



American Water Works
Association

Dedicated to the World's Most Important Resource™



Source Water Assessment and Protection



Purpose

This lesson is important because it is your drinking water. This lesson will show how a proactive approach to protecting source water can protect public health and the environment.



Learning Objectives

As a result of this lesson, you will be able to:

1. Understand the purposes of a source water *assessment* program (SWAP) and a source water *protection* program (SWPP)
2. Learn how your source water assessment program was developed and what is needed to update a SWAP
3. Develop a basic plan for protecting drinking water sources
4. Create ways to inform and engage the public in source water protection
5. Find additional resources and guidance



Agenda

- Introduction
- What can a SWAP look like?
- Mapping a source water area
- Identify potential contaminants
- Source water protection plans
- Engaging and informing the public in source water protection
- New drinking water sources
- Additional guidance and resources
- Recap / Q&A



Source Water



Safe Drinking Water Act Amendments

- 1986 Wellhead Protection Programs (WHPP)
- 1996 Source Water Assessment Programs (SWAP)



Assessing Public Water Supplies

All states have EPA-approved state WHPPs and/or SWAPs for *every* public water system...except Wyoming Systems!

Examples:

- Major metropolitan areas
- Small towns
- Schools
- Campgrounds
- Restaurants
- Rest areas



Wyoming Status

- “Currently, WY DEQ is not approving protection plans, nor do I foresee that changing within the near future.”
 - Ms. Parker, email, 2/17/16



Wyoming Status

- **PLEASE...DO NOT CALL MS. PARKER, (307) 777-6128 and ASK FOR A SOURCE WATER ASSESSMENT REVIEW and/or ASSISTANCE!!!**



Wyoming Status

- WARWS does have a source water specialist, Miles Edwards, that can assist your PWS with a protection plan if you are interested.
- Source Water Assessment Plan outlines how assessments were done in 2003, Wellhead Protection Plan explains how to build a protection plan.



Wyoming Status - Review

- About 55% of Wyoming PWSs participated in the assessments in 2003, but water supplies or PWSs that have been developed since then have not been assessed.
- Tri-Hydro



Reported to EPA - 2011

Community PWS Name	Water Source Type	Year Completed	Population	Implementation Notes
Baggs	SW	2011	490	ordinance, delineations filed w/BLM
Dubois	SW	2011	1,067	ordinance
Elk Mountain Sole Source Aquifer	GW	1998	200	Sole Source Aquifer Protection plan filed with EPA R8
High Meadow Ranch	GW	2011	475	community implemented plan
Laramie (Casper Aquifer Protection Area)	GW	2006	28,000	State approved plan, ordinances, community implemented plan
Rolling Hills	GW	2011	450	ordinance
Sheridan	SW	2013	15,500	Source Water Collaborative Pilot Project and Big Goose Watershed Control Program
Shoshoni	GW	2010	649	ordinance
Star Valley Ranch	GW	2013	2,000	ordinance
Star Valley Trailer Court	GW	2011	95	community implemented plan
Ten Sleep	GW	2011	304	ordinance
Torrington	GW	1994	5,800	submitted for state review, ordinances, community implemented plan
Wamsutter	GW	2011	450	ordinance, delineations filed w/BLM
Worland	GW	2012	6,200	ordinance
			61,680	



What's the Problem?

- These assessments were completed under very tight timeframes using readily available data.
- Circumstances may have changed.



Review is Essential

It is important that each water system review state-supplied assessment for their public water system to determine if there are any changes.



Knowledge Checkpoint

Do all public water supplies have a source water assessment on file?



What Can Happen

An outbreak of 98 cases of hepatitis A was reported in Polk County, Arkansas, in 1971. The outbreak was traced to commercial pellet ice made from well water at a general store. Both the ice and the well water showed heavy coliform contamination.

Dye studies revealed that the sedimentary rock strata in the area permitted lateral drainage of septic tank effluent from a nearby home occupied by residents who had infectious hepatitis.



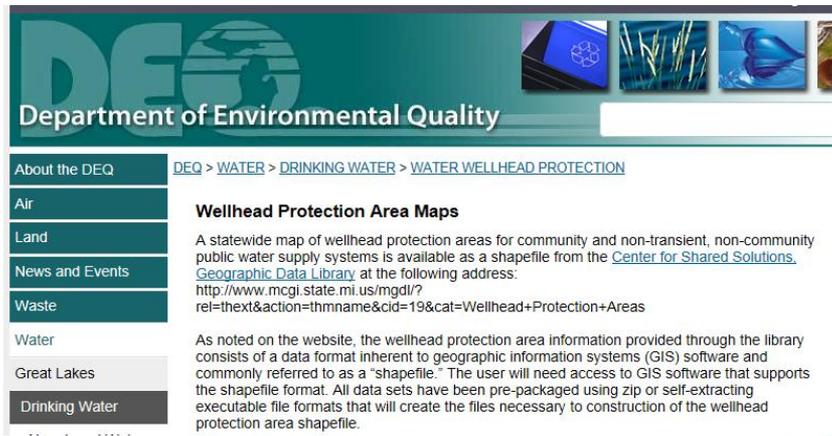
Cost/Benefit of Source Water Protection

- Contaminated source water threatens public health, clean water, and a healthy ecosystem
- The better the water quality when it reaches the treatment plant, the easier and cheaper it is to treat
- The cost of handling contaminated groundwater ranges from 30 to more than 200 times the cost of wellhead protection
- The cost of a new drinking water source can be prohibitive



Where to find your SWAP

- EPA has links to state contacts
- State websites
- Local water boards, health departments, or wetland commissions



DEQ
Department of Environmental Quality

About the DEQ | [DEQ > WATER > DRINKING WATER > WATER WELLHEAD PROTECTION](#)

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Land

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Waste

Water

Great Lakes

Drinking Water

Wellhead Protection Area Maps

A statewide map of wellhead protection areas for community and non-transient, non-community public water supply systems is available as a shapefile from the [Center for Shared Solutions, Geographic Data Library](#) at the following address:
<http://www.mcgi.state.mi.us/mgdl/?rel=thext&action=thmname&cid=19&cat=Wellhead+Protection+Areas>

As noted on the website, the wellhead protection area information provided through the library consists of a data format inherent to geographic information systems (GIS) software and commonly referred to as a "shapefile." The user will need access to GIS software that supports the shapefile format. All data sets have been pre-packaged using zip or self-extracting executable file formats that will create the files necessary to construction of the wellhead protection area shapefile.

