Environmental Assessment – Eurasian Watermilfoil / Curlyleaf Pondweed Research and Implementation Project: Phase 2

Sanders County, Montana

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1.0 INTRODUCTION

During the summer of 2007, Eurasian watermilfoil (*Myriophyllum spicatum*) (EWM) was confirmed in both Noxon Rapids and Cabinet Gorge Reservoirs on the Clark Fork River. The reservoirs were created by the operations of Avista Utilities at Noxon Rapids Dam and Cabinet Gorge Dam, respectively, on the Clark Fork River within Sanders County, Montana. This was the first infestation of EWM found in Montana. Inventory data collected in 2008 indicate EWM infests 247 acres and 117 acres in Noxon Rapids and Cabinet Gorge Reservoirs, respectively (Madsen and Cheshier 2009). Montana's Aquatic Nuisance Species Plan lists EWM as a "priority 1B" species with a high potential for invasion. In addition, two other invasive aquatic species, curlyleaf pondweed (*Potamogenton crispus* L.) (CLP) and flowering rush (*Butomus umbellatus* L.) are also present in Noxon Rapids, Cabinet Gorge, and Thompson Falls Reservoirs. EWM and other invasive non-native aquatic plants are a concern because they have the potential to impact aquatic environments and impair recreational resources in Montana. Management of this invasive weed is critical since it is a new invader to Montana, and Idaho has spent over $9 million to control EWM, concentrating efforts in Lake Pend Oreille and the Pend Oreille River, which is directly downstream of Noxon and Cabinet Gorge Reservoirs.

The Eurasian Watermilfoil Task Force (EWMTF) was formed in November 2007 in order to develop and administer methods to control and prevent further spread of EWM (**Table 1-1**). The EWMTF provides collaborative direction for control of EWM in Montana and, in this case, acts as an advisory board to Avista Utilities and the Sanders County Weed District for the implementation of this project. Weed control is most effective when addressed with an Integrated Weed Management (IWM) approach. IWM is a comprehensive approach to weed control suggested in the Montana Weed Management Plan (Montana Noxious Weed Summit Advisory Council and Weed Management Task Force, 2008). Components of IWM may include: education, prevention, mechanical control, biological control, and chemical control. The EWMTF approach to EWM control is an IWM approach, as they have used multiple techniques in an attempt to control the spread of EWM. Some IWM activities that have been completed to date include: installation of fabric barriers to limit EWM spread by fragmentation at "high risk" sites, including boat launches and docks; initiating a public/decision maker education program by hosting public meetings, and conducting public outreach, education, and inspection of watercraft and trailers; and, quantifying EWM infestations on three reservoirs along the lower Clark Fork River. As part of the IWM approach, the EWMTF proposes to study the feasibility of herbicides as a management tool for controlling EWM.

TABLE 1-1
Eurasian Watermilfoil Task Force

Name	Entity	Name	Entity
Brian Burky	Avista Utilities	John Halpop	MSU Extension / Sanders County
Eileen Ryce	Montana Fish, Wildlife and Parks	Jon Hanson	Montana Fish, Wildlife and Parks
Dave Burch	Montana Department of Agriculture	Jim Marshal	Shoreline Users Coalition
Rick Robinson	Shoreline Users Coalition	Pending	Confederated Salish and Kootenai Tribes
Gail Patton	Sanders County Board of County Commissioners	Dale Neiman	Sanders County Weed Board
Jim Dunn	Green Mountain Conservation District	Julie Molzahn	US Forest Service, Cabinet Ranger District
John Sugden	Tri-State Water Quality Council	Mike Chenowith	Sanders County Weed District

This Environmental Assessment (EA) analyzes two alternatives: the no action alternative and the proposed action. The proposed action alternative would allow Avista Utilities, the Sanders County Extension, and the EWMTF to continue with herbicide research within the Noxon Reservoir and, consequently, implement operational herbicide weed control as a portion of an IWM approach within Noxon Rapids and Cabinet Gorge Reservoirs. The proposed action entails three phases: a research phase, an operational herbicide treatment program phase, and a maintenance phase. The proposed action proposes to treat with herbicide up to 200 acres of EWM beds per year over a 10-year period within Noxon Rapids and Cabinet Gorge Reservoirs. Two hundred acres per year was selected as an adequate rate of treatment in order to reach a maintenance level of treatment within three years. Implementation of the proposed action would be directed through the oversight and guidance of the EWMTF. While the Sanders County Extension and Avista Utilities would be the final decision makers regarding the proposed action, the EWMTF would provide oversight and direct a collaborative decision making process.

This EA only evaluates those treatments that are proposed to occur within Montana, and the project area includes Noxon Rapids and Cabinet Gorge Reservoirs which are on the Clark Fork River within Sanders County near the city of Trout Creek, Montana (**Figure 1**).

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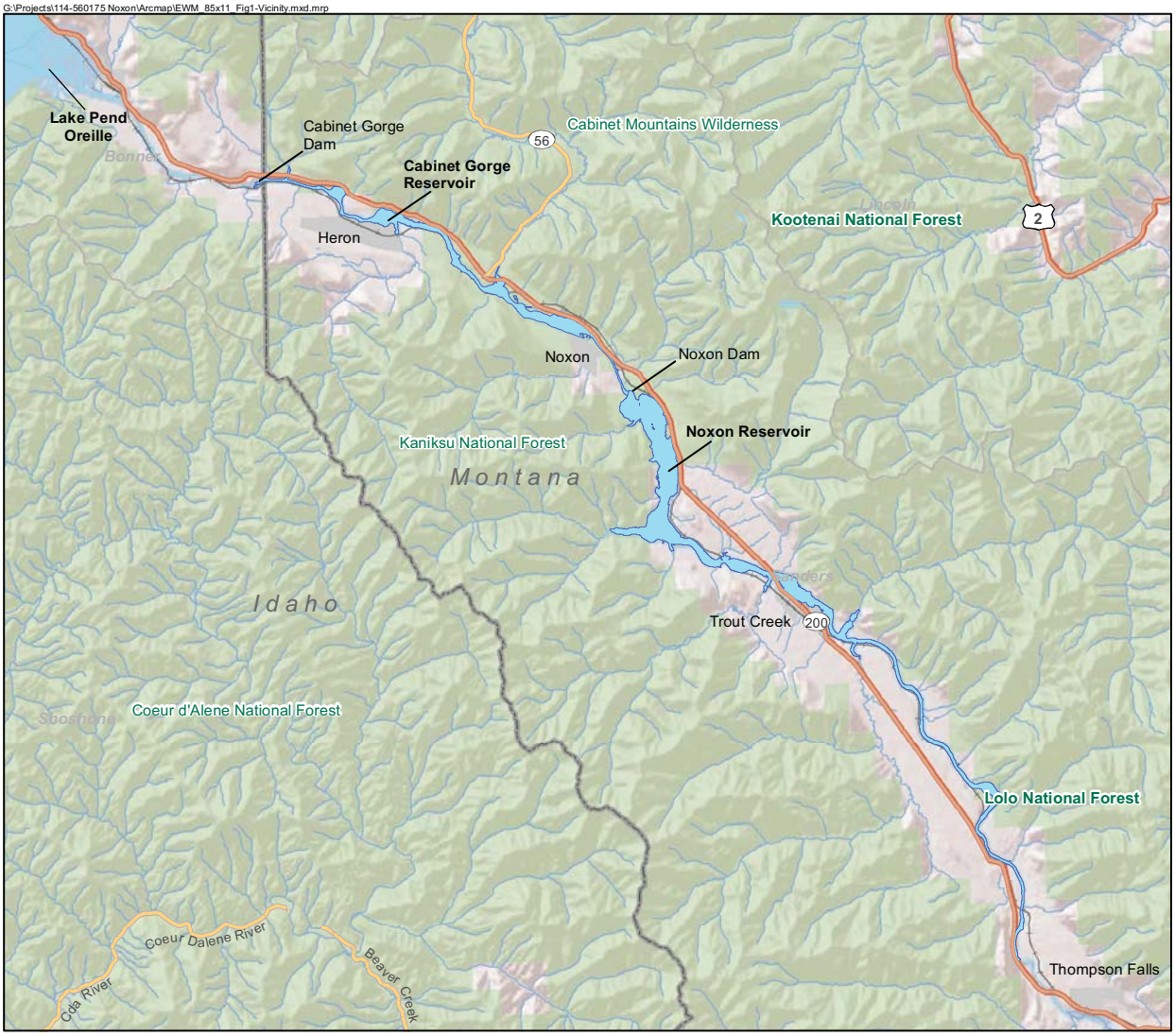

Legend

- Highway
- Major Road
- Municipality
- Stream / River
- Forest Service Land
- State Boundary

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Miles
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May, 2010

Location Map
Eurasian Watermilfoil Study
Noxon and Cabinet Gorge Reservoirs Sanders County Montana

Figure 1

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2.0 PURPOSE AND NEED FOR RESEARCH AND IMPLEMENTATION PROJECT

In 2003, Montana's Aquatic Nuisance Species (ANS) coordinator prioritized water bodies in Montana for risk of non-native aquatic species based on angler/boater use and biotic factors. Results of the prioritization ranking indicated approximately 132 high-risk water bodies in Montana. Thompson Falls, Noxon Rapids, and Cabinet Gorge Reservoirs have historically been considered high-risk sites for EWM introduction and establishment due to proximity to existing infestations in Idaho and high angler/boater use. These areas have been surveyed either annually or biennially for aquatic nuisance species, including EWM, since 2003 through the ANS program. The ANS program first reported EWM in Noxon Rapids and Cabinet Gorge Reservoirs in 2007.

The potential negative impacts caused by EWM and the ease with which the weed is spread, increases the importance of containing existing infestations in Montana to protect non-infested water bodies. Infestations of EWM are known to occur in adjoining states of Idaho, North Dakota, and South Dakota, and provinces of British Columbia, Alberta, and Saskatchewan, Canada. Both Idaho and North Dakota have active management programs to reduce density and abundance of the weed. As a headwater state, it is critical for Montana to develop and implement a strategy to reduce impacts and potential for invasion to downstream waterways. In addition, there is risk for movement within Montana due to high angler/boater use in both Noxon Rapids and Cabinet Gorge Reservoirs.

The objective of the EWMTF is to develop and administer methods to control and prevent further spread of EWM. Weed control is proven to be most effective when addressed with an IWM approach. As previously discussed, IWM is a comprehensive approach to weed control suggested in the Montana Weed Management Plan (Montana Noxious Weed Summit Advisory Council and Weed Management Task Force 2008). Components of IWM can include: education, prevention, mechanical control, biological control, and chemical control. The EWMTF has identified the IWM approach as the most effective approach for dealing with EWM as it uses multiple techniques in an attempt to control the spread of the weed.

As part of the IWM approach, the following activities have been conducted at Noxon Rapids and Cabinet Gorge Reservoirs since EWM was initially reported in 2007 to address management criteria set forth in the Montana Aquatic Nuisance Species Plan:

1) Task force was formed to direct management of EWM and other non-native aquatic plants;
2) Systematic aquatic vegetation inventory of Noxon Rapids, Cabinet Gorge, and Thompson Falls Reservoirs was completed in August 2008 and updated in 2009 by Dr. John Madsen of Mississippi State University;
3) 31,000 square feet of barrier fabric was installed at high risk locations, including Forest Service boat ramp sites;
4) A public informational meeting was held with stakeholders, local and state decision-makers, the general public, and experts on non-native aquatic vegetation in August 2008;

5) A statewide invasive aquatic plant plan (that includes EWM) is being written;

6) Three, seasonal boat-wash stations were set up to reduce the spread of EWM to other water bodies;

7) A public education program on EWM was initiated in 2009 for Noxon Rapids and Cabinet Gorge Reservoirs, and is being expanded in 2010 with funding from the Montana Noxious Weed Trust Fund and Task Force partners. The program includes employment of a EWM Education Coordinator, public tours and programs, developing educational material, newsreleases, and watercraft/boat inspection; and,

8) In 2009, a dye and herbicide research trial (Phase 1 of this project) on EWM and CLP on up to 40 acres in Noxon Rapids Reservoir was completed. The purpose of this research was to determine effectiveness of herbicide treatment for selectively controlling invasive non-native aquatic plants and feasibility of including herbicides in an IWM approach.

In addition to the activities listed above, further research is needed to determine effectiveness of several US Environmental Protection Agency (EPA) approved and labeled herbicides as part of an IWM approach to control EWM and CLP. The purpose of the EA would be to identify and review environmental effects of conducting Phase 2 of the herbicide research trial and an operation herbicide treatment program on EWM and CLP on up to 200 acres per year in Noxon Rapids and Cabinet Gorge Reservoirs. Phase 2 research is being funded by a Montana Department of Natural Resources, U.S. Army Engineer Research and Development Center Grant, and Conservation Reclamation and Development Grant and a Noxious Weed Trust Fund (NWTF) Grant. Results from evaluations of Phase 1 and 2 (2009-2010) would be utilized in developing a long-term, cost effective operational program for managing non-native aquatic plants in Noxon Rapids and Cabinet Gorge Reservoirs. In addition, results could be applied to develop site-specific evaluations and operational control programs for other Avista Utilities systems in the region including Lake Coeur d'Alene and Lake Spokane.

2.1 PUBLIC INVOLVEMENT AND SCOPING

Public input regarding the proposed alternatives was encouraged through the public scoping process. The official scoping comment period occurred from February 16, 2010 through March 22, 2010. Two public meetings in towns near the reservoirs were scheduled to determine the scope of the EA and to identify issues to be addressed by the EA.

The general public was notified by announcements sent to the Thompson Falls Sanders County Ledger (http://www.scledger.net/) and The Missoulian (http://www.missoulian.com). A notice and scoping document were also posted on the Sanders County Extension website (http://www.co.sanders.mt.us/Pages/ExtensionMSU.html) and on the Noxon Cabinet Shoreline Coalition's website (www.ncshorelines.com). Two public meetings were held on March 11, 2010, and attendees were documented by signing in on a voluntary sign-in sheet at the respective public meetings. There were 25 attendees and three individuals who attended both of the public meetings. A total of 59 letters and comment forms were sent by mail to interested parties before the public scoping meetings.

The purpose of the public meetings was to help determine the scope of the EA and identify issues to be addressed by the EA. Individuals providing verbal comments at the meetings were requested to provide a copy of their comments for the record. Written comments at the meetings were accepted, along with emailed or mailed comments, through March 22, 2010.

TABLE 2-1
Public Scoping Meeting Dates, Locations, and Attendance

Meeting Date / Time	Meeting Location	Meeting Location Address	Number Signed In
Thursday, March 11, 2010, 10 AM to 12 PM	Noxon	Emergency Services Building, 401 Noxon Ave	12
Thursday, March 11, 2010, 6 PM to 8 PM	Thompson Falls	Courtroom of the Sanders County Courthouse, 1111 Main St.	13
		Total	**25**

A representative from the EWMTF was present at each meeting to provide a brief description of the proposed research project. There was also a brief presentation regarding the EA process. After presentations, attendees had the opportunity to speak with the EWMTF technical staff and submit written comments.

The EWMTF received many comments during the public scoping meeting. After the public scoping meetings, a total of 13 comment forms and letters were received during the public scoping period either by mail or email.

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3.0 ALTERNATIVES

3.1 ALTERNATIVE 1: NO ACTION ALTERNATIVE

Under the no action alternative, there would be no continuation of herbicide application research and no herbicide treatment of EWM and CLP within Noxon Rapids and Cabinet Gorge Reservoirs. Therefore, the feasibility of using herbicides as a part of an IWM approach for controlling EWM would not be known. The EWM infestation would be allowed to persist within the Noxon Rapids and Cabinet Gorge Reservoirs and could potentially spread to other waterways within Montana.

3.2 ALTERNATIVE 2: PROPOSED ACTION FOR RESEARCH AND IMPLEMENTATION OF HERBICIDES

The proposed action alternative would allow Avista Utilities, the Sanders County Weed District, and the EWMTF to continue with herbicide research within Noxon Reservoir and, consequently, implement operational herbicide weed control as a portion of an IWM approach within both Noxon Rapids and Cabinet Gorge Reservoirs. The proposed research, implementation and maintenance would occur over the next ten years. Research within Noxon Rapids Reservoir is proposed to continue during the summer of 2010, and research could potentially be required during the summer of 2011. Implementation of herbicide treatments within known EWM beds (**Figure 2**) would occur within the three to four years following the completion of research. CLP would also be treated where it coexists with EWM; however, CLP beds in the absence of EWM would not be identified as treatments areas for the proposed action. Herbicide treatment would be followed by five years of maintenance herbicide treatments. Treatments during the maintenance phase of the project could occur anywhere within the reservoirs that EWM is identified. Potential habitat for EWM (i.e., water depths less than 30 feet) is presented on **Figure 3**. Herbicide treatments could occur on up to 200 acres within any given year depending on need and available funds. Two hundred acres per year was selected as an adequate rate of treatment in order to reach a maintenance level of treatment within three years. This was based on an estimation of a 2010 infestation size of approximately 440 acres, a EWM spread rate of 10 percent, and acres requiring retreatment of approximately 15 to 20 percent. These estimates were based on previous monitoring data (Madsen and Cheshier 2009; Wersal et al. 2009).

While the Sanders County Weed District and Avista Utilities would be the final decision makers regarding the proposed action, the EWMTF would provide oversight and direct a collaborative decision making process. The EWMTF would work with a Technical Advisory Committee that would monitor results of management efforts and help guide and implement adaptive management. The Technical Advisory Committee would include resource professionals associated with the signatories to the Clark Fork Settlement Agreement. Members may also include but are not limited to federal, state and local government agencies, nonprofits, non-government organizations, tribes, and others with expertise in fisheries biology/ecology, aquatic plant biology/ecology, water resources, water quality, and other disciplines to address management program components.

RESEARCH PHASE

EWM and CLP are increasingly problematic in the Pacific Northwest, with significant nuisance populations already formed in reservoirs of the Lower Clark Fork River (Madsen and Cheshier, 2009). Run of the river reservoirs have presented consistent challenges in achieving effective and efficient control of invasive submersed aquatic plants. Herbicide treatments in flowing

water have often been inconsistent and unpredictable which has led to increased interest in developing cost effective and efficacious operational recommendations for these systems. Run of the river reservoirs typically have variable water exchange patterns. Ultimately, water exchange will impact aqueous distribution of herbicides often resulting in reduced chemical

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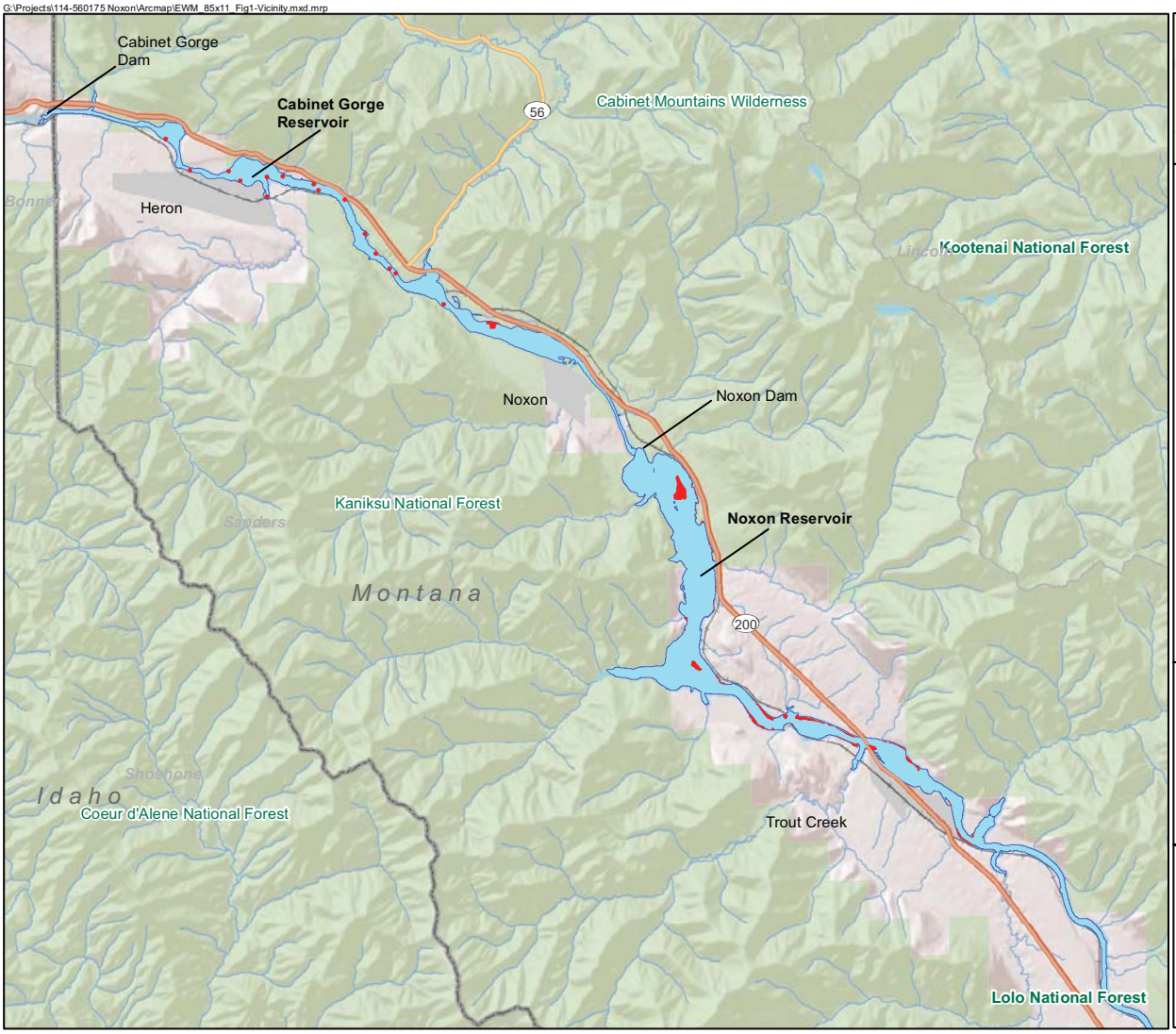

Legend

- Highway
- Major Road
- Municipality
- Stream / River
- Forest Service Land
- State Boundary
- Eurasian Watermilfoil Infested Area

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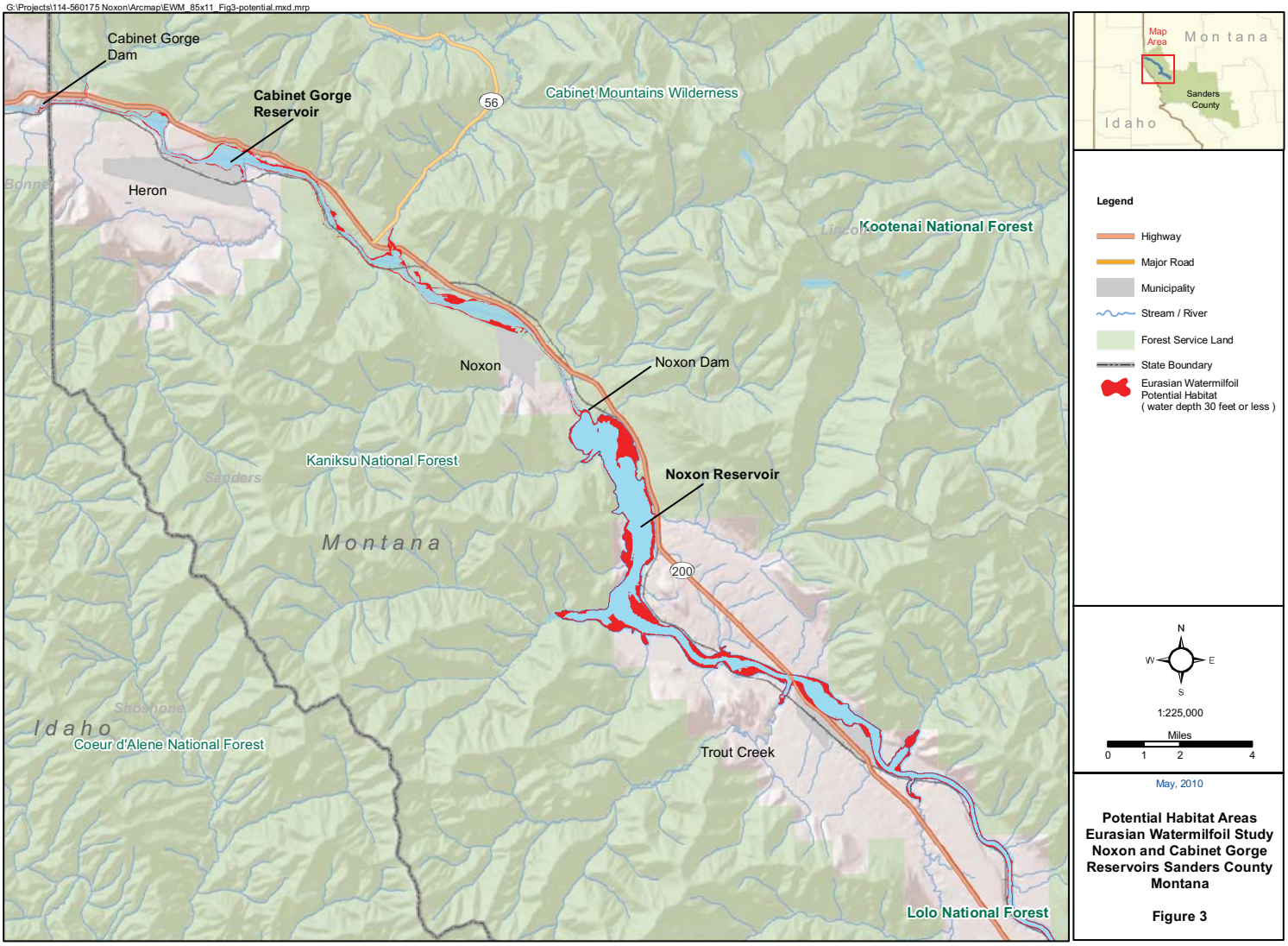
May, 2010

Infested Areas Eurasian Watermilfoil Study Noxon and Cabinet Gorge Reservoirs Sanders County Montana

Figure 2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Cabinet Gorge Dam
Cabinet Gorge Reservoir
56
Cabinet Mountains Wilderness
Heron
Kootenai National Forest
Noxon
Noxon Dam
Kaniksu National Forest
Noxon Reservoir
Montana
200
Idaho
Coeur d'Alene National Forest
Trout Creek
Lolo National Forest
Map Area
Montana
Idaho
Sanders County
Legend
Highway
Major Road
Municipality
Stream / River
Forest Service Land
State Boundary
Eurasian Watermilfoil Potential Habitat (water depth 30 feet or less)
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0 1 2 4
May, 2010
Potential Habitat Areas Eurasian Watermilfoil Study Noxon and Cabinet Gorge Reservoirs Sanders County Montana
Figure 3

exposure times against target plants and unacceptable control. Herbicide concentration exposure time (CET) relationships designed to provide excellent plant control have been developed specifically for endothall and triclopyr (Netherland et al. 1991; Netherland and Getsinger 1992). However, these studies and relationships were derived in small scale controlled settings; therefore, further research is needed to understand water exchange characteristics that are site specific for a given waterbody.

Phase 1 water-exchange and herbicide trials, including vegetation and water quality monitoring, were conducted on two 20-acre plots in Noxon Rapids Reservoir during July and August 2009. Based on results of Phase 1, the proposed Phase 2 work would study and evaluate additional environments on the reservoir. The Phase 1 and Phase 2 efforts would serve to refine selective herbicide techniques to control EWM and CLP, information which would be critical in developing an operational herbicide treatment program as a component of an IWM approach to address these invasive aquatic plants in Montana. Federal, state and local governmental and non-governmental entities are actively working together with the EWMTF. This group will provide guidance and direction to Avista Utilities and Sanders County Weed District for coordination and implementation of the proposed project as part of an IWM approach that includes herbicide studies, biological controls, bottom barrier applications, and public education and outreach.

The objectives of the research proposed for 2010 (and potentially 2011) would be to:

1) determine water exchange processes in large contiguous aquatic plant stands in areas of Noxon Reservoir infested with EWM and CLP;

2) utilize that information to refine species selective control techniques of those invasive plants using preferred herbicide formulations and prescriptive application methods; and

3) quantitatively assess herbicide efficacy and response of both invasive and native aquatic plants to herbicide treatments.

Techniques would be based on study results that demonstrate optimal seasonal timing, efficient rates for EWM and CLP control, impacts on non-targeted vegetation and cost effectiveness.

All herbicides, formulations, application rates, evaluation sites, application techniques and applicators, and vegetation assessment methods would be selected and approved by the EWMTF, principal investigators, and other technical advisors as appropriate. Quality control and project oversight by the principal investigators and EWMTF would maintain the scientific integrity of the work and ensure that Phase 2 results could be compared with previous studies on Noxon Rapids Reservoir and similar sites.

The research activities would occur from April through February. Spring months would involve project planning, permitting, and contracting; late summer (July/August) would entail vegetation assessments, herbicide/dye applications, and evaluation; and, fall months would involve post-treatment vegetation assessments, post-treatment analysis, and reporting.

The following proposed herbicides would be used for both the research phase and the operational herbicide treatment phase of the project:

- liquid diquat (Reward);
- liquid endothall (Aquathol K);

- liquid diquat (Reward) + liquid endothall (Aquathol K);
- granular endothall (Aquathol Super K);
- triclopyr; and
- other combinations of above compounds as appropriate.

The proposed herbicides have been approved and registered for aquatic use by the EPA and the Montana Department of Agriculture. Additional aquatic herbicides, other than those listed above, may be used for future treatments although only those herbicides approved and registered by the EPA and Montana Department of Agriculture would be used. These herbicides have been studied extensively prior to EPA approval and have very defined criteria for application rates in order to ensure that they are not toxic to humans, fish, invertebrates, or other animals. All herbicide labels would be strictly followed for both the research phase and the operational treatment phase of the proposed action. Refer to **Appendix A** for herbicide labels.

During treatment implementation, the public would be made aware of the herbicide application via mailings and posting such as: public notices would be posted along access points and boat ramps during treatment implementation; a public notice would be published in the local paper informing people of upcoming treatments; the shoreline users group would be contacted prior to treatments; and, public notices would be mailed out to all Avista permit holders. These public notices would inform the public when it would be safe to use the water within treatment areas, specifying timing for swimming, fishing, drinking, or irrigation. In addition, when herbicide labels indicate a swimming or fishing restriction, marker buoys would be placed within area of treatment informing recreationists of restrictions.

The research activities would be addressed under three tasks. For a more detailed description of the research activities, refer to the grant proposals in **Appendix B.**

Task 1 would focus on water exchange characteristics with the goal of this task being to determine water exchange rates at specific sites to improve EWM and CLP treatment efficacy. Data from the water exchange studies would be used to improve planned operational herbicide treatments that would be conducted shortly following completion of data analysis of water exchange operations. Data would aid in future site selection, herbicide application timing, herbicide selection, and determination of appropriate herbicide rates as dictated by water exchange. This data would provide necessary information to make future herbicide applications more efficacious and cost effective.

Task 2 would entail herbicide applications based upon site-specific water exchange characteristics. The goal of this task would be to utilize data collected during the above described water exchange studies to maximize treatment efficacy of herbicide applications to control EWM and CLP. Treatment timing would be based upon data from water exchange studies and discharge patterns from Noxon Rapids and Cabinet Gorge Dams to determine a time of minimal discharge to increase herbicide contact time in the treatment areas. Project investigators, Sanders County and the EWMTF would work with Avista Utilities if a change in dam operations is needed to maximize herbicide effectiveness. Herbicide applications would be conducted in the sites utilized for the water exchange study, with the addition of untreated reference plots for comparison. Combinations of the various proposed herbicides would be used within different treatment plots. Herbicide rates would be determined following evaluation of the water exchange data and would be based upon concentration exposure time relationships already determined for endothall and triclopyr (Netherland et al., 1991; Netherland and

Getsinger, 1992). In addition, quantitative pre- and post-treatment assessments of the aquatic plant community would occur four weeks after treatment (WAT) and 52 WAT. These assessments would be conducted to document efficacy on target plants and impacts on non-target vegetation.

Under the proposed action, results from evaluations of Phase 1 and 2 (2009-2010) could be utilized in developing a long-term, cost effective operational program for managing non-native aquatic plants in Noxon Rapids and Cabinet Gorge Reservoirs. For more comprehensive descriptions of the proposed 2010 research, see **Appendix B** Grant Proposals, which details proposed 2010 activities.

Task 3 would entail EWM/CLP treatment evaluation. The goal of this task would be to quantitatively assess effectiveness of herbicide applications for control of EWM and CLP, based upon site specific water exchange characteristics. Unlike terrestrial systems, plants are not readily observable in aquatic environments and alternative methods to sample aquatic plants must be utilized other than relying on visual estimation. Point intercept surveys would be conducted using no less than 30 sample points within each treatment area including the untreated reference sites.

IMPLEMENTATION OF HERBICIDE TREATMENT

The implementation phase of the proposed action allows for the application of an operational herbicide treatment program within Noxon Rapids and Cabinet Gorge Reservoirs. Information gained from the Phase I research treatments that occurred within the summer of 2009, and the proposed Phase 2 research treatments that would occur during the summer of 2010 and potentially 2011, would be used to develop the operational herbicide treatments which would be a critical component of an IWM approach. The research treatments entailed water-exchange and herbicide trials with follow-up vegetation and water quality monitoring.

The operational herbicide treatments would occur for three to four years (2011 to 2014) depending on whether it is determined that additional research needs to be completed during 2011. Herbicide treatment timing and application rates would be based upon data from water exchange studies and discharge patterns from Noxon Rapids and Cabinet Gorge Dams to determine a time of minimal discharge to increase herbicide contact time in the treatment areas. Treatment application would occur utilizing similar methods as described for the Phase 2, 2010 research treatments. Herbicide applications would be made using deep-water precision application technology and/or traditional subsurface application methods (e.g. airboat fitted with boom and weighted trailing hoses, and/or granular spreaders or inductors). Up to 200 acres of EWM beds could be treated within a year. CLP would also be treated where it coexists with EWM; however, CLP beds in the absence of EWM would not be identified as treatments areas for the proposed action.

The water quality monitoring program implemented during the operational phase of the project would meet the guidelines set by the National Pollutant Discharge Elimination System (NPDES) and the Montana Department of Environmental Quality (MDEQ) Montana Pollutant Discharge Elimination System (MPDES) standards. The Environmental Protection Agency (EPA) is expected to finalize their NPDES guidelines for aquatic herbicides in April 2011. The MDEQ would tier to these standards and may add additional standards. Vegetation monitoring during the operational phase would occur at selected points within the reservoir to determine the

effectiveness of the herbicide treatments. These monitoring points would be selected based on effectiveness of treatments and rate of spread of EWM.

The application rates and application techniques would follow methods and rates outlined in the proposed research portion of the proposed action. The proposed action assumes that the research results would recommend no significant increases in these rates or changes in application methods or areas. If the methods or rates increase substantively, then another environmental review may be warranted.

Federal, state and local governmental and non-governmental entities are actively working together with the EWMTF. This group serves to provide guidance and direction to Avista Utilities and Sanders County Weed District for coordination and implementation of the proposed project as part of an IWM approach that includes herbicide studies, biological controls, bottom barrier applications, and public education and outreach.

All herbicides, formulations, application rates, evaluation sites, application techniques and applicators, and vegetation assessment methods would be selected and approved by the EWMTF, principal investigators, and other technical advisors as appropriate. Quality control and project oversight by the principal investigators and EWMTF would maintain the scientific integrity of the work.

The herbicide treatment activities would occur from April through February. Spring months would involve project planning, permitting, and contracting; mid- to late-summer (late June/August) would entail vegetation assessments, herbicide/dye applications, and evaluation; and fall months would involve post-treatment vegetation assessments, post-treatment analysis, and reporting.

The following proposed herbicides would be used for the operational herbicide treatment phase of the project:

- liquid diquat (Reward);
- liquid endothall (Aquathol K);
- liquid diquat (Reward) + liquid endothall (Aquathol K);
- granular endothall (Aquathol Super K);
- Triclopyr; and,
- other combinations of above compounds as appropriate.

All the proposed herbicides have been approved and registered for aquatic use by the US Environmental Protection Agency (USEPA) and the Montana Department of Agriculture. Other aquatic herbicides than those listed above may be used for future treatments although only those herbicides approved and registered by the USEPA and Montana Department of Agriculture would be used. These herbicides have been studied extensively prior to USEPA approval and have very defined criteria for application rates in order to ensure that they are not toxic to humans, fish, invertebrates or other animals. All herbicide labels would be strictly followed for both the research phase and the operational treatment phase of the proposed action. Refer to **Appendix A** for herbicide labels.

