

**Written Testimony of Jennifer Zygmunt, Nonpoint Source Program Coordinator
Water Quality Division
Wyoming Department of Environmental Quality**

Before

U.S. Senate Committee on Environment and Public Works

Hearing to receive testimony on

**“The Nonpoint Source Management Program Under the Clean Water Act: Perspectives
from States”**

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REGULATORY BACKGROUND

Section 319(b) of the Clean Water Act (CWA) provides the legal basis for the implementation of state nonpoint source management programs and identifies requirements that states must meet to qualify for financial assistance under the Act. Section 319(b) stresses two items that must be completed by a state prior to receiving grant funds to address nonpoint source pollution—the State Assessment Report and the State Nonpoint Source Management Program.

Wyoming's State Assessment Report is the Integrated 305(b)/303(d) Report¹, which the Wyoming Department of Environmental Quality (WDEQ) has prepared on a biennial basis since 1988. The Integrated Report provides a statewide analysis of water quality impairments, including those caused by nonpoint source pollution. The State Nonpoint Source Management Program (the Wyoming Nonpoint Source Program) works to restore these water quality impairments following directions established in the Wyoming Nonpoint Source Management Plan². Thus, the 305(b)/303(d) Integrated Report and the Nonpoint Source Management Plan provide the basis for nonpoint source pollution management in Wyoming in accordance with Section 319(b) of the CWA.

The Wyoming Nonpoint Source Program also implements state regulations. As the designated agency for water quality management in Wyoming, the WDEQ works through many programs, including the Nonpoint Source Program, to fulfill the policy purpose of the Wyoming Environmental Quality Act (EQA) as stated in §35-11-102. Sections 35-11-109 (a) (iii) and (viii) of the Wyoming EQA provide the director of the WDEQ with authority for securing intergovernmental cooperation in implementing the Wyoming Nonpoint Source Program. Furthermore, §35-11-114 establishes that through WDEQ, the Water and Waste Advisory Board will recommend to the Environmental Quality Council comprehensive

¹ Wyoming's 2016/2018 305(b)/303(d) Integrated Report is available at <http://deq.wyoming.gov/wqd/water-quality-assessment/resources/reports/>. The draft 2020 Integrated Report will be available for public comment in early January 2020.

² The 2013 Wyoming Nonpoint Source Management Plan is available at <http://deq.wyoming.gov/wqd/non-point-source/resources/reports/>.

plans and programs for the “prevention, control and abatement of air, water, and land pollution and the protection of public water supplies.”

Finally, the current Wyoming Nonpoint Source Management Plan has been prepared to meet requirements established in 1999 by the Environmental Protection Agency (EPA) as part of national Section 319 Program guidance (Key Components of an Effective State Nonpoint Source Management Program; currently available in Appendix A of *Nonpoint Source Program and Grants Guidelines for States and Territories*³, April 2013).

In accordance with the state and federal regulations cited above as well as WDEQ policy, the management plan receives significant review by program partners and the public. The plan is prepared by the WDEQ Nonpoint Source Program Coordinator with input from other WDEQ programs, partnering agencies and organizations, and the Nonpoint Source Task Force⁴ (a board of governor-appointed citizens who oversee the program). Once approved by the Nonpoint Source Task Force, the Water Quality Division Administrator, and the WDEQ Director, the plan is presented to the Water and Waste Advisory Board for adoption by resolution. Following a 45-day public comment period, the plan is submitted for certification by the governor—in accordance with Section 319(b)(1) of the CWA—before being submitted to EPA for approval.

The Wyoming NPS Management Plan was first written and approved in 1989 and most recently updated and approved in 2013. The WDEQ is currently working on another revision of the plan.

NONPOINT SOURCE POLLUTION AND WYOMING

Nonpoint source pollution refers to a broad range of pollutant sources that are not regulated.

Typically, nonpoint source pollution occurs when surface water runoff (from rainfall and snowmelt, as

³ Available at <https://www.epa.gov/sites/production/files/2015-09/documents/319-guidelines-fy14.pdf>

⁴ Nonpoint Source Task Force members represent various interests within Wyoming: wildlife, conservation districts, environment, oil and gas, timber, sheep, recreation and travel, cattle, public-at-large, and local government. A list of current Task Force members is available at <http://deq.wyoming.gov/wqd/non-point-source/resources/task-force/>.

well as human activities such as irrigation) travels over or percolates through the ground and picks up contaminants. These contaminants are deposited into streams, lakes, rivers, and groundwater. Nonpoint source pollution can also be caused when stream and river channels become unstable, resulting in erosion and sedimentation. Common nonpoint source pollutants include fertilizers and pesticides from agricultural and residential activity; oil, grease, and toxic chemicals from urban runoff; sediment from construction activity or stream bank erosion; and pathogens and nutrients from livestock and pet waste or failing septic systems. Nonpoint source pollution typically comes from large, diffuse areas, which, along with many factors affecting fate and transport, can make it a challenge to mitigate. In contrast, point sources of pollution come from discrete conveyances, such as pipes and outlets, and are regulated through permitting programs such as the Wyoming Pollutant Discharge Elimination System.

Nonpoint sources of pollution are inherently variable, and many factors (e.g., precipitation, soil type, slope, geology, vegetative cover, depth to groundwater, and distance to surface water) affect whether or not a land use will cause nonpoint source pollution. Thus, nonpoint sources of pollution and methods to mitigate them can vary from state to state as well as from watershed to watershed within a state. Some key characteristics about Wyoming that influence nonpoint source pollution and its management include the following:

- Wyoming is characterized by an arid to semi-arid climate, high elevation, and an abruptly variable topography. Most of the state's precipitation is received as snowfall in the high elevations, which melts and runs off into major river systems or recharges groundwater aquifers. During peak run-off times during melting of the snowpack and during high-intensity storm events, flooding can occur. This, in combination with highly erosive soils in some areas of the state, can result in a significant amount of natural erosion.
- Wyoming is a headwater state, with most surface waters originating in Wyoming and few major river systems entering Wyoming from other states. Interstate coordination is an important aspect of managing water resources.

- Riparian areas along surface waters are important ecological features. Only 1 percent or less of Wyoming is considered riparian, but the majority of native animals depend on riparian areas at some point during the year for food, water, shelter, and migration routes. In addition, riparian areas filter sediment and nutrients to improve water quality and help to minimize the effects of flooding by storing water.
- More than 75 percent of Wyoming’s population relies on groundwater for part or all of their drinking water supply. Mitigation of nonpoint sources of pollution is important for both surface water and groundwater.
- Over 50 percent of Wyoming is public land; partnerships with federal and state land management agencies are important to protect and restore water quality.
- Wyoming is the least populous state in the nation; according to the U.S. Census Bureau, Wyoming’s population was 577,737 as of July 2018. All but two of Wyoming’s municipalities have a population less than 50,000, and a significant portion of Wyoming residents live in unincorporated rural areas. Finding local resources to address nonpoint sources of pollution can be challenging for smaller municipalities and rural areas.
- Agriculture is an important industry in Wyoming that includes cropland farming and livestock production. According to the U.S. Department of Agriculture, National Agricultural Statistics Service, cash receipts from agricultural commodities in Wyoming exceeded \$1.4 billion in 2018; in addition, there were 11,900 farms and ranches with an average size of 2,437 acres, making Wyoming first in the nation for this statistic. Partnerships with the agricultural community are important for successful nonpoint source pollution mitigation.
- Outdoor recreation and tourism are also important socioeconomic factors—Wyoming’s open spaces and extensive public lands draw many visitors each year. According to Wyoming State Parks, there were over four million visitations to state parks and recreation areas in 2018. According to the National Park Service, there were over eight million visitations to

Wyoming’s national parks, monuments, and historic sites in 2018. Outdoor recreation activities and tourism have the potential to impact Wyoming’s water quality.