Wisconsin's Source Water Assessment Program

Source water assessments are documents produced by DNR staff during the period between 1999 and 2003 intended to provide basic information to public water suppliers regarding:

- where their drinking water comes from
- the degree to which it may be impacted by potential sources of contamination.

» [Find an Assessment](#)

A full assessment includes the following:

1. A brief description of Wisconsin's Source Water Assessment Program
2. A map of the system's source water assessment area(s) and the potential contaminant sources within those area(s)
3. A susceptibility determination based on presence of potential contaminant sources and other factors such as well construction, intake location, and geology
4. Recommendations for source water protection

All States are required to complete source water assessments for both groundwater and surface water supplied systems as a result of the 1996 Amendments to the Safe Drinking Water Act.

» [Source Water Assessment Program plan](#)



- Drinking water
- Laws and rules
- Publications
- Water quality data
- Related links
 - Drinking water
 - Groundwater
 - Water use
 - Wells



Source Water Assessment Reports

1. Delineation of protection area
2. An inventory of potential sources of contamination; and
3. An evaluation of the likelihood of the water system being contaminated



Example of a Small System SWAP: Mobile Home Park

The study area for this example is located in Iowa County, Iowa. The majority of land use in the study area is agriculture, followed by residential and undeveloped areas. The study area is surrounded on the east, south and west by a creek. The creek is a tributary of English River, which lies to the west.

Sunnyside Mobile Home Park obtains its water from four groundwater well sources, two of which are in the mobile home park, the others on a local farm.