The public would be made aware of the herbicide application via mailings and posting such as: public notices would be posted along access points and boat ramps during treatment implementation; a public notice would be published in the local paper informing people of upcoming treatments; the shoreline users group would be contacted prior to treatments; and, public notices would be mailed out to all Avista permit holders. These public notices would inform the public when it would be safe to use the water within treatment areas, specifying timing for swimming, fishing, drinking, or irrigation. In addition, when herbicide labels indicate a swimming or fishing restriction, marker buoys would be placed within area of treatment informing recreationists of restrictions.

MAINTENANCE TREATMENTS

The maintenance phase of the proposed action would entail follow-up herbicide treatments of EWM within Noxon Rapids and Cabinet Gorge Reservoirs. These treatments would occur once a year, probably during late June through July and possibly in fall and up to 200 acres could receive treatment. It is assumed that during this phase, the current EWM infestation areas would be reduced or controlled and the maintenance treatments would focus on maintaining control of EWM beds with the goal of reducing the number and size of existing beds and new beds within the reservoirs. Therefore, herbicide treatments could occur anywhere where potential EWM habitat occurs (shallow water less than 30 feet deep) (**Figure 3**). The treatment methods and herbicides would be consistent with those methods used during the research and operational herbicide treatment phase of the project, although new herbicides may be used if they are approved by the EPA and the Montana Department of Agriculture for aquatic use. As with the other two phases of the project, an adaptive and collaborative process would be used and the EWMTF would direct the maintenance treatments.

4.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

This section describes the current environmental conditions and environmental consequences of implementing the proposed action and no action alternatives. For each resource, current conditions are described, followed by the direct, indirect and cumulative effects of the no action and proposed action alternatives. The direct and indirect effects of the no action alternative and cumulative effects are described to provide a baseline for evaluating effects of the action alternative. Direct effects are those effects that result from an action at the same time and place that the action occurs. Indirect effects are effects that result from an action but occur at a different time or place. Cumulative effects are the additive effects of the action and other ongoing and reasonable foreseeable activities.

4.1 EXISTING AQUATIC WEED INFESTATIONS

ANALYSIS AREA

The analysis area for existing aquatic weed infestations is Noxon Rapids and Cabinet Gorge Reservoirs. Noxon Rapids Reservoir is the area of the proposed research and where the dye/herbicide research project was initiated in July, 2009. However, both Noxon Rapids and Cabinet Gorge Reservoirs would be included in the project area for the implementation of the operational weed treatment program.

AFFECTED ENVIRONMENT

EWM and CLP are non-native, submersed, perennial aquatic plants that can form dense mats of vegetation in the littoral zone on the water's surface. EWM is native to Europe, Asia, and Northern Africa and was likely introduced into the United States in the late 1880's in the Chesapeake Bay Area by a ship ballast (Aiken et al. 1979). The first documented discovery was in 1942 in Washington, D.C. (Couch and Nelson 1985). CWP, a native to Eurasia, Africa, and Australia, was accidentally introduced to United States waters in the mid-1880's from the use of it as an aquarium plant (Wisconsin Department of Natural Resources 2008). Infestations of EWM are known to occur in adjoining states of Idaho, North Dakota, and South Dakota, and provinces of British Columbia, Alberta, and Saskatchewan, Canada. In Montana, EWM was first confirmed at the Trout Creek Recreation area at Noxon Rapids Reservoir in June 2007. CLP has been reported in all of the United States with the exception of Maine and South Carolina.

Under the Montana state classification system, noxious weeds are divided into five priority levels based on the distribution of infestations in the state and management criteria needed to control their spread. They are modified and updated as needed by the Statewide Noxious Weed List Advisory Committee, and determined by Rule of the Montana Department of Agriculture (MDA) under the provisions of the Montana County Weed Control Act. This classification ranks EWM and CLP as Priority 1B noxious weeds in Montana, which includes weeds that have limited infestations. Management criteria for Priority 1B noxious weeds include public awareness and education, early detection, and immediate action to contain and possibly eradicate infestations.

In 2008, a vegetation inventory of Noxon Rapids, Cabinet Gorge, and Thompson Falls Reservoirs was completed. This survey recorded an abundance of native vegetation at Noxon Rapids Reservoir in the littoral zone, especially in the downstream two-thirds (Madsen and

Cheshier 2009). Four dense beds of EWM with several areas of moderate to scattered plants were recorded. CLP was found in narrow bands along the shore in moderate to dense patches throughout the reservoir. Cabinet Gorge Reservoir had widespread native vegetation, especially in the upstream segment, with scattered to moderate densities of EWM and CLP throughout. Compared to Noxon Rapids, Cabinet Gorge had fewer areas of EWM and was found to be more prevalent in the upstream portion of the reservoir (Madsen and Cheshier 2009). This survey also quantified the presence and location of flowering rush (a Priority 1B noxious weed in Montana) (Madsen and Cheshier 2009) (**Table 4-1**).

TABLE 4-1
Acreage Infested by Invasive Aquatic Plants Within Lower Clark Fork Reservoirs (Madsen and Cheshier, 2009)

Aquatic Weed	Cabinet Gorge	Noxon Rapids	Thompson Falls
Eurasian Watermilfoil	117	247	0
Curlyleaf Pondweed	195	401	72
Flowering Rush	0	46	8

Flowering rush was observed established in Cabinet Gorge, but was not within the point intercept survey.

In 2009, Wersal et al. conducted a survey to assess the aquatic plant community in Noxon Rapids Reservoir to quantify changes in community composition between 2008 and 2009. Preliminary data from this report estimates that in 2008, EWM occupied 247 acres with 323 acres estimated in 2009, a difference of 24% as determined by point intercept surveys. Based on these survey results, EWM populations are of concern because, if left untreated, an additional 70 acres could be present in Noxon Rapids Reservoir in 2010 bringing the total EWM acreage to approximately 400 based upon estimates from 2008 and 2009 (Wersal et al. 2009). Though data from other Pacific Northwest waterbodies indicates that EWM has a spread rate of 8 to 10% (Woolf pers. comm.), which would equate to an additional 31 acres of EWM in Noxon Rapids Reservoir if the current population is not addressed. In Lake George, New York, the colonization rate of EWM was estimated to be between 10 and 19% (Madsen et al. 1988). Therefore, given data from other oligotrophic lakes, a spread rate of 10% is a likely continuing rate of spread for Eurasian watermilfoil in this system.

ENVIRONMENTAL CONSEQUENCES

Alternative 1: No Action

Direct and Indirect Effects

Under the no action alternative, the proposed herbicide research and operational treatment project on EWM and CLP would not occur. Further determination on the effectiveness of herbicide treatment on controlling invasive, non-native, aquatic plants and the feasibility of including herbicides in an IWM approach would remain unknown and development of a long-term, cost effective operational program for managing non-native aquatic plants in Noxon Rapids and Cabinet Gorge Reservoirs would not occur. Existing aquatic weeds in Noxon Rapids and Cabinet Gorge Reservoirs would continue to expand with a significant potential to spread to other water bodies in Montana. Noxon Rapids and Cabinet Gorge Reservoirs would not likely remain in their current condition and would likely continue to experience an increase in weed infestation.

Cumulative Effects

The no action alternative would allow for the continuation of aquatic weed infestations and the potential spread of EWM and CLP to additional water bodies within Montana. EWM is becoming a wide spread concern in the Pacific Northwest that has significant established populations already formed in reservoirs of the Lower Clark Fork River (Madsen and Cheshier 2009). These weedy species could spread into adjacent public and private areas that are currently not infested. Expansion could cause ecological problems that displace aquatic native plant communities, fisheries and aquatic recreational activities. In dense mats, algae blooms could occur from an increase in phosphorus as a result of the plants dying back mid to late summer. In addition, the cost of weed control could increase significantly over time as current aquatic weed infestations expand and new areas are impacted.

Alternative 2 - Proposed Action

Direct and Indirect Effects

The proposed action would allow Avista Utilities, Sanders County Weed District, and the EWMTF to conduct Phase 2 of the herbicide research and implementation of an operational herbicide treatment program on EWM and CLP on up to 200 acres per year in Noxon Rapids and Cabinet Gorge Reservoirs. The purpose of this proposed research project and implementation of annual herbicide treatments would be to demonstrate, evaluate, and refine strategies for using herbicides for selective control of EWM and CLP in Noxon Rapids and Cabinet Gorge Reservoirs. Under the proposed action, results from evaluations of Phase 1 and 2 (2009-2010) could be utilized in developing a long-term, cost effective operational program for managing non-native, aquatic plants in the reservoirs. Implementation of an operational herbicide treatment program would control the spread of EWM and reduce the size of current infestations. Treatments would likely prevent the spread of EWM to other Montana water bodies; thus, protecting the health of aquatic plant communities. In addition, the results from the research and treatment could be applied to develop site-specific evaluations and operational control programs for other Avista Utilities systems in the region and other Montana water bodies.

Cumulative Effects

The knowledge gained from completion of the proposed action may be used to develop effective herbicide prescriptions to control EWM and CLP within Noxon Rapids and Cabinet Gorge Reservoirs and similar flowing water habitats. The cumulative effects of the proposed action would be the protection of Montana water bodies and downstream water bodies in nearby states from EWM and CLP infestations since Montana is a headwaters state. Results from this research and implementation could provide protection for resources such as fish habitat, native plant communities, and recreation and provide guidance for further treatments and monitoring.

4.2 VEGETATION

ANALYSIS AREA

The analysis area includes the vegetation communities within Noxon Rapids and Cabinet Gorge Reservoirs.

AFFECTED ENVIRONMENT

In 2008, Madsen and Cheshier (2009) surveyed Noxon Rapids and Cabinet Gorge Reservoirs for aquatic weed and native plant species. Using the point intercept method for the littoral zone

at depths of less than 25 feet, they found a mosaic of native plants that included: elodea, native pondweeds, and coontail. Overall, plant species richness at both reservoirs was moderate to high, with an average of 1.7 species per point at Cabinet Gorge Reservoir and 2.25 species per point at Noxon Rapids Reservoir. Native plant richness was 1.30 species per point at Cabinet Gorge and 1.91 species per point at Noxon Rapids. Invasive species comprised only a small component of the community for both reservoirs, averaging 0.35-0.40 species per point (Madsen and Cheshier, 2009). In Cabinet Gorge Reservoir, vegetation was lacking at areas with less than one foot of water and common at depths from 1-12 feet, with less frequency beginning at 12 feet. CLP was encountered predominantly at depths between 3-12 feet and EWM at depths between 1-11 feet. In Noxon Rapids Reservoir, vegetation was observed at all depths of up to 15 feet, common to 20 feet, and present at the deepest recorded occurrence of 24 feet. **Table 4-2** displays a list and percentage of vegetation Madsen and Cheshier (2009) encountered in the littoral zone (<25 feet) at Cabinet Gorge and Noxon Rapids Reservoirs.

TABLE 4-2
Vegetation In Noxon Rapids and Cabinet Gorge Reservoirs
(Madsen and Cheshier, 2009)

Common Name	Scientific Name	Cabinet Gorge Percent	Noxon Rapids Percent
Flowering Rush	*Butomus umbellatus* L	0	2.3
Coontail	*Ceratophyllum demersum* L.	35.3	23.9
Chara	*Chara* sp.	1.4	21.5
Elodea	*Elodea canadensis* Michx.	38.1	37.7
Yellow stargrass	*Heteranthera dubia* (Jacq.)MacMill.	0.7	6.9
Northern watermilfoil	*Myriophyllum sibiricum K*marov	12.2	21.5
Eurasian watermilfoil	*Myriophyllum spicatum* L.	15.1	12.3
Nitella	*Nitella* sp.	0.7	2.3
Curlyleaf pondweed	*Potamogeton crispus* L.	25.2	20.0
Leafy pondweed	*Potamogeton foliosus* Raf.	5.8	25.4
Illinois pondweed	*Potamogeton illinoensis* Morong	2.2	1.5
Richardson's pondweed	*Potamogeton richardsonii* (Benn.) Rydb.	14.4	13.1
Flatstem pondweed	*Potamogeton zosteriformis* Fernald	7.2	2.3
White watercrowfoot	*Ranunculus aquatilis* L.	2.2	3.1
Boerner Sago pondweed	*Stuckenia pectinata* (L.)	4.3	30.8
Water celery	*Vallisneria americana* Michx.	Not observed	0.8

In 1993 and 1994, cover type mapping, rare threatened and endangered plants and wetland delineations, and functional assessment were initiated for areas surrounding Noxon Rapids and Cabinet Gorge Reservoirs. These areas were mapped using aerial photography and ground truthing. Cover type mapping identified 12 basic cover type and land use classifications for the area (**Table 4-3**) (WWP 1995). For a more detailed discussion of survey results and a comprehensive list of plant species observed in the project area, please refer to Northrop, Devine, and Tarbell, Inc. (1995) botanical resources study and the 1994 Wetlands Mapping and Assessment Study Reports available from Washington Water Power Company (Avista Utilities predecessor company).

TABLE 4-3
Cover Type and Land Use Classification for Noxon Rapids and Cabinet Gorge Reservoirs (WWP1995)

Cover Type	Dominating Species
Softwood forest	Douglas fir, western larch, lodgepole pine, western white pine, ponderosa pine, western red-cedar, western hemlock, and Engelmann spruce.
Hardwood forest	Alder, willow, mountain maple, hawthorn, dogwood, elderberry, serviceberry, and ninebark.
Mixed softwood/hardwood forest	Consists of softwood and hardwood forest species mentioned above.
Disturbed area	Thistles, oxeye daisy, St. John's wort, spotted knapweed, common mullein, and sweet clover.
Wetland	Sedges, spikerush, bullrush, rushes, willows, monkey flower, cattail.
Recreational area	Typically located under softwood forest areas.
Agricultural area	Hayfields and grazing pastures.
Urban/other	Small plots surrounded by softwood forest.
Gravel pit	Sparsely vegetated.
Gravel bars	Located in the reservoir and downstream river waters.
Steep/rocky terrain	Sparsely vegetated, with the occasional Douglas-fir, ponderosa pine, and juniper.
Body of water	The reservoirs and the Clark Fork River.

Threatened, Endangered, and Sensitive Plant Species

Madsen and Cheshier (2009) did not report findings for any threatened, endangered, or sensitive species during their vegetation surveys. The review of available information from the Montana Natural Heritage Program for Sanders County yielded a list of 16 species of concern and one federally threatened species, Spalding's catchfly (*Silene spaldingii)*. These 16 species of concern have been identified for the entire Sanders County area and are not sorted into individual areas for the county (Montana Natural Heritage Database, 2010).

Washington Water Power (now Avista Utilities) reports during field surveys in 1993 and 1994 two rare plant taxa were encountered at Noxon Rapids Reservoir (WWP 1995). These two species were Pyramid spirea (*Spirea x pyramidata*) and Twin clover (*Trifolium latifolia*). Two of the Pyramid spirea populations reported occurred in wetland areas where the hydrology is influenced by the operation of the reservoir. Twin flower was reported at the North Shore Campground (WWP 1995). Since the report was published, both species have been taken off the species of concern list. Twin flower was removed in May 1995 and Pyramid spirea in June 1997.

Wetlands

Wetlands are commonly associated with riparian areas and landscape depressions that have adequate soil moisture throughout the growing season to support a prevalence of hydrophytic vegetation. Wetlands are defined 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 condition. Both Noxon Rapids and Cabinet Gorge Reservoirs have extensive aquatic habitat. Wetlands around the reservoirs were previously surveyed to the class level (forested, scrub-shrub, emergent) according to the USFWS classification system and U.S. Army Corps of Engineers (WWP 1995). According to the survey, 119 wetlands were identified along Noxon Rapids Reservoir, 69 along Cabinet Gorge Reservoir, and 26 along the river reach between Cabinet Gorge Dam and Clark Fork Idaho (WWP 1995). A majority of these wetlands were

classified as palustrine emergent and occurred on the shoreline fringe of the reservoirs. The next prevalent classification was palustrine scrub-shrub. The National Wetland Inventory database (http://www.nwi.fws.gov) for Noxon Rapids and Cabinet Gorge Reservoirs was also searched but was found to be incomplete and did not identify any wetlands for the area.

ENVIRONMENTAL CONSEQUENCES

Alternative 1: No Action

Direct and Indirect Effects

Under the no action alternative, the proposed herbicide research and implementation project on EWM and CLP would not occur. Aquatic weed species would continue to be present and spread. Over time this presence of aquatic weed species in Noxon Rapids and Cabinet Gorge Reservoirs could change the aquatic environment to the extent that diversity and abundance of other native aquatic plants and nearby wetland and/or threatened, endangered, or sensitive plant species are adversely affected through competition for space and nutrients. Although invasive aquatic species can provide habitat for aquatic life, overall long-term negative consequences of these weeds far outweigh the positive ones. These subject weeds are known to increase rapidly and plant growth can get out of control. Under the no action alternative, effective herbicide application rates and impacts to non-target aquatic vegetation would not be determined; therefore, widespread, effective treatments of the current weed infestation would not occur. The existing aquatic weeds in Noxon Rapids and Cabinet Gorge Reservoirs would continue to expand with a significant potential to spread to other water bodies in Montana. Noxon Rapids and Cabinet Gorge Reservoirs would not likely remain in its current condition and would likely continue to experience an increase in weed infestation.

Cumulative Effects

The no action alternative would allow for the continuation of aquatic weed infestations and the potential spread of EWM and CLP to additional water bodies within Montana. An increase in weeds could spread into adjacent public and private areas that are currently not infested. The expansion of weed infestations would likely continue to degrade aquatic native plant communities and may eventually impact wetland and rare plant communities to the extent that diversity and abundance of other aquatic plants are adversely impacted through competition for nutrients and space. According to Madsen and Cheshier (2009), the littoral zone (<25 feet) occupies 40% of Cabinet Gorge and 30% of Noxon Rapids Reservoirs. Given this information, a potential for invasive aquatics to occupy up to 1,080 acres in Cabinet Gorge and 1,839 acres in Noxon Rapids could occur.

Alternative 2: Proposed Action

Direct and Indirect Effects

Research and operational herbicide treatments associated with this project would assist in further refining species selective control techniques of invasive plants using preferred herbicide formulations and prescriptive application methods. In addition, the proposed 2010 research would help quantify herbicide efficacy and response of both invasive and native plants to herbicide treatments. After these factors have been determined, application of herbicide treatments for areas infested with the subject weeds could occur for up to four years following methods and rates outlined in the proposed research portion of the proposed action. The proposed action assumes that the research results would recommend no significant increases

in the rates or changes in application methods. If methods or rates increase substantially, then another environmental review may be warranted. Once subject weed infestations have been contained, a maintenance program to treat scattered beds would be implemented for up to five years.

Under the proposed action, native aquatic, non-target plants that occur within or near the invasive aquatic plant infestation areas may be impaired and/or killed by the herbicide application. However, these direct effects would most likely be localized and short-term and not create adverse long-term effects on the native vegetation. The short-term effects to non-target plants would be offset by long-term benefits of treatment to native plant communities. The proposed herbicide treatments would be conducted by trained, professional crews with experience in handling and application of herbicides. The herbicide label would be followed and application methods would limit the impacts of non-target plants due to herbicide exposure.

Emergent plants or wetlands aquatic plants bordering the treated area could be exposed to herbicide. There could be some drifting or flow of herbicide affected water into wetland communities. However, it is unlikely that the impacts would be measurable due to dilution and break-down rates. Direct and indirect effects would be minimized by properly developing application rates and application methods. Herbicide rates would not exceed maximum amounts allowed by the respective labels and application would be contained to target beds.

In addition, the post-treatment monitoring of the aquatic plant community would occur for both the research phase and the operational phase. This monitoring is imperative for determining efficacy on target plants and limiting impacts to native vegetation. In the event that monitoring results indicated there were substantial impacts to native communities, the treatment rates and methods would be adjusted to reduce impacts as a part of the collaborative review of the EWMTF.

Control of invasive aquatic weeds using the proposed herbicides with limited impacts to native plant communities has been well documented. These studies have shown native species were not impaired or killed after herbicide application to control Eurasian watermilfoil in water bodies that have reasonable flow rates (Netherland and Getsinger 1992; Getsinger et al. 1997). Overall, the proposed action is likely to benefit native vegetation long-term by keeping the habitat free of the subject weeds. If any plant species of concern would be identified in the project areas, a protective buffer zone between the treated area and plant species of concern would be implemented.

Without the continuation of this proposed project, it is likely that aquatic weed infestations would continue to increase and spread, and possibly displace native plants, wetland plants, and plant species of concern and their habitats.

Cumulative Effects

Factors involved in analyses of the cumulative effects of the proposed action include the relatively small area that would be treated, the nature of the herbicides, the EPA and state approval of Diquat (Reward) and Endothall (Aquathol K), Triclopyr, and the expertise of the personnel involved in performing the research and implementation. Removal of EWM and CLP would improve habitat for native plant communities, wetland plants, and any plant species of concern that may occur in the area. It is unlikely any of these plant communities would be adversely impacted by the proposed action alternative. Native aquatic vegetation provides beneficial functions and values for fish and wildlife and their respective habitats. All aquatic

vegetation provides some level of protection from predators and can act as feeding and spawning areas for fish and other invertebrate species. However, under certain conditions, non-native aquatic plants out compete native species and can deplete oxygen levels needed for these species to survive.

4.3 WATER QUALITY

ANALYSIS AREA

This water resource section includes both surface water and groundwater resources within the Noxon Rapids and Cabinet Gorge Reservoirs and water bodies adjacent and downstream of the reservoirs.

AFFECTED ENVIRONMENT

The proposed action is within Noxon Rapids and Cabinet Gorge Reservoirs. These reservoirs are located in western Montana and northern Idaho on the lower Clark Fork River. Noxon Rapids Reservoir is located approximately 115 miles downstream of Missoula and 230 miles downstream of Butte, Montana, the two largest populated areas along the Clark Fork River. Cabinet Gorge Reservoir is located a short distance downstream of Noxon Rapids Reservoir, between the town of Noxon, Montana, and the dam location at Clark Fork, Idaho. The climate at the proposed project area is dominated by Pacific maritime weather. Average annual precipitation ranges from 22.97 inches on the eastern side near Thompson Falls to 33.86 inches on the western side near Heron. Peak streamflow occurs in May and June. Summers are typically dry and warm and winters cool and moist.

Surface Water

Noxon Rapids and Cabinet Gorge Reservoirs and the Clark Fork River are the principal surface water bodies in the proposed action area. Noxon Rapids Reservoir is created by the Noxon Rapids Dam on the Clark Fork River in northwestern Montana. The Noxon Rapids Dam consists of a 6,195 foot long, 260 foot high earthen-fill dam. At full capacity the reservoir creates a 7,940 surface acre area, 400,000 acre-feet impoundment with a maximum depth of 200 feet. The reservoir is 35.5 miles in length, and 2 miles wide at its widest point (WWP, 1995). The operating capacity of Noxon Rapids Dam at full turbine flow and full pool is 466 MW (UNEP DDP, 2009). The Cabinet Gorge Reservoir is created by the Cabinet Gorge Dam on the Clark Fork River in northeastern Idaho near the Montana border. The majority of the reservoir lies within Montana. The Cabinet Gorge Dam consists of a concrete gravity-arch hydroelectric dam on the Clark Fork River which is 208 ft high and 600 ft long. Throughout the whole dam its thickness never exceeds 40 ft. At full capacity the reservoir creates a surface area of 3,200 acres, 106,000 acre-feet impoundment with 231 MW turbine output.

The Clark Fork River is approximately 360 miles long and the largest river by volume in Montana. It flows in a NW direction for approximately 340 miles from its origin at the confluence of Silver Bow and Warm Springs Creek near Anaconda, Montana, to its mouth at the northeast end of Pend Oreille Lake in Idaho. The river drains an extensive region of approximately 22,000 square miles. Major tributaries include the Blackfoot, Bitterroot, and Flathead Rivers.

Surface Water Development and Water Rights

Avista Utilities (formerly Washington Water Power) installed turbines at the Noxon Rapids Dam in 1951, 1959, and 1976. The hydropower water rights for the Noxon Rapids Dam are owned by Avista Utilities and total 55,000+ cfs. Approximately 30% of the Clark Fork River Basin water rights are junior to Avista's entitlements (MT DNRC 2004). Avista's water rights are sufficient to utilize almost all of the flows leaving the basin. Clark Fork River flows greater than 50,000 cfs occur only 6-8% of the time over the entire 90 year period of record. Flows greater than 50,000 cfs generally occur 22 days in May and June of wetter years (MT DNRC 2004). Avista also owns and operates Cabinet Gorge Dam in northeaster Idaho. Turbines at the Cabinet Gorge dam were installed in 1952.

Surface water uses for the reservoir storage include hydroelectric, recreation, and small scale irrigation. There are approximately 166 water rights points of diversion (POD) and 150 POD within ¼ mile of Noxon Rapids and Cabinet Gorge Reservoirs, respectively (**Figure 4**) These POD include both surface water diversion as well as groundwater wells. Cross referencing the number of groundwater wells on file with state to the number of POD, indicates (assuming all wells have registered water rights) that there are approximately 15 surface water POD on Noxon Rapids and 44 surface water POD on Cabinet Gorge Reservoirs.

Groundwater

Exploitable groundwater resources within the lower Clark Fork River valley occur primarily as Quaternary basin-fill deposits and to a lesser extent fractured bedrock. The basin-fill contains unconfined aquifers and sequences of confined aquifers with numerous discontinuous confining layers. In places, confining sequences hydrologically isolate the aquifers; however, in most valleys water level data from different depths suggest that the basin-fill aquifers are well connected on a valley wide scale (LaFave 2006). Basin-fill sediments are comprised of modern Clark Fork River alluvium (Qal) in the valley bottom and older quaternary sediments (Qao) that form benches or terraces on the periphery. Colluvial and alluvial processes also contribute to basin-fill on valley margins. Glacial Lake Missoula high-energy flood deposits may be locally present throughout the lower Clark Fork River valley. Bedrock consists of well cemented or indurated rock that is commonly fractured. Most of the bedrock is comprised of metamorphosed carbonates, argillite, and quartzites of the Proterozoic Belt Supergroup; there are also localized occurrences of Cretaceous aged igneous intrusives of the Idaho Batholith. The presence of these fractures dissipates with depth, but deeper fractured zones do exist and numerous faults are present throughout the lower Clark Fork River valley. With almost no primary permeability in the bedrock, these fractures provide the secondary permeability from which groundwater is extracted.

Groundwater Development and Water Rights

Groundwater wells are the sole source water in the area for small community businesses and residential homes. No public water supply (PWS) systems utilize surface water from Noxon Rapids or Cabinet Gorge Reservoirs as a source; however, shallow alluvial wells (Qal) completed near the Clark Fork River or reservoirs may hydraulically connected to the surface water and several PWS system are located within a short distance of the reservoir.

There are approximately 151 wells on file with the Montana Bureau of Mines and Geology Ground-Water Information Center (GWIC) that are within ¼ mile of Noxon Rapids Reservoir (**Figure 5**) (http://mbmggwic.mtech.edu/). There are approximately 106 wells on file with the

Montana Bureau of Mines and Geology GWIC that are within ¼ mile of Cabinet Gorge Reservoir (**Figure 5**).

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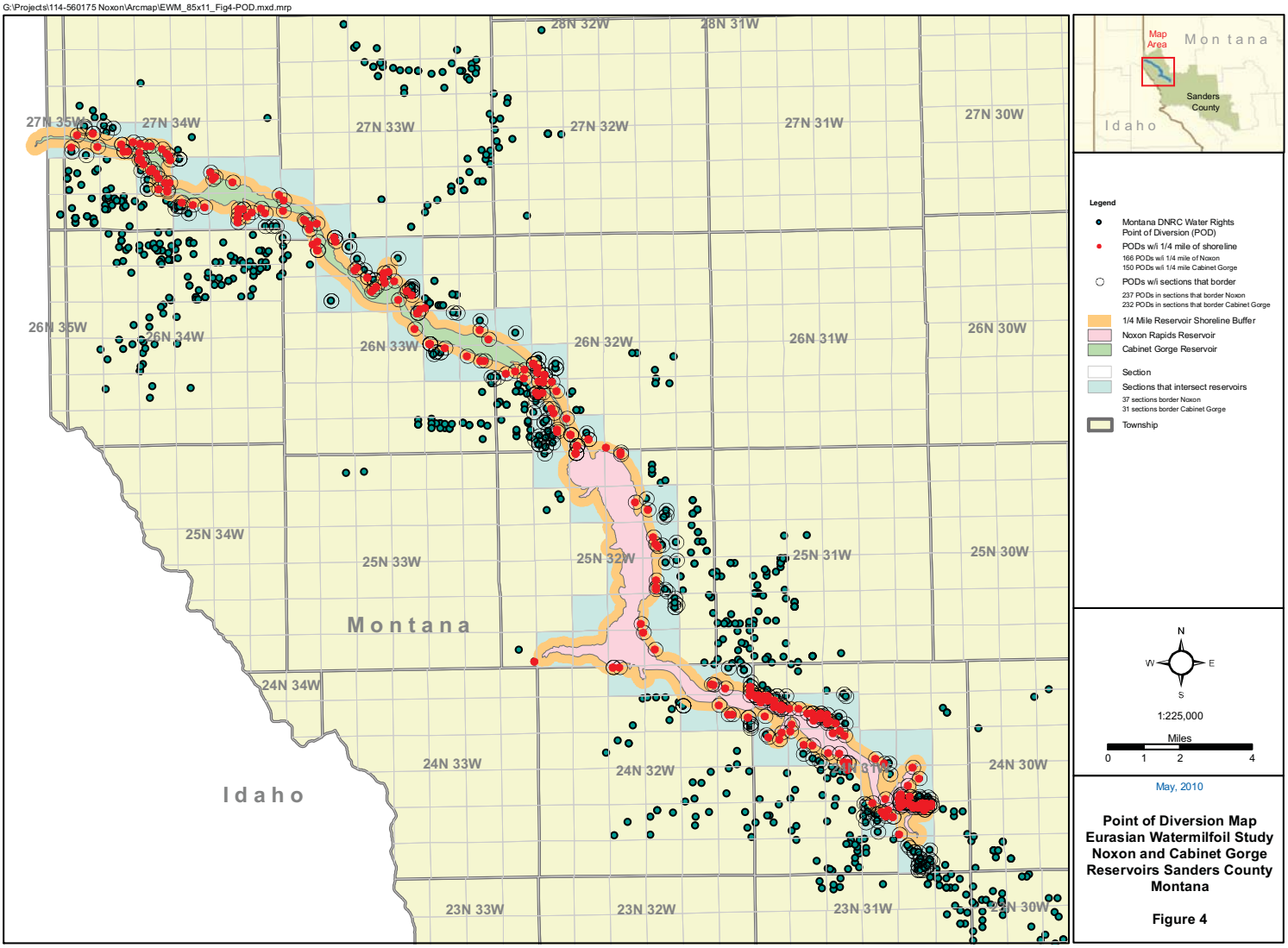
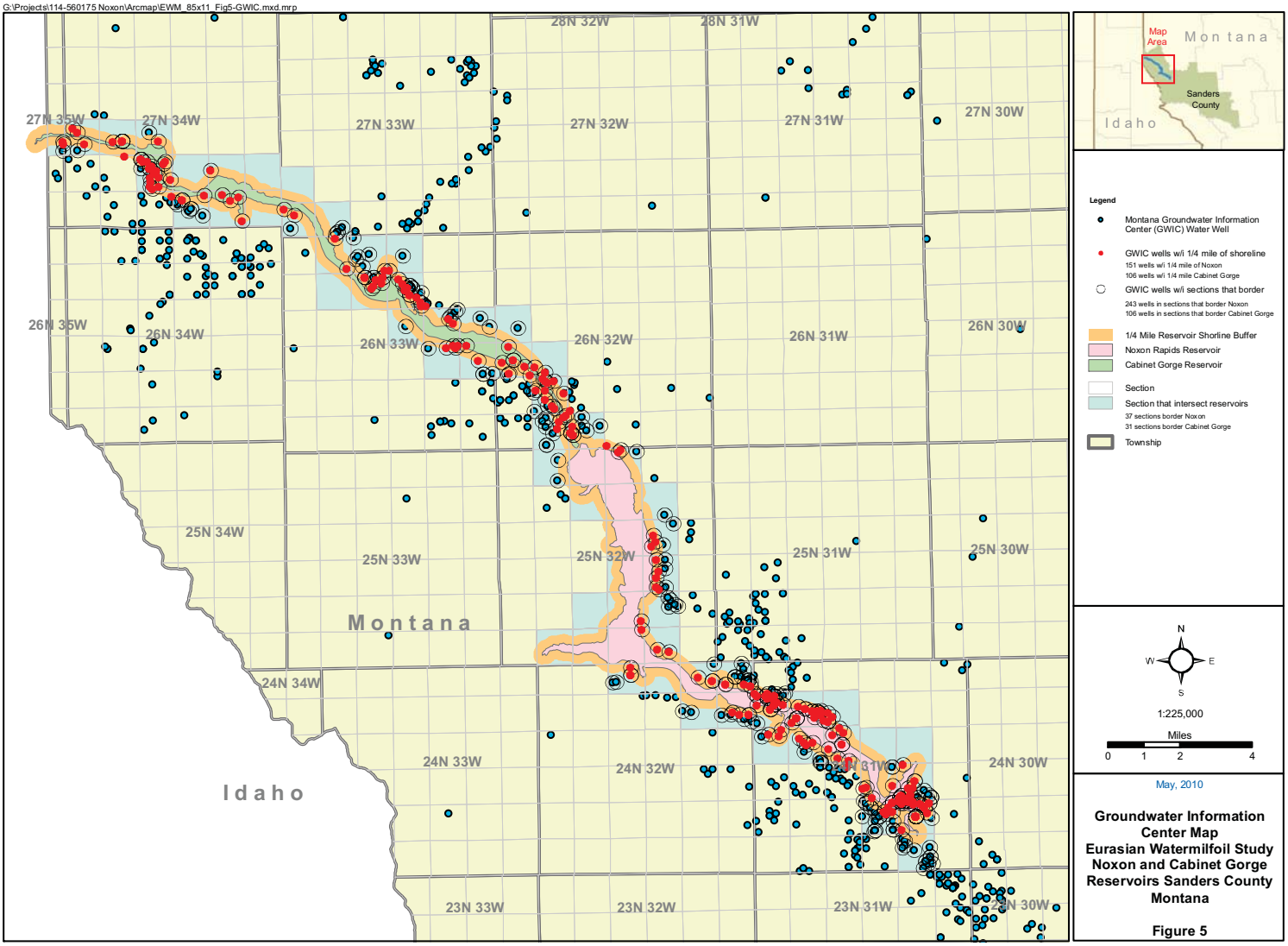


May, 2010

Point of Diversion Map Eurasian Watermilfoil Study Noxon and Cabinet Gorge Reservoirs Sanders County Montana

Figure 4



May, 2010

Groundwater Information Center Map
Eurasian Watermilfoil Study
Noxon and Cabinet Gorge Reservoirs Sanders County Montana

Figure 5

Usage for these wells are listed as domestic supply, public water supply and irrigation (GWIC 2010). The North Shore Campground has a transient non-community public water supply system (MT0062358) that serves up to 60 people. The source for the PWS is listed as Well#1. There have been numerous violations regarding coliform bacteria detections in the PWS required sampling program. No other information regarding the well completion depth or connectively with Noxon Rapids Reservoir surface water is supplied. The well is not listed with GWIC. No other public water supplies are located within ¼ mile of the reservoirs.

Water Quality

Collection of water quality data on the middle and upper Clark Fork River is performed routinely by various state and federal agencies (WWP 1995). Overall water quality in Noxon Rapids, Cabinet Gorge and the Clark Fork River has been rated as good to excellent (WWP 1995). An identified water quality issue in the Clark Fork Drainage is heavy metals and excessive nutrient enrichment. In 1993, sediment samples were collected upstream of Noxon Rapids and at an adjoining tributary and analyzed for an array of metal concentrations. Results found metals do occur in the reservoir at slightly elevated concentrations but are not considered to occur at problematic levels (WWP 1995). These results are lower than concentrations reported for upstream locations.

Nutrient levels entering the reservoir are low and water transparency has been found to be consistent with EPA criteria for mesotrophic water bodies (WWP 1995). Calculated nitrogen to phosphorus ratios indicate advantageous phosphorous limited nutrient condition throughout the growing season (WWP 1995). Available data also indicates a trend of nutrient decrease moving downstream due to both physical and biological processes within the reservoirs. This is a highly desirable condition given concerns over nutrient loading to Lake Pend Oreille.

