.e. Project Areas, adjacent Project vicinities or areas upstream of downstream of the Projects)?

☒ Yes ***(Please complete 3a thru 3e)*** ☐ No ***(Proceed to 4 on page 4)***

a. If yes, check box(es) to indicate the specific resource area(s) that the information relates to:

- ☐ Geology and soils
- ☐ Water resources
- ☐ Fish and aquatic resources
- ☐ Wildlife and botanical resources
- ☐ Wetlands, riparian, and littoral habitat
- ☐ Rare, threatened, and endangered species
- ☐ Recreational and land use
- ☐ Aesthetic resources
- ☐ Cultural resources
- ☐ Socio-economic resources
- ☐ Tribal resources
- ☒ Other resource information

b. Briefly describe the information or list available documents:
(Additional information, if any, may be provided on page 4)

Flood mitigation Study, transportation projects, etc.

c. Where or how can Sartell Hydro obtain this information?

City Engineering Firm: SEH via City Engineer April Ryan at 320-229-4329

Questions 3d – 3e are continued on the following page

d. Please indicate the representative(s) you wish to designate for potential follow-up contact by Sartell Hydro, or their representative, for the resource area(s) checked in 3a: ***(Additional information, if any, may be provided on page 4)***

Representative Contact Information

Name: Butch Rieland Title: City Fire Marshal

Address: 125 Pinecone Road North
Sartell MN 56377

Phone: 320-258-7307 Email: butch@sartellmn.com

Name: _____ Title: _____

Address: _____

_____

Phone: _____ Email: _____

e. Are you aware of any particular issues pertaining to the specific resource area(s) identified in 3a? ***(Additional information, if any. may be provided on page 4)***

☐ Yes ***(Please list specific issues below)*** ☒ No

Resource Area	**Specific Issue**

4. Sartell Hydro intends to request FERC permission to use the Traditional Licensing Process (TLP) for the Projects, rather than FERC's default Integrated Licensing Process (ILP). Do you support use of the TLP process?

☐ Yes ☐ No ***(Please describe concerns below)***

Traditional Licensing Process Concerns

5. Sartell Hydro is interested in any additional comments, questions, or information you may have regarding the licensing of the Projects. If the additional comments, questions, or information you provide below pertain to a particular question, please indicate the applicable question (such as 3b, 3d, 3e).

Additional comments, questions, or information

6. If you do not wish to participate in the relicensing process and would like to be removed from the stakeholder list, please check the box below.

☐ I do not wish to participate, please remove me from the stakeholder list.

Please return this completed questionnaire to Mead & Hunt within 30 days of receipt to allow for follow-up by Sartell Hydro or its representative. *Not responding within 30 days* will indicate you are not aware of any existing, relevant, and reasonably available information that describes the existing environment or known potential impacts of the Hydroelectric Projects.

Please email your responses and/or questions to: Darrin.Johnson@meadhunt.com

Darrin Johnson

From: Kris Ambuehl <kambuehl@cityofstjoseph.com>
Sent: Wednesday, December 11, 2019 8:40 AM
To: Darrin Johnson
Subject: Questionnaire
Attachments: 19-12-02_SRTL_ReLicensing PAD Questionnaire.pdf

Hello

Attached is the requested questionnaire.

Regards,

Kris Ambuehl
City Administrator
75 Callway Street East
St Joseph, MN 56374
kambuehl@cityofstjoseph.com
Office - 320-229-9425

City of St. Joseph Response

Eagle Creek Sartell Hydro, LLC (Sartell Hydro), with assistance from Mead & Hunt, Inc. (Mead & Hunt), is beginning the Federal Energy Regulatory Commission (FERC) relicensing process for the Sartell Hydroelectric Project (Project) located on the Mississippi River in Benton County and Stearns County, Minnesota.

Under FERC regulations, Sartell Hydro must prepare a Notice of Intent (NOI) and Preliminary Application Document (PAD) to provide FERC and other entities with existing, relevant, and reasonably available information pertaining to the Project to help identify additional information needs, develop study requests and study plans, and prepare documents analyzing impacts.

This PAD Information Questionnaire will be used to help identify sources of existing, relevant, and reasonably available information that is not in Sartell Hydro's possession regarding environmental, recreation, and cultural resources in the vicinity of the Projects.