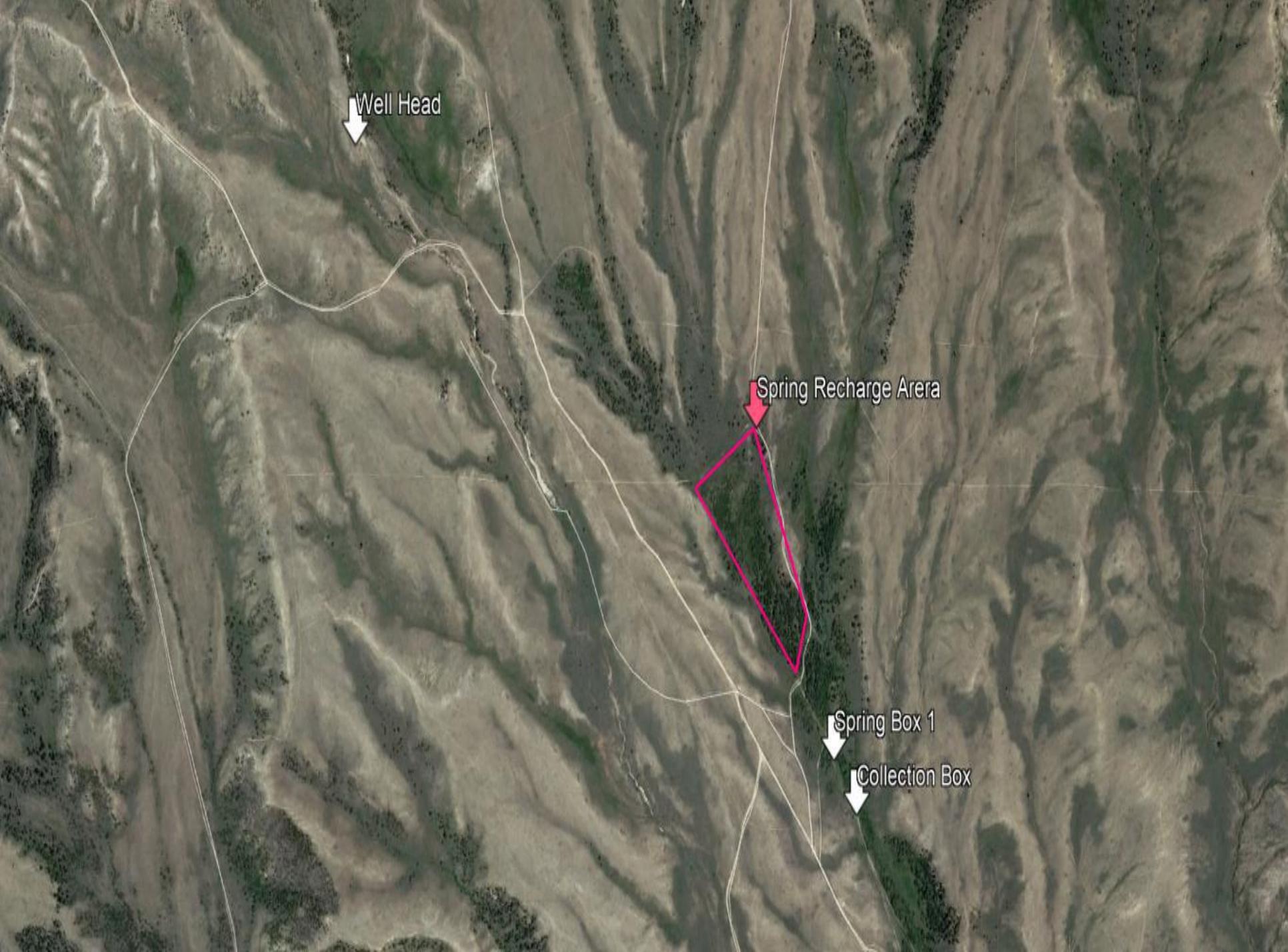


Well Head

Spring Recharge Arera

Spring Box 1

Collection Box

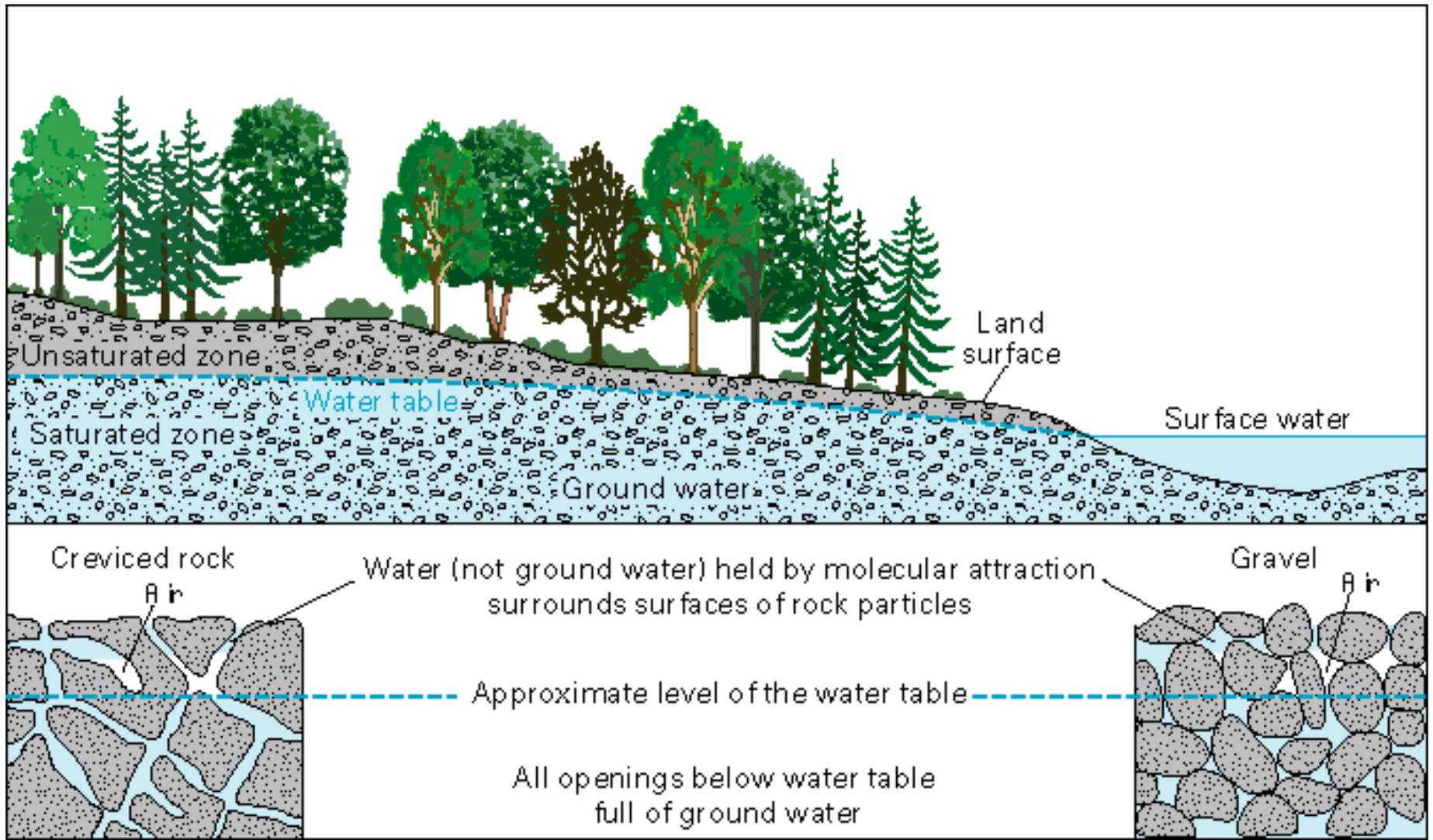


Know Your Drinking Water Sources

Public water systems may consist of

1. Surface water
2. Ground water
3. Groundwater under the direct influence of surface water





What Next?

Step 1: Verify assessment area

Step 2: Evaluate listed contaminants



Step 1: Verify Assessment Area

Preliminary delineation tools:

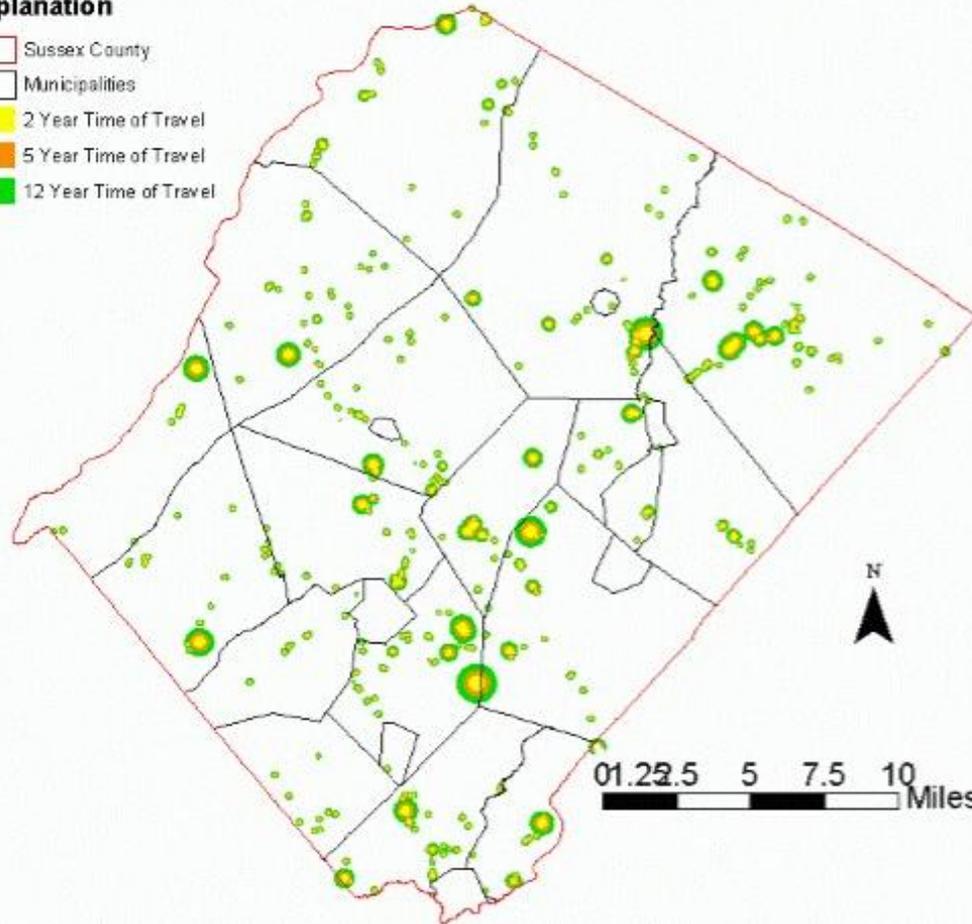
1. Distance
2. Drawdown
3. Flow boundaries
4. Geometric or graphical method
5. Time of travel (TOT)