Management measures (referred to as best management practices [BMPs] or conservation practices) can be implemented to prevent, mitigate, or eliminate nonpoint source pollution resulting from a particular land use. Major land uses in Wyoming that can potentially generate nonpoint source pollution are shown in Table 1 below, along with examples of BMPs that have been implemented to reduce nonpoint source pollution from those land uses. As part of the Nonpoint Source Management Plan, the Nonpoint Source Program manages five BMP Manuals: Livestock/Wildlife, Cropland, Urban, Stream and Lakeshore Restoration, and Silviculture. The Livestock/Wildlife, Cropland, and Stream and Lakeshore Restoration manuals incorporate by reference conservation practices used by Wyoming Natural Resources Conservation Service (NRCS) and the United States Forest Service. The Nonpoint Source Program also includes by reference the Forestry BMP manual prepared by the Wyoming State Forestry Division.

Table 1. Major land uses in Wyoming and examples of BMPs implemented to address nonpoint source pollution that may occur from those sources.

Land Use	Examples of BMPs Implemented
Urban	Stormwater wetlands Rain gardens Storm sewer catch basins and treatment units Pet waste campaigns
Rural Residential	Remediation of failing septic systems Small-acreage grazing management
Livestock and Wildlife	Off-channel water sources Grazing management Riparian fencing and cross fencing for improved pastures Corral relocations
Irrigated cropland	Conversion of flood irrigation to sprinkler irrigation Irrigation water management Converting dirt ditches to buried pipeline Soil health workshops
Forestry	Wildfire rehabilitation (seeding, soil stabilization)
Hydrologic Modification	Stream and river restoration using natural channel design principles (e.g., grade control structures, bank stabilization, channel realignment) Irrigation diversion improvements Irrigation push-up dam removal
Recreation	Road closures and decommissioning; Campsite remediation

Wyoming's Water Quality Impairments

The WDEQ collects biological, chemical, and physical data on Wyoming's surface waters and analyzes that data to make assessment decisions (i.e., determining if a waterbody is or is not meeting water quality standards). Other agencies, such as conservation districts, can also submit data that the WDEQ may use for assessment decisions. Impaired waterbodies are those streams, rivers, lakes, and reservoirs that are not meeting water quality standards. Most, but not all, of Wyoming's surface water impairments are caused at least in part by nonpoint source pollution—as of 2018, nonpoint source pollution contributed to 89 percent of the water quality impairments in Wyoming.

The three nonpoint source pollutants causing the majority of Wyoming's surface water quality impairments are pathogens, sediment, and selenium, as shown in Figures 1 and 2 below. Pathogens (as measured by the indicator *E. coli*) impair recreational use of waterbodies, selenium impairs aquatic life other than fish use, and sediment impairs fisheries and other aquatic life uses.

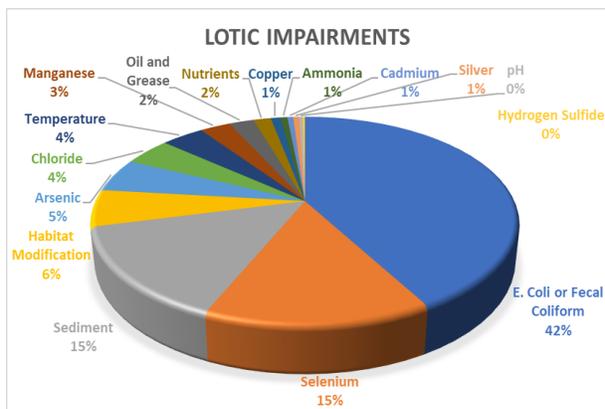


Figure 1. Pollutants causing water quality impairments in Wyoming streams and rivers as of the 2016/2018 Integrated Report.

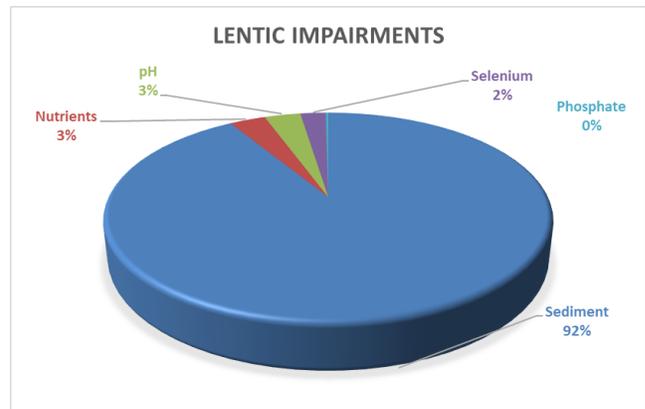
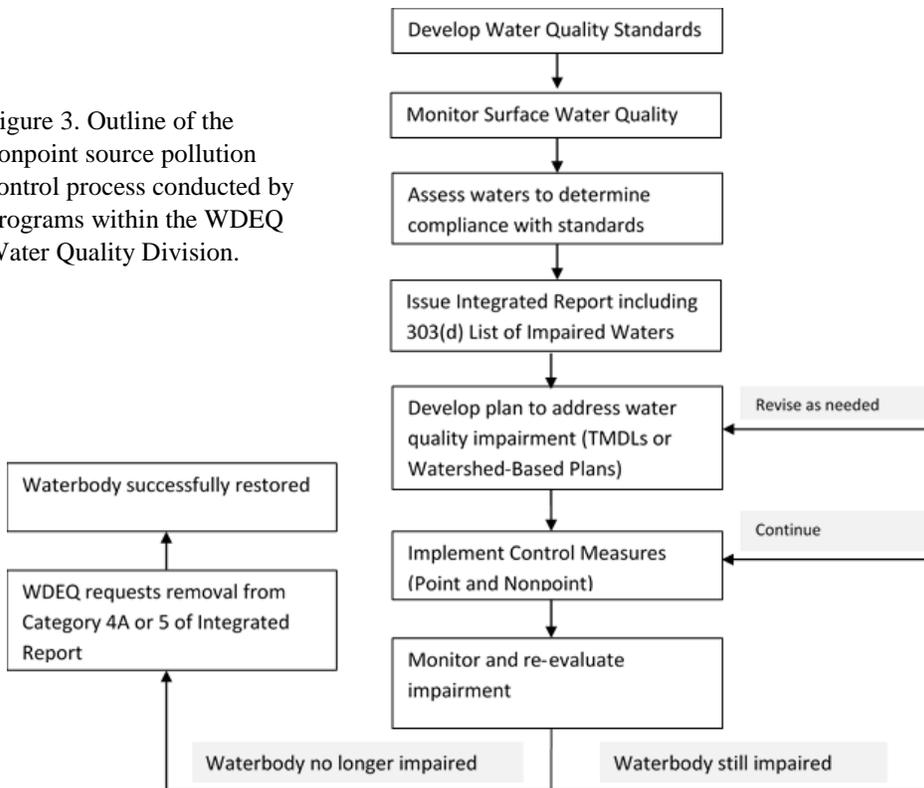


Figure 2. Pollutants causing water quality impairments in Wyoming lakes and reservoirs as of the 2016/2018 Integrated Report.