Sartell Hydro is promoting the use of electronic communication and requests all parties who intend to be engaged in the relicensing process provide their email address via this questionnaire. In addition, if you know of any stakeholder(s) not included on the distribution list that may be interested in participating in this proceeding, we kindly ask that you forward the questionnaire on to them. We greatly appreciate your response and assistance with providing information resources and interested parties in this proceeding.

1. Information about the person completing this questionnaire:

   Name: Kris Ambuehl Title: City Administrator

   Organization: City of St Joseph

   Address: 75 Calaway Street East, St Joseph, MN 56374

   Phone: 320-229-9425 Email: kambuehl@cityofstjoseph.com

2. Do you or your organization plan to participate in the 3 to 5 year-long licensing proceeding for the Sartell Hydroelectric Project?

   ☐ Yes ☒ No

3. Do you or your organization know of existing, relevant, and reasonably available information that describes the existing or historical environment of the Project (i.e. Project Areas, adjacent Project vicinities or areas upstream of downstream of the Projects)?

☐ Yes ***(Please complete 3a thru 3e)*** ☒ No ***(Proceed to 4 on page 4)***

a. If yes, check box(es) to indicate the specific resource area(s) that the information relates to:

- ☐ Geology and soils
- ☐ Water resources
- ☐ Fish and aquatic resources
- ☐ Wildlife and botanical resources
- ☐ Wetlands, riparian, and littoral habitat
- ☐ Rare, threatened, and endangered species
- ☐ Recreational and land use
- ☐ Aesthetic resources
- ☐ Cultural resources
- ☐ Socio-economic resources
- ☐ Tribal resources
- ☐ Other resource information

b. Briefly describe the information or list available documents:
(Additional information, if any, may be provided on page 4)

c. Where or how can Sartell Hydro obtain this information?

Questions 3d – 3e are continued on the following page

d. Please indicate the representative(s) you wish to designate for potential follow-up contact by Sartell Hydro, or their representative, for the resource area(s) checked in 3a: ***(Additional information, if any, may be provided on page 4)***

Representative Contact Information

Name:_____ Title:_____

Address: _____

_____

Phone:_____ Email: _____

Name:_____ Title:_____

Address: _____

_____

Phone:_____ Email: _____

e. Are you aware of any particular issues pertaining to the specific resource area(s) identified in 3a? ***(Additional information, if any. may be provided on page 4)***

☐ Yes ***(Please list specific issues below)*** ☐ No

Resource Area	**Specific Issue**

4. Sartell Hydro intends to request FERC permission to use the Traditional Licensing Process (TLP) for the Projects, rather than FERC's default Integrated Licensing Process (ILP). Do you support use of the TLP process?

   ☒ Yes ☐ No ***(Please describe concerns below)***

   Traditional Licensing Process Concerns

5. Sartell Hydro is interested in any additional comments, questions, or information you may have regarding the licensing of the Projects. If the additional comments, questions, or information you provide below pertain to a particular question, please indicate the applicable question (such as 3b, 3d, 3e).

   Additional comments, questions, or information

   None

6. If you do not wish to participate in the relicensing process and would like to be removed from the stakeholder list, please check the box below.

   ☐ I do not wish to participate, please remove me from the stakeholder list.

Please return this completed questionnaire to Mead & Hunt within 30 days of receipt to allow for follow-up by Sartell Hydro or its representative. *Not responding within 30 days* will indicate you are not aware of any existing, relevant, and reasonably available information that describes the existing environment or known potential impacts of the Hydroelectric Projects.

Please email your responses and/or questions to: Darrin.Johnson@meadhunt.com

EPA Response

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

DEC 2 0 2019

REPLY TO THE ATTENTION OF:

RM-19J

Darrin Johnson
Mead & Hunt, Inc.
1702 Lawrence Drive
De Pere, Wisconsin 54115

Re: Request for Information for Pre-Application Document for Federal Energy Regulatory Commission (FERC) Project No. 8315, Sartell Hydroelectric Project, Mississippi River, City of Sartell in Stearns and Benton Counties and City of Rice in Benton County, Minnesota

Dear Mr. Johnson:

Mead & Hunt, Inc. is assisting Eagle Creek, LLC obtain licenses from FERC for the project referenced above. Thank you for your December 2019 letter requesting information to develop a Pre-Application Document (PAD) for submission to FERC as part of the relicensing process. We recommend accessing the following websites to obtain pertinent information on the existing project environment and potential project impacts.