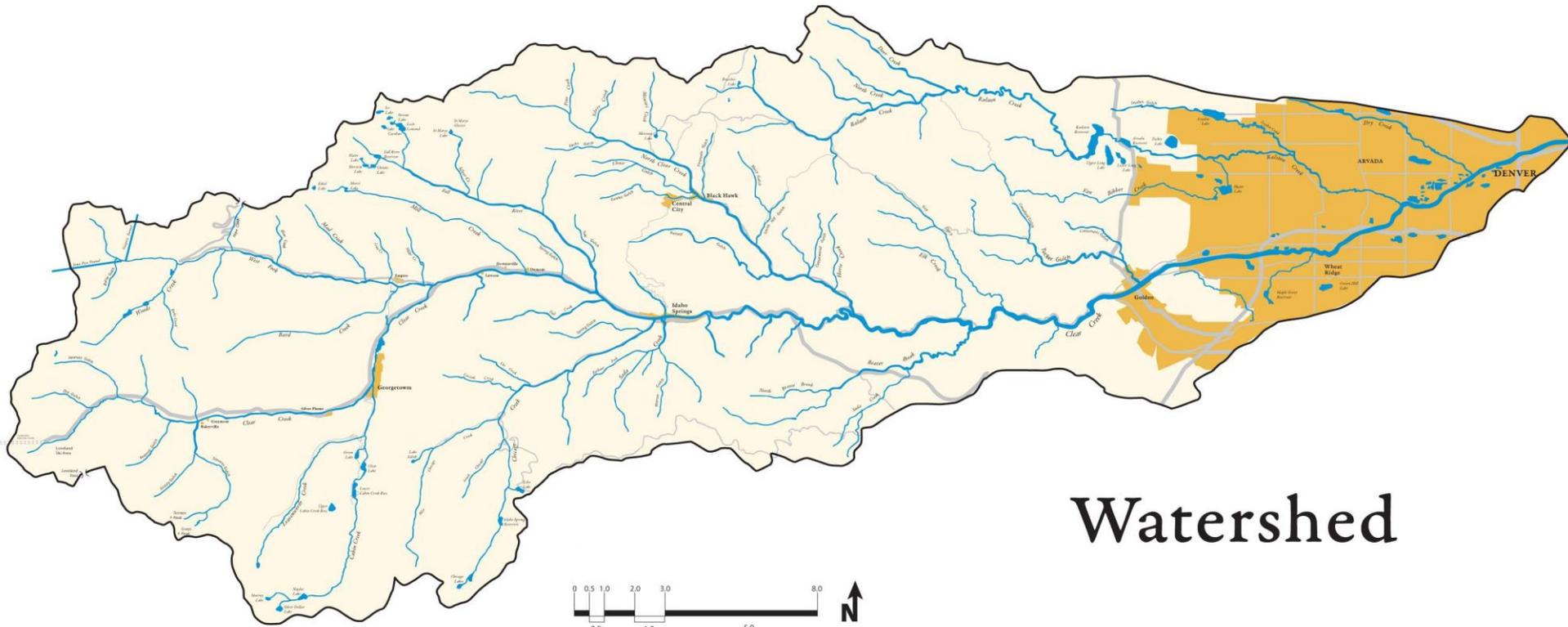
Groundwater Wells

Explanation

- Sussex County
- Municipalities
- 2 Year Time of Travel
- 5 Year Time of Travel
- 12 Year Time of Travel



Surface water



Watershed



Example of a Small Systems Proactive Measures: West Bonner Water District

West Bonner Water District, which serves about 2,200 customers in Idaho, launched source water protection efforts when a proposed development threatened 59 of the 540 acres of the watershed for the district's drinking water source. The development included 70 septic systems.



West Bonner Water District cont'd

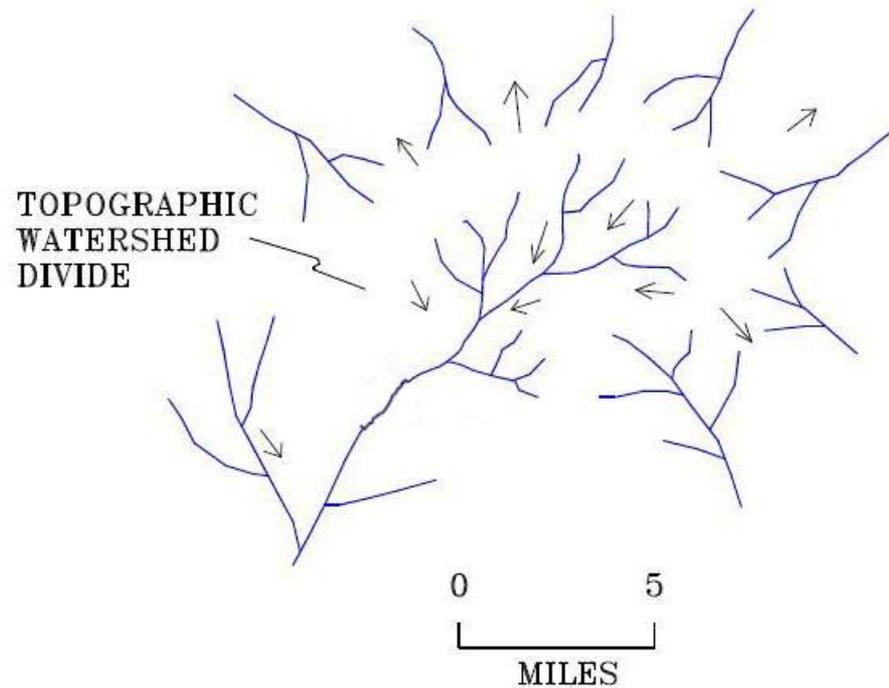
Using grant money obtained from the state, federal programs, and local sources, the district had a hydrogeologist map the spring recharge zone out to the appropriate boundaries.