THE WYOMING NONPOINT SOURCE PROGRAM

The Wyoming Nonpoint Source Program is housed within the Watershed Protection Section of the Water Quality Division. It works closely with other Water Quality Division programs as well as numerous partner agencies and organizations to implement the nonpoint source pollution control process as shown in Figure 3.

Figure 3. Outline of the nonpoint source pollution control process conducted by programs within the WDEQ Water Quality Division.



Goals, Principles, and Objectives

The goals of the Wyoming Nonpoint Source Program are to (1) **identify sources of nonpoint source pollution to surface water and groundwater of the State of Wyoming** and (2) **to prevent and reduce nonpoint source pollution such that water quality standards are achieved and maintained.**

The program works to achieve these goals through a set of overarching principles that emphasize **voluntary and incentive-based participation, locally led projects, partnerships, measurable water quality improvement, and effective and efficient program administration.** Program activities are directed to fulfill nine objectives established in the 2013 Nonpoint Source Management Plan:

1. **Identification and prioritization:** identify waterbodies impaired or threatened due to nonpoint source pollution and prioritize those waterbodies for restoration and protection efforts
2. **Planning:** work with local stakeholders to develop accurate and effective watershed-based plans that identify how impaired waterbodies will be restored

3. **Implementation:** provide technical and financial assistance to local sponsors to implement effective watershed restoration projects in accordance with watershed-based plans
4. **Documenting environmental results:** collect credible data and use other methods to evaluate project effectiveness and water quality improvement
5. **Protection:** protect high-quality waters from degradation and work to prevent new water quality impairments from occurring
6. **Groundwater protection:** work to understand current groundwater quality conditions, improve groundwater quality, and protect drinking water supplies from nonpoint sources of pollution
7. **Information and education:** increase public awareness of water quality, nonpoint source pollution, and actions that can be taken to improve and protect water quality
8. **Partnerships and interagency coordination:** continue to improve existing partnerships and build new ones
9. **Efficient and effective program administration:** administer the program as effectively and efficiently as possible, with a focus on integration with other programs, demonstration of accountability, and continual program evaluation

Milestones and tracking measures are established for each objective to evaluate progress over time.

Administration of Section 319 Grant Funds

Section 319 grant funds awarded to Wyoming are administered to fulfill the nine objectives listed above. Historically, \$675,000 (approximately 45 percent) of each annual Section 319 grant is used for staffing to support full-time employees who implement various aspects of the nonpoint source pollution control process (see Figure 1). The remaining Section 319 grant funds (\$800,000–\$900,000 in recent years; approximately 55 percent of the total grant award) are awarded as pass-through funds to third-party sponsors who implement locally led, voluntary watershed restoration and protection projects.

Projects are selected through a competitive proposal process—a Request for Proposals is issued annually (usually in the summer), with final proposals submitted in early fall. The Nonpoint Source Task Force makes funding recommendations after evaluating proposals at a fall meeting. Sponsors whose proposals are recommended for funding then work with the Nonpoint Source Program Coordinator to develop Project Implementation Plans (PIPs). PIPs are submitted to EPA Region 8 for approval as part of the Section 319 grant application. After grant funds are awarded, the WDEQ issues cooperative agreements with project sponsors. Section 319 grants are active for a maximum of five years; most projects require three to four years for completion.

During the course of each project, the Nonpoint Source Program Coordinator works with the sponsor to monitor project progress, provide technical assistance, track budgets, and ensure that grant requirements are met. Project management training is provided to each sponsor at the time the agreement is signed. Reimbursement requests and progress reports are submitted quarterly, and an annual progress report is submitted at the end of each calendar year. A final project report is submitted when the project closes.

A 40 percent nonfederal match component is required for Section 319 grant funds; each project awarded funding commits to reporting 40 percent of total project cost as nonfederal match, though many projects report significantly more. Common sources of nonfederal match include Wyoming Department of Agriculture grant funds, Wyoming Wildlife and Natural Resource Trust funds, Wyoming Game and Fish Department funds and staff time, local government (conservation district, county, or city) funds or staff time, and contributions (cash or in-kind services) from landowners.

The Nonpoint Source Program also manages a minor amount of grant funding under Sections 604(b) and 205(j) of the CWA. These funds are used for water quality management planning, with \$60,000 per year being used for staffing and support and \$40,000 per year being pass-through funding for local agencies to implement water quality management planning projects. The funds are awarded through

the same competitive proposal and award process as described above for Section 319 funds and are also administered in a similar manner.

Wyoming's Section 319 Budget

Wyoming receives 0.977 percent of the total Section 319 allocation. Between 1996 and 2019, Wyoming's total Section 319 allocation has ranged from \$970,800 (FY96 and FY97) to \$2,270,000 (FY03), as shown in Figure 4 below.

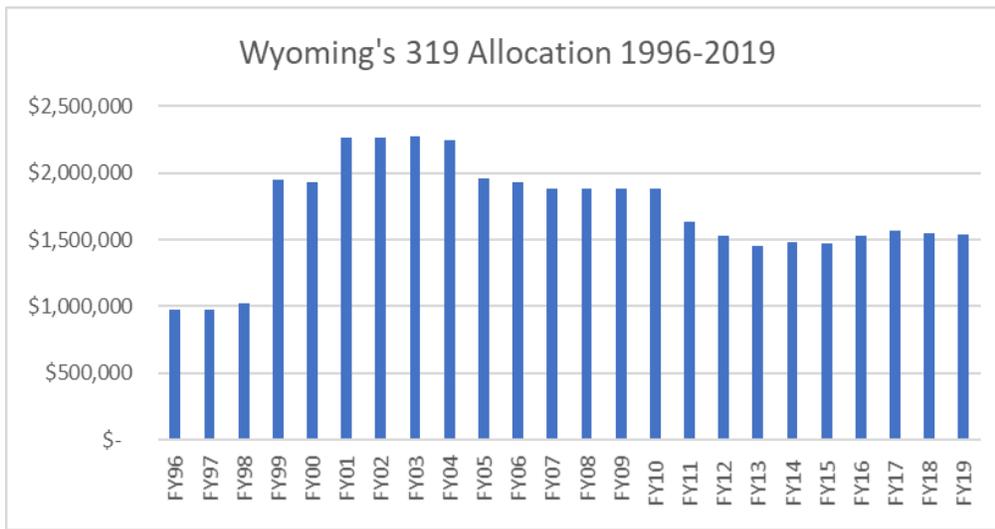


Figure 4. Comparison of Wyoming's Section 319 allocation from 1996 to 2019.

As described above, the WDEQ has historically used \$675,000 of the total Section 319 allocation each year for staffing and support; the remaining funding (typically \$800,000–\$900,000) is awarded to third-party projects through the competitive proposal process. It is typical to have more funds requested by applicants each year than funds available; over the past five years, applicants have requested 1.1 to 2.3 times the amount of funding available (see Figure 5).