Physical water quality parameters in the reservoirs including temperature, dissolved oxygen (DO), pH, conductivity, and water transparency are characteristic of the reservoir morphology and influent Clark Fork River. Noxon Rapids and to a lesser degree Cabinet Gorge Reservoir are classified as deep-water lacustrine (lake-like) water bodies. While water quality is much improved over the upper basin, project water still reflect the elevated pH levels (>8.5) and high summer water temperatures (>66 F) of influent water. It is common for Noxon Rapids Reservoir to stratify during warm summer months of low flow years. Dissolved oxygen concentrations in the summer of 1994 were recorded as high in all but the deepest waters (WWP 1995). In the upper 100 feet of the water column, DO levels were above 7 mg/l. Cabinet Gorge Reservoir is smaller than Noxon Rapids, has a shorter retention time at all river flow conditions, and does not stratify. Even during the extremely low conditions, relatively homogenous temperature and DO conditions exist throughout the water column in Cabinet Gorge Reservoir. Cabinet Gorge Reservoir also tends to have slightly cooler surface and near-surface water temperatures than Noxon Reservoir due to the depth of the Noxon Rapids dam intakes.

The EPA has listed the Clark Fork River subbasin (from mouth of Flathead River to Noxon Rapids dam) under the impaired waters list (Section 303d of the CWA). The 303d listing is for metals (other than mercury) (EPA 2009). The Montana Department of Environmental Quality (DEQ) is currently working on the Clark Fork River Total Mean Daily Load (TMDL). EPA lists the estimated TMDL submittal by DEQ as September 30, 2012; however, no mention of the submittal date by DEQ is listed on their TMDL Program webpage.

Water Quality Standards and Classifications

Surface water quality standards have been established by the DEQ through the Water Quality Bureau Circular 7 document (WQB-7) (MT DEQ 2004). A majority of the Clark Fork River (from the mouth of the Little Blackfoot River to the Idaho-Montana border is classified by the DEQ as B-1[1]. B-1 classification implies unrestricted beneficial use, and as such WQB-7 implements the most protective water quality standard based on its intended beneficial use. In most cases, the human health Maximum Contaminant Level (MCL) implemented by EPA under the Safe Drinking Water Act (SDWA) is utilized.

The WQB-7 standards for the three aquatic herbicides considered for this project (diquat, endothall, and triclopyr) are therefore based on the B-1 classification of Clark Fork River water and the drinking water MCLs provided by EPA (**Table 4-4**).

TABLE 4-4
Summary Of Water Quality Standards For Herbicides To Be Used

Herbicide	Water Quality WQB-7 Standard Groundwater/Surface	Solubility		Suggested Application Rate (per label)
Diquat (a, c)	20 µg/L/20 µg/L	700 g/L	Human Health	0.5 to 2 gal/acre per 4 feet depth
Endothall (b,c,d)	100 µg/L/100 µg/L	100 g/L	Human Health	2-3 mg/L up to 5 mg/L; 1.3 to 1.9 gal/acre-ft
Triclopyr (e)	350 µg/L/350 µg/L	440 mg/L	Human Health	0.5 to 2 gal/acre per annual growing season

ENVIRONMENTAL CONSEQUENCES

Alternative 1- No Action

Direct and Indirect Effects

Under the no action alternative, Phase 2 of the Eurasian Watermilfoil / Curlyleaf Pondweed Research and Implementation Project would not be conducted. The EWM infestation would be allowed to persist within the Noxon Rapids and Cabinet Gorge Reservoirs and could potentially spread to other water bodies within Montana. If left unchecked, these aquatic weeds could degrade water quality by depleting dissolved oxygen and out-competing native plant species (Honnell 1992; Engel 1995).

Cumulative Effects

Dissolved oxygen is not currently a target concern for the Clark Fork River TMDL as it is in portions of the Pend Oreille watershed (CFR below Cabinet Gorge Dam). However, it is expected that the lack of invasive aquatic plant control in Noxon Rapids and Cabinet Gorge Reservoirs would contribute to lower dissolved oxygen levels during plant die-off and ice-

[1] The beneficial uses associated with B-1 waters include drinking, culinary and food processing purposes, after conventional treatment; bathing, swimming, and recreation; growth and propagation of salmonid fishes and associated aquatic life, waterfowl, and furbearers; and agricultural and industrial water supply (Administrative Rules of Montana (ARM) 17.30.620/623)

covered portions of the year. This could in-turn affect native plant and fish species and could harm the recreation resources associated with the reservoir.

The no action alternative would allow for the continuation of aquatic weed infestations and the potential spread of EWM to additional water bodies within Montana. The expansion of weed infestations would likely degrade dissolved oxygen levels, which is likely to negatively affect native plant communities, fisheries, and aquatic recreational activities in numerous other water bodies within Montana.

Alternative 2 - Proposed Action

The proposed action alternative would allow Avista, Sanders County Extension, and the EWMTF to continue with herbicide research within the Noxon Reservoir and, consequently, implement operational herbicide weed control as a portion of an IWM approach within both Noxon Rapids and Cabinet Gorge Reservoirs. The proposed research and implementation would occur over the next ten years.

Direct and Indirect Effects

There are no anticipated direct or indirect effects to water quality other than short-term impacts within application focus areas. Herbicide application would follow pilot test recommendations and the manufacturer's label rates of application. While these recommended application rates would exceed short-term water quality standards listed under Montana WQB-7; due to the short-lived nature of these compounds under normal oxidizing environments and exposure to sunlight, short-term increased health risk to humans or adverse environmental effects with the application of these herbicides is not expected.

Publicly posted label specified posting of treatment areas for short-term water quality cautioning is required for some of the herbicides proposed to be used and will limit any short-term exposure risks to human health or non-target plant or animal species near the proposed application areas. The label warnings for diquat (Reward) include restrictions for drinking (up to 3 days), livestock or domestic animal consumptions (1 day), irrigation to turf and ornamentals (3 days), and irrigation to food crops (5 days). Warning labels for endothall (Aqualthol K) applications up to the maximum recommended dosage include fishing (3 days), and 25 days for all other water consumptive usages (watering livestock, food crop irrigation, or domestic supply). At the lowest recommended application rate, the consumptive use restrictions for endothall aquatic application is 7 days. Wind drift prevention and avoidance of any identified sensitive areas (e.g., residential areas, known habitat for threatened or endangered species or non-target vegetation) are also covered under the aquatic use directions of the labels.

Because aquatic herbicides have been deemed non-point sources of contaminates a Montana Pollutant Discharge Elimination System (MPDES) permit is not required. Instead, DEQ allows a short-term exemption for surface water quality standards for pesticide/herbicide application under a Section 308 Permit 75-5-308, MCA.

According to Jeff Ryan, Water Quality/Wetland Specialist with the DEQ Water Protection Bureau (2009):

> *As long as the 308 Permit applicant follows labeling instructions, appropriate dosing, and develops a monitoring program; the short term water quality variance generates no long-term adverse effects on water quality and fulfills its intended*

purpose- to control invasive aquatic plant species. In this case, the short-term water quality exceedances are conducted under a permitted and controlled situation where the resultant outcome is of higher beneficial use to the overall health of the aquatic ecosystem than any short term adverse effects generated by such use.

Cumulative Effects

The cumulative effects of the proposed action would be the protection of Montana water bodies from EWM and CLP infestations which would also provide protection for other resources such as fish habitat, native plant communities, and recreation.

The knowledge gained from completion of the proposed action would support future decisions on the most effective treatment of EWM and CLP within waters of the State of Montana. A successful project involving an integrated management approach to controlling or eradicating invasive non-native aquatic weeds within a dynamic hydrologic system like the Noxon Rapids and Cabinet Gorge Reservoirs on the Clark Fork River would assist in managing current EWM and CLP infestations throughout Montana.

4.4 FISHERIES

ANALYSIS AREA

The fisheries resource analysis considers the water bodies of Noxon Rapids Reservoir with a maximum capacity of 400,000 acre feet, Cabinet Gorge Reservoir with a maximum capacity of 106,000 acre feet, and the Clark Fork River linking the two reservoirs.

AFFECTED ENVIRONMENT

Fish species in Noxon Rapids and Cabinet Gorge Reservoirs and the Clark Fork River include a mixture of native and introduced species. Montana Fish, Wildlife and Parks (MT FWP) list the following species as present in Noxon Rapids and Cabinet Gorge Reservoirs: westslope cutthroat trout, bull trout, and mountain whitefish. Introduced species include: brook trout, brown trout, lake trout, lake whitefish, largemouth bass, largescale sucker, longnose sucker, northern pike, northern pike minnow, peamouth, pumpkinseed, rainbow trout, redside shiner, smallmouth bass, walleye, yellow bullhead, yellow perch, and black bullhead. The same fish species present in the reservoirs are found in the Clark Fork River with the addition of black bullhead, longnose dace, slimy sculpin and mottled sculpin.

Dominant fish communities recorded in Noxon Rapids Reservoir catches by MT FWP include peamouth chub, yellow perch, and northern pikeminnow (Avista Corporation 2008). During 2008, 204 peamouth chub, 193 yellow perch, and 104 northern pikeminnow were captured during gill net surveys conducted in Noxon Rapids Reservoir. Between 2004 and 2006, yearly gill net monitoring at Noxon Rapids Reservoir found yellow perch to consistently be the most abundant species sampled (52%) of all species sampled in one stratum. Peamouth chub was the next most abundant fish captured by gill nets (Avista Corporation 2007).

Gill nets set overnight in Cabinet Gorge Reservoir resulted in capture rates that were similar to those observed in Noxon Rapids Reservoir, but with yellow perch being the most abundant species captured with a total of 46 fish captured. Peamouth chub and northern pikeminnow

were the next most abundant fish captured and had catches of 38 fish and 30 fish, respectively (Avista Utilities 2008).

Since the development of the reservoirs, fish management efforts have focused on fish stocking and hatcheries development to support a sports fishery. Though a small population of bull, westslope cutthroat, brown, and rainbow trout exists in the reservoir and the downstream portion of the Clark Fork River, these populations have not developed into a quality fishery due to habitat limitations (WWP 1995). Management of Noxon Rapids and Cabinet Gorge Reservoirs has been centered on creating and maintaining a recreational fishery for species of sunfish including small- and largemouth bass, *Micropterus dolomieui* and *M. salmoides*, respectively. These efforts have established a reputation for the reservoir as a statewide and regional quality bass fishery.

EWM and CLP are known to out-compete native plants primarily through earlier starting times of spring growth, greater tolerances to cold water temperatures, and rapid vegetative regeneration. Once established, EWM and CLP form dense mats of floating vegetation that interfere with recreation activities such as swimming, water skiing, boating, and fishing. Stagnant mats can also create good habitat for mosquitoes and decrease mixing of oxygenated surface waters to deeper depths (Washington State Department of Ecology 2010). In the case of CLP, mid-summer die-offs create depleted dissolved oxygen concentrations for native or desirable macrophytes during periods of growth for those plant species. The decaying plants from the mid-summer die-off also contribute excess nutrients to the local system, inviting algal blooms, and create aesthetic issues such as offensive odors (Wisconsin Department of Natural Resources 2009).

Smallmouth bass typically nest on sandy gravel or rocky bottoms of streams or lakes and usually adjacent to a rock or fallen log. Smallmouth bass eggs hatch and brood in a period of about 16 to 24 days; thereafter, the fry disperse rapidly. Preferred habitat of smallmouth bass includes the cool waters of streams with riffle areas and clean gravel or rubble bottoms or lakes with rock ledges or outcroppings. The diet of smallmouth bass consists of mainly aquatic and terrestrial insects during the first year of life and then shifts to fish and crayfish after age two (Simpson and Wallace 1982).

Largemouth bass begin building nests when water temperatures approach 60º F and spawning generally takes place in waters with temperatures of 62º to 65º F. Nests are built in areas with rooted vegetation or sandy, small gravel locations. Hatching and brooding occurs throughout a period of approximately 40 – 43 days after the eggs are laid. Largemouth bass are sight feeders and feed at or near the surface during morning and evening hours and usually close to cover or vegetation. They move to deeper water and feed near the bottom during the day (Simpson and Wallace 1982).

Threatened, Endangered and Sensitive Fish Species

The native westslope cutthroat trout and bull trout are of special concern and both have designated special status. Bull trout are listed by the Fish and Wildlife Service as threatened, pursuant to the Endangered Species Act. Westslope cutthroat trout are listed as a sensitive species by the United States Forest Service (USFS), Bureau of Land Management (BLM), and as a species of special concern by the Montana Chapter of American Fisheries Society, MT FWP, and the Montana Natural Heritage Program (MNHP). Both species have been observed in the reservoir, however, only a small population exists.

Both reservoirs and the portion of the Clark Fork River that links those two water bodies are included in the newly revised (USFWS 2010) proposed critical habitat rule for bull trout under authority of the Endangered Species Act with the goal to provide access to more high quality habitat for bull trout in an effort to further increase bull trout population numbers.

ENVIRONMENTAL CONSEQUENCES

Alternative 1: No Action

Direct and Indirect Effects

Under the no action alternative, weeds would not be treated with herbicides and the appropriate CET and aquatic herbicide effectiveness would not be determined. Therefore, effective herbicide treatment of EWM and CLP within Noxon Rapids and Cabinet Gorge Reservoirs would not occur. Weed infestation would continue to expand and fish habitat would continue to be altered due to the infestations. The expanding infestations would especially degrade habitat for salmonids due to the potential reduction in spawning habitat.

Cumulative Effects

The cumulative impacts associated with the no action alternative would entail a likely expansion of EWM and CLP, not only within Noxon Rapids and Cabinet Gorge Reservoirs, but potentially other water bodies within Montana. This would result in a degradation of habitat for many fish species, particularly salmonid species. However, those fish species that prefer dense vegetation cover may benefit as the weed expansion would be a habitat enhancement.

Alternative 2: Proposed Action

Direct and Indirect Effects

Significant reduction of vegetation stands could have a potentially negative impact on recreational fishery populations within Noxon Rapids and Cabinet Gorge Reservoirs. Vegetation stands are used by most species of fish at some point in their life cycles as nesting, brooding, or refuge areas. Species that spend larger amounts of their lives centered in or around vegetation stands would be at greater risk to a negative impact from herbicide treatments as their primary habitat would be removed from the system. Largemouth bass, in particular, nest, brood and feed in close proximity to vegetation stands and pose to have a proportionally larger risk to impacts from herbicide treatments. The species of vegetation present does not seem to be a limiting factor on the population and production of largemouth bass. Of greater importance is the presence of some aquatic vegetation in which to carry out a typical life cycle.

The herbicides included in the proposed action are selective herbicides and have the ability to kill certain plants without harming others. Resistive plants can survive herbicide treatment by metabolizing or not absorbing the active chemicals in the herbicide. Plants targeted by the selected herbicides are perennial dicots (EWM) or monocots (CLP and flowering rush). Plants that may remain in aquatic settings after herbicide treatment could include sedges, rushes, elodea and other native submersed aquatic vegetation, and cattails. These plants and others may be found in sufficient quantity to provide the needed resources for largemouth bass and feeder fish species. This would allow fish and young fry, which are most susceptible to disturbance, an opportunity to displace to the adjacent, untreated vegetation within the bed. Impacts would be minimized as fish could disperse to adjacent hiding cover and avoid the conditions created as target vegetation is treated and dies.

Impacts associated with the proposed action to fish and their habitat could occur through direct impacts from herbicides or post-treatment alteration of habitat. The herbicides that would potentially be used in the proposed action include one of three phenoxy herbicides, diquat or Triclopyr, and endothall. All of these herbicides have been researched extensively and approved by the EPA and Montana Department of Agriculture (MDA) for use in aquatic systems. These herbicides are accepted as safe as long as they are administered within the recommended application rates and procedures. Below is a brief discussion of the herbicides proposed for use and their impacts on fish:

Diquat – Diquat dibromide is the common chemical component of this general use herbicide and plant growth regulator. It is a quick acting contact herbicide that functions as a non-selective desiccant to all plants that it comes in contact with. Diquat is slightly toxic to fish and to fish prey items. The 8-hour lethal concentration 50 of this herbicide for rainbow trout has been measured at 12.3 ppm and at 28.5 ppm for Chinook salmon. The lethal concentration (LC) 50 or, LC50, is that concentration of a chemical in air or water that kills half of the experimental subjects exposed to it of a specific amount of time. A 96-hour LC50 for northern pike was also measured and had a corresponding concentration value of 16 ppm.

Studies conducted to determine a risk quotient for diquat have shown that there is a direct potential risk to fish species in ponds or streams sprayed with diquat at the typical application rates resulting in an acute risk quotient of 0.149 and a chronic risk quotient of 0.659. Conservative risk quotients for fish species have been set at 0.05 for acute exposure and 0.5 for chronic exposure (BLM 2005). Indirect effects to fish species present in streams and ponds treated with diquat come in the form of reduced cover from lack of aquatic vegetation and reduced prey species present as invertebrates or other fish species.

Triclopyr – Triclopyr acid has been reported to be practically non-toxic to rainbow trout (LC50 = 117 ppm a.e. for rainbow trout) and bluegill sunfish (96-hour LC50 of 148 ppm a.e.) (WSDE 2001). Risk Assessments indicate that triclopyr (triclopyr TEA) may be used safely at concentrations up to 2.5 ppm a.e. when most species of fish and invertebrates are present (WSDE 2001). The 96-hour LC50 for all verified studies on fish is greater than 82 ppm a.e. Therefore, the Risk Quotient for the most sensitive species of fish is below the acute levels of concern (0.1) for protection of the biota. The Acute Risk Quotient for triclopyr TEA using rainbow trout (Oncorhynchus mykiss) is 0.03 (2.5 ppm a.e./82 ppm a.e.) (WSDE 2001). Both fish and aquatic invertebrate biota should not be at high risk from the use of triclopyr TEA to control aquatic weeds (WSDE 2001).

Endothall – Endothall in the form of the acid, dipotassium endothall salt, or disodium endothall should not chronically affect fish or invertebrates. Since the most sensitive species (Chinook salmon) has an LC50 of 23 mg a.e./L, the predicted No Observable Effects Concentration (NOEC) would be 3.6 mg a.e./L based on an acute LC50 to chronic NOEC ratio of 6.4 for the tested species (WSDE 2001). The value of 3.6 mg a.e./L does not differ significantly from the empirically obtained values of 5 mg a.e./L for rainbow trout and Daphnia magna. The chronic NOEC ranges between 0.06 and 0.14 mg a.e. (WSDE 2001). Therefore, the chronic risk quotient does not exceed the chronic level of concern of 1.0 (0. 06 ppm a.e./3.6 ppm a.e. = 0.017). Therefore, one can anticipate that even the most sensitive species in the biota should not be affected by endothall acid or inorganic endothall salts (WSDE 2001).

Under the proposed action, all herbicides would be strictly administered under the manufacturer's recommendations and extended, repeat exposure of herbicides would not occur. Therefore, fish within the analysis area would not be directly impacted by the proposed herbicide applications. Maximum label rates are 0.7 mg/L diquat, 5 mg/L endothall, and 2.5 mg/L triclopyr. The proposed pilot test will target lower concentrations if water exchange allows. Dissipation should be rapid, between a few hours to a few days. With rapid dissipation and mixing outside of the pilot control plots, concentrations should be within water quality standards and, therefore, should not impact fish. Additionally, appropriate post-treatment monitoring would provide assurances that water quality impacts would be minimized. Based on the toxicity/risk basis and the short-lived nature of these compounds under normal oxidizing environments and exposure to sunlight, short-term increased health risks to fish or adverse environmental effects with the application of these herbicides within Noxon Rapids and Cabinet Gorge Reservoirs are not expected.

Exposure of living plant tissue to herbicides usually results in indirect effects. When plants start to die, there is often a drop in the dissolved oxygen content associated with the decay of the dead and dying plant material. A significant reduction in dissolved oxygen concentration could result in aquatic animal mortality or a shift in dominant forms to those more tolerant of anaerobic conditions. Although a significant reduction in dissolved oxygen concentrations may be realized in a closed pond system, dissolved oxygen concentration reductions in the flowing reservoir system, in which the weed bed treatment is proposed to occur, may not be observed at a significant level. Constant water circulation through several forces may limit the reduction of dissolved oxygen concentrations within the treated areas. Water quality surveys conducted in 2009 within Noxon Rapids Reservoir showed that five weeks post-application, dissolved oxygen concentrations were above 5.0 mg/L within treated plots which is above optimum level to support healthy fish populations (Getsinger 2010, pers. com.). Fish observed in or near the treatment areas showed no signs of stress, injury or mortality. Noxon Rapids and Cabinet Gorge reservoirs have historically shown no signs of ambient or prescribed conditions that might intensify the effects of proposed action on dissolved oxygen concentrations. Ambient or prescribed conditions that might produce lower dissolved oxygen concentrations in conjunction with the proposed action include elevated water temperatures, limited water circulation, low water inflow of oxygenated water, broad spectrum control of all plants within the system and treatment of the entire water body.

There may also be changes in the levels of plant nutrients due to release of phosphate from the decaying plant tissue and anoxic hypolimnion. In addition, ammonia may be produced from the decay of dead and dying plant tissue and may reach levels toxic to the resident biota. Ammonia may be further oxidized to nitrite (which is also toxic to fish) and nitrate (almost nontoxic). The presence of these nutrients may cause an alga bloom to occur. While the decaying plant material associated with the proposed action may temporarily alter water chemistry within the treated plots, the treated plots represent a small area relative to the fish habitat within the analysis area; therefore, water chemistry impacts would be quickly diluted. While the temporary impacts to water chemistry may displace fish within the area of the treated plots, the displacement due to these impacts would be temporary and, as water chemistry stabilizes, impacts to fish would diminish. The reservoirs are flowing systems, hence, oxygenated water would continually be carried through treatment areas, further diluting affects on water quality. Fish appear to have adapted to the water quality and habitat affects of CLP's natural die-off in late summer and would likely adapt to the die-offs created by the proposed action.

Adult bass and pike usually hunt along the perimeter of the dense weed beds and are, thus concentrated in a relatively small area compared to the overall size of the reservoirs. The concentrations of adult bass in these areas make the weed beds prime targets for fishermen. As treatment of the weed beds proceeds under the proposed action, adult bass and pike would have to disperse to other hunting grounds as the weed beds die back and offer less area to hunt. Fishermen may take decreased fishing success in a small area associated with the weed beds as an indication that the proposed treatment has had a direct adverse affect on the adult bass population. However, the adult bass and pike would not actually be experiencing a direct adverse affect, they would be dispersing to other areas of the reservoirs to find suitable hunting grounds as the weed beds die off and become re-established with native or desired aquatic vegetation. Fishermen who once heavily fished the weed beds would most likely have to alter their fishing areas.

It is important to note, that while the proposed action would influence fish habitat and fish distribution within the reservoirs, monitoring data and annual treatment application plans would be reviewed and approved by the EWMTF. Montana Fish, Wildlife and Parks (FWP) has two representatives as acting members on the EWMTF; therefore, input from fish biologists would be incorporated into the collaborative review by the EWMTF.

Threatened, Endangered and Sensitive Fish Species

The proposed action would not pose unique impacts to threatened, endangered and sensitive fish species within the analysis area. Direct and indirect impacts are the same as those discussed above. The proposed action would have no net effect on threatened or endangered fish within the analysis area. While some sensitive fish species may temporarily be displaced due to the proposed action, displacement would be temporary and the viability of their populations would not be impacted.

Adfluvial populations of bull trout (*Salvelinus confluentus*) that may be present in the reservoirs for portions of a given year may seek refuge in tributary streams to the reservoirs potentially affected by the proposed action, or maintain a longer residence time in those tributary streams if conditions warranted such response. Based on the size of the targeted reservoirs and size of the treatment areas, it is unlikely that resident bull trout populations will lack resources in maintaining normal life cycle functions.

Cumulative Effects

Overall, the proposed action would have positive cumulative effects on fish and their habitat. Upon completion of the proposed action, the appropriate CET and aquatic herbicide effectiveness would be determined. Therefore, the potential to use herbicides as part of an IWM program for treatment of EWM and CLP within Noxon Rapids and Cabinet Gorge Reservoirs could be evaluated based on site specific research results. Control and reduction of EWM and CLP would protect and possibly increase native fish habitat, not only within Noxon Rapids and Cabinet Gorge Reservoirs, but within all Montana water bodies

4.5 WILDLIFE

ANALYSIS AREA

The analysis area for wildlife resources includes Noxon Rapids and Cabinet Gorge Reservoirs and the areas adjacent to the proposed action.

AFFECTED ENVIRONMENT

In 1993 and 1994, WWP performed a wildlife baseline inventory of the Noxon Rapid and Cabinet Gorge Reservoirs. This inventory documented a diverse assortment of over 120 wildlife species utilizing the area. This survey observed a range of butterflies, amphibians, reptiles, breeding songbirds, waterbirds, raptors, and a variety of mammal species including big game species such as black bear, elk, moose, and deer. For detailed results and descriptions from these surveys refer to the 1995 WWP report.

Threatened, Endangered and Sensitive Fish Species

The MNHP Database (2010) identifies 53 species of concern for Sanders County. The following **Table 4-5** does not reflect wildlife species in the project area itself but Sanders County on a broad scale. Only a small percentage of these species are likely to actually occur within or in close proximity to the project area.

TABLE 4-5
Threatened, Endangered, and Sensitive Species Near Noxon Rapids and Cabinet Gorge Reservoirs (MNHP 2010)

Common Name	Scientific Name	State Rank	USFWS	USFS/BLM
Mammals				
Bison	*Bos bison*	S2		
Gray Wolf	*Canis lupus*	S3	DM	Sensitive/Special Status
Townsend's Big-eared Bat	*Corynorhinus townsendii*	S2		Sensitive
Wolverine	*Gulo gulo*	S3		Sensitive
Canada Lynx	*Lynx canadensis*	S3	LT	Threatened/Special Status
Fisher	*Martes pennanti*	S3		Sensitive
Fringed Myotis	*Myotis thysanodes*	S3		Sensitive
Grizzly Bear	*Ursus arctos horribilis*	S2S3	LT, XN, DM	Threatened/Special Status
Birds				
Northern Goshawk	*Accipiter gentilis*	S3		Sensitive
Grasshopper Sparrow	*Ammodramus savannarum*	S3B		
Bobolink	*Dolichonyx oryzivorus*	S3B		
Peregrine Falcon	*Falco peregrinus*	S3B	DM	Sensitive
Common Loon	*Gavia immer*	S3B		Sensitive
Golden Eagle	*Aquila chrysaetos*	S3		Sensitive
Bald Eagle	*Haliaeetus leucocephalus*	S3	DM	Threatened/Special Status
Harlequin Duck	*Histrionicus histrionicus*	S2B		Sensitive
Great Blue Heron	*Ardea herodias*	S3		
American Bittern	*Botaurus lentiginosus*	S3B		
Cassin's Finch	*Carpodacus cassinii*	S3		
Veery	*Catharus fusescens*	S3B		
Brown Creeper	*Dolichonyx oryzivorus*	S3B		Sensitive
Pileated Woodpecker	*Dryocopus pileatus*	S3		
Winter Wren	*Troglodytes troglodytes*	S3		
Lewis's Woodpecker	*Melanerpes lewis*	S2B		
Clark's Nutcracker	*Nucifraga columbiana*	S3		
Long-Billed Curlew	*Numenius americanus*	S3B		
Sage Thrasher	*Oreoscoptes montanus*	S3B		Sensitive

TABLE 4-5
Threatened, Endangered, and Sensitive Species Near Noxon Rapids and Cabinet Gorge Reservoirs (MNHP 2010)

Common Name	Scientific Name	State Rank	USFWS	USFS/BLM
Flammulated Owl	*Otus flammeolus*	S3B		Sensitive
Black-backed Woodpecker	*Picoides arciticus*	S3		Sensitive
Brewer's Sparrow	*Spizella breweri*	S3B		Sensitive
Reptiles				
Northern Alligator Lizard	*Elgaria coerulea*	S3		
Western Skink	*Eumeces skiltonianus*	S3		
Amphibians				
Western Toad	*Bufo boreas*	S2		Sensitive
Coeur d' Alene Salamander	*Plethodon idahoensis*	S2		Sensitive
Fish				
Westslope Cutthroat Trout	*Oncorhynchus clarkii lewisi*	S2		Sensitive
Bull Trout	*Salvelinus confluentus*	S2	LT	Threatened/Special Status
Invertebrates				
Caddisfly	*Rossiana montana*	S2		Sensitive
Mayfly	*Caurinella idahoensis*	S2		Sensitive
Roachfly	*Soliperla salish*	S2		Sensitive
Stonefly	*Soyedina potteria*	S2		Sensitive
Duskysnail	*Colligyrus greggi*	S1		
Pale Jumping-Slug	*Hempillia caelus*	S1S2		
Western Pearlshell	*Margaritifera falcata*	S2		
Millipede	*Corypus cochlearis*	S1S3		
Millepede	*Orophe cabinetus*	S1S3		
Millepede	*Orthogmus oculatus*	S1S3		
Humped Coin	*Polygyrella polygyrella*	S1S2		
Smoky Taildropper	*Prophysaon humile*	S2S3		
Reticulate Taildropper	*Prophysaon andersoni*	S1S2		
Robust Lanctooth	*Haplotrema vancouverense*	S1S2		
Pygmy Slug	*Kootenaia burkei*	S1S2		
Magnum Mantleslug	*Magnipelta mycophaga*	S2S3		
Sheathed Slug	*Zacoleus idahoensis*	S2S3		

ENVIRONMENTAL CONSEQUENCES

Alternative 1: No Action

Direct and Indirect Effects

The no action alternative could potentially impact wildlife or wildlife habitat within the analysis area. Reduction in habitat quality resulting from invasion of EWM and CLP could impact a variety of wildlife species that utilize the area, especially birds, amphibians, and invertebrates. Failure to control the continued expansion of the subject weeds in and along the shorelines of Noxon Rapids and Cabinet Gorge Reservoirs could adversely modify the aquatic environment for some species of wildlife by altering different parts of their life cycles or food webs. Aquatic habitat in relation to fisheries would be impacted (refer to **Section 4.4** for a discussion of impacts to aquatic habitat on fisheries).

Cumulative Effects

The no action alternative could impact wildlife species habitat within the analysis area. Over time, these impacts could cumulatively impact the biodiversity of wildlife species, especially

birds, amphibians, and invertebrates. Alterations to biodiversity are one of the most fundamental ecological impacts of invasive species and the inability to control or prevent their spread may have long lasting ecological effects.

Alternative 2: Proposed Action

Direct and Indirect Effects

Impacts to wildlife associated with the proposed action would occur in the event that wildlife came in direct contact with contaminated water. These impacts are likely to be short term due to the size of the areas proposed to being treated, rapid dissipation and mixing outside of the treatment areas. In the event that contaminated water does come in contact with terrestrial wildlife, health impacts would be very unlikely. All herbicides would be strictly administered under the manufacturer's recommendations and extended, repeat exposure of herbicides would not occur. Dissipation should be rapid, between a few hours to a few days. With rapid dissipation and mixing outside of the treatment areas, concentrations should be within water quality standards and, therefore, should not impact wildlife. Additionally, appropriate post-treatment monitoring would provide assurances that water quality impacts would be minimized. Based on the toxicity/risk basis and the short-lived nature of these compounds under normal oxidizing environments and exposure to sunlight, any short-term increased health risks to wildlife or adverse environmental effects with the application of these herbicides would not be expected to occur. Many studies have been run on these products to ensure their safety to wildlife and the label directions and warnings reflect the results of these studies. Therefore, if the chemicals are applied according to the label, the effect on terrestrial wildlife should be minimal (WSDE 2001).

Risks to aquatic invertebrates are likely when waterbodies are directly sprayed with diquat. These risks were categorized as moderate to high following typical and maximum application rates in ponds and streams (BLM 2005). The toxicity of triclopyr for the proposed action has been found to be practically non-toxic to moderately toxic to aquatic invertebrates depending on the formulation of the chemical used in the treatment. Triclopyr has been found to be practically non-toxic to the aquatic invertebrate *Daphnia magna*, a water flea (EPA 1998). The use of endothall in aquatic systems has been found to minimally exceed chronic levels of concern for freshwater aquatic invertebrates at the highest labeled application rates.

Threatened, Endangered and Sensitive Wildlife Species

The proposed action may pose short-term impacts to threatened, endangered and sensitive wildlife species within the analysis area. The direct and indirect impacts are the same as those discussed above.

Cumulative Effects

The proposed action may have impacts on wildlife species within the analysis area by impacting their habitats and food webs. However, control of EWM and CLP through herbicide treatments and a management implementation program would result in improving overall habitat and biodiversity for wildlife using the area.

4.6 RECREATION

The analysis area for recreation includes Noxon Rapids and Cabinet Gorge Reservoirs. The area surrounding the Reservoirs are characterized by rural, residential, and agriculture with

interspersed tracts of undeveloped land and is surrounded by the Panhandle, Kootenai, Kaniksu, and Lolo National Forests (WWP 1995).

AFFECTED ENVIRONMENT

Noxon Rapids and Cabinet Gorge Reservoirs are located in a geographical region that encompasses several popular recreation destinations (e.g., Glacier National Park, Lake Coeur d' Alene). Due to this, recreation facilities and opportunities at the reservoir are more of a local stature that provide nearby opportunities for local residents of Sanders County, Montana, and northern Idaho. Data collected in 1993 and 1994 found 50% of the users were local (WWP 1995).

Noxon Rapids and Cabinet Gorge Reservoirs are not situated in a remote setting. Paved and dirt roads border both sides of the reservoirs for most of their entire length. Motorized use is allowed with the exception of restricted access areas designed to protect resources, and public accessibility to water at Noxon Rapids and Cabinet Gorge Reservoirs is widely available. Six developed recreation use areas including campgrounds, day use areas, and boat ramps exist along Noxon Rapids Reservoir. As well as these developed sites, 12 additional undeveloped sites have been identified where recreation activities occur (Burky pers. comm.).

Developed and undeveloped sites in the project area provide opportunities for water-based and other recreation activities (WWP 1995). Activities documented in the project area include: fishing, motor boating, RV and tent camping, picnicking, swimming, sightseeing, walking, relaxing, nature watching, water skiing, windsurfing, canoeing, tubing, sunbathing, kayaking, and ice fishing. Observational surveys of recreational activity at recreation sites were conducted by WWP in 1993 and 1994. These studies found fishing, motor boating, relaxing, and swimming the most popular activities of the summer season (WWP 1995). Less popular activities included canoeing, kayaking, windsurfing, and nature watching. Winter recreational use of the area is low and appears to be dependent on weather conditions (WWP 1995).

Visitation activity was recorded for those recreation areas adjacent to Noxon Rapids and Cabinet Gorge Reservoirs during the peak use months (Memorial Day through Labor Day) in 2009 (Pinnacle 2009). The sites monitored included: Thompson Falls State Park, Finlay Flats, North Shore Recreation Area, Pilgrim Park, South Shore Recreation Area, Nurreau Flats, Noxon Rapids Dam Overlook, Bull River Recreation Area, and Cabinet Gorge Overlook. Overall, these nine sites hosted 31,147 visitors between May 22 and September 7, 2009. This represents an 11% increase in comparison to visitors recorded during 2008.

Overall, the proposed action area provides access for recreation activities such as fishing, motorboating, camping, swimming, and sightseeing. Current use of the area for recreation activities is estimated at 65-70% capacity (Burky pers. comm.). Future usage will more than likely bring an increase in both user numbers and types of recreational activities. This projection is based on the 2000 U.S. Census Bureau data which indicated a 7.9% increase in the population of Sanders County, Montana, and an increase in the real estate market.

ENVIRONMENTAL CONSEQUENCES

Alternative 1: No Action

Direct and Indirect Effects

Under the no action alternative, the proposed weed treatment research and operational weed treatment program on EWM and CLP would not occur.

Recreational opportunities and activities at Noxon Rapids and Cabinet Gorge Reservoirs could be impacted if a concerted effort to control EWM and CLP does not occur. A failure to control large floating beds of aquatic weeds from swimming areas could result in swimmers being entangled in the floating beds and potentially resulting in drowning or injury. Boaters' motors could become entangled with the floating beds and the floating beds of aquatic weeds could serve as breeding grounds for mosquitoes. Areas infested with weeds tend to be less aesthetically pleasing to recreationists and these areas tend to be avoided.

Cumulative Effects

Over time, an increase in aquatic weeds could restrict waterways and degrade water quality, resulting in an adverse impact to recreational use. With weed establishment in Noxon Rapids and Cabinet Gorge Reservoirs and nearby reservoirs, EWM and CLP may spread to other water bodies in the area and throughout Montana. Recreation activities such as boating, swimming, and fishing could be degraded and reduced in areas that are greatly infested with aquatic weeds. Other non-infested boat launching areas around the lake may become impacted since infestations generally begin around boat launching areas where plant fragments are accidentally introduced by boats from other infected areas.