An engineering consulting firm inventoried land uses inside the boundaries, and assessed associated risks to the drinking water source. The firm's final report outlined protection measures.

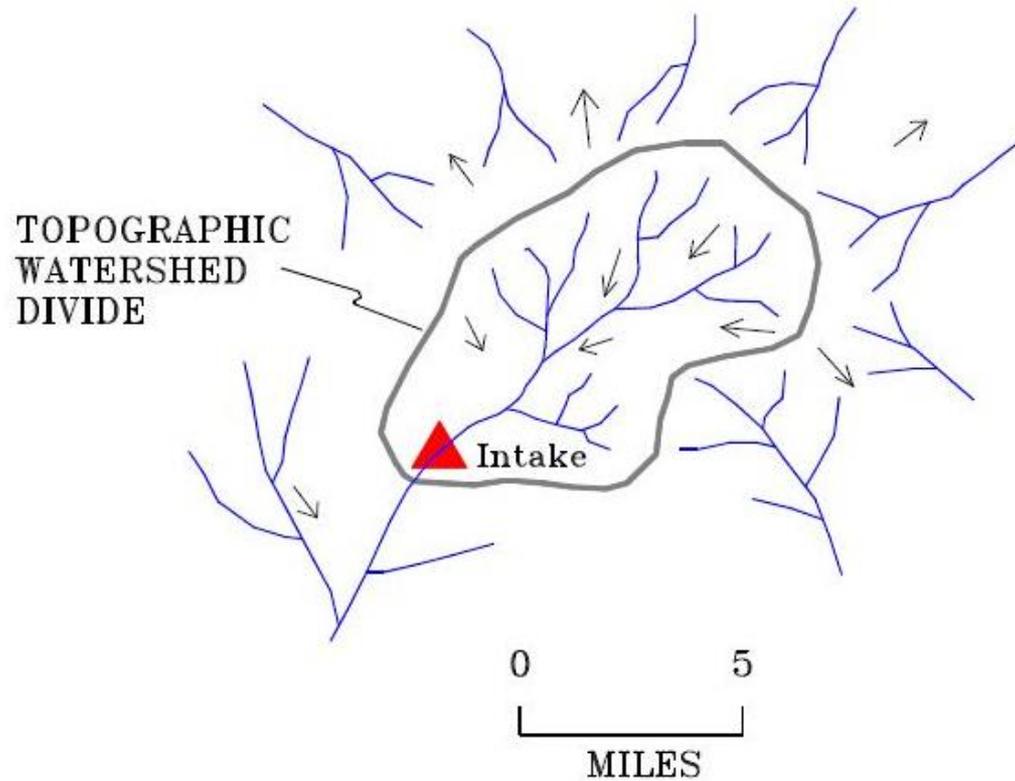


Activity – Identifying the source water assessment area

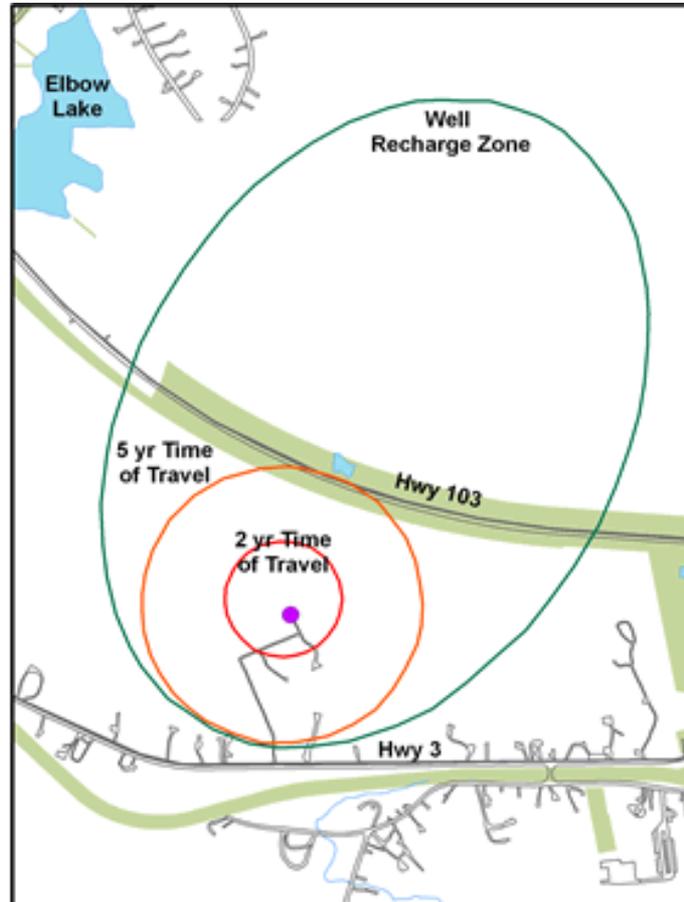
1. Determine the outlet for the watershed



2. Delineate the water that contributes to the outflow



Defining a Wellhead Protection Area



Case Study

In 2014 two water-supply systems on the Marine Corps Base Camp Lejeune in North Carolina were contaminated with the industrial solvents trichloroethylene (TCE) and perchloroethylene (PCE).

The contamination appears to have begun in the middle 1950s and continued until the 1980s, when contaminated supply wells were shut down.

The sources of contamination were an off-base dry-cleaning establishment and on-base industrial activities. The lawsuit continues.