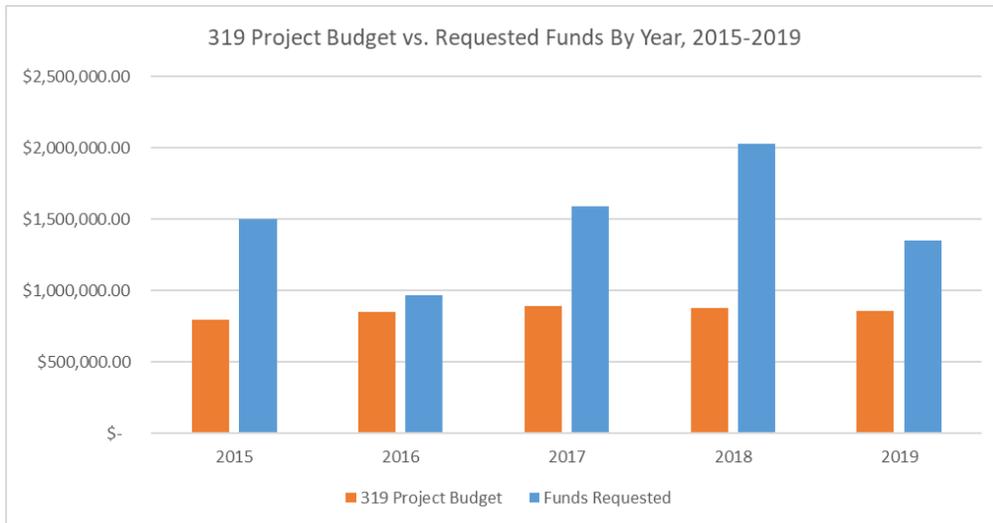


Figure 5. Comparison of Wyoming’s Section 319 project budget with amount of funds requested by applicants, 2015–2019.

As part of its ninth objective (Efficient and Effective Program Administration), the WDEQ has made it a priority to effectively use grant funds. The last four closed Section 319 grants (FY11 – FY14) had all grant funds expended prior to grant closure. The WDEQ has consistently met or exceeded the required 40 percent nonfederal match for each grant.

Program Partners

Addressing nonpoint source pollution is a challenging task that requires efforts at local, state, and federal levels. Numerous other agencies, organizations, and individuals also work to reduce nonpoint source pollution, and the Nonpoint Source Program seeks to form partnerships to share resources, encourage communication, and promote collaboration.

The WDEQ’s partnerships with Wyoming’s 34 conservation districts and the Wyoming Association of Conservation Districts (WACD) are among the most important for successful implementation of the Nonpoint Source Program. As local government entities with the authority to lead watershed planning and restoration activities, conservation districts have sponsored the majority of Section 319 projects, providing an important link between the WDEQ and local stakeholders. Wyoming’s conservation districts also lead water quality education programs to support on-the-ground restoration,

and most districts also conduct water quality monitoring activities. The WDEQ and WACD routinely communicate and collaborate on Nonpoint Source Program activities.

The partnership with the Wyoming NRCS is also critical. The NRCS and WDEQ recognize the importance of developing strong partnerships resulting in coordinated interagency delivery of watershed planning efforts, conservation technical assistance, and voluntary implementation of water quality improvement programs. Both agencies also recognize that owners and managers of farmland, rangeland, forestland, and other lands are key customers for each agency's programs and activities. Increased coordination, collaboration, and educational efforts have been a focus of improving the WDEQ/NRCS partnership. The WDEQ is a participating member of the NRCS State Technical Advisory Committee. In recent years, the WDEQ and NRCS have worked together to implement the National Water Quality Initiative.

A complete list of program partners is included in the 2013 Nonpoint Source Management Plan. Partners that the Nonpoint Source Program routinely collaborates with include the following:

- Wyoming Association of Conservation Districts
- Wyoming's 34 conservation districts
- Wyoming NRCS
- Wyoming Game and Fish Department
- Wyoming State Forestry Division
- Trout Unlimited
- The Nature Conservancy
- United States Forest Service
- City and county governments
- Environmental Protection Agency

Program Summary 1999-2018

The following highlights are provided as a summary of program progress and accomplishments between 1999 and 2018:

- A total of 164 projects have been funded.
- Over \$20.4 million in grant funds have been invested in nonpoint source pollution reduction projects. Over \$19.5 million in non-federal funds have matched these projects.
- A total of 55 agencies or organizations have sponsored projects. Conservation districts continue to sponsor the majority (55 percent) of projects (see Figure 6).

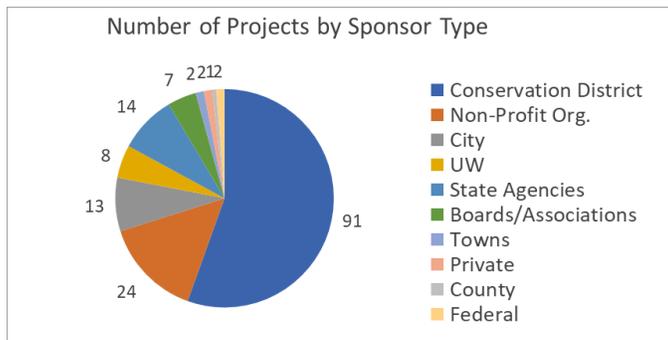


Figure 6. Pie chart showing number of projects sponsored by sponsor type, 1999–2018.

- Out of four broad project types (implementation, education, planning/assessment, and groundwater), the majority of funds (over 75 percent) continue to be spent toward implementation projects that install on-the-ground best management practices for water quality improvement in Wyoming's streams, rivers, lakes, and reservoirs (see Figure 7). Within the last five years, greater than 97 percent of project funds have been awarded to on-the-ground implementation projects.

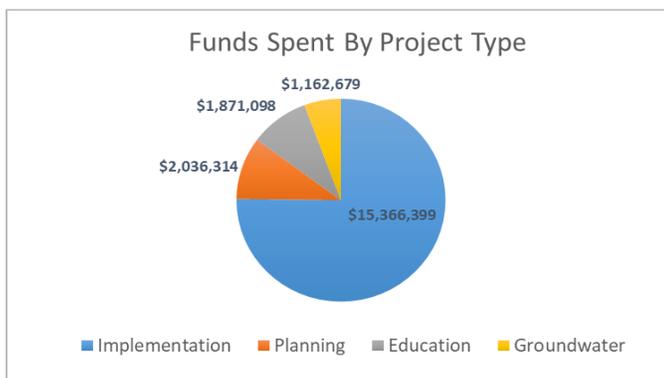


Figure 7. Pie chart showing funds expended by project type, 1999–2018.

- Projects have addressed a variety of sources, with a focus on livestock- and urban-related sources (see Figure 8).