- NEPAssist is a free EPA web-based analytical tool that allows users to access geospatial environmental data for user-defined locations (https://www.epa.gov/nepa/nepassist).
- The Watershed Assessment, Tracking & Environmental Results System provides additional information about the quality of the nation's surface water (https://www.epa.gov/waterdata/waters-watershed-assessment-tracking-environmental-results-system).
- The U.S. Global Change Research Program's National Climate Assessment has information on potential impacts to infrastructure in the Midwest caused by the increasing severity and frequency of major storm events. Future changes to the integrity of infrastructure could alter the environmental impacts of the proposed project over the life of the license. Information on adaptation is available at EPA's Climate Adaption Resource Center (https://www.globalchange.gov/browse/reports and https://www.epa.gov/arc-x).

EPA would appreciate the opportunity to provide scoping comments and review the environmental document prepared under the National Environmental Policy Act (NEPA). Please

EPA Response

provide electronic copies of the scoping request and subsequent NEPA documents to Jen Tyler, the lead reviewer for this project, at tyler.jennifer@epa.gov. Ms. Tyler is available at 312-886-6394 if you would like to discuss our comments.

Sincerely,

Kenneth A. Westlake
Deputy Director, Tribal and Multi-Media Programs Office
Office of the Regional Administrator

CC Via Email: Susan Giansante, Eagle Creek Renewable Energy, LLC

MNSHPO Response

EAGLE CREEK RENEWABLE ENERGY
— EXCELLENCE IN HYDRO —

Sartell Hydroelectric Project - FERC Project No. 8315
Mississippi River – Benton County and Stearns County, Minnesota
Licensing Preliminary Application Document Information Questionnaire

Eagle Creek Sartell Hydro, LLC (Sartell Hydro), with assistance from Mead & Hunt, Inc. (Mead & Hunt), is beginning the Federal Energy Regulatory Commission (FERC) relicensing process for the Sartell Hydroelectric Project (Project) located on the Mississippi River in Benton County and Stearns County, Minnesota.

Under FERC regulations, Sartell Hydro must prepare a Notice of Intent (NOI) and Preliminary Application Document (PAD) to provide FERC and other entities with existing, relevant, and reasonably available information pertaining to the Project to help identify additional information needs, develop study requests and study plans, and prepare documents analyzing impacts.

This PAD Information Questionnaire will be used to help identify sources of existing, relevant, and reasonably available information that is not in Sartell Hydro's possession regarding environmental, recreation, and cultural resources in the vicinity of the Projects.

Sartell Hydro is promoting the use of electronic communication and requests all parties who intend to be engaged in the relicensing process provide their email address via this questionnaire. In addition, if you know of any stakeholder(s) not included on the distribution list that may be interested in participating in this proceeding, we kindly ask that you forward the questionnaire on to them. We greatly appreciate your response and assistance with providing information resources and interested parties in this proceeding.

1. Information about the person completing this questionnaire:

   Name: SARAH BEIMERS Title: ENVIRONMENTAL REVIEW PROG. MGR.

   Organization: MN STATE HISTORIC PRESERVATION OFFICE

   Address: SUITE 203
   50 SHERBURNE AVE ST PAUL MN 55155

   Phone: 6512013290 Email: sarah.beimers@state.mn.us

2. Do you or your organization plan to participate in the 3 to 5 year-long licensing proceeding for the Sartell Hydroelectric Project?