Alternative 2: Proposed Action

Direct and Indirect Effects

Under the proposed action, research would be conducted on the CET and aquatic herbicide effectiveness for treatment of EWM and CLP to determine use of approved herbicides as part of an integrated management approach. Completion of the proposed research would allow the necessary information to develop and implement an operational herbicide treatment program which would allow for the control of EWM and reduce the potential for the weed to spread to other Montana water bodies. The control of these invasive aquatic weeds would assist in maintaining access to boating, fishing, and swimming areas where water resource activities may become restricted in the future due to rapid spread and infestation. Implementation of the proposed action would maintain the aesthetic qualities of Noxon Rapids and Cabinet Gorge Reservoirs for recreational users and would contribute to maintaining or improving their recreational experience. The proposed action is expected to have a direct positive impact on recreational use in the area.

The herbicides selected for use in the proposed action would be EPA and MDA approved and registered. These herbicides have been researched extensively and would be not be expected to cause adverse impacts to recreational activities such as fishing, boating, or swimming. Public notices would be posted within access points and boat ramps during treatments. These public notices would inform the public when it would be safe to use the water within treatment areas, specifying timing for swimming, fishing, drinking, or irrigation. When herbicide labels indicate a restricted use for swimming or fishing, a buoy with a posted public notice would be placed within the treated area informing boaters of the restricted use associated with the herbicides.

Recreational use may be temporarily inconvenienced during application of herbicides. There is a slight potential for direct exposure to recreational users in the event they did not see or ignore the public postings. These effects could result from chemical exposure through contact, ingestion, or inhalation during activities such as boating, fishing, or swimming. Swimming and

fishing outside the treatment area would not have any restrictions. Boaters would be advised to wait until the application is completed before entering the treatment area. Indirect effects post-treatment could occur due to different dissipation rates of the herbicides. Dissipation half-life for the proposed herbicides in water has been shown to vary from less than one day to approximately 7.5 days. Studies of spot treatments at Lake Seminole for control of EWM did not detect herbicides at sites located more than 1.5 Km (~5000 feet) downstream (WSDE 2001). Disruption of recreational activities would be localized (less than 200 acres across both reservoirs per year) and very short term (one to three days).

Cumulative Effects

Knowledge gained from completion of the proposed action would allow for effective herbicide treatment of EWM and CLP within Noxon Rapids and Cabinet Gorge Reservoirs. This component of the integrated management approach would assist in managing current EWM and CLP infestations within Montana. The cumulative effects of the proposed action would be the protection of Montana water bodies from EWM and CLP infestations and would likely be beneficial to recreational users of the reservoir. Cumulative effects may also result in educating the public on the benefits of controlling aquatic weed species and preventing their spread.

4.7 SOIL RESOURCES

ANALYSIS AREA

The analysis area for evaluating potential impacts to soil resources includes the soil and sediment in the potential treatment areas and the shorelines along Noxon Rapids and Cabinet Gorge Reservoirs. This analysis area is adequate for evaluating direct, indirect, and cumulative effects from the project because it is unlikely the project will impact sediment and soils in and surrounding the reservoirs.

AFFECTED ENVIRONMENT

Soils map data obtained from the Natural Resources Conservation Service (http://soildatamart.nrcs.usda.gov/) was used to evaluate potential impacts to soils. The distribution of dominant soil types in the project area are geographically intermixed and range in texture from rock outcrops to gravelly-ashy-silt loam. Soils of the project area are well drained and formed in weathered metasedimentary loamy slope alluvium and volcanic ash over colluvium. Capacity of the most limiting layer to transmit water is rated as moderately high to high. Depth to water table is greater than 80 inches with frequency of flooding and ponding none. Descriptively these soil profiles range from gravelly silt loam, to very gravelly very fine sandy loam, or cobbly sandy loam.

ENVIRONMENTAL CONSEQUENCES

Alternative 1: No Action

Direct and Indirect Effects

Under the no action alternative, the proposed research and implementation project would not occur. Therefore, no direct or indirect effects to sediment or soil would occur in the analysis area.

Cumulative Effects

The no action alternative would not result in any change to sediment and soil conditions within the area; therefore, there would be no cumulative effects from the research and implementation project.

Alternative 2: Proposed Action

Direct and Indirect Effects

Effects of herbicide applications on the sediment and soil relates directly to the type of herbicide and rate of application, the characteristics of the soil types present, and the timing and amount of precipitation following application. The primary mode of contact would be along the shoreline where water that has been treated comes into contact with soils. The proposed action would not negatively impact sediment and soils within the proposed treatment areas or along the shorelines of Noxon Rapids and Cabinet Gorge Reservoirs. Direct effects of herbicide application and persistence include the potential for decreasing microbial populations or altering species composition of microorganisms in the sediment and soil profile. There may be micro-organisms in the sediment and soils of the project area that may be negatively impacted from the herbicide application. However, others may utilize the herbicides as an energy source. Much of this depends on the herbicide and application rate and soil properties. The proposed action would aid in controlling competition from noxious weed species, native vegetation would be able to fully occupy the site, and favorable soil conditions for soil processes and microorganisms that contribute to long-term sustainability of soil productivity would be restored.

Impacts to soils from the proposed herbicides were reviewed. Diquat is an herbicide that is proposed to be used. Diquat is a highly persistent herbicide that is well adsorbed by soil, particularly soil organic matter and clay. Field and laboratory trials report that diquat may remain in the top inch of soil for extended periods of time after it is applied. By binding to the soil particles, the herbicide is biologically and chemically less likely, in certain soils, to be leached through the soil, taken up by non-targeted plants, or broken down by microbial or photochemical degradation (Etoxnet 1996). Another herbicide that is proposed to be used is endothall. In soil, endothall is rapidly biodegraded under aerobic conditions. The half-life of endothall in soil is recorded to be between 4-9 days. Endothall is highly mobile in soil; however, it is of little concern due to rapid degradation leaching. Its persistence in soil may be extended by adsorption to soil organic matter or by limited microbial activity. Endothall is unlikely to oxidize, volatilize, or chemically hydrolyze, or absorb to suspended solids or sediments in water (Extoxnet 1996).

Cumulative Effects

The proposed action alternative is not expected to change the soil properties or cause any other soil concerns, and will, therefore, cause no cumulative effects on soils. It is unlikely that the herbicides and rate of application that are proposed to be used in this project have long term adverse effects on soil properties and productivity. Herbicide treatments have occurred around the project area and will likely continue on adjacent private and state lands. Therefore, affects to soils would also occur from treatments beyond areas specified in the proposed action.

4.8 AIR QUALITY

ANALYSIS AREA

The analysis area for air quality includes Noxon Rapids and Cabinet George Reservoirs.

AFFECTED ENVIRONMENT

The Noxon Rapids and Cabinet George Reservoirs project area is dominated by Pacific maritime weather, characteristic of much of the Pacific Northwest, with a secondary continental influence (WWP 1995). Typically the area is characterized as having cold winter and warm summer days. The coldest weather occurs when continental air masses from Canada move into the region. The majority of precipitation occurs between November and January.

The State of Montana and the federal government have established ambient air quality standards for criteria air pollutants. Criteria pollutants are carbon monoxide (CO), lead (Pb), sulfur dioxide (SO_2), particulate matter smaller than 10 microns (PM_{10}), particulate matter smaller than 2.5 microns ($PM_{2.5}$), ozone, and nitrogen dioxide (NO_2).

Ambient air quality standards must not be exceeded in areas accessible to the general public. **Table 4-6** lists the national primary air quality standards which Montana has adopted by rule. National primary standards are the levels of air quality necessary, with an adequate margin of safety, to protect public health. Attainment concentrations or status for pollutants within the proposed action area is determined by monitoring levels of criteria pollutants for which National Ambient Air Quality Standards (NAAQS) and Montana Ambient Air Quality Standards exist. Attainment or unclassified designation means no violations of Montana or national air quality standards have been documented in the region.

TABLE 4-6
National Ambient Air Quality Standards

	Primary Standards	
Pollutant	**Level**	**Averaging Time**
Sulfur Dioxide	0.50 ppm 0.10 ppm 0.02 ppm	1-hour 24-hour Annual
Nitrogen Dioxide	0.30 ppm 0.05 ppm	1-hour Annual
Carbon Monoxide	23 ppm 9 ppm	1-hour 8-hour
Ozone	0.10 ppm	1-hour
Hydrogen Sulfide	0.05 ppm	1-hour
Settled Particulate Matter	10 gm/m²	30 day average
PM-2.5	35 µg/m3 15.0 µg/m3	24-hour Annual
PM-10	150 µg/m^3 50 µg/m3	24-hour Annual
Lead	1.5 µg/m^3	90 day average

The proposed herbicide and implementation project is located in Sanders County. The nearest air quality monitoring in the area is performed at Thompson Falls High School. Pollutants monitored include PM_{10} and $PM_{2.5}$. The measured concentrations of all pollutants are well below the National Ambient Air Quality Standards (US EPA 2009). Monitoring data from 2009 for particulate matter is shown in **Table 4-7.**

TABLE 4-7 Particulate Monitoring Data from 2009		
Pollutant	**Averaging Time**	**Avg. Concentration, micrograms/cubic meter**
PM-2.5	Annual	6.10 µg/m^3
PM-10	Annual	14 µg/m^3

ENVIRONMENTAL CONSEQUENCES

Alternative 1: No Action

Direct and Indirect Effects

Under the no action alternative, there would be no continuation of the herbicide research and implementation project and, therefore, no effects on the air quality of the area.

Cumulative Effects

The no action alternative would result in no change to current conditions and, therefore, there would be no cumulative effects from herbicides.

Alternative 2: Proposed Action

Direct and Indirect Effects

Direct effects to air quality from the proposed action would likely be nonexistent. The herbicides involved in the research and implementation project for treatment of EWM and CLP are not expected to have an appreciable affect on air quality because of the small size of the areas treated, amount of herbicide used, the mode of application (subsurface injection into water), and the rapid dilution of herbicides in the air.

Cumulative Effects

According to the EPA, herbicide residues in air can be from three sources: 1) drift at the time of application; 2) dispersal of herbicides due to wind erosion after application; and 3) volatilization from treated areas (soil, water, plants, etc.) or areas contaminated by herbicide residues in air. Due to the manner in which the herbicides would be applied, it is unlikely air quality would be impacted and cumulative air quality effects would not be expected to result in violations of particulate ambient air quality standards.

4.9 HUMAN HEALTH

ANALYSIS AREA

This section focuses on potential health issues associated with herbicide use, as well as other possible health and safety concerns to project workers, nearby residents, and others using the reservoirs for various activities. The Region of Influence (ROI) considered in this section is Noxon Rapids and Cabinet Gorge Reservoirs and adjacent areas.

AFFECTED ENVIRONMENT

Potential pathways for impacting human health include herbicide contact to herbicide applicators and direct herbicide contact, and inhalation or ingestion from members of the public that could potentially swim within or drink treated areas shortly after application. Most of the herbicides proposed to be used quickly become diluted and quickly biodegrade; therefore, the opportunity for the public to come in contact with the herbicide is limited.

ENVIRONMENTAL CONSEQUENCES

Alternative 1: No Action

Direct and Indirect Effects

There would be no herbicide treatment or weed control activities associated with the no action alternative. The no action alternative would not directly or indirectly effect human health.

Cumulative Effects

The no action alternative would not result changes to current human health conditions and therefore, there would be no cumulative effects to human health.

Alternative 2: Proposed Action

Direct and Indirect Effects

Only herbicides that have been approved by the EPA and licensed in Montana would be used in the proposed herbicide treatments. The herbicides proposed for the proposed treatments are water-soluble, are rapidly eliminated from humans, and do not concentrate in fatty tissues or bioaccumulate. Most human chemical exposures are either acute (one time exposure) or subchronic (exposure to a chemical for a few days or weeks). Research has shown use of these herbicides present little to no risk to human health from acute exposures through dermal contact with water or ingestion of fish. Dermal contact with treated vegetation may present limited risk exposure if contact is within one hour after application. 24-hours post application dermal contact is essentially nonexistent. Margins of safety for all acute exposure scenarios are greater than “100.” This rating implies risk of systemic, teratogenic, or reproductive effects to humans is negligible. Chronic exposure assessments indicate human health should not be adversely impacted from chronic exposure to these chemicals via ingestion of fish, ingestion of surface water, incidental ingestion of sediments, dermal contact with sediments, or dermal contact with water (swimming). Acute, subchronic, and chronic toxicology investigations reveal the acid, amine salts, and esters in these herbicides have similar degrees of low systemic toxicity. Amine salts and esters are metabolized to the acid and undergo rapid excretion by the kidneys. These herbicides do not accumulate in organisms; however, when the administered dose exceeds the threshold for normal renal function a disruption could occur resulting in possible systemic poisoning. Based on research of these aquatic herbicides, label directed use poses little concern for causing adverse health effects to people (WSDE 2001).

The proposed herbicides have been studied extensively prior to EPA approval and have very defined criteria for application rates in order to ensure that they are not toxic to humans, fish, invertebrates, or other animals. All herbicide labels would be strictly followed for both the research phase and the operational treatment phase of the proposed action. Refer to **Appendix A** for herbicide labels.

The public would be made aware of the herbicide application via mailings and posting such as: public notices would be posted along access points and boat ramps during treatment implementation; a public notice would be published in the local paper informing people of upcoming treatments; the shoreline homeowners group would be contacted prior to treatments; and, public notices would be mailed out to all Avista permit holders. These public notices would inform the public when it would be safe to use the water within treatment areas, specifying timing for swimming, fishing, drinking, or irrigation. In addition, when herbicide labels indicate a swimming or fishing restriction, marker buoys would be placed within area of treatment informing recreationists of restrictions.

Below is a discussion of the specific herbicides that are proposed to be used and the associated research that has been conducted on their affects to human health.

Diquat (Reward) – Diquat is an organic herbicide that has been approved by the EPA and the MDA. The effects of contact, ingestion and inhalation of diquat has been researched through laboratory experiments and the results indicates that normal exposures to diquat, in compliance with the products label, do not pose a serious health risk to humans.

The maximum contaminant level goals (MCLG) for diquat are 0.02 mg/L or 20 ppb. EPA has set this level of protection based on the best available science to prevent potential health problems. EPA has also set an enforceable regulation for diquat, called a maximum contaminant level (MCL), at 0.02 mg/L or 20 ppb. MCLs are set as close to the health goals as possible, considering cost, benefits and the ability of public water systems to detect and remove contaminants using suitable treatment technologies. In this case, the MCL equals the MCLG, because analytical methods or treatment technology do not pose any limitation.

The Phase V Rule, the regulation for diquat, became effective in 1994. The Safe Drinking Water Act requires EPA to periodically review the national primary drinking water regulation for each contaminant and revise the regulation, if appropriate. EPA reviewed diquat as part of the Six Year Review and determined that the 0.02 mg/L or 20 ppb MCLG and 0.02 mg/L or 20 ppb MCL for diquat are still protective of human health. Although, research finds that some people who drink water containing diquat *well in excess* of the MCL for many years could get cataracts.

Endothall (Aquathol K) – The MCLG for endothall is 0.1 mg/L or 100 ppb. EPA has set this level of protection based on the best available science to prevent potential health problems. EPA has set an enforceable MCL regulation for endothall at 0.1 mg/L or 100 ppb. MCLs are set as close to the health goals as possible, considering cost, benefits and the ability of public water systems to detect and remove contaminants using suitable treatment technologies. In this case, the MCL equals the MCLG, because analytical methods or treatment technology do not pose any limitation.

The Phase V Rule, the regulation for endothall, became effective in 1994. The Safe Drinking Water Act requires EPA to periodically review the national primary drinking water regulation for each contaminant and revise the regulation, if appropriate. EPA reviewed endothall as part of the Six Year Review and determined that the 0.1 mg/L or 100 ppb MCLG and 0.1 mg/L or 100 ppb MCL for endothall are still protective of human health.

Consumption of water by the public is allowed only when the concentration of endothall in the water is less than the MCL of 0.1 ppm. Applicators should consider the unique characteristics of

the treated waters to assure that endothall concentrations in potable drinking water do not exceed 0.1 ppm at the time of consumption. For applications of endothall, the drinking water setback distance from functioning potable water intakes is greater than or equal to 600 feet. Some people who drink water containing endothall *well in excess* of the MCL for many years could experience problems with the stomach or intestines.

***Triclopyr (Kraken)* –** Triclopyr, a pyridine, is a selective systemic herbicide used for control of woody and broadleaf plants along rights-of-way, in forests, on industrial lands, and on grasslands. Unlike a similar product 2,4,5-T, which has been banned in the United States, there is no possibility of dioxin impurities occurring in triclopyr. Technical triclopyr acid was found to be slightly toxic by oral and dermal routes and has been placed in Toxicity Category III for these effects. Acceptable studies for acute inhalation, primary eye irritation, primary dermal irritation, and dermal sensitization were not available for the technical grade of triclopyr acid. Available data indicate that both triclopyr butoxyethyl ester (BEE) and triclopyr triethylamine salt (TEA) are slightly toxic by oral (Toxicity Category III) and dermal (Toxicity Category III) routes of exposure, and practically non-toxic by inhalation (Toxicity Category IV) and do not cause dermal irritation. In a primary eye irritation study, triclopyr TEA was found to be corrosive while BEE was found to be minimally irritating. Both TEA and BEE were found to cause dermal sensitization in test animals. EPA has classified triclopyr as a Group D chemical (not classifiable as to human carcinogenicity). This decision was based on increases in mammary tumors in both the female rat and mouse, and adrenal pheochromocytomas in the male rat, which were considered to be only a marginal response, and the absence of additional support from structural analogs or genotoxicity. The Reference Dose (RfD), the amount of triclopyr residues that could be consumed daily over a lifetime without adverse effects, was established at 0.05 mg/kg/day, based on the 2-generation reproduction toxicity study in rats with a no observable affect level (NOEL) of 5.0 mg/kg/day, the lowest dose tested. At the next dose level (25 mg/kg/day), an increased incidence of proximal tubular degeneration of the kidneys was observed in P1 and P2 parental rats in this study. For the acute dietary risk assessment, the endpoint of concern was the maternal and developmental NOEL of 30 mg/kg/day from a developmental toxicity study in rabbits based on a decreased number of live fetuses and other effects at the 100 mg/kg dose. Because reliable pre- and post-natal data indicate no special sensitivity of young animals to triclopyr residues, EPA found that an uncertainty factor of 100 (10 for interspecies differences in response and 10 for intraspecies differences) is adequately protective of infants and children. Therefore, for risk assessment purposes the chronic dietary (RfD) calculations include a factor of 100, and the acute dietary risk assessments assume that a margin of exposure of 100 or greater is acceptable.

Direct effects to those involved in the herbicide application may result from exposure through chemical contact, ingestion, or inhalation. Applicators may be exposed during the mixing of herbicide formulations and addition of surfactants and during application operations. However, little to no inhalation exposure is expected due to the methods of application. Acute inhalation overexposure to these herbicides in animal studies has demonstrated signs of respiratory tract irritation. Symptoms did not persist beyond 3-7 days post exposure, nor were there any deaths. Potential for exposure will be minimized through use of appropriate personal protective equipment and having only qualified personnel handling the herbicides.

Exposure to the general public exceeding thresholds of concern under this alternative would be very limited because of the concentrations that would be used and the mechanisms by which the herbicide would be applied.(i.e. subsurface injection). There would be little possibility of the public being directly sprayed given the application methods proposed for this project.

Cumulative Effects

The human health cumulative effects associated with the aquatic herbicides used in the proposed action are not expected to result in adverse health effects if chemicals are utilized properly with label directions. The areas to be treated annually represent a small portion of the two reservoirs and herbicide application would occur on only one day for any given location. Treatment may occur in subsequent years if necessary (e.g., adequate removal is not obtained or reinfestation occurs in later years). However, any given area would only likely be treated one to three times over the life of the project; hence, the herbicides would only be present for a few days over the 10 year period of this project.

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5.0 PEOPLE ASSOCIATED WITH THE PROJECT

NAME	ASSOCIATION	PROJECT RESPONSIBILITY
Kirk Miller	Tetra Tech	Project Management, Editing and Technical Review, Public Involvement and Scoping
Stacy Pease	Tetra Tech	Wildlife, Fisheries, Threatened and Endangered Species, Human Health, Recreation, Air Quality
Vicki Regula	Tetra Tech	Vegetation, Wetlands, Aquatic Weeds, Soils, Scoping
Cory Sandow	Tetra Tech	Fisheries
Mark Pearson	Tetra Tech	Mapping, GIS
Celestine Duncan	EWM Task Force	Purpose and Need, Herbicides
Bill Craig	Tetra Tech	Water Quality
John Halpop	Sanders County Extension	Purpose and Need Public Involvement and Scoping

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APPENDIX A

HERBICIDE LABELS

PULL HERE TO OPEN

REWARD®

Landscape and Aquatic Herbicide

TO PREVENT ACCIDENTAL POISONING, NEVER PUT INTO FOOD, DRINK, OR OTHER CONTAINERS, AND USE STRICTLY IN ACCORDANCE WITH ENTIRE LABEL.

DO NOT USE THIS PRODUCT FOR REFORMULATION.

Active Ingredient:	
Diquat dibromide [6,7-dihydrodipyrido (1,2-a:2',1'-c) pyrazinediium dibromide]	37.3%
Other Ingredients:	62.7%
Total:	100.0%

Contains 2 lbs. diquat cation per gal. (3.73 lbs. diquat dibromide per gal.)

KEEP OUT OF REACH OF CHILDREN.

WARNING/AVISO

Si usted no entiende la etiqueta, busque a alguien para que se la explique a usted en detalle. (If you do not understand the label, find someone to explain it to you in detail.)

See additional precautionary statements on label.

EPA Reg. No. 100-1091
EPA Est. 100-TX-001

Product of United Kingdom
Formulated in the USA

SCP 1091A-L2C 0605

2.5 gallons
Net Contents

syngenta

FIRST AID	
If on skin or clothing	• Take off contaminated clothing. • Rinse skin immediately with plenty of water for 15-20 minutes. • Call a poison control center or doctor for treatment advice.
If in eyes	• Hold eye open and rinse slowly and gently with water for 15-20 minutes. • Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye. • Call a poison control center or doctor for treatment advice.
If swallowed	• Call a poison control center or doctor immediately for treatment advice. • Have person sip a glass of water if able to swallow. • Do not induce vomiting unless told to do so by the poison control center or doctor. • Do not give anything by mouth to an unconscious person.
If inhaled	• Move person to fresh air. • If person is not breathing, call 911 or an ambulance, then give artificial respiration, preferably mouth-to-mouth, if possible. • Call a poison control center or doctor for further treatment advice.

NOTE TO PHYSICIANS

To be effective, treatment for diquat poisoning must begin **IMMEDIATELY**. Treatment consists of binding diquat in the gut with suspensions of activated charcoal or bentonite clay, administration of cathartics to enhance elimination, and removal of diquat from the blood by charcoal hemoperfusion or continuous hemodialysis.

Have the product container or label with you when calling a poison control center or doctor, or going for treatment.

HOTLINE NUMBER

For 24-Hour Medical Emergency Assistance (Human or Animal) or Chemical Emergency Assistance (Spill, Leak, Fire, or Accident), Call
1-800-888-8372

PRECAUTIONARY STATEMENTS

Hazards to Humans and Domestic Animals

WARNING / AVISO

May be fatal if absorbed through skin. Harmful if swallowed or inhaled. Causes substantial, but temporary, eye injury. Causes skin irritation. Contact with irritated skin, or a cut, or repeated contact with intact skin may result in poisoning. Do not get in eyes, on skin, or on clothing. Avoid breathing vapor or spray mist. Do not feed forage from treated crops to livestock. Keep livestock and pets out of treated fields and crop areas.

Personal Protective Equipment (PPE)

Some materials that are chemical-resistant to this product are: barrier laminate, butyl rubber ≥14 mils, nitrile rubber ≥14 mils. If you want more options, follow the instructions for Category A on an EPA Chemical Resistance Category Selection Chart.

Mixers, Loaders, Applicators and other handlers must wear:

- Coveralls over short-sleeved shirt and short pants or coveralls over long-sleeved shirt and long pants
- Chemical-resistant gloves
- Chemical-resistant footwear plus socks
- Protective eyewear
- Chemical-resistant headgear for overhead exposure
- Chemical-resistant apron when cleaning equipment, mixing, or loading
- Face shield when mixing or loading

Exception: After this product has been diluted to 0.50% Reward or less in water (i.e., the labeled rate for some spot applications), applicators for AQUATIC SURFACE APPLICATIONS must, at a minimum, wear (Note - Mixers and Loaders for this application method must still wear the personal protective equipment (PPE) as described in the above section):

- Long-sleeved shirt and long pants
- Shoes plus socks
- Waterproof gloves
- Protective eyewear

Exception: At a minimum, applicators for AQUATIC SUBSURFACE APPLICATIONS must wear (Note - Mixers and Loaders for this application method must still wear the personal protective equipment (PPE) as described in the above section):

- Short-sleeved shirt and short pants
- Waterproof gloves
- Chemical-resistant footwear plus socks

Discard clothing and other absorbent materials that have been drenched or heavily contaminated with this product's concentrate. Do not reuse them. Follow manufacturer's instructions for cleaning/maintaining PPE. If no such instructions for washables exist, use detergent and hot water. Keep and wash PPE separately from other laundry.

Engineering Control Statements

Mixers and loaders supporting aerial applications are required to use closed systems that provide dermal protection. The closed system must be used in a manner that meets the requirements listed in the Worker Protection Standard (WPS) for agricultural pesticides [40 CFR 170.240(d)(4)]. When using the closed system, mixers and loaders' PPE requirements may be reduced or modified as specified in the WPS.

When handlers use closed systems, enclosed cabs, or aircraft in a manner that meets the requirements listed in the Worker Protection Standard (WPS) for agricultural pesticides [40 CFR 170.240(d)(4-6)], the handler PPE requirements may be reduced or modified as specified in the WPS.

User Safety Recommendations

Users should:

- Wash hands before eating, drinking, chewing gum, using tobacco, or using the toilet.
- Remove clothing/PPE immediately if pesticide gets inside. Then wash thoroughly and put on clean clothing. Prolonged contact of the product with the skin may produce burns.
- Remove PPE immediately after handling this product. Wash the outside of gloves before removing. As soon as possible, wash thoroughly and change into clean clothing.

Environmental Hazards

This pesticide is toxic to aquatic invertebrates. **For Terrestrial Uses,** do not apply directly to water, or to areas where surface water is present, or to intertidal areas below the mean high water mark. Do not contaminate water when disposing of equipment wash water. **For Aquatic Uses** do not apply directly to water except as specified on this label.

CONDITIONS OF SALE AND LIMITATION OF WARRANTY AND LIABILITY

NOTICE: Read the entire Directions for Use and Conditions of Sale and Limitation of Warranty and Liability before buying or using this product. If the terms are not acceptable, return the product at once, unopened, and the purchase price will be refunded.

The Directions for Use of this product should be followed carefully. It is impossible to eliminate all risks inherently associated with the use of this product. Crop injury, ineffectiveness or other unintended consequences may result because of such factors as manner of use or application, weather or crop conditions, presence of other materials or other influencing factors in the use of the product, which are beyond the control of SYNGENTA CROP PROTECTION, Inc. or Seller. All such risks shall be assumed by Buyer and User, and Buyer and User agree to hold SYNGENTA and Seller harmless for any claims relating to such factors.

SYNGENTA warrants that this product conforms to the chemical description on the label and is reasonably fit for the purposes stated in the Directions for Use, subject to the inherent risks referred to above, when used in accordance with directions under normal use conditions. This warranty does not extend to the use of the product contrary to label instructions, or under abnormal conditions or under conditions not reasonably foreseeable to or beyond the control of Seller or SYNGENTA, and Buyer and User assume the risk of any such use. SYNGENTA MAKES NO WARRANTIES OF MERCHANTABILITY OR OF FITNESS FOR A PARTICULAR PURPOSE NOR ANY OTHER EXPRESS OR IMPLIED WARRANTY EXCEPT AS STATED ABOVE.

In no event shall SYNGENTA or Seller be liable for any incidental, consequential or special damages resulting from the use or handling of this product. **THE EXCLUSIVE REMEDY OF THE USER OR BUYER, AND THE EXCLUSIVE LIABILITY OF SYNGENTA AND SELLER FOR ANY AND ALL CLAIMS, LOSSES, INJURIES OR DAMAGES (INCLUDING CLAIMS BASED ON BREACH OF WARRANTY, CONTRACT, NEGLIGENCE, TORT, STRICT LIABILITY OR OTHERWISE) RESULTING FROM THE USE OR HANDLING OF THIS PRODUCT, SHALL BE THE RETURN OF THE PURCHASE PRICE OF THE PRODUCT OR, AT THE ELECTION OF SYNGENTA OR SELLER, THE REPLACEMENT OF THE PRODUCT.**

SYNGENTA and Seller offer this product, and Buyer and User accept it, subject to the foregoing conditions of Sale and Limitations of Warranty and Liability, which may not be modified except by written agreement signed by a duly authorized representative of SYNGENTA.

DIRECTIONS FOR USE

It is a violation of federal law to use this product in a manner inconsistent with its labeling.

READ ENTIRE LABEL. USE STRICTLY IN ACCORDANCE WITH PRECAUTIONARY STATEMENTS AND DIRECTIONS, AND WITH APPLICABLE STATE AND FEDERAL REGULATIONS.

Do not apply this product through any type of irrigation system.

Do not apply this product in a way that will contact workers or other persons, either directly or through drift. Only protected handlers may be in the area during application. For any requirements specific to your State or Tribe, consult the agency responsible for pesticide regulation.

AGRICULTURAL USE REQUIREMENTS

Use this product only in accordance with its labeling and with the Worker Protection Standard, 40 CFR part 170. This Standard contains requirements for the protection of agricultural workers on farms, forests, nurseries, and greenhouses, and handlers of agricultural pesticides. It contains requirements for training, decontamination, notification, and emergency assistance. It also contains specific instructions and exceptions pertaining to the statements on this label about personal protective equipment (PPE), and restricted-entry interval. The requirements in this box only apply to uses of this product that are covered by the Worker Protection Standard.

Do not enter or allow worker entry into treated areas during the restricted-entry interval (REI) of 24 hours.

PPE required for early entry to treated areas that is permitted under the Worker Protection Standard and that involves contact with anything that has been treated, such as plants, soil, or water is:

- Coveralls over short-sleeved shirt and short pants, or coveralls over long-sleeved shirt and long pants
- Chemical-resistant gloves made of any waterproof material
- Chemical-resistant footwear plus socks
- Protective eyewear
- Chemical-resistant headgear for overhead exposure

NON-AGRICULTURAL USE REQUIREMENTS

The requirements in this box apply to uses of this product that are NOT within the scope of the Worker Protection Standard for agricultural pesticides (40 CFR part 170). The WPS applies when this product is used to produce agricultural plants on farms, forests, nurseries, or greenhouses.

Keep all unprotected persons out of operating areas or vicinity where there may be drift.

For terrestrial uses, do not enter or allow entry of maintenance workers into treated areas, or allow contact with treated vegetation wet with spray, dew, or rain, without appropriate protective clothing until spray has dried.

For aquatic uses, do not enter treated areas while treatments are in progress.

STORAGE AND DISPOSAL

Do not contaminate water, food, or feed by storage or disposal.

Pesticide Storage

Keep pesticide in original container. Do not put concentrate or dilute into food or drink containers. Do not contaminate feed, foodstuffs, or drinking water. Do not store or transport near feed or food. Store at temperatures above 32°F. For help with any spill, leak, fire, or exposure involving this material, call **1-800-888-8372**.

Pesticide Disposal

Open dumping is prohibited. Pesticide wastes are toxic. Improper disposal of excess pesticide, spray mixture, or rinsate is a violation of federal law. If these wastes cannot be disposed of by use according to label instructions, contact your State Pesticide or Environmental Control Agency, or the Hazardous Waste representative at the nearest EPA Regional Office for guidance.

Container Disposal

Do not reuse container. Triple rinse (or equivalent). Then offer for recycling or reconditioning, or puncture and dispose of in a sanitary landfill, or incineration, or if allowed by State and local authorities, by burning. If burned, stay out of smoke.

For Bulk And Mini-Bulk Containers

When the container is empty, replace the cap and seal all openings that have been opened during use and return the container to the point of purchase, or to a designated location named at the time of purchase of this product. This container must be refilled with this pesticide product. **DO NOT REUSE THE CONTAINER FOR ANY OTHER PURPOSE.** Prior to refilling, inspect carefully for damage such as cracks, punctures, abrasions, worn-out threads and closure devices. Check for leaks after refilling and before transporting. Do not transport if this container is damaged or leaking. If the container is damaged, leaking or obsolete, contact Syngenta Crop Protection at 1-800-888-8372. If not returned to the point of purchase or to a designated location, triple rinse emptied container and offer for recycling. Disposal of this container must be in compliance with state and local regulations.

For minor spills, leaks, etc., follow all precautions indicated on this label and clean up immediately. Take special care to avoid contamination of equipment and facilities during cleanup procedures and disposal of wastes. In the event of a major spill, fire, or other emergency, call 1-800-888-8372, day or night.

CONTAINER IS NOT SAFE FOR FOOD, FEED, OR DRINKING WATER!

SPECIFIC USE DIRECTIONS

Reward Landscape and Aquatic Herbicide is a nonvolatile herbicidal chemical for use as a general herbicide to control weeds in commercial greenhouses and nurseries; ornamental seed crops (flowers, bulbs, etc. – except in the state of California); landscape, industrial, recreational, commercial, residential, and public areas; turf renovation (all turf areas except commercial sod farms); dormant established turfgrass (bermudagrass, zoysiagrass – nonfood or feed crop); and aquatic areas. Absorption and herbicidal action is usually quite rapid with effects visible in a few days. Reward Landscape and Aquatic Herbicide controls weeds by interfering with photosynthesis within green plant tissue. Weed plants should be succulent and actively growing for best results. Rinse all spray equipment thoroughly with water after use. Avoid spray drift to crops, ornamentals, and other desirable plants during application, as injury may result. Application to muddy water may result in reduced control. Minimize creating muddy water during application. Use of dirty or muddy water for Reward Landscape and Aquatic Herbicide dilution may result in reduced herbicidal activity. Avoid applying under conditions of high wind, water flow, or wave action.

SPRAY DRIFT MANAGEMENT

Avoiding spray drift at the application site is the responsibility of the applicator and the grower. The interaction of many equipment- and weather-related factors determine the potential for spray drift. The applicator and the grower are responsible for considering all these factors when making decisions.

The following drift management requirements must be followed to avoid off-target movement from aerial applications to agricultural field crops. These requirements do not apply to forestry applications, public health uses, or to applications using dry formulations.

- The distance of the outermost nozzles on the boom must not exceed 3/4 the length of the wingspan or rotor.
- Nozzles must always point backward parallel with the air stream and never be pointed downward more than 45 degrees.

Where states have more stringent regulations, they should be observed.

Droplet Size

The most effective way to reduce drift potential is to apply large droplets. The best drift management strategy is to apply the largest droplets that provide sufficient coverage and control. Applying larger droplets reduces drift potential, but will not prevent drift if applications are made improperly, or under unfavorable environmental conditions (See **Wind, Temperature and Humidity,** and **Temperature inversions**).

Controlling Droplet Size

- **Volume** - Use high flow rate nozzles to apply the highest practical spray volume. Nozzles with higher rated flows produce larger droplets.
- **Pressure** - Do not exceed the nozzle manufacturer's recommended pressures. For many nozzle types, lower pressure produces larger droplets. When higher flow rates are needed, use higher flow rate nozzles instead of increasing pressure.
- **Number of Nozzles** - Use the minimum number of nozzles that provide uniform coverage.
- **Nozzle Orientation** - Orienting nozzles so that the spray is released parallel to the airstream produces larger droplets than other orientations and is the recommended practice. Significant deflection from horizontal will reduce droplet size and increase drift potential.
- **Nozzle Type** - Use a nozzle type that is designed for the intended application. With most nozzle types, narrower spray angles produce larger droplets. Consider using low-drift nozzles. Solid stream nozzles oriented straight back produce the largest droplets and the lowest drift.

Boom Length

For some use patterns, reducing the effective boom length to less than 3/4 of the wingspan or rotor length may further reduce drift without reducing swath width.

Application Height

Applications should not be made at a height greater than 10 ft. above the top of the target plants, unless a greater height is required for aircraft safety. Making applications at the lowest height that is safe reduces exposure of droplets to evaporation and wind.

Swath Adjustment

When applications are made with a crosswind, the swath will be displaced downwind. Therefore, on the up and downwind edges of the field, the applicator must compensate for this displacement by adjusting the path of the aircraft upwind. Swath adjustment distance should increase with increasing drift potential (higher wind, smaller drops, etc.).