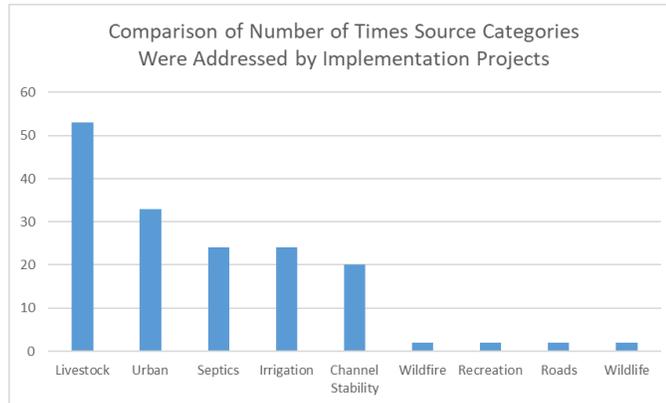


Figure 8. Chart showing relative number of times projects have addressed source categories, 1999–2018.

- Projects have addressed a variety of pollutants, with a focus on sediment and pathogens (see Figure 9).

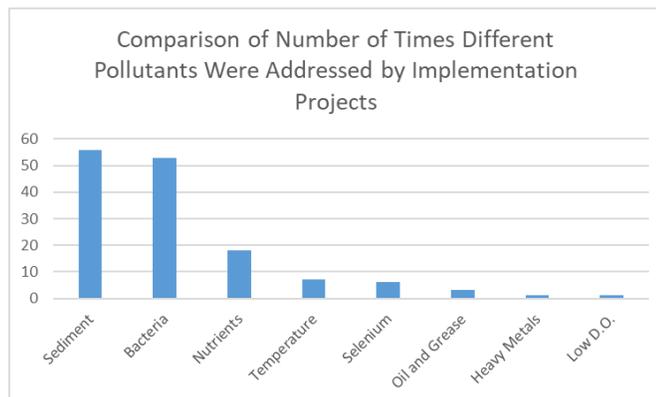


Figure 9. Chart showing relative number of times projects have addressed different pollutants, 1999–2018.

- Water quality monitoring data continue to show positive results. To date, 15 stream and river segments totaling over 187 miles have been restored to meeting water quality standards using technical and financial assistance provided by the WDEQ. All of Wyoming's restoration success stories can be viewed on EPA's nonpoint source success story website⁵. Over 40 different local, state, and federal entities are identified as partners in those stories.

⁵ <https://www.epa.gov/nps/success-stories-about-restoring-water-bodies-impaired-nonpoint-source-pollution>

- In addition to its restoration success stories, Wyoming has two nationally-published success stories where nonpoint source pollution efforts have addressed water quality degradation that had not yet reached impairment status. These two stories are also available on EPA’s success story website.
- Watershed-based plans have been completed for over 60 percent of the waterbodies where nonpoint sources of pollution contribute to a water quality impairment.
- A total of 66 nonpoint source impaired segments (47 percent) have been or are being addressed by at least one BMP implementation project in accordance with a watershed-based plan.
- Since 1999, 80 percent of BMP implementation projects have included information/education activities.
- Since 1999, 70 percent of implementation projects have included a monitoring component to evaluate effectiveness.

ASPECTS OF THE PROGRAM THAT ARE WORKING WELL

Overall, the WDEQ believes that the Section 319 Program is functioning effectively. We would like to highlight the following aspects of the program that we believe are important to its success.

Flexibility: Priority nonpoint source issues vary from state to state, as do the best methods to address them. Furthermore, priorities can vary within a state over time—state programs need to be able to adapt to emerging issues, new initiatives, and opportunities for partnerships. Some specific areas where program flexibility is needed are as follows:

- **Determining the amount of resources to put toward restoring impaired waters versus protecting healthy waters:** In some cases, it may be more cost-effective to protect healthy waters and prevent new water quality impairments from occurring.

- **Determining the amount of resources to put toward surface water versus groundwater:** In states such as Wyoming that are largely dependent on groundwater for drinking water, resources may need to be mobilized toward groundwater projects rather than surface water projects.
- **Determining the best use of grant funds to realize water quality improvement:** While on-the-ground project implementation has been the primary focus of the Wyoming Nonpoint Source Program, there are times when the most significant financial assistance need is for activities other than on-the-ground project implementation—e.g., planning, engineering and design, technical assistance, education, and monitoring. Allowing flexibility in how states use Section 319 funds better enables coordination with other funding sources and helps Section 319 funds be a catalyst for securing other funding.
- **Determining whether grant funds should be targeted to specific watersheds:** Historically, the Wyoming Nonpoint Source Program has made grant funds available statewide each year; however, based on the success of some states in using a rotating-basin approach or targeted-watershed approach, the program is considering, with input from partners, whether such an approach would have value in Wyoming to focus restoration efforts, improve program integration, and ease administrative burden.

National Section 319 program guidance established by EPA needs to provide enough flexibility that states can structure and manage nonpoint source programs according to the needs of each state while maintaining the focus on water quality improvement. National guidance has provided sufficient flexibility to meet Wyoming's needs to date; however, we continue to advocate that EPA supports flexibility in program guidance during future revisions. We would like to commend EPA on the amount of outreach and coordination that occurred with states during the development of the current (2013) guidance and the incorporation of additional areas of flexibility into the guidance. Furthermore, EPA staff (both at Region 8 and Headquarters) have consistently been open to discussing new ideas and have supported the Wyoming Nonpoint Source Program in its efforts to pursue innovative solutions.

Voluntary approach: Wyoming believes that a voluntary approach to nonpoint source pollution management is the most effective approach. Stakeholders voluntarily working together in a spirit of collaboration prompts productive dialogue and information sharing that would not occur in a regulatory approach. Such dialogue and information sharing often leads to innovative solutions and long-lasting partnerships. Furthermore, a voluntary approach promotes finding long-term solutions that have multiple benefits—the WDEQ encourages projects that improve water quality while also benefiting other resources such as wildlife habitat and agricultural production (see attachment A, In-Depth Success Story on the North Platte River). Wyoming’s restoration success stories support that a voluntary approach can effectively address nonpoint source pollution. Whether a state pursues voluntary or regulatory approaches to mitigate nonpoint sources of pollution is a decision that should be made by each state.

Local leadership: A successful voluntary approach requires leadership at the local level—individuals, agencies, and organizations who drive efforts to find and implement solutions with assistance from state and federal partners. Wyoming’s most successful projects have had a local “champion” who builds support, awareness, partnerships, and access to financial and technical resources. Building capacity of local agencies and organizations is an important part of the Nonpoint Source Program. Wyoming’s conservation districts are important local leaders in protecting and restoring water quality in Wyoming, and the WDEQ supports activities that build capacity within the state’s conservation districts.

Environmental measures of success: Nationally, the Section 319 Program emphasizes environmental measures of success: Pollutant load reduction estimates for sediment, nitrogen, and phosphorus are reported annually. Water quality data is collected to determine if impaired waterbodies are now meeting water quality standards following nonpoint source pollution reduction efforts—such restoration success stories are the primary measure of success for the program. While challenging, the collection of environmental data to measure success is a valuable part of the program, providing a means of accountability, an effective communication tool with the public, and feedback to evaluate program progress over time and prompt adaptive management. Data collection, however, can be resource

intensive, and such costs and staff time need to be factored into successful nonpoint source program management. In addition, it may take many years before projects implemented in a watershed become fully effective and improving water quality trends are detected; monitoring may be needed over one or more decades to fully understand trends (see attachment B; Whitelaw Creek Success Story). Coordination between state nonpoint source programs and state monitoring programs is important, as is training project sponsors to collect water quality data when possible. For example, in Wyoming, most conservation districts conduct water quality monitoring to evaluate effectiveness of their nonpoint source projects, often providing the data that leads to a restoration success story.