Step 2: Evaluate Contaminants

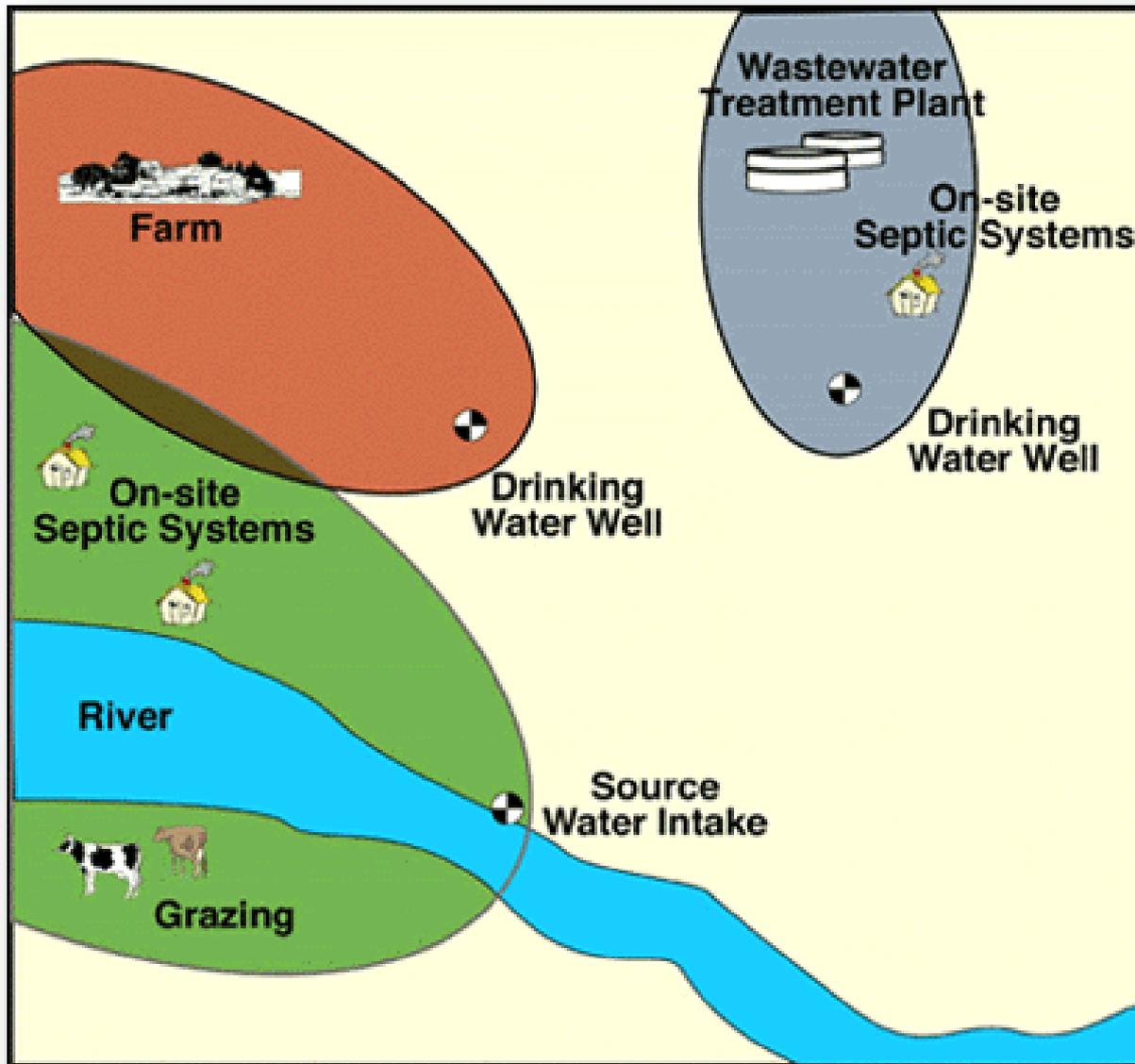
- Identify potential contaminant sources
- Document the efforts to reduce threat



Factors to Consider

- Contaminant plumes
- History of spills/releases
- Time of travel
- Hydrogeologic setting sensitivity
- Chemical toxicity and mobility
- Material handling practices
- State and provincial, federal, or local regulations





Activity

Taking Inventory



Inventory of Potential Contaminant Source	Contaminant of Concern
Agriculture activities	SOCs , VOCs, microbiological pathogens, nitrates/nitrites, disinfectants, turbidity, metals, pesticides
Residential or commercial septic systems	microbiological pathogens, nitrates/nitrites, disinfectants, turbidity, metals
Roads or paved surfaces	Salting activities
Golf course	Pesticides / Fertilizers
Underground fuel storage tanks	Petroleum hydrocarbons
Stormwater runoff	VOCs, nitrate/nitrites, turbidity, metals



Knowledge Checkpoint

Is it important for each water system to review the state-supplied (or not) assessment for their area? Why?



SWAP to SWPP

The purpose of a Source Water Assessment Program is to provide the framework for the long-term management and *protection* of public water supplies.



Source Water Protection Plan

The goal is to develop *protective strategies* for the potential contaminant sources identified in the community water system's protective area.



Protective Strategies

Examples include

- Local regulations or ordinances
- Public education
- Voluntary action



Protective Strategies

- Public participation and education
- Source control strategies
- Contingency/emergency planning
- Groundwater monitoring



Activity

Identifying protective strategies.



Inventory of Potential Contaminant Source	Contaminant of Concern	Distance from well	Priority/ Level of Threat Determine susceptibility (or Risk)	Protective Strategies	Timeline for Implementation	Who will implement?
Examples:				Examples:		
Agriculture activities	SOCs , VOCs, microbiological pathogens, nitrates/nitrites, disinfectants, turbidity, metals	100 ft	1	<p>Send out information on farming BMPs</p> <p>Ask county SWCD staff to meet with individuals farming in protection area to promote farming BMPs such as enrollment in Conservation Reserve Program, planting winter crops, avoid chemical storage, washing or spraying near wells etc.</p>	<p>Every March</p> <p>Every March</p>	
Residential or commercial septic systems	microbiological pathogens, nitrates/nitrites, disinfectants, turbidity, metals	700 ft	2	Regular septic tank inspections by order of a local ordinance and an educational program on septic tank maintenance		
Roads or paved surfaces	Salting activities	300 ft	1	<p>Install road signs on Route XX</p> <p>Update PWS Contingency plan</p> <p>Coordinate with emergency responders</p>	<p>Install by 2016</p> <p>By August and every 3 years</p> <p>By January</p>	<p>Mayor will contact XXX.</p> <p>PWS Operator</p>
Golf course	Pesticides / Fertilizers	1500 ft	2			
Underground fuel storage tanks	Petroleum hydrocarbons	1000 ft	4			
Stormwater runoff	VOCs, nitrate/nitrites, turbidity, metals		2			