Wind

Drift potential is lowest between wind speeds of 2-10 mph. However, many factors, including droplet size and equipment type, determine drift potential at any given speed. Application should be avoided below 2 mph due to variable wind direction and high inversion potential. **Note:** Local terrain can influence wind patterns. Every applicator should be familiar with local wind patterns and how they affect spray drift.

Temperature and Humidity

When making applications in low relative humidity, set up equipment to produce larger droplets to compensate for evaporation. Droplet evaporation is most severe when conditions are both hot and dry.

Temperature Inversions

Applications should not occur during a temperature inversion because drift potential is high. Temperature inversions restrict vertical air mixing, which causes small suspended droplets to remain in a concentrated cloud. This cloud can move in unpredictable directions due to the light variable winds common during inversions. Temperature inversions are characterized by increasing temperatures with altitude and are common on nights with limited cloud cover and light to no wind. They begin to form as the sun sets and often continue into the morning. Their presence can be indicated by ground fog, however, if fog is not present inversions can also be identified by the movement of smoke from a ground source or an aircraft smoke generator. Smoke that layers and moves laterally in a concentrated cloud (under low wind conditions) indicates an inversion, while smoke that moves upward and rapidly dissipates indicates good vertical air mixing.

Sensitive Areas

The pesticide should only be applied when the wind is blowing away from adjacent sensitive areas (e.g., residential areas, bodies of water, known habitat for threatened or endangered species, nontarget crops).

COMMERCIAL GREENHOUSES AND NURSERIES

For general weed control in commercial greenhouses (beneath benches), field grown and container stock, and other similar areas, Reward Landscape and Aquatic Herbicide may be applied preplant or postplant preemergence in field grown ornamental nursery plantings or postemergence as a directed spray. Reward Landscape and Aquatic Herbicide may also be applied preemergence in ornamental seed crops (except in the state of California). Avoid contact with desirable foliage as injury may occur. Do not use on food or feed crops.

Spot spray: 1-2 qts. Reward Landscape and Aquatic Herbicide plus the labeled rate of a 75% or greater nonionic surfactant per 100 gals. of water, or 0.75 oz. (22 mls.) Reward Landscape and Aquatic Herbicide plus the labeled rate of a 75% or greater nonionic surfactant per 1 gal. of water.

Broadcast: 1-2 pts. Reward Landscape and Aquatic Herbicide in a minimum of 15 gals. of water per acre. Add the labeled rate of a 75% or greater nonionic surfactant per 100 gals. of spray mixture. Use an adequate spray volume to insure good coverage.

ORNAMENTAL SEED CROPS (FLOWERS, BULBS, ETC.) EXCEPT IN THE STATE OF CALIFORNIA

For preharvest desiccation of ornamental seed crops. NOT FOR FOOD OR FIBER CROPS.

Broadcast (Air or Ground): 1.5-2 pts. Reward Landscape and Aquatic Herbicide plus the labeled rate of a 75% or greater nonionic surfactant per acre in sufficient water (minimum of 5 gals. by air; 15 gals. by ground) for desiccation and weed burndown. Repeat as needed at no less than 5-day intervals up to three applications. Do not use seed, screenings, or waste as feed or for consumption.

DIRECTIONS FOR LANDSCAPE, INDUSTRIAL, RECREATIONAL, COMMERCIAL, RESIDENTIAL, AND PUBLIC AREAS

Reward Landscape and Aquatic Herbicide provides fast control of broadleaf and grassy weeds in industrial, recreational, golf course, commercial, residential, and public areas.

Reward Landscape and Aquatic Herbicide is a nonselective herbicide that rapidly kills undesirable above ground weed growth in 24-36 hours. Avoid application of Reward Landscape and Aquatic Herbicide to desirable plants.

Reward Landscape and Aquatic Herbicide is a contact/desiccant herbicide; it is essential to obtain complete coverage of the target weeds to get good control. Improper application technique and/or application to stressed weeds may result in unacceptable weed control. For best results, apply to actively growing, young weeds.

Difficult weeds (such as perennial or deeply-rooted weeds) can often be controlled by tank mixing Reward Landscape and Aquatic Herbicide with other systemic-type herbicides. Refer to other product labels for specific application directions.

For residual weed control, tank mix Reward Landscape and Aquatic Herbicide with a preemergent herbicide labeled for the intended use site. When mixing Reward Landscape and Aquatic Herbicide with another herbicide, it is recommended to mix just a small amount first to determine if the mixture is physically compatible before proceeding with larger volumes.

Syngenta has not tested all possible tank mixtures with other herbicides for compatibility, efficacy or other adverse effects. Before mixing with other herbicides Syngenta recommends you first consult your state experimental station, state university or extension agent.

Grounds maintenance weed control: Reward Landscape and Aquatic Herbicide can be used as a spot or broadcast spray to control weeds in public, commercial and residential landscapes, including landscape beds, lawns, golf courses and roadsides. Reward Landscape and Aquatic Herbicide can also be used for weed control around the edges and nonflooded portions of ponds, lakes and ditches.

Trim and Edge weed control: Reward Landscape and Aquatic Herbicide can be used to eliminate undesired grass and broadleaf plant growth in a narrow band along driveways, walkways, patios, cart paths, fence lines, and around trees, ornamental gardens, buildings, other structures, and beneath noncommercial greenhouse benches. Vegetation control with Reward Landscape and Aquatic Herbicide is limited to the spray application width. Do not exceed the labeled rate of Reward Landscape and Aquatic Herbicide as excessive rates may result in staining of concrete-based materials.

Reward Landscape and Aquatic Herbicide, since it does not translocate systemically, can be used as an edging or pruning tool when precisely applied to select areas of grass or to undesirable growth on desirable ornamental bedding plants, ground covers, etc.

Industrial weed control: Reward Landscape and Aquatic Herbicide can be used as a spot or broadcast spray either alone or in combination with other herbicides as a fast burndown or control weeds in rights-of-ways, railroad beds/yards, highways, roads, dividers and medians, parking lots, pipelines, pumping stations, public utility lines, transformer stations and substations, electric utilities, storage yards, and other non-crop areas.

Spot spray: Apply either 1-2 qts. of Reward Landscape and Aquatic Herbicide plus the labeled rate of a 75% or greater nonionic surfactant per 100 gals. water, or 0.75 oz. (22 mls.) Reward Landscape and Aquatic Herbicide plus the labeled rate of a 75% or greater nonionic surfactant per 1 gal. of water.

Broadcast: 1-2 pts. Reward Landscape and Aquatic Herbicide per acre in sufficient water to insure good spray coverage. Add the labeled rate of 75% or greater nonionic surfactant per 100 gals. spray mixture. Greater water volumes are necessary if the target plants are tall and/or dense. It is recommended that 60 gals. or greater water volume be used to obtain good coverage of dense weeds.

TURF RENOVATION (ALL TURF AREAS EXCEPT COMMERCIAL SOD FARMS)

To desiccate golf course turf and other turf areas prior to renovation, apply 1-2 pts. of Reward Landscape and Aquatic Herbicide per acre plus the labeled rate of a 75% or greater nonionic surfactant in 20-100 gals. of water (4 teaspoons of Reward Landscape and Aquatic Herbicide plus the labeled rate of a 75% or greater nonionic surfactant per 1 gal. of water) using ground spray equipment. Apply for full coverage and thorough contact with the turfgrass. Apply only when the turf is dry, free from dew and incidental moisture. For enhanced turf desiccation, especially in the case of thick turfgrass, water volumes should approach 100 gals. of water per acre.

For **suppression** of regrowth and quick desiccation of treated turfgrass, Reward Landscape and Aquatic Herbicide may be mixed with other systemic nonselective or systemic postemergence grassy weed herbicides. Refer to other product labels for specific application directions and restrictions.

Avoid spray contact with, or spray drift to, foliage of ornamental plants or food crops.

Do not graze livestock on treated turf or feed treated thatch to livestock.

DORMANT ESTABLISHED TURFGRASS (BERMUDAGRASS, ZOYSIAGRASS), NONFOOD OR FEED CROP

For control of emerged annual broadleaf and grass weeds, including Little Barley*, Annual Bluegrass, Bromes including Rescuegrass, Sixweeks fescue, Henbit, Buttercup, and Carolina Geranium in established dormant bermudagrass lawns, parks, golf courses, etc.

Apply 1-2 pts. Reward Landscape and Aquatic Herbicide per acre in 20-100 gals. of spray mix by ground as a broadcast application. Add the labeled rate of a 75% or greater nonionic surfactant per 100 gals. of spray mixture.

Bermudagrass must be dormant at application. Application to actively growing bermudagrass may cause delay or permanent injury. Users in the extreme Southern areas should be attentive to the extent of dormancy at the time of application.

*For control of Little Barley, apply Reward Landscape and Aquatic Herbicide prior to the mid-boot stage.

AQUATIC USE DIRECTIONS

New York – Not for Sale or Use in New York State without Supplemental Special Local Needs Labeling.

Necessary approval and/or permits must be obtained prior to application if required. Consult the responsible State Agencies (i.e., Fish and Game Agencies, State Water Conservation authorities, or Department of Natural Resources).

Treatment of dense weed areas may result in oxygen loss from decomposition of dead weeds. This loss of oxygen may cause fish suffocation. Therefore, treat only 1/3 to 1/2 of the water body area at one time and wait 14 days between treatments.

For best results on submersed weeds, Reward Landscape and Aquatic Herbicide should be applied to actively growing (photosynthesizing) weeds when water temperatures have reached or exceeded approximately 50°F, typically during the Spring or early Summer.

For application only to **still water** (i.e. ponds, lakes, and drainage ditches) where there is minimal or no outflow to public waters.

and/or

For applications to **public waters** in ponds, lakes, reservoirs, marshes, bayous, drainage ditches, canals, streams, rivers, and other slow-moving or quiescent bodies of water for control of aquatic weeds. For use by:

- Corps of Engineers; or
- Federal or State Public Agencies (i.e., Water Management District personnel, municipal officials); or
- Applicators and/or Licensees (Certified for aquatic pest control) that are authorized by the State or Local government.

Treated water may be used according to the following table or until such time as an approved assay (example: PAM II Spectromatic Method) shows that the water does not contain more than the designated maximum contaminant level goal (MCLG) of 0.02 mg/l. (ppm) of diquat dibromide (calculated as the cation).

Water Use Restrictions Following Applications With Reward Landscape And Aquatic Herbicide (Days)

Application Rate	Drinking	Fishing and Swimming	Livestock/ Domestic Animals Consumption	Spray Tank Applications** and Irrigation to Turf and Landscape Ornamentals	Spray Tank Applications** and Irrigation to Food Crops and Production Ornamentals
2 gals./surface acre	3 days	0	1 day	3 days	5 days
1 gal./surface acre	2 days	0	1 day	2 days	5 days
0.75 gal. /surface acre	2 days	0	1 day	2 days	5 days
0.50 gal./surface acre	1 day	0	1 day	1 day	5 days
Spot Spray* (< 0.5 gal./surface acre)	1 day	0	1 day	1 day	5 days

***Add a nonionic surfactant (with at least 75% of the constituents active as a spray adjuvant) at the rate recommended by the manufacturer.

****For preparing agricultural sprays for food crops, turf or ornamentals (to prevent phytotoxicity), do not use water treated with Reward Landscape and Aquatic Herbicide before the specified time period.

When the contents of more than one spray tank is necessary to complete a single aquatic application, no water holding restrictions apply between the consecutive spray tanks.

No applications are to be made in areas where commercial processing of fish, resulting in the production of fish protein concentrate or fish meal, is practiced. Before application, coordination and approval of local and/or State authorities must be obtained.

Floating and Marginal Weeds Including:

Water lettuce, *Pistia stratiotes*
Water hyacinth, *Eichhornia crassipes*
Duckweed, *Lemna* spp.
Salvinia spp. (including *S. molesta*)
Pennywort (*Hydrocotyle* spp.)
Frog's Bit[1], *Limnobium spongia*
Cattails, *Typha* spp.

[1]Not for use in California

Reward Landscape and Aquatic Herbicide may be applied by backpack, airboat, spray handgun, helicopter, airplane, or similar application equipment that results in thorough spray coverage.

Spot Treatment: Apply Reward Landscape and Aquatic Herbicide at 2 quarts per 100 gallons spray carrier (0.5% solution) with an approved aquatic wetting agent at 0.25-1.0% v/v (1 quart to 1 gallon per 100 gallons water). For cattail control, Reward Landscape and Aquatic Herbicide should be applied prior to flowering at the maximum application rate (8 quarts of Reward Landscape and Aquatic Herbicide/100 gallons spray carrier) plus the wetting agent. Repeat treatments may be necessary for complete control.

Spray to completely wet target weeds but not to runoff. Densely packed weeds or mats may require additional applications due to incomplete spray coverage. Re-treat as needed. For best results, re-treat weed escapes within 2 weeks of the initial treatment.

Broadcast Treatment: Apply Reward Landscape and Aquatic Herbicide at the rate of 0.5-2.0 gallons per surface acre in sufficient carrier along with 16-32 oz./A of an approved wetting agent. Re-treat as necessary for densely populated weed areas. Good coverage is necessary for control of the target weeds.

For duckweed control, apply Reward Landscape and Aquatic Herbicide at 1-2 gallons/A.

Submersed Weeds Including:

Bladderwort, *Utricularia* spp.
Hydrilla, *Hydrilla verticillata*
Watermilfoils (including Eurasian), *Myriophyllum* spp.
Pondweeds[1], *Potamogeton* spp.
Coontail, *Ceratophyllum demersum*
Elodea, *Elodea* spp.
Brazilian Elodea, *Egeria densa*
Naiad, *Najas* spp.
Algae[2], *Spirogyra* spp. and *Pithophora* spp.

[1]Reward Landscape and Aquatic Herbicide controls *Potamogetan* species except Richardson's pondweed, *P. richardsonii*.

[2]Suppression only. For control of *Spirogyra* and/or *Pithophora*, use Reward Landscape and Aquatic Herbicide in a tank mix with an approved algaecide.

Reward® Landscape and Aquatic Herbicide

For severe weed or algae infestations, the use of an approved algaecide either as a pretreatment to the Reward Landscape and Aquatic Herbicide application or in a tank mix, may result in enhanced weed control.

To control submersed weeds, apply Reward Landscape and Aquatic Herbicide in water at 0.5-2.0 gallons per surface acre (per 4 foot water depth). For severe weed infestations, use the 2.0 gallon per surface acre rate. For best results, re-treat as necessary on 14-21 day intervals. The table below shows how many gallons of Reward Landscape and Aquatic Herbicide to apply per surface acre based on water depth.

	Gallons of Reward Landscape and Aquatic Herbicide per Surface Acre Average Water Depth			
	1 Foot	**2 Feet**	**3 Feet**	**4 Feet**
1 gallon/acre rate	0.25 gal.	0.50 gal.	0.75 gal.	1.0 gal.
2 gallon/acre rate	0.50 gal.	1.0 gal.	1.5 gals.	2.0 gals.

Note: For water depths of 2 feet or less including shorelines, do not exceed 1 gallon per surface acre.

Subsurface Applications: Where the submersed weed growth, especially Hydrilla, has reached the water surface, apply either in a water carrier or an invert emulsion through boom trailing hoses carrying nozzle tips to apply the dilute spray below the water surface to insure adequate coverage.

Bottom Placement: Where submersed weeds such as Hydrilla, Bladderwort, or Coontail have reached the water surface and/or where the water is slowly moving through the weed growth, the use of an invert emulsion carrier injecting diluted Reward Landscape and Aquatic Herbicide near the bottom with weighted hoses may improve control. The addition of a copper based algaecide may improve control. If algae are present along with the submersed weeds, a pretreatment with a copper based algaecide may improve overall control.

Surface Application for Submerged Aquatic Weeds: Apply the recommended rate of Reward Landscape and Aquatic Herbicide as a spray in sufficient carrier to fully cover the target area. Applications should be made to ensure complete coverage of the weed areas. In mixed weed populations, use the high rate of application as indicated by weeds present. For dense submersed weeds or water over 2 feet deep, a surface spray is not recommended (Reward Landscape and Aquatic Herbicide should be applied subsurface in these situations.)

If posting is required by your state or tribe – consult the agency responsible for pesticide regulations for specific details.

For non-emergency (e.g., current product information), call
Syngenta Crop Protection at 1-800-334-9481.

Syngenta Crop Protection, Inc.
Greensboro, North Carolina 27409
www.syngenta-us.com

SCP 1091A-L2C 0605

REWARD®

Landscape and Aquatic Herbicide

TO PREVENT ACCIDENTAL POISONING, NEVER PUT INTO FOOD, DRINK, OR OTHER CONTAINERS, AND USE STRICTLY IN ACCORDANCE WITH ENTIRE LABEL.

DO NOT USE THIS PRODUCT FOR REFORMULATION.

Active Ingredient: Diquat dibromide [6,7-dihydrodipyrido (1,2-a:2',1'-c) pyrazinediium dibromide]	37.3%
Other Ingredients:	62.7%
Total:	100.0%

Contains 2 lbs. diquat cation per gal. (3.73 lbs. diquat dibromide per gal.)

See additional precautionary statements on label.

AGRICULTURAL USE REQUIREMENTS

Use this product only in accordance with its labeling and with the Worker Protection Standard, 40 CFR part 170. Refer to supplemental labeling under "Agricultural Use Requirements" in the Directions for Use section for information about this standard.

EPA Reg. No. 100-1091

EPA Est. 100-TX-001

Product of United Kingdom
Formulated in the USA

Syngenta Crop Protection, Inc.
Greensboro, North Carolina 27409
www.syngenta-us.com

SCP 1091A-L2C 0605

2.5 gallons

Net Contents

KEEP OUT OF REACH OF CHILDREN.

WARNING/ AVISO

Si usted no entiende la etiqueta, busque a alguien para que se la explique a usted en detalle. (If you do not understand the label, find someone to explain it to you in detail.)

FIRST AID

If on skin or clothing: Take off contaminated clothing. Rinse skin immediately with plenty of water for 15-20 minutes. Call a poison control center or doctor for treatment advice.

If in eyes: Hold eye open and rinse slowly and gently with water for 15-20 minutes. Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye. Call a poison control center or doctor for treatment advice.

If swallowed: Call a poison control center or doctor immediately for treatment advice. Have person sip a glass of water if able to swallow. Do not induce vomiting unless told to do so by the poison control center or doctor. Do not give anything by mouth to an unconscious person.

If inhaled: Move person to fresh air. If person is not breathing, call 911 or an ambulance, then give artificial respiration, preferably mouth-to-mouth, if possible. Call a poison control center or doctor for further treatment advice.

NOTE TO PHYSICIANS: To be effective, treatment for diquat poisoning must begin **IMMEDIATELY**. Treatment consists of binding diquat in the gut with suspensions of activated charcoal or bentonite clay, administration of cathartics to enhance elimination, and removal of diquat from the blood by charcoal hemoperfusion or continuous hemodialysis.

Have the product container or label with you when calling a poison control center or doctor, or going for treatment.

HOT LINE NUMBER: For 24-Hour Medical Emergency Assistance (Human or Animal) or Chemical Emergency Assistance (Spill, Leak, Fire, or Accident), Call **1-800-888-8372.**

Precautionary Statements

Hazards to Humans and Domestic Animals

WARNING/AVISO

May be fatal if absorbed through skin. Harmful if swallowed or inhaled. Causes substantial, but temporary, eye injury. Causes skin irritation. Contact with irritated skin, or a cut, or repeated contact with intact skin may result in poisoning. Do not get in eyes, on skin, or on clothing. Avoid breathing vapor or spray mist. Do not feed forage from treated crops to livestock. Keep livestock and pets out of treated fields and crop areas.

Environmental Hazards

This pesticide is toxic to aquatic invertebrates. **For Terrestrial Uses,** do not apply directly to water, or to areas where surface water is present, or to intertidal areas below the mean high water mark. Do not contaminate water when disposing of equipment wash water. **For Aquatic Uses** do not apply directly to water except as specified on this label.

STORAGE AND DISPOSAL

Do not contaminate water, food, or feed by storage or disposal.

Pesticide Storage

Keep pesticide in original container. Do not put concentrate or dilute into food or drink containers. Do not contaminate feed, foodstuffs, or drinking water. Do not store or transport near feed or food. Store at temperatures above 32°F. For help with any spill, leak, fire, or exposure involving this material, call **1-800-888-8372**.

Pesticide Disposal

Open dumping is prohibited. Pesticide wastes are toxic. Improper disposal of excess pesticide, spray mixture, or rinsate is a violation of federal law. If these wastes cannot be disposed of by use according to label instructions, contact your State Pesticide or Environmental Control Agency, or the Hazardous Waste representative at the nearest EPA Regional Office for guidance.

Container Disposal

Do not reuse container. Triple rinse (or equivalent). Then offer for recycling or reconditioning, or puncture and dispose of in a sanitary landfill, or incineration, or if allowed by State and local authorities, by burning. If burned, stay out of smoke.

For Bulk And Mini-Bulk Containers

When the container is empty, replace the cap and seal all openings that have been opened during use and return the container to the point of purchase, or to a designated location named at the time of purchase of this product. This container must be refilled with this pesticide product. **DO NOT REUSE THE CONTAINER FOR ANY OTHER PURPOSE.** Prior to refilling, inspect carefully for damage such as cracks, punctures, abrasions, worn-out threads and closure devices. Check for leaks after refilling and before transporting. Do not transport if this container is damaged or leaking. If the container is damaged, leaking or obsolete, contact Syngenta Crop Protection at 1-800-888-8372. If not returned to the point of purchase or to a designated location, triple rinse emptied container and offer for recycling. Disposal of this container must be in compliance with state and local regulations.

For minor spills, leaks, etc., follow all precautions indicated on this label and clean up immediately. Take special care to avoid contamination of equipment and facilities during cleanup procedures and disposal of wastes. In the event of a major spill, fire, or other emergency, call 1-800-888-8372, day or night.

CONTAINER IS NOT SAFE FOR FOOD, FEED, OR DRINKING WATER!

syngenta

Specimen Label

Renovate® 3

Aquatic Herbicide

Aquatic Sites: For control of emersed, submersed and floating aquatic plants in aquatic sites such as ponds, lakes, reservoirs, non-irrigation canals, seasonal irrigation waters and ditches which have little or no continuous outflow, marshes, and wetlands, including broadleaf and woody vegetation on banks and shores within or adjacent to these and other aquatic sites.

For use in New York State, comply with Section 24(c) Special Local Need labeling for Renovate® 3, SLN NY-060001.

Active Ingredient	
triclopyr: 3,5,6-trichloro-2-pyridinyloxyacetic acid, triethylamine salt	44.4%
Other Ingredients	55.6%
TOTAL	100.0%

Acid equivalent: triclopyr - 31.8% - 3 lbs/gal.

Precautionary Statements

Hazards to Humans and Domestic Animals

Keep Out of Reach of Children

DANGER / PELIGRO

Si usted no entiende la etiqueta, busque a alguien para que se la explique a usted en detalle. (If you do not understand the label, find someone to explain it to you in detail.)

Corrosive. Causes irreversible eye damage. Harmful if swallowed or absorbed through skin. Prolonged or frequently repeated skin contact may cause allergic reaction in some individuals. Do not get in eyes or on skin or clothing.

Notice: Read the entire label. Use only according to label directions. **Before using this product, read *Warranty Disclaimer, Inherent Risks of Use,* and *Limitation of Remedies* at end of label booklet. If terms are unacceptable, return at once unopened.**

If you wish to obtain additional product information, visit our web site at **www.sepro.com.**

FIRST AID	
If in eyes	• Hold eye open and rinse slowly and gently with water for 15 - 20 minutes. Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye. • Call a poison control center or doctor for treatment advice.
If on skin or clothing	• Take off contaminated clothing. • Rinse skin immediately with plenty of water for 15 - 20 minutes. • Call a poison control center or doctor for treatment advice.
If swallowed	• Call a poison control center or doctor immediately for treatment advice. • Have person sip a glass of water if able to swallow. • Do not induce vomiting unless told to do so by a poison control center or doctor. • Do not give anything by mouth to an unconscious person

Have the product container or label with you when calling a poison control center or doctor, or going for treatment. In case of emergency endangering health or the environment involving this product, call **INFOTRAC** at **1-800-535-5053**.

Note to Applicator: Allergic skin reaction is not expected from exposure to spray mixtures of Renovate 3 aquatic herbicide when used as directed.

Note to Physician: Probable mucosal damage may contraindicate the use of gastric lavage.

Personal Protective Equipment (PPE)

Applicators and other handlers must wear:

- Long-sleeved shirt and long pants;
- Shoes plus socks;
- Protective eyewear; and
- Chemical-resistant gloves (≥14 mils) such as butyl rubber, natural rubber, neoprene rubber or nitrile rubber.

Discard clothing and other absorbent materials that have been drenched or heavily contaminated with this product's concentrate. Do not reuse them. Follow manufacturer's instructions for cleaning/maintaining PPE. If no such instructions for washables exist, use detergent and hot water. Keep and wash PPE separately from other laundry.

EPA Reg. No. 62719-37-67690
FPL082109

Produced for: **SePRO Corporation** 11550 North Meridian Street, Suite 600
Carmel, IN 46032 U.S.A.

Engineering Controls

When handlers use closed systems, enclosed cabs, or aircraft in a manner that meets the requirements listed in the WPS [(40 CFR 170.240(d)(4-6)], the handler PPE requirements may be reduced or modified as specified in the WPS.

User Safety Recommendations

Users should:

- Wash hands before eating, drinking, chewing gum, using tobacco or using the toilet.
- Remove clothing immediately if pesticide gets inside. Then wash thoroughly and put on clean clothing.
- Remove PPE immediately after handling this product. Wash the outside of gloves before removing. As soon as possible, wash thoroughly and change into clean clothing.

ENVIRONMENTAL HAZARDS

Do not contaminate water when cleaning equipment or disposing of equipment washwaters. Under certain conditions, treatment of aquatic weeds can result in oxygen depletion or loss due to decomposition of dead plants, which may contribute to fish suffocation. This loss can cause fish suffocation. Therefore, to minimize this hazard, do not treat more than one-third to one-half of the water area in a single operation and wait at least 10 to 14 days between treatments. Begin treatment along the shore and proceed outwards in bands to allow fish to move into untreated areas. Consult with the State agency for fish and game before applying to public water to determine if a permit is needed.

PHYSICAL OR CHEMICAL HAZARDS

Combustible. Do not use or store the product near heat or open flame.

Agricultural Chemical: Do not ship or store with food, feeds, drugs or clothing.

Directions for Use

It is a violation of Federal law to use this product in a manner inconsistent with its labeling. Read all *Directions for Use* carefully before applying.

Do not apply this product in a way that will contact workers or other persons, either directly or through drift. Only protected handlers may be in the area during application. For any requirements specific to your state or tribe, consult the agency responsible for pesticide regulation.

GENERAL INFORMATION FOR AQUATIC AND WETLAND SITES

Use Renovate® 3 aquatic herbicide for control of emersed, submersed and floating aquatic plants in aquatic sites such as ponds, lakes, reservoirs, non-irrigation canals, and ditches which have little or no continuous outflow, marshes and wetlands, including broadleaf and woody vegetation on banks and shores within or adjacent to these and other aquatic sites.

Obtain Required Permits: Consult with appropriate state or local water authorities before applying this product to public waters. State or local public agencies may require permits.

Agricultural Use Requirements

Use this product only in accordance with its labeling and with the Worker Protection Standard, 40 CFR Part 170. This Standard contains requirements for the protection of agricultural workers on farms, forests, nurseries, and greenhouses, and handlers of agricultural pesticides. It contains requirements for training, decontamination, notification, and emergency assistance. It also contains specific instructions and exceptions pertaining to the statements on this label about personal protective equipment (PPE), and restricted-entry interval. The requirements in this box only apply to uses of this product that are covered by the Worker Protection Standard.

Do not enter or allow worker entry into treated areas during the restricted entry interval (REI) of 48 hours.

PPE required for early entry to treated areas that is permitted under the Worker Protection Standard and that involves contact with anything that has been treated, such as plants, soil, or water, is:

- Coveralls;
- Shoes plus socks;
- Protective eyewear; and
- Chemical-resistant gloves (≥ 14 mils) such as butyl rubber, natural rubber, neoprene rubber or nitrile rubber.

Non-Agricultural Use Requirements

The requirements in this box apply to uses of this product that are **NOT** within the scope of the Worker Protection Standard for Agricultural Pesticides (40 CFR Part 170). The WPS applies when this product is used to produce agricultural plants on farms, forests, nurseries, or greenhouses.

Entry Restrictions for Non-WPS Uses: For applications to non-cropland areas, do not allow entry into areas until sprays have dried, unless applicator and other handler PPE is worn.

GENERAL USE PRECAUTIONS AND RESTRICTIONS

For use in New York State, comply with Section 24(c) Special Local Need labeling for Renovate® 3, SLN NY-060001.

When applying this product in tank mix combination, follow all applicable use directions, precautions and limitations on each manufacturer's label.

Chemigation: Do not apply this product through any type of irrigation system.

Irrigation: Do not use treated water for irrigation for 120 days following application. As an alternative to waiting 120 days, treated water may be used for irrigation once the triclopyr level in the intake water is determined to be non-detectable by laboratory analysis (immunoassay). There is no restriction on use of water from the treatment area to irrigate established grasses.

Water treated with Renovate 3 may not be used for irrigation purposes for 120 days after application or until residue levels of Renovate 3 are determined by laboratory analysis, or other appropriate means of analysis, to be 1 ppb or less.

Seasonal Irrigation Waters: Renovate 3 may be applied during the off-season to surface waters that are used for irrigation on a seasonal basis provided that there is a minimum of 120 days between applying Renovate 3 and the first use of treated water for irrigation purposes, or until residues levels of Renovate 3 are determined by laboratory analysis, or other appropriate means of analysis, to be 1 ppb or less.

Irrigation Canals/Ditches: Do not apply Renovate 3 to irrigation canals/ditches unless the 120-day restriction on irrigation water usage can be observed or residue levels of Renovate 3 are determined by laboratory analysis, or other appropriate means of analysis, to be 1 ppb or less.

Do not apply Renovate 3 directly to, or otherwise permit it to come into direct contact with grapes, tobacco, vegetable crops, flowers, or other desirable broadleaf plants, and do not permit spray mists containing it to drift into them.

- **Do not** apply to salt water bays or estuaries.
- **Do not** apply directly to un-impounded rivers or streams.
- **Do not** apply on ditches or canals currently being used to transport irrigation water or that will be used for irrigation within 4 months following treatment. It is permissible to treat irrigation and non-irrigation ditch banks.
- **Do not** apply where runoff water may flow onto agricultural land as injury to crops may result.
- When making applications to control unwanted plants on banks or shorelines of moving water sites, minimize overspray to open water.
- The use of a mist blower is not recommended.

Grazing and Haying Restrictions
Except for lactating dairy animals, there are no grazing restrictions following application of this product.

- **Grazing Lactating Dairy Animals: Do not** allow lactating dairy animals to graze treated areas until the next growing season following application of this product.
- **Do not** harvest hay for 14 days after application.
- Grazed areas of non-cropland and forestry sites may be spot treated if they comprise no more than 10% of the total grazable area.

Slaughter Restrictions: During the season of application, withdraw livestock from grazing treated grass at least 3 days before slaughter.

AVOIDING INJURIOUS SPRAY DRIFT

Applications should be made only when there is little or no hazard from spray drift. Very small quantities of spray, which may not be visible, may seriously injure susceptible plants. **Do not** spray when wind is blowing toward susceptible crops or ornamental plants near enough to be injured. It is suggested that a continuous smoke column at or near the spray site or a smoke generator on the spray equipment be used to detect air movement, lapse conditions, or temperature inversions (stable air). If the smoke layers indicate a potential of hazardous spray drift, do not spray.

Aerial Application: For aerial application near susceptible crops, apply through a Microfoil† or Thru-Valve boom†, or use a drift control additive labeled for aquatic use. Other drift reducing systems or thickened sprays prepared by using high viscosity inverting systems may be used if they are made as drift-free mixtures containing thickening agents labeled for use in aquatics or applications made with the Microfoil or Thru-Valve boom. Keep spray pressures low enough to provide coarse spray droplets. Spray boom should be no longer than 3/4 of the rotor length. Do not use a thickening agent with the Microfoil or Thru-Valve booms, or other systems that cannot accommodate thick sprays. Spray only when the wind velocity is low (follow state regulations). Avoid application during air inversions. If a spray thickening agent is used, follow all use recommendations and precautions on the product label.

†Reference within this label to a particular piece of equipment produced by or available from other parties is provided without consideration for use by the reader at its discretion and subject to the reader's independent circumstances, evaluation, and expertise. Such reference by SePRO Corporation is not intended as an endorsement of such equipment, shall not constitute a warranty (express or implied) of such equipment, and is not intended to imply that other equipment is not available and equally suitable. Any discussion of methods of use of such equipment does not imply that the reader should use the equipment other than is advised in directions available from the equipment's manufacturer. The reader is responsible for exercising its own judgment and expertise, or consulting with sources other than SePRO Corporation, in selecting and determining how to use its equipment.

Spray Drift Management
Avoiding spray drift at the application site is the responsibility of the applicator. The interaction of many equipment and weather related factors determine the potential for spray drift. The applicator and the grower are responsible for considering all these factors when making decisions.

The following drift management requirements must be followed to avoid off-target drift movement from aerial applications:

1. The distance of the outer most operating nozzles on the boom must not exceed 3/4 the length of the rotor.
2. Nozzles must always point backward parallel with the air stream and never be pointed downwards more than 45 degrees.

Where states have more stringent regulations, they should be observed.

The applicator should be familiar with and take into account the information covered in the following *Aerial Drift Reduction Advisory*. [This information is advisory in nature and does not supersede mandatory label requirements.]

AERIAL DRIFT REDUCTION ADVISORY
Information on Droplet Size: The most effective way to reduce drift potential is to apply large droplets. The best drift management strategy is to apply the largest droplets that provide sufficient coverage and control. Applying larger droplets reduces drift potential, but will not prevent drift if applications are made improperly, or under unfavorable environmental conditions (see *Wind, Temperature and Humidity, and Temperature Inversions*).

Controlling Droplet Size:

- **Volume** - Use high flow rate nozzles to apply the highest practical spray volume. Nozzles with higher rated flows produce larger droplets.
- **Pressure** - Do not exceed the nozzle manufacturer's recommended pressures. For many nozzle types lower pressure produces larger droplets. When higher flow rates are needed, use higher flow rate nozzles instead of increasing pressure.
- **Number of Nozzles** - Use the minimum number of nozzles that provide uniform coverage.
- **Nozzle Orientation** - Orienting nozzles so that the spray is released parallel to the airstream produces larger droplets than other orientations and is the recommended practice. Significant deflection from horizontal will reduce droplet size and increase drift potential.
- **Nozzle Type** - Use a nozzle type that is designed for the intended application. With most nozzle types, narrower spray angles produce larger droplets. Consider using low-drift nozzles. Solid stream nozzles oriented straight back produce the largest droplets and the lowest drift.

Boom Length: For some use patterns, reducing the effective boom length to less than 3/4 of the wingspan or rotor length may further reduce drift without reducing swath width.

Application Height: Applications should not be made at a height greater than 10 feet above the top of the largest plants unless a greater height is required for aircraft safety. Making applications at the lowest height that is safe reduces exposure of droplets to evaporation and wind.

Swath Adjustment: When applications are made with a crosswind, the swath will be displaced downwind. Therefore, on the up and downwind edges of the field, the applicator must compensate for this displacement by adjusting the path of the aircraft upwind. Swath adjustment distance should increase, with increasing drift potential (higher wind, smaller drops, etc.).

Wind: Drift potential is lowest between wind speeds of 2 to 10 mph. However, many factors, including droplet size and equipment type determine drift potential at any given speed. Application should be avoided below 2 mph due to variable wind direction and high inversion potential. **Note:** Local terrain can influence wind patterns. Every applicator should be familiar with local wind patterns and how they affect spray drift.

Temperature and Humidity: When making applications in low relative humidity, set up equipment to produce larger droplets to compensate for evaporation. Droplet evaporation is most severe when conditions are both hot and dry.

Temperature Inversions: Applications should not occur during a local, low level temperature inversion because drift potential is high. Temperature inversions restrict vertical air mixing, which causes small suspended droplets to remain in a concentrated cloud. This cloud can move in unpredictable directions due to the light variable winds common during inversions. Temperature inversions are characterized by increasing temperatures with altitude and are common on nights with limited cloud cover and light to no wind. They begin to form as the sun sets and often continue into the morning. Their presence can be indicated by ground fog; however, if fog is not present, inversions can also be identified by the movement of the smoke from a ground source or an aircraft smoke generator. Smoke that layers and moves laterally in a concentrated cloud (under low wind conditions) indicates an inversion, while smoke that moves upward and rapidly dissipates indicates good vertical air mixing.