Partnerships: Water quality is an issue that affects all Wyoming citizens, and because nonpoint source pollution management touches most land uses in the state, the importance of partnerships in successful nonpoint source program implementation cannot be overstated. Finding common goals with other agencies, organizations, and individuals is key to success, helping to build trust, raise awareness, and leverage financial and technical resources toward targeted conservation. Successful conservation requires actions at the federal, state, and local levels; partnerships ensure these actions occur (see attachment C, Muddy and McKinney Creeks Success Story). Building partnerships takes time and resources and is a significant activity for program staff.

Nonpoint Source Task Force: Wyoming is unique in that the members of its Nonpoint Source Task Force are citizens appointed by the governor to represent various interests within the state. This has provided an additional link between the state program and the general public to ensure that grant funds meet the needs of Wyoming. The Task Force has provided sound input on program directions and helpful insight when selecting projects for funding on an annual basis. Most members have served at least two four-year terms, with several current members serving their third or fourth term; the commitment of members and the amount of time they have volunteered contributes significantly to the success of the Wyoming Nonpoint Source Program.

RECOMMENDATIONS FOR PROGRAM IMPROVEMENT

The WDEQ respectfully offers the following recommendations for nonpoint source program improvement.

Grants Award Process: We recommend that EPA evaluates ways to streamline and simplify the Section 319 grant application and award process. Delays in awarding grants to states in turn leads to delays in states starting projects with sponsors. In recent years, grants have not been awarded until early summer, and project agreements have not been signed until mid to late summer, meaning sponsors miss most of the first field season for monitoring and construction activities. Having a definitive timeframe for when grants will be awarded will improve our ability to notify sponsors of anticipated project start dates, allowing sponsors to better plan projects and coordinate nonfederal sources of match. Having an indefinite timeframe for when funds will be available reflects poorly on the program and may discourage interested sponsors from applying, especially if their first experience was negative. We appreciate that EPA Region 8 has heard our concerns on this subject and is taking steps to determine if improvements can be made in our region. We encourage that this conversation happens at the national level as well.

Allocation Formula: The WDEQ is aware that there has been discussion in recent years about whether the original Section 319 allocation formula should be re-evaluated. If the allocation formula is re-evaluated, it needs to be done with careful consideration and input from all states; while changes to the formula would benefit some states, they could be detrimental to others. If the formula is re-evaluated, the WDEQ encourages that the following items be included in that discussion:

- Consideration of visitations to the state for recreation and tourism activities
- Consideration of increased weight for rangeland and pastureland activities
- Consideration of factors that would provide smaller municipalities and unincorporated rural areas with better access to resources
- Consideration of the benefits of protecting water quality in headwater streams and rivers

Watershed-Based Plan Review: With the 2013 national program guidance, a requirement was added that EPA would review at least one watershed-based plan from each state per year. We feel that EPA review of watershed-based plans is unnecessary and that the plans should be left to state review and approval.

Data Entry: We commend EPA for developing the “How’s My Waterway” application to better provide water quality information to the public. While we support this tool, EPA needs to recognize that this tool indirectly puts more emphasis on states’ data entry in the Grants Reporting and Tracking System. Increased data entry will be an additional staff resource burden on the Wyoming Nonpoint Source Program.

Partnerships with NRCS: The WDEQ recommends that nationally, EPA and NRCS continue to gather and evaluate state feedback to determine how the federal National Water Quality Initiative can be improved. The WDEQ’s partnership with Wyoming NRCS is a critical one. Recognizing the common goal of water quality improvement, both agencies are committed to working together to improve delivery of conservation programs, including the National Water Quality Initiative. While the initiative has resulted in some positive outcomes in Wyoming, new requirements under the initiative have put additional burden on limited WDEQ staff resources, and it has been challenging to meet these new requirements. Further national initiatives with NRCS should only be considered after significant outreach to states and should allow flexibility in how states best pursue partnerships with their NRCS counterparts.

WDEQ CONTACTS

Todd Parfitt, Director

307-777-7937

todd.parfitt@wyo.gov

Kevin Frederick, Water Quality Division Administrator

307-777-5985

kevin.frederick@wyo.gov

David Waterstreet, Watershed Protection Section Manager

307-777-6709

David.waterstreet@wyo.gov

Jennifer Zygmunt, Nonpoint Source Program Coordinator

307-777-6080

Jennifer.zygmunt@wyo.gov

OTHER WYOMING NONPOINT SOURCE PROGRAM RESOURCES

2018 Wyoming Nonpoint Source Program Annual Report

- Report (in ArcGIS Story Map format) prepared by the WDEQ Nonpoint Source Program describing accomplishments of the Wyoming Nonpoint Source Program for 2018
- <https://arcg.is/18SG5S>

2018 Wyoming Watersheds Progress Report

- Report (in ArcGIS Story Map format) prepared by the Wyoming Association of Conservation Districts describing work that Wyoming's conservation districts are doing to restore impaired waterbodies
- <https://arcg.is/10vb4b>

Shoshone River Sediment Watershed Plan

- Example of a recent voluntary watershed planning effort completed with a local stakeholder group to reduce sediment loading to the Shoshone River near Cody, Wyoming
- <https://arcg.is/OPmPvS>
- <https://arcg.is/1ymq19>

ATTACHMENTS

Attachment A: *In-Depth NPS Program Success Story: Communitywide Effort to Convert to Sprinkler Irrigation Reduces Selenium and Yields Environmental and Economic Benefits*

Attachment B: *Section 319 NPS Program Success Story: Coordinated Resource Management and Riparian Restoration Improves [Whitelaw] Creek*

Attachment C: *Section 319 NPS Program Success Story: Coordinated Resource Management Restores Fish and Aquatic Life Habitat in Wyoming's Muddy and McKinney Creeks*

In-Depth NONPOINT SOURCE SUCCESS STORY

Highlighting the People Behind the Progress

Communitywide Effort to Convert to Sprinkler Irrigation Reduces Selenium and Yields Environmental and Economic Benefits

NORTH PLATTE RIVER, WYOMING

Natrona County farmers near Casper, Wyoming, banded together to reduce levels of selenium in local waters by switching from flood irrigation to sprinkler irrigation. By 2018, thanks to the example of a few enterprising landowners and the leadership of the local conservation district, more than 65 percent of the farms had switched to sprinkler irrigation and added other management practices. Water quality improved, field production increased, and water and labor costs were reduced. Plus, local stakeholders and government officials formed lasting partnerships.

Partners in Success



Lisa Ogden, Natrona County Conservation District (NCCD)

Local Leader Creates Change

Lisa spearheaded efforts to use irrigation best management practices (BMPs) throughout the area.



Kelly Burch, Farmer

Neighbor Leads by Example

An early adopter of sprinkler irrigation, Kelly told others about the financial and environmental benefits.



Andy Anderson, Farmer and NCCD Board of Supervisors

Local Leader Inspires Others

Andy highlighted cost savings when encouraging operators of small farms to use sprinkler irrigation.