   ☒ Yes ☐ No

MNSHPO Response

d. Please indicate the representative(s) you wish to designate for potential follow-up contact by Sartell Hydro, or their representative, for the resource area(s) checked in 3a: ***(Additional information, if any, may be provided on page 4)***

Representative Contact Information

Name: Jim Krumrie Title: Cultural Resources Information Manager

Address: (SHPO)

Phone: 651-201-3299 Email: jim.krumrie@state.mn.us

Name: _____ Title: _____

Address: _____

_____

Phone: _____ Email: _____

e. Are you aware of any particular issues pertaining to the specific resource area(s) identified in 3a? ***(Additional information, if any. may be provided on page 4)***

☐ Yes ***(Please list specific issues below)*** ☐ No

Resource Area	**Specific Issue**

3. Do you or your organization know of existing, relevant, and reasonably available information that describes the existing or historical environment of the Project (i.e. Project Areas, adjacent Project vicinities or areas upstream of downstream of the Projects)?

☒ Yes *(Please complete 3a thru 3e)* ☐ No *(Proceed to 4 on page 4)*

a. If yes, check box(es) to indicate the specific resource area(s) that the information relates to:

- ☐ Geology and soils
- ☐ Water resources
- ☐ Fish and aquatic resources
- ☐ Wildlife and botanical resources
- ☐ Wetlands, riparian, and littoral habitat
- ☐ Rare, threatened, and endangered species
- ☐ Recreational and land use
- ☐ Aesthetic resources
- ☒ Cultural resources
- ☐ Socio-economic resources
- ☐ Tribal resources
- ☐ Other resource information

b. Briefly describe the information or list available documents:
(Additional information, if any, may be provided on page 4)

statewide historic property inventories and survey reports

Eagle Creek should contact Office of the State Archaeologist for archaeological site data as well.

c. Where or how can Sartell Hydro obtain this information?

send request to:
datarequest.shpo@state.mn.us
or check mn.gov/admin/shpo/aboutfiles/

Questions 3d – 3e are continued on the following page

MNSHPO Response

4. Sartell Hydro intends to request FERC permission to use the Traditional Licensing Process (TLP) for the Projects, rather than FERC's default Integrated Licensing Process (ILP). Do you support use of the TLP process?

☒ Yes ☐ No ***(Please describe concerns below)***

Traditional Licensing Process Concerns

5. Sartell Hydro is interested in any additional comments, questions, or information you may have regarding the licensing of the Projects. If the additional comments, questions, or information you provide below pertain to a particular question, please indicate the applicable question (such as 3b, 3d, 3e).

Additional comments, questions, or information

Section 106 consultation to be initiated by FERC

All submittals to SHPO for review + comment pursuant to Section 106 | 36 CFR 800 MUST be submitted in hard copy. Electronic requests for SHPO review + comment will not be responded to.

6. If you do not wish to participate in the relicensing process and would like to be removed from the stakeholder list, please check the box below.

☐ I do not wish to participate, please remove me from the stakeholder list.

Please return this completed questionnaire to Mead & Hunt within 30 days of receipt to allow for follow-up by Sartell Hydro or its representative. *Not responding within 30 days* will indicate you are not aware of any existing, relevant, and reasonably available information that describes the existing environment or known potential impacts of the Hydroelectric Projects.

Please email your responses and/or questions to: Darrin.Johnson@meadhunt.com

Eagle Creek Sartell Hydro, LLC (Sartell Hydro), with assistance from Mead & Hunt, Inc. (Mead & Hunt), is beginning the Federal Energy Regulatory Commission (FERC) relicensing process for the Sartell Hydroelectric Project (Project) located on the Mississippi River in Benton County and Stearns County, Minnesota.

Under FERC regulations, Sartell Hydro must prepare a Notice of Intent (NOI) and Preliminary Application Document (PAD) to provide FERC and other entities with existing, relevant, and reasonably available information pertaining to the Project to help identify additional information needs, develop study requests and study plans, and prepare documents analyzing impacts.

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Sartell Hydro is promoting the use of electronic communication and requests all parties who intend to be engaged in the relicensing process provide their email address via this questionnaire. In addition, if you know of any stakeholder(s) not included on the distribution list that may be interested in participating in this proceeding, we kindly ask that you forward the questionnaire on to them. We greatly appreciate your response and assistance with providing information resources and interested parties in this proceeding.

1. Information about the person completing this questionnaire:

   Name: Greg Berg Title: Organization: Stearns County Soil & Water Conservation District

   Address: 110 Second Street South, Suite 128 Waite Park, MN 56387

   Phone: 320/345-6479 Email: greg.berg@mn.nacdnet.net

2. Do you or your organization plan to participate in the 3 to 5 year-long licensing proceeding for the Sartell Hydroelectric Project?