Sensitive Areas: The pesticide should only be applied when the potential for drift to adjacent sensitive areas (e.g., residential areas, known habitat for threatened or endangered species, non-target crops) is minimal (e.g., when wind is blowing away from the sensitive areas).

Ground Equipment: To aid in reducing spray drift, Renovate 3 should be used in thickened (high viscosity) spray mixtures using a labeled drift control additive, high viscosity invert system, or equivalent as directed by the manufacturer. With ground equipment, spray drift can be reduced by keeping the spray boom as low as possible; by applying 20 gallons or more of spray per acre; by keeping the operating spray pressures at the lower end of the manufacturer's recommended pressures for the specific nozzle type used (low pressure nozzles are available from spray equipment manufacturers); and by spraying when wind velocity is low (follow state regulations). In hand-gun applications, select the minimum spray pressure that will provide adequate plant coverage (without forming a mist). Do not apply with nozzles that produce a fine-droplet spray.

High Volume Leaf-Stem Treatment: To minimize spray drift, do not use pressure exceeding 50 psi at the spray nozzle and keep sprays no higher than brush tops. A labeled thickening agent may be used to reduce drift.

PLANTS CONTROLLED

Woody Plant Species

alder	cascara	maples
arrowwood	ceanothus	mulberry
ash	cherry	oaks
aspen	Chinese tallow	poison ivy
bear clover (bearmat)	chinquapin	poison oak
beech	choke cherry	poplar
birch	cottonwood	salt-bush (*Baccharis* spp.)
blackberry	crataegus (hawthorn)	sweetgum
blackgum	locust	waxmyrtle
Brazilian pepper	maleleuca (seedlings)	willow

Annual and Perennial Broadleaf Weeds

burdock	plantain	tropical sodaapple
Canada thistle	smartweed	vetch
curly dock	tansy ragwort	wild lettuce
elephant ear		

Aquatic Weeds

alligatorweed	milfoil species	pickerelweed
American lotus	nuphar (spatterdock)	purple loosestrife
American frogbit	parrotfeather†	waterhyacinth
aquatic sodaapple	pennywort	waterlily
Eurasian watermilfoil	phragmities	watershield
		water primrose

†Retreatment may be needed to achieve desired level of control.

Application Methods

FLOATING AND EMERGED WEEDS

For control of waterhyacinth, alligatorweed (see specific directions below), and other susceptible emerged and floating herbaceous weeds and woody plants, apply 1 1/2 to 6 lb ae triclopyr (2 to 8 quarts of Renovate 3) per acre as a foliar application using surface or aerial equipment. Use higher rates in the rate range when plants are mature, when the weed mass is dense, or for difficult to control species. Repeat as necessary to control regrowth and plants missed in the previous operation, but do not exceed a total of 6 lb ae triclopyr (8 quarts of Renovate 3) per acre per annual growing season.

Use a non-ionic surfactant in the spray mixture to improve control. Follow all directions and use precautions on the aquatic surfactant label.

Apply when plants are actively growing.

Surface Application

Use a spray boom, handgun or other similar suitable equipment mounted on a boat or vehicle. Thorough wetting of foliage is essential for maximum effectiveness. Use 20 to 200 gallons per acre of spray mixture. Special precautions such as the use of low spray pressure, large droplet producing nozzles or addition of a labeled thickening agent may minimize spray drift in areas near sensitive crops.

Aerial Application (Helicopter Only)

Apply with a helicopter using a Microfoil or Thru-Valve boom, or a drift control additive in the spray solution. Apply in a minimum of 10 gallons of total spray mix per acre. Do not apply when weather conditions favor drift to sensitive areas. See label section on aerial application directions and precautions.

Waterhyacinth (*Eichhornia crassipes*)

Apply Renovate 3 at 1 1/2 to 6 lb ae triclopyr (2 to 8 quarts of Renovate 3) per acre to control waterhyacinth. Apply when plants are actively growing. Use the higher rate in the rate range when the weed mass is dense. It is important to thoroughly wet all foliage with the spray mixture. Use of a non-ionic surfactant in the spray mixture is recommended. A repeat treatment may be needed to control regrowth or plants missed in the previous treatment.

Alligatorweed (*Alternanthera philoxeroides*)

Apply Renovate 3 at 2 to 6 lb ae triclopyr (3 to 8 quarts of Renovate 3) per acre to control alligatorweed. It is important to thoroughly wet all foliage with the spray mixture. For best results, add an approved non-ionic aquatic surfactant to the spray mixture. Alligatorweed growing outside the margins of a body of water can be controlled with this treatment. However, alligatorweed growing in water will only be partially controlled. Top growth above the water will be controlled, but the plant will likely regrow from tissue below the water surface.

Precautions for Potable Water Intakes – Lakes, Reservoirs, Ponds:

For applications of Renovate 3 to control floating and emerged weeds in lakes, reservoirs or ponds that contain a functioning potable water intake for human consumption, see chart below to determine the minimum setback distances of the application from the functioning potable water intakes.

Renovate 3 Application Rate

Area Treated (acres)	Setback Distance (ft)			
	2 qt/acre	4 qt/acre	6 qt/acre	8 qt/acre
< 4	0	200	400	500
> 4 - 8	0	200	700	900
> 8 - 16	0	200	700	1,000
> 16	0	200	900	1,300

Note: Existing potable water intakes which are no longer in use, such as those replaced by potable water wells or connections to a municipal water system, are not considered to be functioning potable water intakes. These setback restrictions do not apply to terrestrial applications made adjacent to potable water intakes.

To apply Renovate 3 around and within the distances noted above from a functioning potable water intake, the intake must be turned off until the triclopyr level in the intake water is determined to be 0.4 parts per million (ppm) or less by laboratory analysis or immunoassay.

- **Recreational Use of Water in Treatment Area:** There are no restrictions on use of water in the treatment area for recreational purposes, including swimming and fishing.
- **Livestock Use of Water from Treatment Area:** There are no restrictions on livestock consumption of water from the treatment area.

SUBMERGED WEEDS

For control of Eurasian watermilfoil (*Myriophyllum spicatum*) and other susceptible submerged weeds in ponds, lakes, reservoirs, and in non-irrigation canals or ditches that have little or no continuous outflow, apply Renovate 3 as either a surface or subsurface application. Rates should be selected according to the rate chart below to provide a triclopyr concentration of 0.75 to 2.5 ppm ae in treated water. Use higher rates in the rate range in areas of greater water exchange. These areas may require a repeat application. However, total application of Renovate 3 must not exceed an application rate of 2.5 ppm triclopyr for the treatment area per annual growing season.

Apply in spring or early summer when Eurasian watermilfoil or other submersed weeds are actively growing.

Areas near susceptible crops or other desirable broadleaf plants may be treated by subsurface injection applied by boat to avoid spray drift.

Subsurface Application

Apply desired amount of Renovate 3 per acre directly into the water through boat-mounted distribution systems. When treating target plants that are 6 feet below the surface of the water, trailing hoses should be used along with an aquatic approved sinking agent (except California).

Surface Application
Apply the desired amount of Renovate 3 as either a concentrate or a spray mixture in water. However, use a minimum spray volume of 5 gallons per acre. Do not apply when weather conditions favor drift to sensitive areas.

Average water depth (feet) x 0.905 x target concentration (ppm) = gallons of Renovate 3 per surface acre treated.

Example: to achieve a 2 ppm concentration of triclopyr in water averaging 4 feet deep

4 x 0.905 x 2 ppm = 7.2 gallons of Renovate 3 per surface acre treated.

Concentration of Triclopyr Acid in Water (ppm ae)

Water Depth (ft)	Gallons of Renovate 3 per Surface Acre at Specified Depth				
	0.75 ppm	1.0 ppm	1.5 ppm	2.0 ppm	2.5 ppm
1	0.7	0.9	1.4	1.8	2.3
2	1.4	1.8	2.7	3.6	4.6
3	2.1	2.7	4.1	5.4	6.8
4	2.7	3.6	5.4	7.2	9.1
5	3.4	4.5	6.8	9.0	11.3
6	4.1	5.4	8.1	10.9	13.6
7	4.8	6.3	9.5	12.7	15.8
8	5.5	7.2	10.9	14.5	18.1
9	6.1	8.1	12.2	16.3	20.4
10	6.8	9.0	13.6	18.1	22.6
15	10.2	13.6	20.4	27.2	33.9
20	13.6	18.1	27.2	36.2	45.3

Precautions for Potable Water Intakes – Lakes, Reservoirs, Ponds:
For applications of Renovate 3 to control submerged weeds in lakes, reservoirs or ponds that contain a functioning potable water intake for human consumption, see the chart below to determine the minimum setback distances of the application from the functioning potable water intakes.

Concentration of Triclopyr Acid in Water (ppm ae)

Area Treated (acres)	Required Setback Distance (ft) from Potable Water Intake				
	0.75 ppm	1.0 ppm	1.5 ppm	2.0 ppm	2.5 ppm
< 4	300	400	600	800	1,000
> 4 - 8	420	560	840	1,120	1,400
> 8 - 16	600	800	1,200	1,600	2,000
> 16 - 32	780	1,040	1,560	2,080	2,600
> 32 acres, calculate a setback using the formula for the appropriate rate	Setback (ft) = (800*ln (acres) – 160)/3.33	Setback (ft) = (800*ln (acres) – 160)/2.50	Setback (ft) = (800*ln (acres) – 160)/1.67	Setback (ft) = (800*ln (acres) – 160)/1.25	Setback (ft) = (800*ln (acres) – 160)

Example Calculation 1: to apply 2.5 ppm Renovate 3 to 50 acres:

Setback in feet = (800 x ln (50 acres) - 160
= (800 x 3.912) – 160
= 2,970 feet

Example Calculation 2: to apply 0.75 ppm Renovate 3 to 50 acres:

$$\text{Setback in feet} = \frac{(800 \times \ln(50 \text{ acres}) - 160}{3.33}$$
$$= \frac{(800 \times 3.912) - 160}{3.33}$$
= 892 feet

NOTE: Existing potable water intakes which are no longer in use, such as those replaced by potable water wells or connections to a municipal water system, are not considered to be functioning potable water intakes. These setback restrictions do not apply to terrestrial applications made adjacent to potable water intakes.

To apply Renovate 3 around and within the distances noted above from a functioning potable water intake, the intake must be turned off until the triclopyr level in the intake water is determined to be 0.4 parts per million (ppm) or less by laboratory analysis or immunoassay.

- **Recreational Use of Water in Treatment Area:** There are no restrictions on use of water in the treatment area for recreational purposes, including swimming and fishing.
- **Livestock Use of Water from Treatment Area:** There are no restrictions on livestock consumption of water from the treatment area.

WETLAND SITES
Wetlands include flood plains, deltas, marshes, swamps, bogs, and transitional areas between upland and lowland sites. Wetlands may occur within forests, wildlife habitat restoration and management areas and similar sites as well as areas adjacent to or surrounding domestic water supply reservoirs, lakes and ponds.

For control of woody plants and broadleaf weeds in these sites, follow use directions and application methods on this label for terrestrial sites associated with wetland areas.

Use Precautions: Minimize overspray to open water when treating target vegetation in and around non-flowing, quiescent or transient water. When making applications to control unwanted plants on banks or shorelines of flowing water, minimize overspray to open water. **NOTE:** Consult local public water control authorities before applying this product in and around public water. Permits may be required to treat such areas.

Purple Loosestrife (*Lythrum salicaria*)
Purple loosestrife can be controlled with foliar applications of Renovate 3. For broadcast applications, use a minimum of 4 1/2 to 6 lb ae triclopyr (6 to 8 quarts of Renovate 3) per acre. Apply Renovate 3 when purple loosestrife is at the bud to mid-flowering stage of growth. Follow-up applications for control of regrowth should be made the following year in order to achieve increased control of this weed species. For all applications, a non-ionic surfactant labeled for aquatics should be added to the spray mixture. Follow all directions and use precautions on the label of the surfactant. Thorough wetting of the foliage and stems is necessary to achieve satisfactory control. A minimum spray volume of 50 gallons per acre is recommended for ground broadcast applications.

If using a backpack sprayer, a spray mixture containing 1% to 1.5% Renovate 3 or 5 to 7.6 fl oz of Renovate 3 per 4 gallons of water should be used. All purple loosestrife plants should be thoroughly wetted.

Phragmites (*Phragmites australis*)
Phragmites can be selectively controlled with foliar applications of Renovate 3. For broadcast applications, a minimum of 2 1/4 lb ae triclopyr (3 quarts of Renovate 3) per acre should be used. For optimum control, apply Renovate 3 when phragmites is in the early stage of growth, 1/2 to 3 feet in height, prior to seed head development. Follow-up applications for control of regrowth may be made the following year in order to achieve increased control of this weed species. For all applications, a non-ionic surfactant labeled for aquatics should be added to the spray mixture. Follow all directions and use precautions on the label of the surfactant. Thorough wetting of the foliage and stems is necessary to achieve satisfactory control. A minimum spray volume of 50 gallons per acre is recommended for ground broadcast applications.

If a backpack sprayer is used, a spray mixture containing 1% to 1.5% Renovate 3 or 5 to 7.6 fl oz of Renovate 3 per 4 gallons of water should be used. All Phragmities foliage should be thoroughly wetted.

Aerial application by helicopter may be needed when treating restoration sites that are inaccessible, remote, difficult to traverse, isolated, or otherwise unsuited to ground application, or in circumstances where invasive exotic weeds dominate native plant populations over extensive areas and efforts to restore native plant diversity are being conducted. By air, apply in a minimum spray volume of 30 gallons per acre using Thru-Valve or Microfoil boom only.

- **Recreational Use of Water in Treatment Area:** There are no restrictions on use of water in the treatment area for recreational purposes, including swimming and fishing.
- **Livestock Use of Water from Treatment Area:** There are no restrictions on livestock consumption of water from the treatment area.

TERRESTRIAL SITES ASSOCIATED WITH WETLAND AREAS

- Apply no more than 2 lb ae triclopyr (2/3 gallon of Renovate 3) per acre per growing season on range and pasture sites, including rights-of-way, fence rows or any area where grazing or harvesting is allowed.
- On forestry sites, Renovate 3 may be used at rates up to 6 lb ae of triclopyr (2 gallons of Renovate 3) per acre per year.

Use Renovate 3 at rates of 3/4 to 6 lb ae triclopyr (1/4 to 2 gallons of Renovate 3) per acre to control broadleaf weeds and woody plants. In all cases use the amount specified in enough water to give uniform and complete coverage of the plants to be controlled. Use only water suitable for spraying. Use a labeled non-ionic surfactant for all foliar applications. When using surfactants, follow the use directions and precautions listed on the surfactant manufacturer's label. Use the higher recommended concentrations of surfactant in the spray mixture when applying lower spray volumes per acre. The order of addition to the spray tank is water, spray thickening agent (if used), additional herbicide (if used), and Renovate 3. A labeled aquatic surfactant should be added to the spray tank last or as recommended on the product label. If combined with emulsifiable concentrate herbicides, moderate continuous adequate agitation is required.

Before using any recommended tank mixtures, read the directions and all use precautions on both labels.

For best results, apply when woody plants and weeds are actively growing. When hard to control species such as ash, blackgum, choke cherry, maples, or oaks are prevalent and during applications made in late summer when the plants are mature and during drought conditions, use the higher rates of Renovate 3.

When using Renovate 3 in combination with a 2,4-D herbicide approved for aquatic use, such as DMA 4 IVM, generally the higher rates should be used for satisfactory brush control.

Use the higher dosage rates when brush approaches an average of 15 feet in height or when the brush covers more than 60% of the area to be treated. If lower rates are used on hard to control species, resprouting may occur the year following treatment.

High Volume Foliage Treatment
For control of woody plants, use Renovate 3 at the rate of 3 to 6 lb ae triclopyr (1 to 2 gallons of Renovate 3) per 100 gallons of spray solution, or Renovate 3 at 3/4 to 3 lb ae triclopyr (1 to 4 quarts of Renovate 3) may be tank mixed with 1/4 to 1/2 gallons of 2,4-D 3.8 lb amine, like DMA 4 IVM, diluted to make 100 gallons of spray solution. Apply at a volume of 100 to 400 gallons of total spray per acre depending on size and density of woody plants. Coverage should be thorough to wet all leaves, stems, and root collars. (See *General Use Precautions and Restrictions*.) Do not exceed the maximum allowable use rate of 6 lb ae of triclopyr (2 gallons of Renovate 3) per acre per growing season.

Low Volume Foliage Treatment
To control susceptible woody plants, apply up to 15 lb ae triclopyr (5 gallons of Renovate 3) in 10 to 100 gallons of finished spray. The spray concentration of Renovate 3 and total spray volume per acre may be adjusted according to the size and density of target woody plants and kind of spray equipment used. With low volume sprays, use sufficient spray volume to obtain uniform coverage of target plants including the surfaces of all foliage, stems, and root collars (see *General Use Precautions and Restrictions*). For best results, a labeled aquatic surfactant should be added to all spray mixtures. Match equipment and delivery rate of spray nozzles to height and density of woody plants. When treating tall, dense brush, a truck mounted spray gun with spray tips that deliver up to 2 gallons per minute at 40 to 60 psi may be required. Backpack or other types of specialized spray equipment with spray tips that deliver less than 1 gallon of spray per minute may be appropriate for short, low to moderate density brush.

Cut Surface Treatments (Woody Plants)
Individual plant treatments such as basal bark and cut surface applications may be used on any use site listed on this label at a maximum use rate of 2.67 gallons of Renovate 3 (8 lb ae of triclopyr) per acre. These types of applications are made directly to ungrazed parts of plants and, therefore, are not restricted by the grazing maximum rate of 2/3 of a gallon of Renovate 3 (2 lb ae of triclopyr) per acre.

To control unwanted trees and other listed woody plants, apply Renovate 3, either undiluted or diluted in a 1 to 1 ratio with water as directed below.

With Tree Injector Method
Apply by injecting 1/2 milliliter of undiluted Renovate 3 or 1 milliliter of the diluted solution through the bark at intervals of 3 to 4 inches between centers of the injector wound. The injections should completely surround the tree at any convenient height. **NOTE: No Worker Protection Standard worker entry restrictions or worker notification requirements apply when this product is injected directly into plants.**

With Hack and Squirt Method
Make cuts at a convenient height around the tree trunk with a hatchet or similar equipment so that the cuts overlap slightly and make a continuous circle around the trunk. Spray 1/2 milliliter of undiluted Renovate 3 or 1 milliliter of the diluted solution into each cut.

With Frill or Girdle Method
Make a single girdle through the bark completely around the tree at a convenient height. Wet the cut surface with undiluted or diluted solution.

Both of the above methods may be used successfully at any season except during periods of heavy sap flow of certain species—for example, maples.

Stump Treatment
Spray or paint the cut surfaces of freshly cut stumps and stubs with undiluted Renovate 3. The cambium area next to the bark is the most vital area to wet.

STORAGE AND DISPOSAL

Do not contaminate water, food, or feed by storage and disposal.
Open dumping is prohibited.
Pesticide Storage: Store above 28˚F or agitate before use.
Pesticide Disposal: Wastes resulting from the use of this product may be disposed of on site or at an approved waste disposal facility.
Nonrefillable containers 5 gallons or less: Container Reuse: Nonrefillable container. Do not reuse or refill this container. Offer for recycling if available. Triple rinse or pressure rinse container (or equivalent) promptly after emptying. Triple rinse as follows: Empty the remaining contents into application equipment or a mix tank and drain for 10 seconds after the flow begins to drip. Fill the container 1/4 full with water and recap. Shake for 10 seconds. Pour rinsate into application equipment or a mix tank or store rinsate for later use or disposal. Drain for 10 seconds after the flow begins to drip. Repeat this procedure two more times. **Pressure rinse** as follows: Empty the remaining contents into application equipment or a mix tank and continue to drain for 10 seconds after the flow begins to drip. Hold container upside down over application equipment or mix tank or collect rinsate for later use or disposal. Insert pressure rinsing nozzle in the side of the container, and rinse at about 40 psi for at least 30 seconds. Drain for 10 seconds after the flow begins to drip.
Nonrefillable containers 5 gallons or larger: Container Reuse: Nonrefillable container. Do not reuse or refill this container. Offer for recycling if available. Triple rinse or pressure rinse container (or equivalent) promptly after emptying. Triple rinse as follows: Empty the remaining contents into application equipment or a mix tank. Fill the container 1/4 full with water. Replace and tighten closures. Tip container on its side and roll it back and forth, ensuring at least one complete revolution, for 30 seconds. Stand the container on its end and tip it back and forth several times. Turn the container over onto its other end and tip it back and forth several times. Empty the rinsate into application equipment or a mix tank or store rinsate for later use or disposal. Repeat this procedure two more times. **Pressure rinse** as follows: Empty the remaining contents into application equipment or a mix tank and continue to drain for 10 seconds after the flow begins to drip. Hold container upside down over application equipment or mix tank or collect rinsate for later use or disposal. Insert pressure rinsing nozzle in the side of the container, and rinse at about 40 psi for at least 30 seconds. Drain for 10 seconds after the flow begins to drip.
Refillable containers 5 gallons or larger: Container Reuse: Refillable container. Refill this container with pesticide only. Do not reuse this container for any other purpose. Cleaning the container before final disposal is the responsibility of the person disposing of the container. Cleaning before refilling is the responsibility of the refiller. To clean the container before final disposal, empty the remaining contents from this container into application equipment or a mix tank. Fill the container about 10% full with water and, if possible, spray all sides while adding water. If practical, agitate vigorously or recirculate water with the pump for two minutes. Pour or pump rinsate into application equipment or rinsate collection system. Repeat this rinsing procedure two more times.

Terms and Conditions of Use

If terms of the following *Warranty Disclaimer, Inherent Risks of Use* and *Limitation of Remedies* are not acceptable, return unopened package at once to the seller for a full refund of purchase price paid. Otherwise, use by the buyer or any other user constitutes acceptance of the terms under *Warranty Disclaimer, Inherent Risks of Use* and *Limitations of Remedies*.

Warranty Disclaimer

SePRO Corporation warrants that the product conforms to the chemical description on the label and is reasonably fit for the purposes stated on the label when used in strict accordance with the directions, subject to the inherent risks set forth below. SEPRO CORPORATION MAKES NO OTHER EXPRESS OR IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR ANY OTHER EXPRESS OR IMPLIED WARRANTY.

Inherent Risks of Use

It is impossible to eliminate all risks associated with use of this product. Plant injury, lack of performance, or other unintended consequences may result because of such factors as use of the product contrary to label instructions (including conditions noted on the label, such as unfavorable temperature, soil conditions, etc.), abnormal conditions (such as excessive rainfall, drought, tornadoes, hurricanes), presence of other materials, the manner of application, or other factors, all of which are beyond the control of SePRO Corporation or the seller. All such risks shall be assumed by buyer.

Limitation of Remedies

The exclusive remedy for losses or damages resulting from this product (including claims based on contract, negligence, strict liability, or other legal theories) shall be limited to, at SePRO Corporation's election, one of the following:

(1) Refund of purchase price paid by buyer or user for product bought, or
(2) Replacement of amount of product used.

SePRO Corporation shall not be liable for losses or damages resulting from handling or use of this product unless SePRO Corporation is promptly notified of such losses or damages in writing. In no case shall SePRO Corporation be liable for consequential or incidental damages or losses.

The terms of the *Warranty Disclaimer, Inherent Risks of Use,* and this *Limitation of Remedies* cannot be varied by any written or verbal statements or agreements. No employee or sales agent of SePRO Corporation or the seller is authorized to vary or exceed the terms of the *Warranty Disclaimer* or this *Limitation of Remedies* in any manner.

AQUATIC HABITAT MANAGEMENT

AQUATHOL® K

AQUATIC HERBICIDE

ACTIVE INGREDIENT:	
Dipotassium salt of endothall*	40.3%
OTHER INGREDIENTS:	59.7%
TOTAL	100.0%

*7-oxabicyclo [2.2.1]heptane-2,3-dicarboxylic acid equivalent 28.6%
Contains per gallon 4.23 lbs. dipotassium endothall

KEEP OUT OF REACH OF CHILDREN

DANGER

FIRST AID:

IF IN EYES:

- Hold eye open and rinse slowly and gently with water for 15-20 minutes.
- Remove contact lenses, if present, after the first 5 minutes, then continue rinsing.
- Call a poison control center or doctor for treatment advice.

IF INHALED:

- Move person to fresh air. If person is not breathing, call 911 or ambulance, then give artificial respiration, preferably mouth-to-mouth if possible.
- Call a poison control center or doctor for treatment advice.

IF SWALLOWED:

- Call a poison control center or doctor immediately for treatment advice.
- Have person sip a glass of water if able to swallow. Do not induce vomiting unless told by a poison control center or doctor. Do not give anything by mouth to an unconscious person.

IF ON SKIN:

- Take off contaminated clothing.
- Rinse skin immediately with plenty of water for 15-20 minutes.
- Call a poison control center or doctor for treatment advice.

HOT LINE NUMBER: Have the product container or label with you when calling a poison control center or doctor, or going for treatment. You may also contact (866) 673-6671 for emergency medical treatment information.

NOTE TO PHYSICIAN: Measures against circulatory shock, respiratory depression, and convulsion may be needed.

EPA Registration No. 70506-176 EPA Establishment No. 62171-MS-003

Net Contents: 2.5 Gallons

UPI

Sold by:
United Phosphorus, Inc.
630 Freedom Business Center, Suite 402
King of Prussia, PA 19406
1-800-438-6071 • www.upi-usa.com

PRECAUTIONARY STATEMENTS
HAZARDS TO HUMANS (AND DOMESTIC ANIMALS)

DANGER

CORROSIVE. CAUSES IRREVERSIBLE EYE DAMAGE. MAY BE FATAL IF SWALLOWED. HARMFUL IF INHALED OR ABSORBED THROUGH SKIN. DO NOT GET IN EYES, ON SKIN, OR ON CLOTHING. AVOID BREATHING VAPORS OR SPRAY MIST. PROLONGED OR FREQUENTLY REPEATED SKIN CONTACT MAY CAUSE ALLERGIC REACTIONS IN SOME INDIVIDUALS. Wear appropriate protective eyewear such as goggles, face shield, or safety glasses. Wash thoroughly with soap and water after handling and before eating, drinking, chewing gum, or using tobacco. Remove and wash contaminated clothing before reuse.

Applicators and other handlers must wear:
- long-sleeved shirt and long pants
- socks
- shoes
- chemical resistant gloves
- protective eyewear

USER SAFETY RECOMMENDATIONS:

Users should:
- Wash hands before eating, drinking, chewing gum, using tobacco or using the toilet.
- Remove clothing immediately if pesticide gets inside. Then wash thoroughly and put on clean clothing.
- Remove protective clothing and equipment immediately after handling this product. Wash the outside of gloves before removing. As soon as possible, wash thoroughly and change into clean clothing.

ENVIRONMENTAL HAZARDS

Avoid contact with or drift to other crops or plants as injury may result. Wash out spray equipment with water after each operation.

Not for use in brackish or salt water. Do not use water from treated areas for watering livestock, for preparing agricultural sprays for food crops, for irrigation or for domestic purposes within the following periods:

Up to 0.5 ppm dipotassium salt — 7 days after application

Up to 4.25 ppm dipotassium salt — 14 days after application

Up to 5.0 ppm dipotassium salt — 25 days after application

Treated water can be used for sprinkling bent grass immediately.

GENERAL INFORMATION

AQUATHOL K is a liquid concentrate soluble in water which is effective against a broad range of aquatic plants with a margin of safety to fish.

Dosage rates indicated for the application of AQUATHOL K are measured in "Parts Per Million" (ppm) of dipotassium endothall. Only 0.5 to 5.0 ppm are generally required for aquatic weed control, whereas some fish species are tolerant to approximately 100 ppm or over.

DIRECTIONS FOR USE

It is a violation of Federal law to use this product in a manner inconsistent with its labeling.

HOW TO APPLY:

AQUATHOL K is a contact herbicide; consequently, do not apply before weeds are present. Application as early as possible after weeds appear and are actively growing is recommended for best results.

If an entire pond is treated at one time, or if the dissolved oxygen level is low at time of application, decay of weeds may remove enough oxygen from the water, causing fish to suffocate. Water containing very heavy vegetation should be treated in sections to prevent suffocation of fish. Sections should be treated 5-7 days apart. Carefully measure size and depth of area to be treated and determine amount of AQUATHOL K to apply from chart.

AQUATHOL K should be sprayed on the water or injected below the water surface and should be distributed as evenly as possible. It may be applied as a concentrate or diluted with water depending on the equipment. Some dilution will give better distribution. For best results apply when water is quiescent and/or flows are minimal.

In instances where the weed(s) to be controlled is an exposed surface problem (i.e., some of the broad-leaved pond weeds) coverage is important. For best results apply the concentrate or with the least amount of water compatible with the application equipment.

Necessary approval and/or permits should be obtained in states where required.

AQUATIC WEEDS CONTROLLED AND DOSAGE RATE CHARTS

AQUATHOL K is recommended for the control of the following aquatic weeds in irrigation and drainage canals, ponds and lakes at the rates indicated. Since the active ingredient is water soluble and tends to diffuse from the treated area, select the dosage rate applicable to the area to be treated. Use the lower rate in each range of rates where the growth is young and growing and/or where the weed stand is not heavy. Marginal treatments of large bodies of water require higher rates as indicated.

Aquatic Weed	RATES			
	Entire Pond/Lake or Large Area Treatment	Gallons per Acre Ft.	Spot or Lake Margin Treatment	Gallons per Acre Ft.
Bur Reed, Sparganium spp.	3.0-4.0 ppm	1.9-2.6 gal.	4.0-5.0 ppm	2.6-3.2 gal.
Coontail, Ceratophyllum spp.	1.0-2.0 ppm	0.6-1.3 gal.	2.0-3.0 ppm	1.3-1.9 gal.
Horned Pondweed, Zannichellia palustris	1.0-2.0 ppm	0.6-1.3 gal.	2.0-3.0 ppm	1.3-1.9 gal.
Hydrilla, Hydrilla verticillata	2.0-3.0 ppm	1.3-1.9 gal.	3.0-4.0 ppm	1.9-2.6 gal.
Hygrophila, Hygrophila polysperma	4.0-5.0 ppm	2.6-3.2 gal.	5.0 ppm	3.2 gal.
Milfoil, Myriophyllum spp.	2.0-3.0 ppm	1.3-1.9 gal.	3.0-4.0 ppm	1.9-2.6 gal.
Naiad, Najas spp.	1.0-3.0 ppm	0.6-1.9 gal.	2.0-4.0 ppm	1.3-2.6 gal.
Pondweed, Potamogeton spp.	0.5-3.0 ppm	0.3-1.9 gal.	1.5-4.0 ppm	1.0-2.6 gal.
Including:				
American, P. nodosus	2.0-3.0 ppm	1.3-1.9 gal.	3.0-4.0 ppm	1.9-2.6 gal.
Largeleaf (Bass Weed), P. amplifolius	2.0-3.0 ppm	1.3-1.9 gal.	3.0-4.0 ppm	1.9-2.6 gal.
Curlyleaf, P. crispus	0.5-1.5 ppm	0.3-1.0 gal.	1.5-3.0 ppm	1.0-1.9 gal.
Flatstem, P. zosteriformis	2.0-3.0 ppm	1.3-1.9 gal.	3.0-4.0 ppm	1.9-2.6 gal.
Floating-leaf, P. natans	1.0-2.0 ppm	0.6-1.3 gal.	2.0-3.0 ppm	1.3-1.9 gal.
Illinois, P. Illinoensis	1.5-2.5 ppm	1.0-1.6 gal.	2.5-3.5 ppm	1.6-2.3 gal.
Narrowleaf, P. pusillus	1.0-2.0 ppm	0.6-1.3 gal.	2.0-3.0 ppm	1.3-1.9 gal.
Threadleaf, P. filiformis	2.0-3.0 ppm	1.3-1.9 gal.	3.0-4.0 ppm	1.9-2.6 gal.
Sago, P. pectinatus	1.0-2.0 ppm	0.6-1.3 gal.	2.0-3.0 ppm	1.3-1.9 gal.
Variable Leaf, P. diversifolius	1.0-2.0 ppm	0.6-1.3 gal.	2.0-3.0 ppm	1.3-1.9 gal.
Parrot Feather, Myriophyllum aquaticum	2.0-3.0 ppm	1.3-1.9 gal.	3.0-4.0 ppm	1.9-2.6 gal.
Water Stargrass, Heteranthera spp.	2.0-3.0 ppm	1.3-1.9 gal.	3.0-4.0 ppm	1.9-2.6 gal.

RATE OF APPLICATION — LAKES AND PONDS

The following chart indicates the total quantity of material to be applied.

APPROXIMATE GALLONS OF AQUATHOL K FOR ONE ACRE (208' x 208') TREATMENT

	DOSAGE IN GALLONS FOR VARIOUS CONCENTRATIONS IN PPM						
DEPTH	0.5 ppm	1.0 ppm	1.5 ppm	2.0 ppm	3.0 ppm	4.0 ppm	5.0 ppm
1 ft.	0.3	0.6	1.0	1.3	1.9	2.6	3.2
2 ft.	0.6	1.3	1.9	2.6	3.8	5.1	6.4
4 ft.	1.3	2.6	3.8	5.1	7.7	10.2	12.8
6 ft.	1.9	3.8	5.8	7.6	11.5	15.3	19.2

RATE OF APPLICATION — IRRIGATION AND DRAINAGE CANALS**

The following indicates the total quantity of material to be applied.

GALLONS OF AQUATHOL K REQUIRED TO TREAT 1 MILE OF CANAL 1 FOOT DEEP*

	WIDTH OF CANAL IN FEET			
PPM	5	10	15	20
1.0 ppm	0.4	0.75	1.2	1.5
2.0 ppm	0.75	1.5	2.3	3.0
3.0 ppm	1.2	2.3	3.5	4.5
4.0 ppm	1.5	3.0	4.5	6.0
5.0 ppm	2.0	3.8	5.7	7.5

The minimum contact time with weeds for optimum results should be 2 hours.

*For deeper water, adjust rate accordingly.

** Not for this use in California.

STORAGE AND DISPOSAL

Do not contaminate water, food, or feed by storage or disposal.

Pesticide Storage Instructions: Store in the original container. Do not store in a manner where cross-contamination with other pesticides, fertilizers, food or feed could occur. Storage at temperatures below 32°F may result in the product freezing or crystallizing. Should this occur the product must be warmed to 50°F or higher and thoroughly agitated. In the event of a spillage during handling or storage, absorb with sand or other inert material and dispose of absorbent in accordance with the Pesticide Disposal Instructions listed below.

Pesticide Disposal Instructions: Pesticide wastes are acutely hazardous. Improper disposal of excess pesticide, spray mixture, or rinsate is a violation of Federal law. If these wastes cannot be disposed of by use according to label instructions, contact your State Pesticide or Environmental Control Agency, or the Hazardous Waste representative at the nearest EPA Regional Office for guidance.

Container Disposal Instructions: Triple rinse (or equivalent). Then offer for recycling or reconditioning, or puncture and dispose of in a sanitary landfill, or incineration, or, if allowed by state and local authorities, by burning. If burned, stay out of smoke.

EMERGENCY TELEPHONE NUMBERS:

CHEMTREC: (800) 424-9300

MEDICAL: (866) 673-6671 Rocky Mountain Poison Control Center

CONDITIONS OF SALE AND LIMITATION OF WARRANTY AND LIABILITY

The Directions for Use of this product must be followed carefully. It is impossible to eliminate all risks inherently associated with the use of this product. Crop injury, ineffectiveness or other unintended consequences may result because of such factors as manner of use or application, weather or crop conditions, presence of other materials, resistant strains or other influencing factors in the use of the product. To the extent consistent with applicable law, all such risks shall be assumed by Buyer and User, and Buyer and User agree to hold United Phosphorus, Inc., Manufacturer and Seller harmless for any claims relating to such factors. TO THE EXTENT CONSISTENT WITH APPLICABLE LAW, UNITED PHOSPHORUS, INC. AND MANUFACTURER MAKE NO WARRANTIES OF MERCHANTABILITY OR OF FITNESS FOR PARTICULAR PURPOSE NOR ANY OTHER EXPRESS OR IMPLIED WARRANTY EXCEPT AS STATED ON THIS LABEL.