Jennifer Zygmunt, Wyoming Department of Environmental Quality

State Staff Serves as a Resource

Jennifer helped the NCCD access Clean Water Act (CWA) section 319 funds to support the project.

Success Story *Highlights*

- **Pollutant of concern:**
Selenium
- **Practices implemented:**
Converting flood irrigation to sprinkler irrigation reduced the mobilization of selenium into surface water
- **Waters restored/improved:**
36.8-mile segment listed as impaired in 1998 and delisted in 2018
- **Key elements of success:**
 - » Strong local leadership
 - » Landowners were willing to take risks to gain long-term benefits
 - » Practices offered economic advantages



Problem

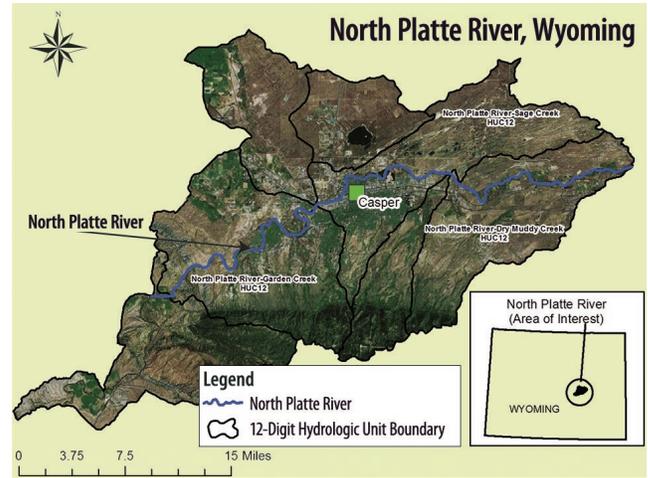
Selenium is a water-soluble mineral that naturally occurs within the Cody Shale underlying Natrona County soils. Groundwater and irrigation water readily dissolves selenium, which can then be carried to surface waters in runoff and can also accumulate on agricultural fields as water pools and evaporates on the surface. Elevated selenium levels are particularly harmful to waterfowl, fish, and aquatic insects. Livestock can be affected if they consume too much selenium by eating plants that absorb selenium.

Background

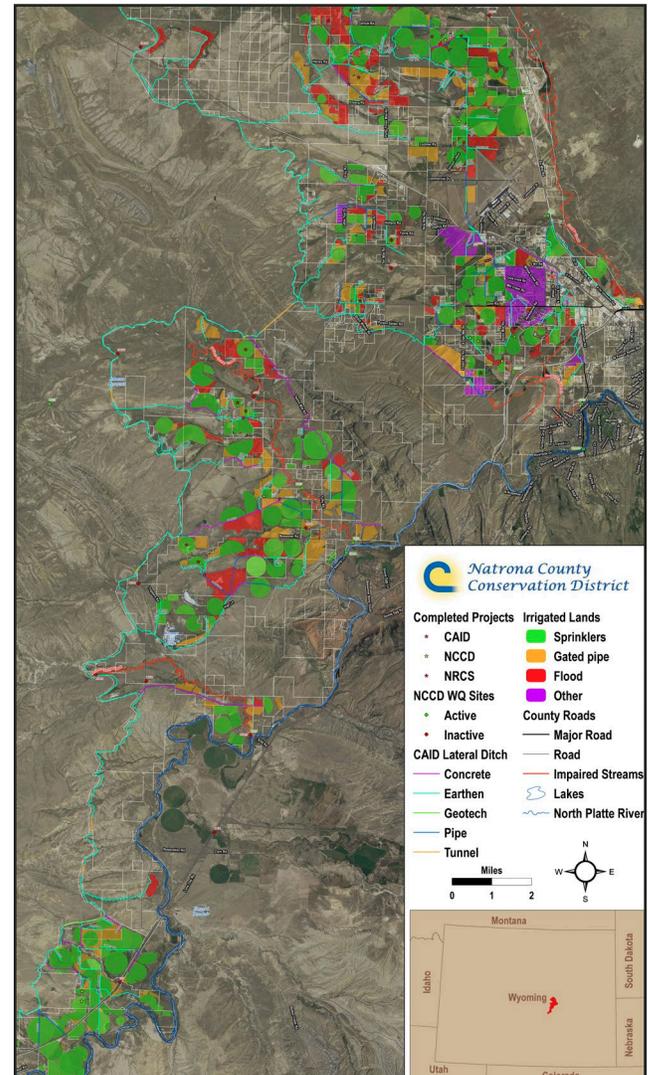
After widespread fish mortality and animal deformities occurred in 1983 at California’s Kesterson National Wildlife Refuge, the U.S. Bureau of Reclamation identified 26 areas in western states that were hydrologically similar to Kesterson (i.e., presence of Cody Shale), including the Kendrick Project Area near Casper, Wyoming. The Wyoming Department of Environmental Quality (WDEQ) found that the aquatic life, coldwater fisheries, and wildlife designated uses in the North Platte River within the Kendrick Project Area were impaired by selenium and added a 36.8-mile segment to the CWA section 303(d) list in 1998.

Key Accomplishments

To reduce the amount of selenium in surface waters, stakeholders implemented numerous BMPs including replacing dirt ditches with pipeline, adding stage-control structures and automation, and replacing flood irrigation with more efficient sprinkler systems (see map for location of BMPs). Water quality has improved as a result. The 2018 North Platte River [NPS Success Story](#) provides additional technical details. The following pages identify the key project elements that contributed to success and the dedicated individuals who helped drive the work forward.



Map of the North Platte River watershed.



By 2018, many selenium-reducing BMPs had been installed throughout the North Platte River watershed in the Kendrick Project area.

Want More Information?

- [Selenium Management Booklet](#)
- [North Platte River Watershed TMDL Implementation Project: Section 319 Final Report](#)

THE PEOPLE BEHIND THE PROGRESS

Lisa Ogden, District Manager, NCCD *A Local Leader Creates Change*

Lisa grew up in Casper, Wyoming, and has worked at the NCCD since 2010. She is the only paid staff member. Lisa works directly with landowners and leads implementation of irrigation BMPs.

- **What is the history of the selenium problem?**

Lisa: Local residents have known about the selenium issue since the early 1950s. In the 1990s, the University of Wyoming studied selenium concentrations in the North Platte River and its tributaries. In the early 2000s, the Casper Alcova Irrigation District (CAID), the Natural Resources Conservation Service (NRCS), the NCCD, and landowners began a focused effort to address the problem by switching from flood irrigation to sprinkler irrigation and adding other BMPs.

- **What was your biggest obstacle?**

Lisa: Getting to know the landowners, gaining their trust, and assuring them that I'm here for the long-haul. My background was not in agriculture, so I listened and learned from the landowners to fully understand the issues.

- **What role did the CWA section 319 program play?**

Lisa: The 319 funding provided a "foot in the door" to build strong relationships. It provided the funds to complete the projects and offered flexibility. For example, when NRCS had a staff shortage and could no longer provide engineering assistance, the 319 grant allowed NCCD to hire outside help.

- **What should people know?**

Lisa: Selenium will always be a part of the geologic makeup of much of Natrona County due to the Cody Shale. People's concerted efforts to work together for a common goal has made the watershed healthier. The delisting of the North Platte River from the 303(d) List of Impaired Waters is a tremendous "feather in the cap" of the landowners and the partners who have worked together.