Examples of Source Water Protection Projects

Award Recipient	Award Amount	Projection Description
City of Manning	\$8,132	Security fencing around Well #1 and #7; decommission Well #4 to protect aquifer from potential contamination.
East Lizard Butte	\$2,400	Decommission test well to protect aquifer from potential contamination.
Lewis Soil Conservation District	\$5,160	Educational brochures, workshops and displays to help homeowners and landowners with fertilization, chemical use, proper BMPs to prevent potential contamination of groundwater that supplies drinking water to City of Craigmont.
Bennington Water System Inc.	\$10,000	Develop and implement a 5-yr sustainable public outreach and education program for water system users and surrounding community and provide security fencing with locking gate around Spring #1.
Bonner Soil & Water Conservation	\$19,996	Regional Project: develop educational campaign on drinking water protection for the communities of Dover and Laclede. Includes door-to-door distribution of Guidebook, signage, radio ads, mailed brochures, articles and advertisements in local media, public presentations.



Public Education and Outreach

- Stakeholders
 - Interested citizens
 - Community groups
 - Government agencies
 - Local ownership



West Bonner Water District – The rest of the story

West Bonner used the scientific work completed and applied to Bonner County to impose stringent land use regulations in the spring recharge area. The community was not fully convinced and eventually the county commissioners defeated the proposal.

Three years later armed with more data and persistent local leaders, the Water District successfully reapplied.

“In the end, it all falls back on the community. It’s their water. They have to drink it. They have to pay attention.”

John Bokor, Technical Assistance Provider



A Good Communication Plan

- State goals
- Define audience
- Message content
- Implementation
- Materials
- Outcomes



Activity

Getting the Word Out

How would you get the word out to your constituents about source water protection?



Consumer Confidence Report

Beginning in 1999, community water suppliers* are required to provide an annual Consumer Confidence Report (CCR) to each customer.

*Only community water systems that serve the same people year-round provide CCRs.



Summary

To keep water clean, and provide safe drinking water we must all work together to protect our source water supplies.



Resources

LINKS TO U.S. EPA RESOURCES

[Protecting Sources of Drinking Water](#)

<http://www.epa.gov/sourcewaterprotection>

[Tribal Drinking Water Programs](#)

<http://www.epa.gov/tribaldrinkingwater>

[U.S. EPA Regional Office Contacts for Source Water Assessment and Protection](#)

<http://www.epa.gov/sourcewaterprotection/source-water-contacts>

[Private Wells](#)

<http://water.epa.gov/drink/info/well/index.cfm>

[Septic \(Onsite/Decentralized\) Systems](#)

<http://water.epa.gov/infrastructure/septic/index.cfm>

LINKS TO RELATED ORGANIZATIONS

[Rural Community Assistance Partnership \(RCAP\)](#)

<http://www.rcap.org/>



Resources

National Ground Water Association

<http://www.ngwa.org>

U.S. Department of the Interior: Geological Survey (USGS), Earth Science Information Center

<http://www.usgs.gov/>

Sourcewater Collaborative

<http://sourcewatercollaborative.org/>

Association of State Drinking Water Administrators (ASDWA) – Source Water Protection Toolkit

<http://asdwa.org/index.cfm?fuseaction=Page.viewPage&pageId=523&parentID=473&nodeID=1>

A Collection of 20 State Source Water Protection Plan Guides and Templates (ASDWA)

<http://www.asdwa.org/index.cfm?fuseaction=page.viewpage&pageid=839>

Water Research Foundation

<http://www.waterrf.org/Pages/Index.aspx>

USDA-NIFA National and Regional Water Quality Programs

<http://www.usawaterquality.org/>



Resources

National Environmental Services Center
<http://www.nesc.wvu.edu/subpages/septic.cfm>

AWWA

ANSI/AWWA G300 Source Water Protection
<http://www.awwa.org/store/productdetail.aspx?productid=39840706>

Operational Guide to AWWA Standard G300: Source Water Protection
<http://www.awwa.org/store/productdetail.aspx?productid=6605>

Source Water Protection Resource Community
<http://www.awwa.org/resources-tools/water-knowledge/source-water-protection.aspx>

THE GROUNDWATER ASSOCIATION

Groundwater Contamination <http://www.groundwater.org/get-informed/groundwater/contamination.html>

Groundwater Foundation Get Pumped! Septic Education Toolkit:
<http://www.groundwater.org/action/resources.html>



Thanks!!

Bud Spillman
Water Reflections
watref@msn.com
307.630.9508



PS

- Wyoming Water Development Commission (WWDC)
 - “...established in 1975 to promote the optimal development of the state's human, industrial, mineral, agricultural, water and recreational resources.”



WWDC Website

- WWDC Home Page
 - <http://wwdc.state.wyo.us/>



WWDC Website, Home (TOP)



Wyoming Water Development Commission

Harry C. LaBonde, Jr., PE, Director

6920 Yellowtail Rd

Cheyenne, WY 82002

Phone: 307-777-7626



Agency Information

- Mission Statement
- Directory
- Calendar
- Commission Agendas & Minutes
- Consultant Selection
- Items Open for Public Comment
- Newsletter
- Operating Criteria
- Project Application Information
- Send Us Your Comments

Planning Program

- Dam and Reservoir Planning
- Groundwater Grant Projects
- Instream Flow Filings
- Current Planning Projects
- River Basin Planning
- Weather Modification Study
- Probable Maximum Precipitation
- Water Research Projects

Construction Program

- Current Construction Projects
- Small Water Projects

The Wyoming Water Development Program was established in 1975 to promote the optimal development of the state's human, industrial, mineral, agricultural, water and recreational resources. The program provides, through a commission, procedures and policies for the planning, selection, financing, construction, acquisition, and operation of projects. This can include projects for the conservation, storage, distribution and use of water, necessary in the public interest to develop and preserve Wyoming's water and related land resources.