To the extent consistent with applicable law, United Phosphorus, Inc., Manufacturer or Seller shall not be liable for any incidental, consequential or special damages resulting from the use or handling of this product. TO THE EXTENT CONSISTENT WITH APPLICABLE LAW, THE EXCLUSIVE REMEDY OF THE USER OR BUYER, AND THE EXCLUSIVE LIABILITY OF UNITED PHOSPHORUS, INC., MANUFACTURER AND SELLER FOR ANY AND ALL CLAIMS, LOSSES, INJURIES OR DAMAGES (INCLUDING CLAIMS BASED ON BREACH OF WARRANTY, CONTRACT, NEGLIGENCE, TORT, STRICT LIABILITY OR OTHERWISE) RESULTING FROM THE USE OR HANDLING OF THIS PRODUCT, SHALL BE THE RETURN OF THE PURCHASE PRICE OF THE PRODUCT OR, AT THE ELECTION OF UNITED PHOSPHORUS, INC., MANUFACTURER OR SELLER, THE REPLACEMENT OF THE PRODUCT.

United Phosphorus, Inc., Manufacturer and Seller offer this product, subject to the foregoing conditions of sale and limitations of warranty and of liability, which may not be modified except by written agreement signed by a duly authorized representative of United Phosphorus, Inc.

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70506-176(111907-2767)

Made and Printed in U.S.A.

AQUATHOL® SUPER K

GRANULAR AQUATIC HERBICIDE

ACTIVE INGREDIENT:	
Dipotassium salt of endothall*	63.0%
OTHER INGREDIENTS:	37.0%
TOTAL	100.0%

*7-oxabicyclo [2.2.1]heptane-2,3-dicarboxylic acid equivalent 44.7%

KEEP OUT OF REACH OF CHILDREN

DANGER

FIRST AID:

IF IN EYES:
- Hold eye open and rinse slowly and gently with water for 15-20 minutes.
- Remove contact lenses, if present, after the first 5 minutes, then continue rinsing.
- Call a poison control center or doctor for treatment advice.

IF SWALLOWED:
- Call a poison control center or doctor immediately for treatment advice.
- Have person sip a glass of water if able to swallow. Do not induce vomiting unless told by a poison control center or doctor. Do not give anything by mouth to an unconscious person.

IF ON SKIN:
- Take off contaminated clothing.
- Rinse skin immediately with plenty of water for 15-20 minutes.
- Call a poison control center or doctor for treatment advice.

HOT LINE NUMBER: Have the product container or label with you when calling a poison control center or doctor, or going for treatment. You may also contact (303) 623-5716 for emergency medical treatment information.

NOTE TO PHYSICIAN: Probable mucosal damage may contraindicate the use of gastric lavage.

See back panel for additional Precautionary Statements.

EPA Registration No. 4581-388-82695

EPA Establishment No. 62171-MS-003

Net Weight _____

Sold by:
Cerexagri-Nisso LLC
630 Freedom Business Center • Suite 402
King of Prussia, PA 19406
1 800-438-6071 • www.cerexagri-nisso.com

AQUATIC HABITAT MANAGEMENT

Cerexagri-Nisso LLC

PRECAUTIONARY STATEMENTS

HAZARDS TO HUMANS (AND DOMESTIC ANIMALS)

DANGER

CORROSIVE. CAUSES IRREVERSIBLE EYE DAMAGE. MAY BE FATAL IF SWALLOWED. HARMFUL IF ABSORBED THROUGH THE SKIN. Do not get in eyes, on skin or on clothing. Wear protective eyewear (goggles or face shield). Wash thoroughly with soap and water after handling and before eating, drinking or using tobacco. Remove contaminated clothing and wash before reuse.

ENVIRONMENTAL HAZARDS

Avoid contact with or drift to other crops or plants as injury may result.

Do not use water from treated areas for irrigation, for agricultural sprays on food crops or for domestic purposes within 7 days of treatment.

Not for use in brackish or salt water.

GENERAL INFORMATION

AQUATHOL SUPER K is a granular aquatic herbicide for use in ponds and lakes which, under field test conditions has shown to be effective against a broad range of aquatic plants with a margin of safety to fish. Dosage rates indicated for the applications of AQUATHOL SUPER K are measured in "Parts Per Million" (ppm). 1ppm as a dosage rate means that there would be 1 part of AQUATHOL SUPER K's active ingredient in 1,000,000 parts of water. Only 0.5 to 5 ppm are generally required for aquatic weed control, whereas some fish species are tolerant to approximately 100 ppm or over. For best results treat areas of one acre or more and/or margins of at least 100 feet in large bodies of water.

Thoroughly clean application equipment immediately after use.

DIRECTIONS FOR USE

It is a violation of Federal law to use this product in a manner inconsistent with its labeling.

HOW TO APPLY:

AQUATHOL SUPER K is a contact herbicide, consequently, do not apply before weeds are present. Treat as early as possible after weeds are present and are actively growing. If an entire pond is treated at one time, or if the dissolved oxygen level is low at the time of application, decay of weeds may remove enough oxygen from the water causing fish to suffocate. Water containing very heavy vegetation should be treated in sections to prevent suffocation of fish. Sections should be treated 5-7 days apart.

Carefully measure size and depth of area to be treated and determine proper amount of AQUATHOL SUPER K to apply. For best results apply when water is quiescent and/or flows are minimal.

Apply AQUATHOL SUPER K as evenly as possible over treated areas. A cyclone spreader is useful for this purpose. In instances where the nuisance weed(s) to be controlled is an exposed surface problem (i.e., some of the broad-leaved pond weeds) coverage is important.

Necessary approval and/or permits should be obtained in states where required.

HOW TO DETERMINE DOSAGE RATE (Active Ingredient)

AQUATHOL SUPER K is recommended for the control of the following aquatic weeds at the rates indicated. Since AQUATHOL SUPER K's active ingredient is water soluble and tends to diffuse from the treated area, select the dosage rate applicable to the area to be treated. Use the lower rate in each range when the growth is young and growing and/or where the weed stand is not heavy. Marginal treatments of large bodies of water require highest rates as indicated.

WEEDS CONTROLLED AND AQUATHOL SUPER K DOSAGE RATE CHART

	RATES			
Aquatic Weed	Entire Pond/Lake or Large Area Treatment	Lbs. per Acre Ft.	Spot or Lake Margin Treatment	Lbs. per Acre Ft.
Bur Reed, Sparganium spp.	3.0-4.0 ppm	13.2-17.6 lbs.	4.0-5.0 ppm	17.6-22.0 lbs.
Coontail, Ceratophyllum spp.	1.0-2.0 ppm	4.4-8.8 lbs.	2.0-3.0 ppm	8.8-13.2 lbs.
Horned Pondweed, Zannichellia palustris	1.0-2.0 ppm	4.4-8.8 lbs.	2.0-3.0 ppm	8.8-13.2 lbs.
Hydrilla, Hydrilla verticillata	2.0-3.0 ppm	8.8-13.2 lbs.	3.0-4.0 ppm	13.2-17.6 lbs.
Hygrophila, Hygrophila polysperma	4.0-5.0 ppm	17.6-22.0 lbs.	5.0 ppm	22.0 lbs.
Milfoil, Myriophyllum spp.	2.0-3.0 ppm	8.8-13.2 lbs.	3.0-4.0 ppm	13.2-17.6 lbs.
Naiad, Najas spp.	1.0-3.0 ppm	4.4-13.2 lbs.	2.0-4.0 ppm	8.8-17.6 lbs.
Pondweed, Potamogeton spp.	0.5-3.0 ppm	2.2-13.2 lbs.	1.5-4.0 ppm	6.6-17.6 lbs.
Including:				
American, P. nodosus	2.0-3.0 ppm	8.8-13.2 lbs.	3.0-4.0 ppm	13.2-17.6 lbs.
Largeleaf (Bass Weed), P. amplifolius	2.0-3.0 ppm	8.8-13.2 lbs.	3.0-4.0 ppm	13.2-17.6 lbs.
Curlyleaf, P. crispus	0.5-1.5 ppm	2.2-6.6 lbs.	1.5-3.0 ppm	6.6-13.2 lbs.
Flatstem, P. zosteriformis	2.0-3.0 ppm	8.8-13.2 lbs.	3.0-4.0 ppm	13.2-17.6 lbs.
Floating-leaf, P. natans	1.0-2.0 ppm	4.4-8.8 lbs.	2.0-3.0 ppm	8.8-13.2 lbs.
Illinois, P. illinoensis	1.5-2.5 ppm	6.6-11.0 lbs.	2.5-3.5 ppm	11.0-15.4 lbs.
Narrowleaf, P. pusillus	1.0-2.0 ppm	4.4-8.8 lbs.	2.0-3.0 ppm	8.8-13.2 lbs.
Slender, P. filiformis	2.0-3.0 ppm	8.8-13.2 lbs.	3.0-4.0 ppm	13.2-17.6 lbs.
Sago, P. pectinatus	1.0-2.0 ppm	4.4-8.8 lbs.	2.0-3.0 ppm	8.8-13.2 lbs.
Variable Leaf, P. diversifolius	1.0-2.0 ppm	4.4-8.8 lbs.	2.0-3.0 ppm	8.8-13.2 lbs.
Parrot Feather, Myriophyllum aquaticum	2.0-3.0 ppm	8.8-13.2 lbs.	3.0-4.0 ppm	13.2-17.6 lbs.
Water Stargrass, Heteranthera spp.	2.0-3.0 ppm	8.8-13.2 lbs.	3.0-4.0 ppm	13.2-17.6 lbs.

APPROXIMATE POUNDS OF AQUATHOL SUPER K FOR ONE ACRE*
TREATMENT DOSAGE IN POUNDS FOR VARIOUS CONCENTRATIONS IN PPM

DEPTH	0.5 ppm	1.0 ppm	1.5 ppm	2.0 ppm	3.0 ppm	4.0 ppm	5.0 ppm
1 Ft. Deep	2.2 lbs.	4.4 lbs.	6.6 lbs.	8.8 lbs.	13.2 lbs.	17.6 lbs.	22 lbs.
2 Ft. Deep	4.4 lbs.	8.8 lbs.	13.2 lbs.	17.6 lbs.	26.4 lbs.	35.2 lbs.	44 lbs.
3 Ft. Deep	6.6 lbs.	13.2 lbs.	19.8 lbs.	26.4 lbs.	39.6 lbs.	52.8 lbs.	66 lbs.
4 Ft. Deep	8.8 lbs.	17.6 lbs.	26.4 lbs.	35.2 lbs.	52.8 lbs.	70.4 lbs.	88 lbs.
5 Ft. Deep	11 lbs.	22 lbs.	33 lbs.	44 lbs.	66 lbs.	88 lbs.	110 lbs.

*One acre equals approximately 208' x 208'

Where the area being treated is greater than those listed in the charts, proceed as follows:

a. Compute the approximate surface acreage
b. Determine the average depth
c. Multiply a. by b. to determine total number of acre/feet
d. Multiply the pounds required at the 1 foot depth under the rate to be used by the number of acre/feet to determine the total quantity to be used.

APPROXIMATE POUNDS OF AQUATHOL SUPER K FOR 1000 SQUARE FEET
TREATMENT DOSAGE IN POUNDS FOR VARIOUS CONCENTRATIONS IN PPM

DEPTH	0.5 ppm	1.0 ppm	1.5 ppm	2.0 ppm	3.0 ppm	4.0 ppm	5.0 ppm
1 Ft. Deep	0.05 lbs.	0.1 lbs.	0.15 lbs.	0.2 lbs.	0.3 lbs.	0.4 lbs.	0.5 lbs.
2 Ft. Deep	0.1 lbs.	0.2 lbs.	0.3 lbs.	0.4 lbs.	0.6 lbs.	0.8 lbs.	1.0 lbs.
3 Ft. Deep	0.15 lbs.	0.3 lbs.	0.45 lbs.	0.6 lbs.	0.9 lbs.	1.2 lbs.	1.5 lbs.
4 Ft. Deep	0.2 lbs.	0.4 lbs.	0.6 lbs.	0.8 lbs.	1.2 lbs.	1.6 lbs.	2.0 lbs.
5 Ft. Deep	0.25 lbs.	0.5 lbs.	0.75 lbs.	1.0 lbs.	1.5 lbs.	2.0 lbs.	2.5 lbs.

Where the depth is greater than 5 feet, multiply the depth by the appropriate rate for 1 ft. depth to determine the amount of product required per 1000 square feet.

STORAGE AND DISPOSAL

Do not contaminate water, food or feed by storage or disposal.

Pesticide Storage Instructions: Store in the original container, preferably in a locked storage area. Do not store in a manner where cross-contamination with other pesticides, fertilizers, food or feed could occur. If spilled during storage or handling sweep up spillage and dispose of in accordance with the Pesticide Disposal Instructions listed below.

Pesticide Disposal Instructions: Pesticide wastes are acutely hazardous. Improper disposal of excess pesticide or rinsate is a violation of Federal law. If these wastes cannot be disposed of by use according to label instructions, contact your State Pesticide or Environmental Control Agency, or the Hazardous Waste representative at the nearest EPA Regional Office for guidance.

Container Disposal Instructions: Triple rinse (or equivalent). Then offer for recycling or reconditioning, or puncture and dispose of in a sanitary landfill, or by incineration, or, if allowed by state and local authorities, by burning. If burned, stay out of smoke.

EMERGENCY TELEPHONE NUMBERS:
CHEMTREC: (800) 424-9300
MEDICAL: (303) 623-5716 Rocky Mountain Poison Control Center

CONDITIONS OF SALE AND LIMITATION OF WARRANTY AND LIABILITY

The Directions for Use of this product must be followed carefully. It is impossible to eliminate all risks inherently associated with the use of this product. Crop injury, ineffectiveness or other unintended consequences may result because of such factors as manner of use or application, weather or crop conditions, presence of other materials, resistant strains or other influencing factors in the use of the product. To the extent consistent with applicable law, all such risks shall be assumed by Buyer and User, and Buyer and User agree to hold Cerexagri-Nisso LLC, Manufacturer and Seller harmless for any claims relating to such factors. TO THE EXTENT CONSISTENT WITH APPLICABLE LAW, CEREXAGRI-NISSO LLC AND MANUFACTURER MAKE NO WARRANTIES OF MERCHANTABILITY OR OF FITNESS FOR PARTICULAR PURPOSE NOR ANY OTHER EXPRESS OR IMPLIED WARRANTY EXCEPT AS STATED ON THIS LABEL.

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APPENDIX B

2010 GRANT PROPOSALS

Montana Noxious Weed Trust Fund Grant Program

APPLICATION – COVER PAGE – 2010

Form NW-1A (6-09)

Good for the Period July 2009 through June 2010 – (one year funding only)

John W. Halpop	jhalpop@montana.edu	406-827-6934
Project Coordinator	E-mail Address	Phone Number

2504 Tradewinds Way, Suite 1B	Thompson Falls	MT	59873	Sanders
Address: Street or Box	City	State	Zip Code	County

	Dale.Neiman@mt.usda.gov	406-826-3751
Sanders Co. Weed District		
Project Sponsor	E-mail Address	Phone Number

PO Box 639	Plains	MT	59859	Sanders
Address: Street or Box	City	State	Zip Code	County

Presenter for the Noxious Weed Trust Fund Hearings (March 1-5, 2010): Brian Burky, AVISTA Corp.____

$31,874.28	2.5	$79,685.70	$0	$213,070	$292,756
Weed Budget-1Mill	Mills Levied	Total Mill Levy	General Fund	Other Revenues	Total Weed Control Budget

NWTF Grants should not be considered as Other Revenues

PROJECT INFORMATION (Do not reference project write-up, this section must be completed.)

Project Title: **Eurasian Watermilfoil Replicated Strip Treatment research**
Brief Project Description: Determine water exchange processes in aquatic plant stands in additional areas
Of Noxon Rapids reservoir infested with EWM & CLP. Refine invasive species selective control using
preferred herbicide formulations & prescriptive application techniques. These will be shoreline areas, totaling
up to 50 acres. * Match Funds; As of December 1, 2009 additional supporting grants are pending.
$10,000 match confirmed. Acreage figures listed (50) represent environmental assessment maximums.

☐ **NEW Trust Fund grant project?** x **Continuing/Previously funded grant project?**

Project Type (check one): **Is This Project Also:**

Local Coop:	Education:	Research:X	■	Mapping:	Grazing:	Biological:

APPLYING FOR:

Yes ☐ No ☐ **Special General Funding**:

Yes ☐ No ☐ **Cooperative Forestry Assistance Funding**:

How many years will this project require Trust Fund support?
One ☐; Two ☐; Three ☐; Four ☐; Other _____

Current Grant Request:

R0UND TO THE NEAREST DOLLAR	2010 Grant Budget
Total Grant Funds **$75,000 maximum**	$75,000
Total Matching Funds	$75,000*
TOTAL PROJECT COST	$150,000

List previously funded grants for this project. Include MDA grant number, amount received, and total NWTF funding.

MDA # 08-108	$54,300	MDA #	$	MDA #	$
MDA #09-039	$19,190	MDA #	$	MDA #	$
MDA #09-040	$70,000	MDA #	$	**Total Amount Funded**	$143,490

Signature (use blue ink)	**MSU Extension/Sanders Countty** Title of Authorized Representative	**Dec. 1, 2009** Date

PRIVATE COOPERATORS

Participating Landowners	Participating Landowners	Letters of Support
		List supporter names below:

COOPERATING AGENCIES AND COUNTIES

List the cooperating agency or county weed districts participating in the grant project along with their contact information (name & phone).

Example: BLM, John Simon, 406-896-5043	MT Fish, Wildlife & Parks, Jon Hanson	Sanders County Weed Dist. Dale Neiman-Chairman 826-3751
AVISTA Corp, Brian Burky 847-1283	Sanders Co. Board of County Commissioners; Carol Brooker	Noxon Cabinet Shoreline Users Coalition; Jim Marshall
Weed Management Services; Celestine Duncan 443-1469	Tri-State Water Quality Council, Sandpoint	Montana Dept. of Agriculture; Dave Burch/Kim Johnson
Dr. John Madsen, Geosystems Research Institute, Mississippi State University, Starkville, MS 662-325-2428	MSU Extension/Sanders County; John Halpop 8276934	Dr Kurt Getsinger, US Army Corp. of Engineers, Chemical Control & Physical Processes Team, Vicksburg, MS 601-831-0774

List all grant participant names and cooperating agencies in your project.

BUDGET DETAIL/FINANCIAL NARRATIVE

GRANT FUNDS and MATCHING FUNDS – 2010

Form NW-2A (6-09)

(NO In-Kind Match)

(Actual dollar amounts only)

Expense Category	Grant Funds	Matching Funds	**Financial Narrative -** Be Specific (see Grant Guidelines)
Salaries (Research Projects)	$ (Grant funds)		
		$ (Matching)	
Benefits (Research Projects)	$ (Grant funds)		
		$ (Matching)	
Contracted Services	$75,000 (Grant funds)		Herbicides, site evaluation, application (Litline), vegetation assessment, conducted by Chemical Control & Physiological Proceses Team (Getsinger/Madsen) and Clean Lakes, Inc. , Idaho. Full detail on narrative page.
		$75,000 (Matching)	AVISTA Corp., Noxon, MT., $10,000 Other grant requests have been submitted to make up the match difference of $65,000.
Supplies & Materials	$ (Grant funds)		
		$ (Matching)	
Communications	$ (Grant funds)		
		$ (Matching)	
Travel	$ (Grant funds)		
		$ (Matching)	
Equipment		$ (Match only)	
Other Expenses	$ (Grant funds)		
		$ (Matching)	
TOTALS	$75,000	$75,000	**TRANSFER TOTALS TO COVER PAGE (FORM NW-1A)**

Form NW-3A (6-09)

HERBICIDE AND APPLICATION COST SUMMARY SHEET

Private Application Cost Sheet (use total from "column H" for **Supplies & Materials** on the Budget Sheet)

A **Active Ingredient**	B **Rate Per Acre**	C **Application Type**	D **Weed(s) to be Treated**	E **Product Cost/Acre**	F **Acres Treated**	G **Total $ Amount**	H **50% Cost Share**
Example **Picloram + 2,4-D**	**1 qt each**	**2**	**7**	**$25**	**400**	**$10,000**	**$5,000**
				Totals:			

Herbicides **NO COST provided by AERF (Aquatic Ecosystem Restoration Fund). See following sheet.**

Commercial Applicator Cost Sheet (use total from "column J" for **Contracted Services** on the Budget Sheet)

A **Active Ingredient**	B **Rate Per Acre**	C **Application Type**	D **Weed(s) to be Treated**	E **Product Cost/Acre**	F **Application Cost/Acre**	G **Total E & F**	H **Acres Treated**	I **Total $ Amount**	J **50% Cost Share**
Example **Picloram+2,4D**	**1 qt each**	**2**	**7**	**$25**	**$15**	**$40**	**400**	**$16,000**	**$8,000**
Endothall (Aquathol K)		Litline, CleanLakes, Inc	29 & Curly Leaf Pondweed						
Triclopyr		Litline, CleanLakes Inc.	29& Curly Leaf Pondweed						
Liquid Diquat (Reward)		Litline, CleanLakes, Inc							
Granular endothall		Litline, CleanLakes Inc.							
Liquid flumioxazin									
Granular endothall									
						Totals:			

Total Acres in Project:

Total Treated Acres in Project:

CODE LIST FOR APPLICATION TYPE
(use in column C)

1. **Aerial**
2. **Ground Broadcast**
3. **Spot Treatment**
4. **Other:** _____

CODE LIST FOR WEEDS List all that apply (use in column D)

1. Spotted Knapweed	12. St. Johnswort	23. Tamarisk (Saltcedar)
2. Diffuse Knapweed	13. Sulfur Cinquefoil	24. Perennial Pepperweed
3. Russian Knapweed	14. Common Tansy	25. Yellow Starthistle
4. Canada Thistle	15. Ox-Eye Daisy	26. Common Crupina
5. Field Bindweed	16. Houndstongue	27. Rush Skeletonweed
6. Hoary Cress (Whitetop)	17. Dyers Woad	28. Yellow Flag Iris
7. Leafy Spurge	18. Purple Loosestrife	29. Eurasian Watermilfoil
8. Dalmatian Toadflax	19. Tansy Ragwort	30. Flowering Rush
9. Yellow Toadflax	20. Orange Hawkweed	31. Japanese Knotweed
10. Hoary Alyssum	21. Meadow Hawkweed	32. Scotch Broom
11. Blueweed	22. Tall Buttercup	

33. Other (specify) _____ _____ _____

One Year Funding: 2010

SEED AND APPLICATION COST SUMMARY SHEET

Landowner Reseed Application Cost Sheet

A Seed Mixture to be Used	B Rate/Acre	C Type of Application (see code list below)	D Seed Cost/Acre	E Acres to be Seeded	F Total Amount (Multiply E x F)	G 50% Cost Share
(Example) Great Northern seed mix	**15 Lbs/Acre**	**2**	**$40.00/Acre**	**75 Acres**	**$3,000**	**$1,500**

Commercial Reseed Application Cost Sheet

A Seed Mixture to be Used	B Rate/ Acre	C Type of Application (see code list below)	D Seed Cost/Acre	E Application Cost/Acre	F Total D&E	G Acres to be Seeded	H Total Amount (Multiply F x G)	I 50% Cost Share
(Example) Great Northern	**15 Lbs/Ac**	**2**	**$40**	**$10**	**$50**	**75**	**$3,750**	**$1,875**

CODE LIST FOR APPLICATION TYPE
(use in column D)

1. **Aerial**
2. **Ground Broadcast**
3. **Spot Treatment**
4. **Other:** _____

Total acres in project: _____

Total acres targeted for seeding: _____

List the plant species in the seed mix:

One Year Funding: 2010

DATE: February 16, 2010

RECOVERY PROPOSAL

TO: U.S. ARMY ENGINEER RESEARCH & DEVELOPMENT CENTER
ERDC Contracting Office, Attention: Amanda Campbell, 3909 Halls Ferry Road, Vicksburg, MS 39180-6199, Amanda.I.Campbell@usace.army.mil

TOPIC NUMBER: **EL 26-1**

PROJECT TITLE: Selective Control of Eurasian Watermilfoil and Curlyleaf Pondweed on Noxon Rapids Reservoir: Demonstrations and Evaluations, Phase 2

OFFEROR: **Sanders County Board of Commissioners**, Attention: Carol Brooker, P. O. Box 519, Thompson Falls, MT 59873; 406-827-6942; brooker@blackfoot.net

OFFEROR DUNS:

COST: $177,563.47

PROPOSAL

I. TECHNICAL INFORMATION

A. Background and Project Overview

During summer 2007, EWM (*Myriophyllum spicatum*) (EWM) was confirmed in both Noxon Rapids and Cabinet Gorge Reservoirs on the Clark Fork River. (The reservoirs are created by the operations of Avista Utilities-owned Noxon Rapids Dam and Cabinet Gorge Dam, respectively, on the Clark Fork River within Sanders County, Montana.) This is the first infestation of EWM found in Montana. Management of this invasive weed is critical since it is a new invader to Montana, and Idaho has spent over $9 million to control EWM, concentrating efforts in Lake Pend Oreille and the Pend Oreille River, directly downstream of Noxon and Cabinet Gorge Reservoirs. Detailed surveys (2008-09) indicate EWM is present in the lower two-thirds of Noxon Reservoir and throughout Cabinet Reservoir. Total are infested by EWM is about 370 acres in additon to 600 acres of CLP (*Potamogenton crispus* L.)(CLP).

Phase 1 water-exchange and herbicide trials, including vegetation and water quality monitoring, were conducted on two 20-acre plots in Noxon Reservoir during July-August 2009. Based on results of Phase 1, the proposed Phase 2 work will study and evaluate additional environments on the reservoir. ARRA funds would be used specifically to undertake treatments of large contiguous blocks of EWM/CLP-infested on Noxon Reservoir. These demonstration and evaluation efforts will serve to refine selective herbicide techniques to control EWM and CLP, information which will be a critical component of an Integrated Management Plan to address these invasive aquatic plants in Montana and the region. Federal, state and local governmental and non-governmental entities are actively working together as the EWM Task Force. This group will provide guidance

and direction to Sanders County for coordination and implementation of the proposed project as part of a multi-pronged approach that includes herbicide studies, biological controls, bottom barrier applications and public education/outreach.

B. Goals and Objectives

The goal of the project is to demonstrate, evaluate and refine strategies for using herbicides for selective control of EWM and CLP in the lower Clark Fork River system. Proposed work will be based upon results of the Phase 1 water-exchange and herbicide trials on Noxon Reservoir (July-August 2009). Phase 2 study objectives for 2010 are to (1) further determine water exchange processes in large contiguous aquatic plant stands in additional areas of Noxon Reservoir infested with EWM and CLP; (2) utilize that information to refine species selective control techniques of those invasive plants using preferred herbicide formulations and prescriptive application methods; and (3) quantitatively assess herbicide efficacy and response of both invasive and native aquatic plants to herbicide treatments. Techniques will be based on study results that demonstrate optimal seasonal timing, efficient rates for EWM and CLP control, impacts on non-targeted vegetation, potential impacts on water quality and threatened and endangered species, and cost effectiveness.

Sanders County will coordinate with project contractors, and cooperating agencies, governments and organizations of the EWM Task Force to plan, direct and conduct the Phase 2 project. Herbicides, formulations, application rates, evaluation sites, application techniques and applicators, and vegetation assessment methods will be selected and approved by the Task Force team, principal investigators and other technical advisors as appropriate. Quality control and project oversight by the principal investigators and Task Force Team will maintain the scientific integrity of the work and ensure that Phase 2 results can be compared with previous studies on Noxon Reservoir and similar sites.

Project Duration: The project will be implemented from April, 2010 through February 2011. The timeline is as follows:

Spring 2010: Project planning, permitting and contracting
July-August 2010: Vegetation assessment, herbicide/dye application and evaluation
Fall/Winter 2010/11: Additional vegetation assessment/analysis and Phase 2 final report
Throughout project: ARRA reports as required

	2010							2011	
	Mar	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Jul**	**Oct**
Activity									
Project planning, permitting, contracting	X	X	X	X					
Pretreatment assessment					21-22				
Water Exchange Studies					23-27				
Herbicide Applications					28-30				
4 Week Assessment							1-5		
1 Year Assessment								28-30	
Final Report									X

(Dates may change depending upon regulations, permitting, weather, etc.)

Project meets ERDC mission and EL-26-1 goals: With a mission to provide science, technology and expertise in engineering and environmental sciences in support of U.S. armed forces and the nation, the ERDC is responsible for conducting research in a broad array of fields that includes water resources and aquatic plants—the focus of our proposal. EL-26-1 seeks projects specific to the Clark Fork/Pend Oreille River system that "demonstrate and evaluate strategies for selective control of aquatic invasive species using herbicides," which is the purpose of our proposed project. The resulting evaluation of methods will provide guidance for operational-scale invasive plant management practices in the Clark Fork/Pend Oreille River system and similar river systems of the Pacific Northwest Region.

C. Technical Approach

Task 1. Water Exchange Studies: The goal of this task is to determine water exchange rates at specific sites to improve EWM and CLP treatment efficacy.

EWM and CLP are increasingly problematic in the Pacific Northwest, with significant nuisance populations already formed in reservoirs of the Lower Clark Fork River (Madsen and Cheshier 2009). Run of the river reservoirs have presented consistent challenges in achieving effective and efficient control of invasive submersed aquatic plants. Herbicide treatments in flowing water have often been inconsistent and unpredictable which has led to increased interest in developing cost-effective and efficacious operational recommendations for these systems. Run of the river reservoirs typically have variable water exchange patterns. Ultimately, water exchange will impact aqueous distribution of herbicides often resulting in reduced chemical exposure times against target plants, and unacceptable control. Herbicide concentration exposure time (CET) relationships designed to provide excellent plant control have been developed specifically for endothall and triclopyr (Netherland et al. 1991; Netherland and Getsinger 1992). However, previous studies and relationships were derived in small scale controlled settings therefore, further research is needed to understand water exchange characteristics that are site specific for a given waterbody.

Herbicide treatments in Noxon Reservoir began in 2009 with approximately 40 acres of EWM being treated with herbicides. Water exchanged studies were conducted in treatment plots prior to herbicide applications to determine water flow, estimate herbicide half-life, and refine herbicide rates based upon water exchange characteristics. The 2009 study also monitored historical dam operations and times of low water discharge were noted. Using data from water exchange studies and dam operations, an optimal application time was determined resulting in increased treatment efficacy by providing longer contact and exposure times for herbicides. The water exchange study allowed for selection of more appropriate herbicide rates to maximize treatment efficacy.

The presence of CLP in these areas further complicates operational control as this species is a monocotyledon and will not respond to auxin herbicides like EWM (Sprecher and Stewart 1995; Sprecher et al. 1998). Herbicides available for CLP control are limited and site-specific water exchange data are critical for herbicide selection and rate selection to maximize treatment efficacy on this species.

Water exchange evaluations will be conducted at two of six sites listed below (Figure 1); however, site selection may change depending upon potential unforeseen regulatory inhibitions such as water intakes, conflicts with water rights, and land ownership of the bottom of the reservoir.

Site 2 – 24.2 acres
Site 4 – 28.5 acres
Site 6 – 19.1 acres
Site 7 – 24.4 acres
Site 8 – 15.8 acres
Site 9 – 22.1 acres

Sites 7 and 8 are the primary choices for water exchange and subsequent herbicide applications as site 7 would yield data regarding herbicide efficacy in a protected shoreline habitat; whereas site 8 would represent an open or unprotected shoreline habitat. Sites 2 and 4 are untreated references for an ongoing project that began in 2009 and will most likely serve as untreated reference plots for this study. Sites 1 and 3 were treated in 2009 and monitoring is ongoing, therefore no herbicide applications will be made to these sites. Site 5 is 11.5 acres and does not meet the suggested block size from the pre-proposal evaluation.

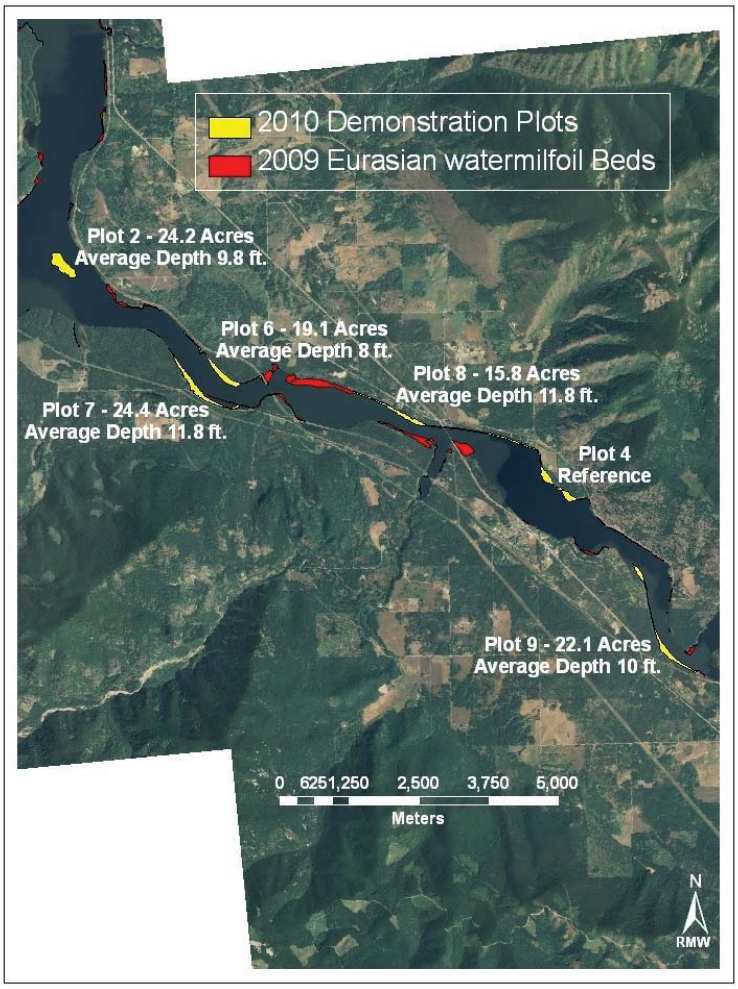

Figure1. Proposed research and demonstration plots for 2010 rhodamine dye and herbicide evaluations.

Rhodamine WT dye will be applied by a licensed applicator subcontracted by Sanders County. Dye applications will be conducted using a weighted hose system that is capable of injecting herbicides to varying depths ranging from several feet below the surface to directly above the lake bottom. Methods for water exchange evaluations will follow those employed by the ERDC in Noxon Reservoir, MT in 2009 (Getsinger 2009, Unpublished research). Sample locations will be pre-determined and located inside each treatment area and at randomly located postions outside of the treatment areas to a distance of 1600 m. Sample locations outside of the treatment area will generally follow dye as it moves with water flow. Measurements of dye concentration will be made by pumping water from the appropriate depth through a portable fluorometer. Depth intervals for dye concentration determination will include just below the water surface and in 50 cm intervals to just above sediment. Dye measurements will be recorded at pretreatment, 1, 3, 6, 9, 12, and 24 hours after treatment. If dye concentrations are still detectable after 24 hours additional samples will be taken to identify water movement from the plot area, estimate a plot herbicide half-life, and to predict herbicide movement within the reservoir. Additionally, water discharge through the Noxon dam will be evaluated from data received from Avista Utilities. Data

from the water exchange studies will be used to improve planned operational herbicide treatments that will be conducted shortly following completion of data analysis of water exchange operations. Data will aid in future site selection, herbicide application timing, herbicide selection, and determination of appropriate herbicide rates as dictated by water exchange. These data will provide necessary information to make future herbicide applications more efficacious and cost effective.

Task 2. Herbicide Applications Based Upon Site-Specific Water Exchange Characteristics: The goal of this task is to utilize data collected during the above described water exchange studies to maximize treatment efficacy of herbicide applications to control EWM and CLP. Treatment timing will be based upon data from water exchange studies and discharge patterns from Noxon Rapids Dam to determine a time of minimal discharge to increase herbicide contact time in the treatment areas. Project investigators, Sanders County and the EWM Task Force will work with Avista Utilities if a change in dam operations is needed to maximize herbicide effectiveness.

Herbicide applications will be conducted in the two sites utilized for the water exchange study, with the addition of two untreated reference plots for comparison. One site will be treated with a combination of endothall and triclopyr for efficacy comparisons to 2009 applications. The other site will be treated with triclopyr alone to determine if control of EWM can be achieved with one herbicide at the contact times determined during the water exchange studies. Herbicide rates will be determined following evaluation of the water exchange data and will be based upon concentration exposure time relationships already determined for endothall and triclopyr (Netherland et al. 1991; Netherland and Getsinger 1992).