   ☐ Yes ☒ No

3. Do you or your organization know of existing, relevant, and reasonably available information that describes the existing or historical environment of the Project (i.e. Project Areas, adjacent Project vicinities or areas upstream of downstream of the Projects)?

☒ Yes ***(Please complete 3a thru 3e)*** ☐ No ***(Proceed to 4 on page 4)***

a. If yes, check box(es) to indicate the specific resource area(s) that the information relates to:

- ☒ Geology and soils
- ☒ Water resources
- ☒ Fish and aquatic resources
- ☒ Wildlife and botanical resources
- ☒ Wetlands, riparian, and littoral habitat
- ☐ Rare, threatened, and endangered species
- ☒ Recreational and land use
- ☐ Aesthetic resources
- ☐ Cultural resources
- ☐ Socio-economic resources
- ☐ Tribal resources
- ☐ Other resource information

b. Briefly describe the information or list available documents:
(Additional information, if any, may be provided on page 4)

Stearns County Geologic Atlas

Stearns County Soil Survey

MN DNR Public Waters Inventory

NWI

Biological Survey

Stearns County Comprehensive Plan

City of St. Cloud Source Water Protection Plan

c. Where or how can Sartell Hydro obtain this information?

Stearns County Environmental Services

Natural Resources Conservation Service

MN DNR

USFWS

Stearns County SWCD

City of St. Cloud

Questions 3d – 3e are continued on the following page

d. Please indicate the representative(s) you wish to designate for potential follow-up contact by Sartell Hydro, or their representative, for the resource area(s) checked in 3a: ***(Additional information, if any, may be provided on page 4)***

Representative Contact Information

Name: Greg Berg Title: Lakeshed Specialist

Address: 110 Second Street South, Suite 128

Waite Park, MN 56387

Phone: 320/345-6479 Email: greg.berg@mn.nacdnet.net

Name: _____ Title: _____

Address: _____

_____

Phone: _____ Email: _____

e. Are you aware of any particular issues pertaining to the specific resource area(s) identified in 3a? ***(Additional information, if any. may be provided on page 4)***

☒ Yes ***(Please list specific issues below)*** ☐ No

Resource Area	**Specific Issue**
Mississippi River	Fish Passage
Mississippi River	Invertebrete movement upstream
Mississippi River Watershed	Bed Load Transport
Mississippi River	Source Water Intake
Mississippi River Watershed	Wildlife movement
Mississippi River	Flood Passage
Mississippi River	Recreational connection upstream and downstream
Mississippi River	Safety

4. Sartell Hydro intends to request FERC permission to use the Traditional Licensing Process (TLP) for the Projects, rather than FERC's default Integrated Licensing Process (ILP). Do you support use of the TLP process?

☐ Yes ☐ No ***(Please describe concerns below)***

Traditional Licensing Process Concerns

Not familiar with either process

5. Sartell Hydro is interested in any additional comments, questions, or information you may have regarding the licensing of the Projects. If the additional comments, questions, or information you provide below pertain to a particular question, please indicate the applicable question (such as 3b, 3d, 3e).

Additional comments, questions, or information

There is a need for periodic maintenance and drawdowns of the system . This allows for re-establishment of vegetation and stabilization of the streambanks. It ties up and exports nutrients. It also allows for the natural establishment of fish and wildlife habitat.

Recomend a restoration component of the system to allow fish, aqautic organisms and wildlife. This would also allow a connection for recreational activities upstream and downstream from dam in the river. This could be provided by allowing for allowing a bypass around the main dam structure in the river.

6. If you do not wish to participate in the relicensing process and would like to be removed from the stakeholder list, please check the box below.

☐ I do not wish to participate, please remove me from the stakeholder list.

Please return this completed questionnaire to Mead & Hunt within 30 days of receipt to allow for follow-up by Sartell Hydro or its representative. *Not responding within 30 days* will indicate you are not aware of any existing, relevant, and reasonably available information that describes the existing environment or known potential impacts of the Hydroelectric Projects.