The commission is composed of 10 members appointed by the governor to represent the four state water divisions and the Wind River Reservation. The Wyoming Water Development Office (WWDO) is staffed by 26 professional, legal, and support employees. The Wyoming Water Development Program receives funding from severance tax distributions. Water Development Account I is utilized for new development projects. Water Development Account II is used to fund the rehabilitation of water projects that have been in existence for 15 years or longer. Water Development Account III is used to fund dam and reservoir planning and construction projects.

Additional information can be found by clicking the menu items on the left



Municipal Pipeline Construction

WWDC Website, Home pt. II

Construction Program

- Current Construction Projects
- Small Water Projects

Agency Products

- Project Reports
- Water/Climate Web Atlas
- Wyoming Reservoirs Status
- Irrigation & Water System Surveys
- Legislative Reports
- Water Mgmt & Conservation Dir
- History of Wyoming Water Law

WWDC Home Page

Water Plan Home Page

WRDS Home Page

Construction projects.

Additional information can be found by clicking the menu items on the left side of the page.

◆ Mission Statement



New Items

- [March WWDC Workshop & Meeting Agenda](#)
- [Platte Basin Plan Public Interest Poll Results](#)
- [New Professional Services Ads](#)
- [Operating Criteria Updates](#)

Water Events in the next 30 days

Mar-16		WY
8-Mar-16	Water Forum	Cheyenne, WY
15-Mar-16	Wind/Bighorn Basin Advisory Group Meeting (6pm BLM Office)	Worland, WY

Events in Yellow are WWDC/WWDO sponsored

WRDS Home

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WRDS



Water Resources Data System

- WRDS Homepage
- Data/Products
 - Water
 - Climate
 - Water/Climate Web Atlas
 - PRISM Climate Data
 - Reservoir Teacup Diagrams
 - Water Library
 - State Climate Office
 - Drought
 - Wyoming Floods
 - Cooperative Projects
 - Snowpack
 - Research Support
 - Other Water Sites

Contact Us

CoCoRaHS

Subscribe to our mailing list

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Laramie, WY 82071

wrds@uwyo.edu
Ph (307) 766-6651
Fax (307) 766-3785

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Water and Climate Data for the State of Wyoming

Sponsored by the Wyoming Water Development Office

The Water Resources Data System (WRDS) is a clearinghouse of hydrological and climatological data for the State of Wyoming. WRDS is funded by the [Wyoming Water Development Office](#) and housed within the [Department of Civil and Architectural Engineering](#) at the University of Wyoming. WRDS serves as the Wyoming State Climate Office (SCO) and, as such, we provide a variety of services ranging from the development of enhanced drought-monitoring products to the online dissemination of water resources publications. WRDS/SCO also supports a variety of stakeholder groups by assisting in the development of the [State Water Plan](#) and helping to coordinate long-term monitoring efforts throughout the region.



Are you interested in measuring precipitation? Wyoming Volunteers will receive a complimentary 4" diameter rain gauge and a login account to enter their observations.

Join CoCoRaHS!



WRDS Reports Page

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Water Resources Data System Library

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[Historical Planning Documents](#)
[Instream Flow Reports](#)
[Water Resource Publications](#)
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The Wyoming Water Library

Staffed with a Water Librarian, this comprehensive collection of almost 21,000 documents is an exceptional resource for individuals desiring more indepth information on the State's water resources. Government documents, maps, theses, and water institute publications all reside within the collection. Specific agency publications represented in the collection include Wyoming Water Development Commission, State Engineer's Office, US Geological Survey, Bureau of Reclamation, Bureau of Land Management and University of Wyoming theses. Although several states are represented in the Collection, the focus is on Wyoming water. Other materials in the library cover drought, climate, the Wyoming water planning program, Wyoming environmental impact statements, and a small reference collection.

[Circulation Policy](#)

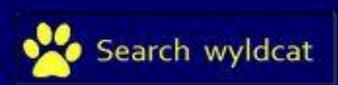


Reports (Afton - York)

Water Resources Data System Library

- Reference
 - River Basin Plans
 - Ground Water Characteristics
 - Reference Shelf
 - Links
- Online Documents
 - Water Development Reports
 - Historical Planning Documents
 - Instream Flow Reports
 - Water Resource Publications
 - Water Resource Series
 - Research Briefs
 - Theses
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- Contact Us
- Water Resources Data System
- Library Homepage



Water Resources Data System Library Wyoming Water Development Commission Projects and Studies

In June 2008, WRDS began a major review of all electronic documents in its WWDC "Project Report and Studies" collection. Each electronic document will be checked for completeness, and optimized to ensure compatibility with all commonly used versions of the Adobe Acrobat reader. Until this project is completed, some electronic documents prior to 2000 will not be available online. However, these documents may still be obtained in hardcopy by contacting the WRDS Librarian at library@wrds.uwyo.edu or 307-766-6661.

[Find Documents via County Map](#)

Afton

- Forsgren Associates, [Afton Municipal Water Supply Level II Study, Final Report](#), Nov, 1990 (15,216 kb)
- Forsgren Associates, [Afton Municipal Water Supply Level II Study, Executive Summary](#), Nov, 1990 (3,101 kb)
- BRS, Inc., [Afton Water Supply Project Level II, Final Report](#), Nov, 1999 (8,112 kb)
- BRS, Inc., [Afton Water Supply Project Level II, Executive Summary](#), Nov, 1999 (4,207 kb)
- Sunrise Engineering, [Siting, Construction and Testing of the Town of Afton New Municipal East Alley Well](#), Feb, 2006 (19,286 kb)

Airport Bench

- Engineering Associates, [Airport Bench Water Supply Project Phase II Report](#), Nov, 1990 (2,252 kb)
- Engineering Associates, [Airport Bench Water Supply Project Phase II, Executive Summary](#), Nov, 1990 (548 kb)

Aladdin

- Soda Butte Services, Inc., [Aladdin Water Supply Project Level I, Final Report](#), Oct, 1994 (2,795 kb)
- Soda Butte Services, Inc., [Aladdin Water Supply Project Level I, Executive Summary](#), Oct, 1994 (1,824 kb)
- Soda Butte Services, Inc., [Well Construction, Testing and Conceptual Design for the Aladdin Water Supply](#)