Herbicide applications will be completed by the above mentioned applicator using a weighted hose system that is capable of injecting herbicides to varying depths ranging from several feet below the surface to directly above the lake bottom in 18 ft. of water. Dye will also be applied at the same time as the herbicides to track herbicide dissipation and rates in the water column. Dye measurements and herbicide residue water samples will be collected at 1, 3, 6, 9, 12, and 24 hours after application. Residue samples will be taken from just below the surface, mid water depth, and just above the sediment to document herbicide dissipation and to corroborate dye data. The number of residue samples will not exceed 300. Residue samples will be frozen or stored on ice and shipped to the University of Florida for sample processing.

Task 3. EWM/CLP Treatment Evaluation: The goal of this task is to quantitatively assess the effectiveness of herbicide applications for control of EWM and CLP, based upon site specific water exchange characteristics.

Unlike terrestrial systems, plants are not readily observable in aquatic environments and alternative methods to sample aquatic plants need to be utilized other than relying on visual estimation. However, use of quantitative methods for aquatic plants has not become as standardized as other components in the aquatic systems, such as biotic or physical components (Lind 1979; Madsen 1999). One cost effective and efficient method to survey large areas and collect large quantities of data on the distribution and abundance of aquatic macrophytes is to conduct a point intercept survey. The point intercept survey is a quantitative approach that yields data for statistical analyses (Madsen 1999). The presence/absence method is generally the

simplest approach, inexpensive, and has a low complexity (Madsen and Bloomfield 1993). Past studies have utilized the point intercept method to assess operational control programs on Lake Pend Oreille and Hayden Lake, ID (Madsen and Wersal 2008, 2009; Wersal et al. 2010), and to document changes in plant community composition as a result of invasion by non-native species (Madsen et al. 2008; Madsen and Cheshier 2009).

Therefore, point intercept surveys will be conducted using no less than 30 sample points within each treatment area including the untreated reference sites. Surveys will be conducted by boat using GPS (Global Positioning System) technology to navigate to each point. A Trimble AgGPS106^{tm} (Sunnyvale, California) receiver coupled with a ruggedized notebook computer will be used to achieve 1-3 m survey accuracy. At each survey point, a weighted plant rake will be deployed twice to determine presence of plant species. Additionally, depth at each point will be recorded using a depth finder or with a sounding rod in water depths of less than 3 m. Pretreatment point intercept surveys will be conducted in July 2010 prior to herbicide treatment and a 4 week after-treatment survey (August or September 2010) will document short term plant response. A one year after-treatment (YAT) evaluation will occur in July 2011 utilizing the same survey points sampled during the surveys. Surveying in this manner will allow for determining direct changes in plant presence and species richness over time; and to extrapolate long term treatment efficacy for a given treatment.

Changes in occurrence of plant species, EWM, CLP, and native plants, across treatments will be determined using McNemar's Test to assess the differences in the correlated proportions within a given data set between variables that are not independent, i.e. sampling the same points pre and post treatment (Stokes et al. 2000, Wersal et al. 2006, Wersal et al. 2010). A paired t-test will be used to assess differences in species richness in treated areas.

All permits, approval and notifications will be secured as required from Montana Department of Agriculture, Aquatic Vegetation Management Plan (Restricted Use Pesticide); Montana Department of Environmental Quality, Short Term Exemption from State Water Quality Standards for Pesticide Application; and notifications and consultation with the property owner and Montana Fish, Wildlife and Parks.

D. Benefits Derived from the Proposed Research

Knowledge gained from completion of Phases 1 and 2 (2009-10) will be used to develop effective herbicide prescriptions to control EWM and CLP within Noxon Rapids and Cabinet Gorge Reservoirs and similar flowing water habitats. Since Montana is a headwaters state, results from these studies benefit downstream water bodies in adjoining states, and also provide guidance for CLP control efforts on Thompson Falls Reservoir, upstream of Noxon and Cabinet Reservoirs on the Clark Fork River. Controlling EWM and CLP in Noxon and Cabinet Reservoirs will also slow propagule spread to sites downs stream such as Lake Pend Oreille, Pend Oreille River, and the greater Columbia River system.

Herbicide treatments will be an important component of an aggressive Integrated Management Plan that will include prevention, containment, mechanical, physical and potentially biological components—as well as public education—to manage existing EWM and CLP infestations in the

Clark Fork River and prevent the spread of these invasive aquatic plants to non-infested waterbodies in Montana.

The outlined approach will dovetail with efforts underway and supported by the Idaho State Department of Agriculture on downstream Lake Pend Oreille and the Pend Oreille River—site of the Corps of Engineers' hydroelectric project at Albeni Falls Dam. In addition, study results can be applied to identify and develop other areas for site-specific evaluations and operational control programs on other Avista Utilities-owned hydroelectric systems in the region, including Lake Coeur d'Alene (Idaho) and Lake Spokane (Washington). If active groups in the states of Idaho, Montana and Washington can develop an effective interstate management plan, it could slow or stop the spread of these invasive aquatic plants through their concerted efforts.

From a purely technical point of view, this study will enhance our ability to predictably control EWM and CLP in flowing-water systems. The scientific basis of knowing herbicide concentration and exposure time has been well developed through a series of small-scale studies by ERDC (Getsinger and Netherland 1997, Netherland et al. 1991, Netherland and Getsinger 1992, Sprecher et al. 2002). Translating these results to the field has been more difficult, requiring a precise knowledge of water exchange characteristics that are difficult and expensive to collect (Getsinger et al. 1996). Additional water exchange studies will build a library of case studies which add to the overall knowledge of how to translate concentration/exposure time studies to field applications. As indicated above, these studies will directly translate to improved control not only to Eurasian watermilfoil programs in Montana, Idaho, Washington and Oregon, but also to other reservoir systems throughout the U.S. dealing with EWM and other submersed species.

E. Anticipated Results and Products

Anticipated results will document not only site specific water exchange characteristics and herbicide efficacy on EWM and CLP, but will also provide insight into native plant species response. Native species response utilizing above survey methods have been documented in other lakes in the Pacific Northwest (Madsen and Wersal 2009; Wersal et al. 2010). Data such as these will aid in future herbicide and rate selection.

A preliminary data report will be provided to sponsors and collaborators in November 2010 after the 4 week after-treatment survey. This will be followed by a final report to sponsors and collaborators in September 2011. The final report will then be formatted and submitted for publication in an appropriate peer reviewed journal.

All project reporting will be conducted in accordance with ERCD and ARRA requirements.

F. Project Cooperators

Local, state, tribal and federal cooperators are committed to undertaking an aggressive long-term program to contain, control, and monitor existing infestations of EWM and CLP and to prevent their spread to non-infested Montana waters. To facilitate the development and implementation of a long-term Integrated Management Plan for EWM and CLP control, cooperators formed the Sanders County EWM Task Force in early 2008. Participants include Sanders County Board of

Commissioners; Montana Department of Agriculture; Montana State University Extension Office; Avista Utilities; Montana Fish, Wildlife and Parks; Sanders County Weed District; Noxon-Cabinet Shoreline Coalition; Green Mountain Conservation District; Tri-State Water Quality Council; Weed Management Services; U. S. Forest Service; Confederated Salish & Kootenai Tribes and PPL Montana.

In addition to being actively engaged in the Phase I and Phase 2 assessment and development of aquatic plant control techniques, the Task Force is implementing a bottom-barrier program on the reservoirs and a public outreach campaign to increase awareness and help prevent the spread of EWM and CLP. To complement the proposed ARRA effort to study large contiguous blocks of EWM and CLP on Noxon Reservoir, the cooperators will be applying to the State of Montana for financial support to carry out herbicide studies in strips (bands) of aquatic vegetation infested with EWM and CLP along the shoreline of the reservoir in summer 2010. The Task Force has also requested funding from the state to implement an extensive public outreach effort in 2010.

2. Key Personnel, Principal Investigators

Principal Investigator:
Dr. John Madsen, Associate Professor, Mississippi State University
(662) 325-2428

Ryan Wersal, Research Associate II, Mississippi State University
(662) 325-4595

Thomas McNabb, President, Clean Lakes, Inc.
P.O. Box 3548, Coeur d'Alene, Idaho 83816
(925) 766-8862

Thomas Moorehouse, Vice President, Clean Lakes, Inc.
P.O. Box 3548, Coeur d'Alene, Idaho 83816
(818) 201-5982

For brief biographical, experience, and recent publications please see the abbreviated curriculum vitas included with this proposal.

3. Other Agencies

The proposed project is one facet of a larger program to address and manage EWM and CLP in the Clark Fork/Pend Oreille River system. Future program components are likely to include strip treatments in the river, expanded outreach, expanded bottom barrier applications and multiple check stations. Most recently, Sanders County and the EWM Task Force have applied to the Montana Noxious Weed Trust Fund for $75,000 for treatments, $10,000 for bottom barriers and $14,000 for public outreach; the Montana Dept of Natural Resources and Conservation (DNRC) for $50,000 for studying impacts and environmental alternatives; Avista Utilities for $15,000 for strip treatments, $7,000 for bottom barriers, $5,000 for outreach, and $7,500 for check stations; Montana Dept of Agriculture for $7,500 for a check station; and Idaho Dept of Agriculture for

$15,000 for a check station. All proposals are currently pending except for the $50,000 from DNRC which has been received. We plan to submit a proposal to DNRC in spring 2010 for $300,000 for future EWM and CLP management.

4. Offeror's Statement, ARRA Requirements

The Sanders County Board of Commissioners understands that there are contracting, reporting and other requirements applicable to projects funded under the Recovery Act and will agree to such requirements should our project be selected for funding.

5. Past Performance

Thomas Woolf, Aquatic Plant Program Manager
Idaho State Department of Agriculture
(208) 332-8564
Dr. John Madsen and his research team worked closely with Mr. Woolf in the design and implementation of point intercept surveys on Lake Pend Oreille in 2007 and 2008.

Benny French, General Manager
Pearl River Valley Water Supply District
115 Madison Landing Circle, Ridgeland, MS 39157
(601) 605-6898
Contract Initiation Date: 03/01/2009
Award Amount: $42,535.00
Dr. John Madsen and his research team has been quantifying the changes in plant community structure and evaluating aquatic plant response to management techniques in the Ross Barnett Reservoir (33,000 acre reservoir) since 2005. The research completed over past 5 years has been used to develop a comprehensive management plan for the reservoir particularly in managing waterhyacinth, alligatorweed, and hydrilla.

Carlton Layne, Executive Director
Aquatic Ecosystem Research Foundation
3272 Sherman Ridge Dr.Marietta, GA 30064
clayne@aquatics.org
678-773-1364
Contract Initiation Date: 05/01/2007
Amount: $64,443.44
Dr. John Madsen and his research team performed point intercept surveys on Lake Pend Oreille (94,000 acre lake) to assess the effectiveness of herbicide applications and assess herbicide effects on the native plant community for the Idaho State Department Agriculture's aquatic plant management program. The project was awarded to John Madsen again in 2008.

Dr. Elton Brown, Board Member
Lake Gaston Weed Board
eyessh@meckcom.net
Contract Initiation Date: 11/6/2006

This was a general memorandum of agreement between the Lake Gaston Weed Control Board and Mississippi State University with a varying dollar amount. Dr. John Madsen conducted point intercept surveys in 21 sites of Lake Gaston (23,000 acre reservoir in North Carolina/Virginia) to assess the effectiveness of fluridone applications made the previous year. This was an ongoing project from 2004-2006.

II. COST INFORMATION

A. Project Budget Summary Table

Fixed Price Contract **- Direct Costs**	**Total Cost**
Mississippi State University (MSU)-Tasks 1, 2, 3	$76,715.50
Clean Lakes, Inc (CLI) -Tasks 1, 2	$94,847.97
University of Florida (UF)-Task 2	$6,000
- Indirect Costs	0
TOTAL BUDGET	**$177,563.47**

B. Project Budget by Task

Category	**Task 1 Exchange studies**	**Task 2 Herbicide applications**	**Task 3 Treatment Evaluation**	**Total Cost**
1. LABOR				
MSU, Madsen	5,583.33	5,583.33	5,583.33	$16,750
MSU, Wersal	2,069.44	2,069.43	2,069.44	$6,208.33
MSU, PhD grad student	853.33	853.33	853.33	2,560.00
CLI, McNabb/Moorhouse	7,040	7,040		14,080.00
TOTAL LABOR				**39,598.33**
2. FRINGE				
MSU	2322.05	2322.05	2322.05	6,966.17
TOTAL FRINGE				**6,966.17**
3. EQUIPMENT				
MSU, Flurometer	6,363.33	6,363.33	6,363.33	19,090.00
MSU, Trimble Yuma GPS	1,231.66	1,231.66	1,231.66	3,695.00
TOTAL EQUIPMENT				**22,785.00**
4. MATERIALS & SUPPLIES				
MSU, Field supplies	666.66	666.66	666.66	2,000.00
CLI, Rhodamine WT dye for 2 sites	1,454			1,454.00
CLI, Triclopyr and Endothall for 2 sites		65,567.77		65,567.77
TOTAL MATERIALS & SUPPLIES				**69,021.77**
5. TRAVEL				
MSU	5,482	5,482	5,482	16,446.00
CLI	1,172.75	1,172.75		2,345.50
TOTAL TRAVEL				**13,991.50**
6. OTHER DIRECT COSTS				

MSU, Boat operating costs	666.66	666.66	666.66	2,000.00
MSU, Miscellaneous contractual	333.33	333.33	333.33	1,000.00
CLI, Boat and application equipment costs	5,700	5,700		11,400.00
UF, Laboratory, herbicide samples		6,000		6,000.00
TOTAL OTHER DIRECT COSTS				**20,400.00**
7. INDIRECT COSTS				0
PROJECT TOTAL				**$177,563.47**

C. Budget Narrative

1. LABOR:

MSU Labor Cost = $25,518.33

- John Madsen, Project Leader,2 months at $105,000 per year. John will be spending approximately 2 weeks preparing the project, 8 weeks in the field, and six weeks analyzing the data and writing a report
- Ryan Wersal, Field Leader, 2 months at $37,250 per year. Ryan will be spending approximately 2 weeks preparing the project, 8 weeks in the field, and six weeks analyzing the data, entering the data into a GIS format, and writing a report
- PhD Graduate student will be spending four weeks in the field and approximately four weeks assisting with materials sent back from Idaho. Cost is set at $18,000 per year

CLI Labor Cost= $14,080

- Project Management (McNabb/Moorhouse): 32 hours @ $110.00 budgeted for preparations; permits (DEQ, MDA) Pesticide Applications Plan Development and submittal to MDA, planning meetings, coordinating product and equipment deliveries, other program related preparation requirements, total line item cost $3,520.00.
- RWT Dye and Aquatic Herbicide Application Labor (McNabb/Moorhouse): Projected six (6) days (96 hours @ $110.00) on site for RWT water exchange evaluation and follow-up aquatic herbicide applications, pre-project on site planning, post treatment meetings, total line item cost $10,560.00.

2. FRINGE:

MSU Fringe = $6,966.17

- Fringe benefits are calculated as 30.22% of full-time employee salary (Madsen and Wersal) and 1.1% of graduate student pay. Tuition costs for graduate students are $4510 per year, prorated at 1 month for each student is $375.83

3. EQUIPMENT:

MSU Equipment Costs = $22,785

- Permanent equipment being purchased will be used on the project. We already have all other necessary equipment (not listed here) to perform the tasks.Turner Designs Fluorometer - to conduct water exchange studies utilizing rhodamine dye, $19,090. Trimble Yuma portable

GPS tablet PC - mapping invasive plant species, survey assessment, and setting up treatment plots, $3,695.

4. MATERIALS AND SUPPLIES:

MSU Materials and Supplies = $2,000

- Calculated as $100 per working (e.g., field) day.

CLI Materials and Supplies = $67,021.77

- Rhodamine WT dye: Cost is $230.00 per gallon including freight to the project site, handling, container disposal and applicable taxes. Total cost, $1,454.
- Herbicides: $65,567.77 Triclopyr (Renovate 3) to be used at 2 sites: Cost is $65.00 per gallon including freight to the project site, handling, container disposal and applicable taxes. Total cost, $45,241.76. Endothall (Aquathol K) to be used at 1 site: Cost is $72.45 per gallon including freight to the project site, handling, container disposal and applicable taxes. Total cost, $20,326.01.

5. TRAVEL:

MSU Travel: $16,446.00

- Pretreatment assessment. 2 people for a total of $186 meals during drive to and from, $930 meals during work in MT; $480 lodging during drive to and from, $2,400 during work in MT; $60 miscellaneous expenses during drive to and from, $300 during work in MT. Total = $5,082.
- Four week post-treatment. 2 people for a total of $186 meals during drive to and from, $930 meals during work in MT; $480 lodging during drive to and from, $800 during work in MT; $60 miscellaneous expenses during drive to and from, $100 during work in MT. Total = $3,282
- One year post-treatment. 2 people for a total of $186 meals during drive to and from, $930 meals during work in MT; $480 lodging during drive to and from, $800 during work in MT; $60 miscellaneous expenses during drive to and from, $100 during work in MT. Total = $3,282

- Truck Operating Costs - calculated as $.32/mile, and mileage between Starkville, MS and Thompson Falls, MT at 2000 miles each way, 3 trips; and 1000 miles, 3 trips (100 per working day) during sampling, for a total of 15,000 miles @.32/mile. Total cost = $4,800

CLI Travel and Per Diem Costs: $2,345.50

- Project Management: One trip from CDA, ID to Trout Creek for pre-treatment planning and preparations (250 miles RT @ $0.55 per mile, 4 hotel room nights (2 staff x 2 nights) at standard Per Diem rate of $142.00, total cost of $705.50.
- RWT Dye and Aquatic Herbicide Application: 1.6 trips from CDA, ID to Trout Creek for pre-treatment planning and preparations (400 miles @ $0.55 per mile, 10 hotel room nights (5 nights 2 staff) at standard Per Diem rate of $142.00, total cost $1,640.00.

6. OTHER DIRECT COSTS:

MSU Boat Operating Costs - calculated as $100 per field day (including gas, oil, parts, and repairs). Total = $2,000

MSU Miscellaneous Contractual - includes items such as Fed Ex, postage, and fees. Total = $1,000

CLI Boats and Equipment: Boats, meters, application equipment, 5 days for RWT and aquatic herbicide applications @ $2,280.00 per day; total cost, $11,400.00

UF Laboratory: Herbicide residue determination; total cost, $6,000.

7. INDIRECT COSTS

Facilities and Administration, or Indirect Costs. MSU has a federally-negotiated rate of 43% of Direct Costs, not including equipment and tuition. If the granting agency has a written statement allowing a different (lesser) rate, or a policy of allowing no indirect costs, the university will honor that policy. Sanders County has provided a written statement that it does not allow indirect costs.

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Biographical Sketches

JOHN D. MADSEN

EDUCATION

Ph.D.	Botany	University of Wisconsin-Madison	1986
M.S.	Botany	University of Wisconsin-Madison	1982
B.S.	Biology	Wheaton College, Wheaton, IL	1980

PROFESSIONAL EXPERIENCE

2003-present: Assistant Professor, Research and Extension, GeoResources Institute and Department of Plant and Soil Sciences, and Mississippi State University Extension Service, Mississippi State University, Mississippi State, MS. (Promotion to Associate Professor effective July 2009).

2000-2003: Assistant Professor, Department of Biological Sciences, Minnesota State University, Mankato.

1996-2000: Research Biologist, US Army Engineer Waterways Experiment Station, Vicksburg, MS; Team Leader, Aquatic Plant Ecology.

1991-1996: Research Biologist, US Army Engineer Waterways Experiment Station, Lewisville Aquatic Ecosystem Research Facility, Lewisville, TX.

1990-1991: Senior Scientist, AScI Corporation; on contract to US Army Engineer Waterways Experiment Station, Lewisville Aquatic Ecosystem Research Facility, Lewisville, TX.

1987-1990: Research Scientist, Rensselaer Fresh Water Institute, Rensselaer Polytechnic Institute, Troy, NY.

HONORS AND PROFESSIONAL ACTIVITIES

Centers and Institutes Faculty Research Award Recipient, Mississippi State University, Office of Research, 2008.

Board Member, Council on Agricultural Science and Technology, representative from Aquatic Plant Management Society, 2008-2012

Associate Editor, ***Invasive Plant Science and Management,*** 2007-

President, Mid-South Aquatic Plant Management Society, 2008-2009.

President-Elect, MidSouth Aquatic Plant Management Society, 2007-2008.

Editor, ***Journal of Aquatic Plant Management***, 1998-2002.

Associate Editor, ***Wetlands***, 1997-2000

Associate Editor, ***Journal of Aquatic Plant Management***, 1996-1998

Certified Senior Ecologist, Ecological Society of America, 1995

Board of Directors, MidSouth Aquatic Plant Management Society, 2005-2007

Board of Directors, Aquatic Plant Management Society, 1998-2002.

Board of Directors, Texas River and Reservoir Management Society, 1994-1996.

Board of Directors, Texas Aquatic Plant Management Society, 1993-1994.

Editorial Board, ***Journal of Freshwater Ecology***, 1990-1993.

KEY RECENT PUBLICATIONS

Wersal, R.M. and J.D. Madsen. 2009. Combinations of diquat and a methylated seed oil surfactant for control of common duckweed and watermeal. ***Journal of Aquatic Plant Management*** 47:59-62.

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Madsen, J.D. and R.M. Wersal. 2008. Growth regulation of *Salvinia molesta* D.S. Mitchell by pH and available water column nutrients. ***Journal of Freshwater Ecology***, 23:305-313.

Madsen, J.D., R.M. Stewart, K.D. Getsinger, R.L. Johnson, and R.M. Wersal. 2008. Aquatic plant communities in Waneta Lake and Lamoka Lake, New York. ***Northeastern Naturalist***, 15:97-110.

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Wersal, R.M. and J.D. Madsen. 2007. Comparison of imaapyr and imazamox for control of parrotfeather (*Myriophyllum aquaticum* (Vell.) Verdc.). ***Journal of Aquatic Plant Management*** 45:132-136.

Gray, C. J., J. D. Madsen, R. M. Wersal, K. D. Getsinger. 2007. Eurasian Watermilfoil and Parrotfeather Control Using Carfentrazone-ethyl. ***Journal of Aquatic Plant Management***. 45:43-46.

Madsen, J. D., R. M. Wersal, T. E. Woolf. 2007. A New Core Sampler for Estimating Biomass of Submersed Aquatic Macrophytes. ***Journal of Aquatic Plant Management***. 45:31-34.

Wersal, R. M., B. R. McMillan, J. D. Madsen. 2007. Food habits of dabbling ducks during the fall migration in a prairie pothole system, Heron Lake, Minnesota. ***Canadian Field-Naturalist***. 119:546-550.

Madsen, J.D., R.M. Wersal, M. Tyler, and P.D. Gerard. 2006. The distribution and abundance of aquatic macrophytes in Swan and Middle Lakes, Micollete County, Minnesota. ***Journal of Freshwater Ecology,*** 21:421-429.

Wersal, R.M., J.D. Madsen, and B.R. McMillan. 2006. Environmental factors affecting biomass and distribution of *Stuckenia pectinata* in the Heron Lake System, Jackson County, Minnesota. ***Wetlands***, 26:313-321.

Madsen, J.D. 2005. Eurasian watermilfoil invasions and management across the United States. ***Currents: The Journal of Marine Education***, 21(2):21-26.

Poovey, A.G., K.D., Getsinger, J.G. Skogerboe, T.J. Koschnik, J.D. Madsen and R.M. Stewart. 2004. Small-plot, low-dose treatments of triclopyr for selective control of Eurasian watermilfoil. ***Lake and Reservoir Management***, 20:322-332.

Case, M.L. and J.D. Madsen. 2004. Point intercept surveys of aquatic macrophytes, tubers and sediment in Heron Lake, Minnesota: Identifying factors limiting the growth of *Stukenia pectinata* (L.) Borner (Sago Pondweed). ***Journal of Freshwater Ecology***, 19:17-23.

RYAN M. WERSAL

EDUCATION

M.S.	Biology	Minnesota State University	2004
B.S.	Biology	Minnesota State University	2002
B.S.	Recreation Parks & Leisure Services: Resource Management	Minnesota State University	2002

PROFESSIONAL EXPERIENCE

2007-present: Research Associate II, Geosystems Research Institute, Mississippi State University, Mississippi State, MS

2004-2007: Research Associate I, Geosystems Research Institute, Mississippi State University, Mississippi State, MS.

2005-present Ph.D.-level graduate student, Department of Plant and Soil Science (Weed Science), Mississippi State University

HONORS AND PROFESSIONAL ACTIVITIES

Research Associate of the Year, GeoResources Institute, Mississippi State University. 2008.
Selected to Gamma Sigma Delta, the Honor Society of Agriculture. 2009.
Selected to the Phi Kappa Phi National Honor Society. 2007.
Chair of the Website Committee, Midsouth Aquatic Plant Management Society. 2008–present.
Mississippi Weed Science Committee, Aquatic Plant Control Committee. 2007–present.
Newsletter Editor for the Midsouth Aquatic Plant Management Society. 2007-present.
Chair of the Editorial Committee, Midsouth Aquatic Plant Management Society. 2007-present.
Board of Directors, Midsouth Aquatic Plant Management Society. 2007- present.
Served on the Student Affairs Committee for the Aquatic Plant Management Society. 2007-2009.
Served on the Publication Committee for the Aquatic Plant Management Society. 2006-present.
Student Representative, Aquatic Plant Management Society. 2006-007.
Board of Directors, Aquatic Plant Management Society 2006-2007.
Student Representative, Southern Weed Science Society. 2005- 2006.
Midsouth Aquatic Plant Management Society, Research Scholarship. 2006.
Midwest Aquatic Plant Management Society, Research Scholarship. 2006.
Robert J. Lick Scholarship, Minnesota Waterfowl Association. 2002.
Minnesota Health Care Engineering Association Scholarship. 1999.
President's Achievement Scholarship, Minnesota State University, Mankato. 1997.
Thorp Credit and Thrift Scholarship, Minneapolis Foundation. 1997.

KEY RECENT PUBLICATIONS

Wersal, R.M., J.D. Madsen, T.E. Woolf, and N. Eckberg. 2010. Assessment of herbicide efficacy on Eurasian watermilfoil and impacts to the native submersed plant community in Hayden Lake, ID, USA. Journal of Aquatic Plant Management. *In Press*.

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Madsen, J.D. and R.M. Wersal. 2008. Growth regulation of *Salvinia molesta* Mitchell by pH and available water column nutrients. Journal of Freshwater Ecology. 23:305-313.

Madsen, J.D., R.M. Stewart, K.D. Getsinger, R.L. Johnson, and R.M. Wersal. 2008. Aquatic plant communities in Waneta Lake and Lamoka Lake, New York. *Northeastern Naturalist* 15:97-110.

Wersal, R.M. and J.D. Madsen. 2007. Comparison of imazapyr and imazamox for control of parrotfeather (*Myriophyllum aquaticum* (Vellozo) Verdecourt). Journal of Aquatic Plant Management 45:132-135.

Madsen, J.D., R.M. Wersal, and T.E. Woolf. 2007. A new core sampler for estimating biomass of submersed aquatic macrophytes. Journal of Aquatic Plant Management 45:31-34.

Gray, C.J., J.D. Madsen, R.M. Wersal, and K.D. Getsinger. 2007. Eurasian watermilfoil and parrotfeather control using carfentrazone-ethyl. Journal of Aquatic Plant Management 45:43-46.

Wersal, R.M., J.D. Madsen, B.R. McMillan, and P.D. Gerard. 2006. Environmental factors affecting the biomass and distribution of *Stuckenia pectinata* in the Heron Lake System, Minnesota, USA. Wetlands 26:313-321.

Madsen, J.D., R.M. Wersal, M. Tyler, and P.D. Gerard. 2006. The distribution and abundance of aquatic macrophytes in Swan Lake and Middle Lake, Minnesota. Journal of Freshwater Ecology 21:421-429.

Wersal, R.M., B.R. McMillan, and J.D. Madsen. 2005. Food habits of dabbling ducks during fall migration in a prairie pothole system, Heron Lake, Minnesota. Canadian Field Naturalist 119:546-550.

THOMAS J. MCNABB

President Clean Lakes Inc., Aquatic Pest Control Advisor (Clean Lakes Inc.): has been involved in the development and implementation of aquatic vegetation management programs in thirteen countries (13) since 1974. Mr. McNabb served as Program Director under a Cooperative Agreement with the United States Agency for International Development's (USAID) Regional Lake Victoria Water Hyacinth Control Program, East Africa (1996-2002) that encompassed various objectives that included the development of a Cooperative Research and Development Agreement (CRADA) with the United States Department of Interior, U.S. Geological Survey for the Monitoring of East African Aquatic Ecosystems. McNabb holds a Washington State, Montana and Idaho Professional Applicators License in the Aquatics Category, as well as a State of California, Pest Control Advisors License, and Qualified Applicators License No. in Aquatics, Regulatory, Demonstration and Research, and Right of Way Categories. He attended Michigan State University, Fisheries and Wildlife Department prior to receiving a B.A. in Management from Saint Mary's College, Moraga, California (1988).
Mr. McNabb would be assigned as Clean Lake Inc.'s Program Director and Technical Advisor for work performed under this proposal.

THOMAS G. MOOREHOUSE

Vice President, Technical Advisor (Clean Lakes Inc.): Mr. Moorhouse has 18 years of development and private sector experience including program management, technical coordination, monitoring and evaluation, project development, natural resource management, grant management, and account management. Moorhouse served as CLEAN LAKES INC.'s Program Manager for the Bonner County's 2007 & 2008 Eurasian Watermilfoil Control Program, and for Clean Lakes Inc.'s USAID Regional Lake Victoria Water Hyacinth Control Program, East Africa (1996-2002) and implemented the objectives McNabb outlined above. Mr. Moorhouse managed the USAID Cooperative Agreement's $2.3 million dollar program budget as well as coordinated all program activities. His efforts led to an 80% reduction of the exotic and invasive aquatic plant water hyacinth in Lake Victoria, East Africa. Moorhouse holds a Washington State, Montana and Idaho Professional Applicators License in the Aquatics Category, as well as a State of California, Pest Control Advisors License and a Qualified Applicators License in the Aquatics and Right of Way Categories. He received a B.Sc. from Virginia Polytechnic Institute and State University, Blacksburg, VA, Forestry and Wildlife Management (1986).

The proposed 2010 trials are a continuation of the dye/herbicide research initiated in July, 2009. The principal difference is location within the Noxon-Rapids reservoir system. The main location variable is water exchange as the upper portions are narrower, with subsequent increased flow rates. In aquatic systems water exchange is a critical factor determining the most effective and environmentally benign "rate" of application, described in ppm.

The Eurasian Watermilfoil task force will again partner with the Mississippi State University (Dr. John Madsen) and US Army Corp of Engineers (Dr. Kurt Getsinger). This work will add to the body of knowledge gained by these researchers, as well as provide critical onsite information for effective control..

Research anticipates conducting a dye and herbicide research trial on Eurasian watermilfoil and curlyleaf pondweed on up to 200 acres in Noxon Rapids reservoir. The following describes the project in more detail:

a. The US Army Engineer Chemical Control and Physiological Processes Team will oversee and conduct dye studies to determine water flow characteristics prior to herbicide application. Research cooperators will include Dr. John Madsen, Mississippi State Univ., Dr. Kurt Getsinger and US Army Corp of Engineers.

b. Sites selected for the dye and herbicide study are located at (describe location including township, section and range info)(GPS & common name locations from Avista Utilities by Monday in Noxon Rapids reservoir.

c. Water-exchange will be measured using the inert tracer dye, rhodamine WT (RWT), approved for use by USEPA in surface waters, using fluorometric instrumentation devises. Dye applications will be conducted using a multi-depth water injection system (LitLine®, Clean Lakes Inc.), simulating an operational aquatic herbicide application calibrated for maximum delivery to targeted submersed plant stands. This will provide estimate of herbicide contact time, and can be matched with herbicide concentration/exposure time (CET) relationships in order to select the herbicide application rates most likely to provide control.

d. A herbicide combination of systemic auxin triclopyr with endothall to control both Eurasian milfoil and curlyleaf pondweed will be used, since these two non-native invasive aquatic plants occur as mixed stands in the reservoirs. Herbicide application rates will be selected based on results of water-exchange evaluations, with treatment to occur within 24-48 hrs of water-exchange evaluations. Herbicide applications will be conducted using a multi-depth water injection system (LitLine®, Clean Lakes Inc.). Water samples will be collected and analyzed for herbicide residues to determine actual CET values in the plots (and link with efficacy), and to monitor dissipation of herbicides within, and downstream of, the plots.

e. Assess changes in plant communities at pretreatment (2010), 6 week post treatment (2010), and 52 week post-treatment (2011) using quantitative techniques developed by Madsen. A data report summarizing all aspects of the 2010 work will be developed by February 2011.

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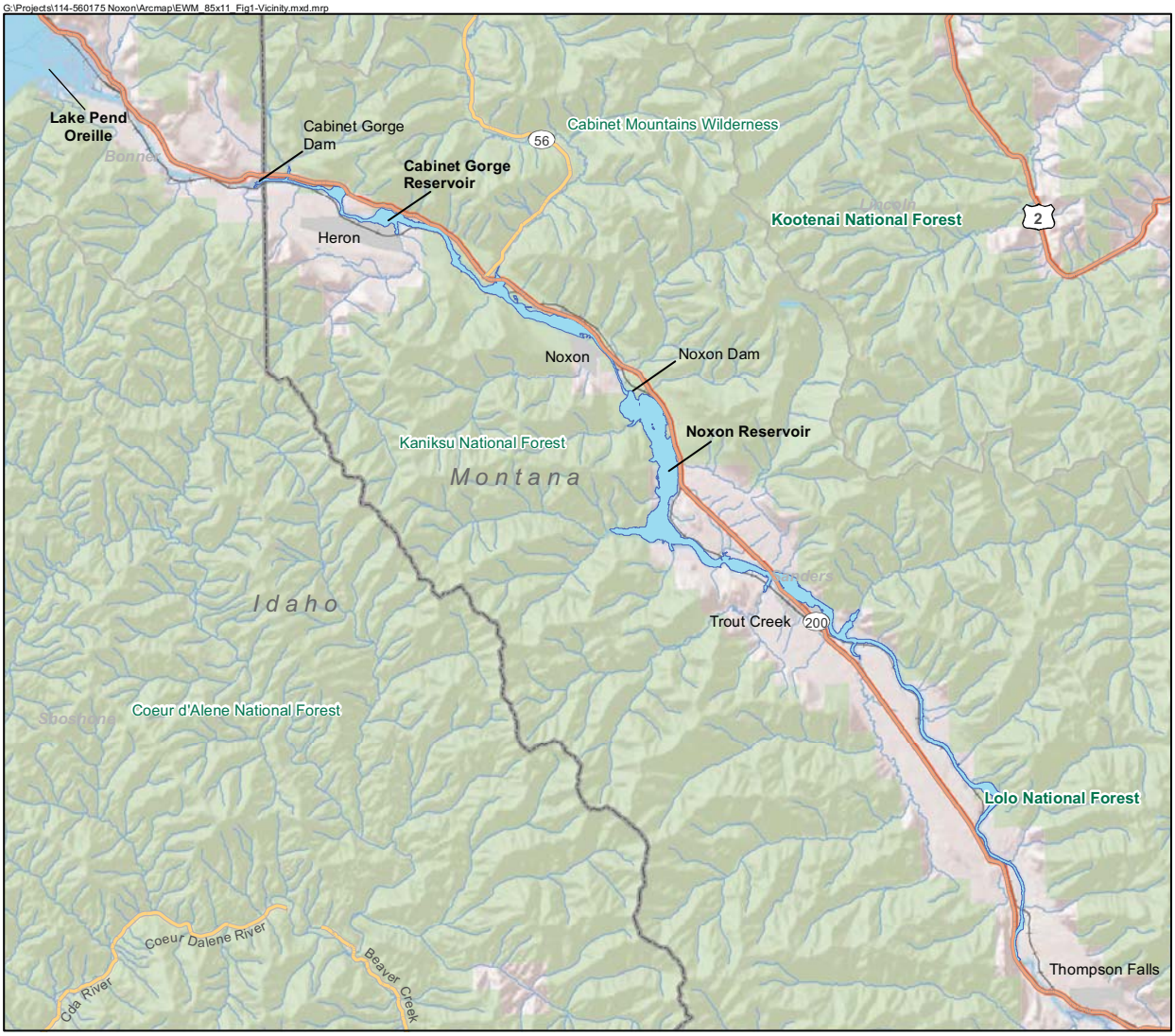

Legend

- Highway
- Major Road
- Municipality
- Stream / River
- Forest Service Land
- State Boundary

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May, 2010

Location Map
Eurasian Watermilfoil Study
Noxon and Cabinet Gorge Reservoirs Sanders County Montana

Figure 1