Please email your responses and/or questions to: Darrin.Johnson@meadhunt.com

Darrin Johnson

From: Wilde, William (MPCA) <william.wilde@state.mn.us>
Sent: Wednesday, January 22, 2020 2:55 PM
To: Darrin Johnson
Cc: Hotz, Anna (MPCA)
Subject: RE: Sartell Hydroelectric Project P-8315-MN Relicensing Process
Attachments: 20191126 Final Eagle Creek_Sartell_Questionnaire.DMJ.SCP.SG (004).docx

Hello Mr. Johnson,

Attached is the requested draft questionnaire for the Sartell (FERC) Hydroelectric Relicensing project.

Please let me know if you need additional information from the MPCA 401 water quality program.

Thanks,
---Bill Wilde
Minnesota Pollution Control Agency
401 Program
520 Lafayette Road
St. Paul, Minnesota 55155
(651) 757-2825

From: Darrin Johnson <Darrin.Johnson@meadhunt.com>
Sent: Wednesday, December 4, 2019 9:35 AM
To: Wilde, William (MPCA) <william.wilde@state.mn.us>
Cc: susan.giansante@eaglecreekre.com
Subject: RE: Sartell Hydroelectric Project P-8315-MN Relicensing Process

Mr. Wilde,

Please find attached a word version of the Sartell Hydroelectric Project Questionnaire per your request. If you have any other questions, feel free to contact me.

MPCA Response

Darrin Johnson | FERC Licensing & Compliance
Mead & Hunt | 2440 Deming Way | Middleton, WI 53562
Direct: 608-443-0313 | Mobile: 715-697-3130
Darrin.Johnson@MeadHunt.com | meadhunt.com

From: Wilde, William (MPCA) <william.wilde@state.mn.us>
Sent: Wednesday, December 4, 2019 8:13 AM
To: Darrin Johnson <Darrin.Johnson@meadhunt.com>
Cc: susan.giansante@eaglecreekre.com
Subject: Sartell Hydroelectric Project P-8315-MN Relicensing Process

Hello Mr. Johnson:

To assist in your request of promoting the use of electronic communication, can you send a Word version of the Application Document Information Questionnaire? Please see attached pdf document, Appendix 3 – Pre-Application Document Questionnaire - sample.

Thank You,

---Bill Wilde
Minnesota Pollution Control Agency
401 Program
520 Lafayette Road
St. Paul, Minnesota 55155
(651) 757-2825

MPCA Response

Eagle Creek Sartell Hydro, LLC (Sartell Hydro), with assistance from Mead & Hunt, Inc. (Mead & Hunt), is beginning the Federal Energy Regulatory Commission (FERC) relicensing process for the Sartell Hydroelectric Project (Project) located on the Mississippi River in Benton County and Stearns County, Minnesota.

Under FERC regulations, Sartell Hydro must prepare a Notice of Intent (NOI) and Preliminary Application Document (PAD) to provide FERC and other entities with existing, relevant, and reasonably available information pertaining to the Project to help identify additional information needs, develop study requests and study plans, and prepare documents analyzing impacts.

This PAD Information Questionnaire will be used to help identify sources of existing, relevant, and reasonably available information that is not in Sartell Hydro's possession regarding environmental, recreation, and cultural resources in the vicinity of the Projects.

Sartell Hydro is promoting the use of electronic communication and requests all parties who intend to be engaged in the relicensing process provide their email address via this questionnaire. In addition, if you know of any stakeholder(s) not included on the distribution list that may be interested in participating in this proceeding, we kindly ask that you forward the questionnaire on to them. We greatly appreciate your response and assistance with providing information resources and interested parties in this proceeding.

1. Information about the person completing this questionnaire:

   Name: Bill Wilde Title: Environmental Specialist

   Organization: MPCA

   Address: 520 Lafayette Road

   St. Paul, MN 55155

   Phone: (651) 757-2825 Email: william.wilde@state.mn.us

2. Do you or your organization plan to participate in the 3 to 5 year-long licensing proceeding for the Sartell Hydroelectric Project?

   X Yes ☐ No

3. Do you or your organization know of existing, relevant, and reasonably available information that describes the existing or historical environment of the Project (i.e. Project Areas, adjacent Project vicinities or areas upstream of downstream of the Projects)?

☐X Yes ***(Please complete 3a thru 3e)*** ☐ No ***(Proceed to 4 on page 4)***

a. If yes, check box(es) to indicate the specific resource area(s) that the information relates to:

- ☐ Geology and soils
- XX☐Water resources
- ☐ Fish and aquatic resources
- ☐ Wildlife and botanical resources
- XX☐Wetlands, riparian, and littoral habitat
- ☐ Rare, threatened, and endangered species
- ☐ Recreational and land use
- ☐ Aesthetic resources
- ☐ Cultural resources
- ☐ Socio-economic resources
- ☐ Tribal resources
- ☐ Other resource information

b. Briefly describe the information or list available documents:
(Additional information, if any, may be provided on page 4)

See 3e.

c. Where or how can Sartell Hydro obtain this information?

-NA-

Questions 3d – 3e are continued on the following page

d. Please indicate the representative(s) you wish to designate for potential follow-up contact by Sartell Hydro, or their representative, for the resource area(s) checked in 3a: ***(Additional information, if any, may be provided on page 4)***

Representative Contact Information

Name: Same as section 1. Title: _____

Address: _____

_____

Phone: _____ Email: _____

Name: _____ Title: _____

Address: _____

_____

Phone: _____ Email: _____

e. Are you aware of any particular issues pertaining to the specific resource area(s) identified in 3a? ***(Additional information, if any. may be provided on page 4)***

☐ Yes ***(Please list specific issues below)*** ☐ No

Resource Area	**Specific Issue**
Water resources and Wetlands, riparian, and littoral habitat	For more than 30-years under the current FERC license, a bathymetry and sediment accumulation and contamination study was never conducted. However, the MPCA 401 Program believes that for future research and documentation this relicensing process would be an excellent opportunity to establish baseline data and would be of great benefit to future research and historical information.

4. Sartell Hydro intends to request FERC permission to use the Traditional Licensing Process (TLP) for the Projects, rather than FERC's default Integrated Licensing Process (ILP). Do you support use of the TLP process?

☐ Yes XX☐ No ***(Please describe concerns below)***

Traditional Licensing Process Concerns

The MPCA 401 program does not know the specific process for the TLP vs. the ILP. Please send additional information that describes the benefits and detriments of the TLP. In addition to how those benefits and detriments are related to the ILP.

5. Sartell Hydro is interested in any additional comments, questions, or information you may have regarding the licensing of the Projects. If the additional comments, questions, or information you provide below pertain to a particular question, please indicate the applicable question (such as 3b, 3d, 3e).

Additional comments, questions, or information

In the initial review of the Sartell Hydroelectric relicensing project; prior to the release of the formal NOI/PAD; under a possible TLP; the MPCA 401 Program is requesting that the applicant, Eagle Creek Renewable Energy, include in the PAD a Bathymetric Study and the Sediment Accumulation and Contaminant Study.

6. If you do not wish to participate in the relicensing process and would like to be removed from the stakeholder list, please check the box below.

☐ I do not wish to participate, please remove me from the stakeholder list.

Please return this completed questionnaire to Mead & Hunt within 30 days of receipt to allow for follow-up by Sartell Hydro or its representative. *Not responding within 30 days* will indicate you are not aware of any existing, relevant, and reasonably available information that describes the existing environment or known potential impacts of the Hydroelectric Projects.

Please email your responses and/or questions to: Darrin.Johnson@meadhunt.com

Darrin Johnson

From: Darrin Johnson
Sent: Wednesday, January 29, 2020 10:56 AM
To: Wilde, William (MPCA)
Cc: Hotz, Anna (MPCA); Susan Giansante; Shawn Puzen
Subject: RE: Sartell Hydroelectric Project P-8315-MN Relicensing Process
Attachments: TLP versus ILP .docx

Thanks for filling out the questionnaire Bill.

Since you had some questions regarding the differences between the Integrated Licensing Process (ILP) and the Traditional Licensing Process (TLP) I put together the attached factsheet comparing the two licensing processes. While the ILP is currently the default licensing process, in recent relicensings, FERC has trended toward the use of the TLP for smaller, less controversial projects as it allows both the stakeholders and the licensee more flexibility for consultation.

Feel free to contact me if you have any remaining questions regarding either licensing process. Once you have reviewed the differences between the two processes, if you do not oppose use of the TLP, just let us know so we can include the information with our Pre-Application Document and TLP request letter.

Darrin Johnson | FERC Licensing & Compliance
Mead & Hunt | 2440 Deming Way | Middleton, WI 53562
Direct: 608-443-0313 | Mobile: 715-697-3130
Darrin.Johnson@MeadHunt.com | meadhunt.com

From: Wilde, William (MPCA) <william.wilde@state.mn.us>
Sent: Wednesday, January 22, 2020 2:55 PM
To: Darrin Johnson <Darrin.Johnson@meadhunt.com>
Cc: Hotz, Anna (MPCA) <Anna.Hotz@state.mn.us>
Subject: RE: Sartell Hydroelectric Project P-8315-MN Relicensing Process

Hello Mr. Johnson,

Attached is the requested draft questionnaire for the Sartell (FERC) Hydroelectric Relicensing project.

Please let me know if you need additional information from the MPCA 401 water quality program.

Thanks,
---Bill Wilde
Questionnaire
Licensee Response to MPCA
Minnesota Pollution Control Agency
401 Program
520 Lafayette Road
St. Paul, Minnesota 55155
(651) 757-2825

TRADITIONAL LICENSING PROCESS

The Traditional License Process (TLP) is most appropriate for less controversial or less complex projects requiring fewer studies. The process requires a three-stage consultation process with stakeholders including coordination with stakeholders on the pre-filing studies. FERC staff generally is not involved until the license application is submitted. The TLP has fewer set timelines for the pre-filing process, except that the final license application must be filed not later than 2 years prior to the license expiration date for the existing license. TLP pre-filing processes are listed below:

- Applicant files Notice of Intent and Pre-Application Document and requests to use TLP with FERC
- FERC notices NOI/PAD and request to use TLP
- FERC approves use of TLP
- Stage 1 Consultation
  Applicant holds initial information meeting, scoping of environmental issues, and prepares study plans
- Stage 2 Consultation
  Applicant conducts studies, prepares draft license application, and stakeholders provide comments on draft application
- Stage 3 Consultation
  Applicant files final license application
- Post filing process same for ILP and TLP

INTEGREATED LICENSING PROCESS

The Integrated Licensing Process (ILP) is the default licensing process and is most appropriate for projects with complex issues and study needs that require close coordination and cooperation with stakeholders during the pre-filing stage. FERC is an active participant during the pre-filing stage, providing oversight and advice to the applicant and stakeholders. NEPA Scoping is conducted during the pre-filing phase, allowing identification of issues and acting to focus the studies that may be required. FERC makes the final determination on studies that are required. The ILP has specific timelines and filing requirements that all participants must adhere to during pre-and post-filing stages. ILP Pre-filing processes are listed below:

- Applicant files NOI and PAD
- FERC holds tribal consultation meetings
- FERC notices NOI/PAD and conducts scoping, issuing Scoping Document 1
- Participants (including FERC) file study requests and comments on PAD and NOI and Scoping Document 1
- FERC issues Scoping Document 2
- Applicant and participants collaborate on study plan development
- FERC issues a study plan determination
- Applicant conducts studies providing annual updates that include opportunities for participants and FERC to review progress and request modifications
- Draft License application due no later than 150 days before license application is due for review and comment by participants and FERC.
- Applicant files Final License application no more than 2 years prior to license expiration.
- Post-filing process the same for TLP and ILP

Integrated Licensing Process (ILP)	Alternative Licensing Process (ALP)	Traditional Licensing Process (TLP)
Default process	Available upon request and FERC approval	Available upon request and FERC approval
Projects with complex issues and study needs; FERC oversight in prefiling	Projects that effectively promote a self-driven collaborative pre-filing process; some FERC involvement	Projects with less complex issues and study needs; no FERC oversight in pre-filing
Predictable scheduling in both pre-filing and post-filing stages	Collaboratively determined schedule in pre-filing stage	Paper-driven process; no set timeframes
Post filing elements of each process are similar		