"I love my job. I get to work every day with the some of the best stewards of our land: the farmers and ranchers."

Lisa Ogden



NCCD staff collect water quality data in the watershed.



Landowners began using more pivot sprinkler irrigation systems in the North Platte River watershed.



“Good things can happen at the grassroots level.”

Kelly Burch

Kelly Burch, Farmer/Rancher *A Neighbor Leads by Example*

Kelly, a retired agriculture teacher, works on his ranch full time. An early adopter of sprinkler irrigation, Kelly has been encouraging other farmers in the North Platte River watershed to do the same. Kelly served on the NCCD Board of Supervisors for 8 years.

- ***What inspired you to get involved?***

Kelly: I knew the selenium had to be cleaned up—and that overwatering contributed to the problem. I began converting my land from flood irrigation to sprinkler irrigation in 2004. I cut water usage in half and doubled my production. I no longer need to purchase additional water, which has helped the pocketbook.

- ***What inspired other farmers to join in?***

Kelly: Once others saw the economic benefits, they got on board. By installing sprinkler irrigation, they could water uniformly across both low-lying and elevated areas, which increases production. In addition, NRCS provided cost-share funding to purchase the pivots [a type of sprinkler irrigation system that rotates on a central axis], which can cost approximately \$100,000. Local banks supported the community’s efforts and provided low-interest loans because they knew this practice increased landowners’ income and allowed them to pay back the loan. Because funding was available, it was pretty easy to convince other landowners to switch.

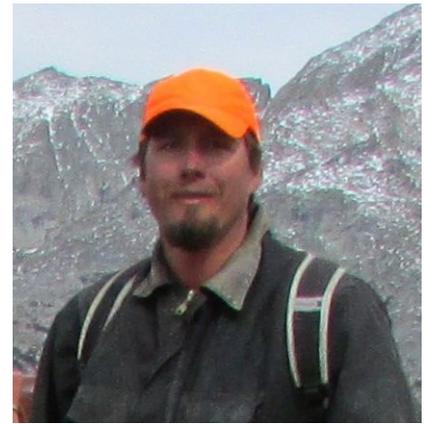
Andy Anderson, Farmer and NCCD Board of Supervisors

A Local Leader Inspires Others

Andy grew up on a small Wyoming farm. He holds professional engineering and geology licenses and worked in consulting for a number of years. He and his wife currently operate a ranch near Casper. He has served as the NCCD Chair for 8 years. Andy encourages operators of small local farms to convert from flood irrigation to sprinkler irrigation.

- ***What inspired farmers to participate?***

Andy: Farmers were enthusiastic because the project offered benefits for the river, community, and their farms. The new pivots helped address the selenium issue, increased production, and reduced labor costs. The larger-acreage producers were more invested at first, but in the past few years the smaller-acreage farmers have seen the larger farms doing well and also began applying for cost share to convert to sprinkler irrigation.



“Farmers saw that using sprinkler irrigation practices was more efficient and saved money.”

Andy Anderson

Jennifer Zygmunt, WDEQ

State Staff Person Serves as a Resource

Based in Cheyenne, Jennifer is the WDEQ’s Nonpoint Source Program Coordinator. Jennifer helped the NCCD access CWA section 319 funds.

- ***What impressed you about this nonpoint source success story?***

Jennifer: Thanks to the community’s hard work, over 36 miles were officially delisted from Wyoming’s impaired waters list. The scope of BMPs implemented is impressive! The project is also notable because of its monitoring program. NCCD’s data has not only shown that the chronic water quality criterion for selenium is being met, it has also helped correlate water quality improvement and reduced selenium loading with BMP implementation. The NCCD was proactive in developing a strong monitoring component to their projects.

- ***What role did CWA section 319 program play in this project?***

Jennifer: Section 319 was a key funding element. Funds from both CWA section 319 and NRCS EQIP [Environmental Quality Incentives Program] were used to accomplish what was needed. The 319 funds helped spotlight the water quality issues and covered a lot of ground that EQIP couldn’t have.

- ***Is this project serving as an example for others?***

Jennifer: Yes! NCCD’s long-term monitoring program to document project effectiveness is a good model for others in the state. NCCD’s positive attitude, persistence, and commitment to partnerships are also traits worth emulating.



“This project promoted dialogue and raised awareness that addressing water quality problems is a community-wide effort.”

Jennifer Zygmunt



Watershed landowners collaborate on land management.

Widespread Participation Was Key

NCCD led the selenium-reduction project, including managing landowner contracts and administrative reporting and budgeting. To ensure success, NCCD turned to diverse stakeholders throughout the watershed and beyond for information, funding, encouragement, and engagement:

- **Watershed landowners** participated in the project and shared information with others.
- **City of Casper, Casper Public Utilities Board, and the Natrona County Commissioners** offered local leadership and funding for projects.
- **Natrona County Weed and Pest** supplied conservation recommendations.
- **Wyoming Association of Conservation Districts** offered leadership and information to NCCD.
- **University of Wyoming Extension Service** provided outreach assistance.
- **USDA National Resource Conservation Service** provided program assistance and technical support.
- **Casper Alcova Irrigation District** partnered on projects.
- **USDA Farm Service Agency** helped landowners.
- **Wyoming Department of Agriculture** provided guidance and water quality grant funding.
- **WDEQ** provided project leadership, supervision, and financial support.
- **Wyoming Department of Game and Fish** provided technical assistance on issues regarding watershed wildlife.
- **U.S. Environmental Protection Agency Region 8** provided grant and project support.

A Community-Based Success

Both environmental and financial considerations played motivating roles in the project. Farmers knew that reducing selenium was important for protecting wildlife and livestock health, and that the placement of the North Platte River on the CWA section 303(d) list of impaired waters had raised concerns of possible increased water treatment costs. As described in the NCCD's *Selenium Management booklet*, if landowners and local agencies did not make a documented effort to reduce selenium loading to surface waters, it was possible that local municipalities within the county could eventually be required to treat excessive selenium concentrations at the local wastewater treatment plant. If required, the expensive upgrades needed to treat the selenium-laden water would substantially increase water costs for consumers.

Private citizen John Lawson offered his unique insight into the project. "At first, the project was not getting much attention. With the 303(d) listing, the larger community began to take notice because concerns about selenium had the potential to increase utility bills if water treatment became necessary," he said. "Plus, less labor is needed with sprinkler irrigation, so costs are lower. There were not many obstacles once the community understood the economics. They clearly saw the benefits of reducing selenium levels in the river."



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For additional information contact:

Lisa Ogden
Natrona County
Conservation District
307-261-5436

Lisa.Ogden@wy.nacdnet.net

Jennifer Zygmunt
Wyoming Department of
Environmental Quality
307-777-6080

Jennifer.Zygmunt@wyo.gov



Section 319

NONPOINT SOURCE PROGRAM SUCCESS STORY

Wyoming

Coordinated Resource Management and Riparian Restoration Improves Creek

Waterbody Improved

Historical livestock grazing practices resulted in damaged riparian areas and eroding streambanks along Whitelaw Creek, leading to poor water quality and degraded fisheries. Local landowners, the U.S. Forest Service (USFS), and other partners worked through a process known as Coordinated Resource Management (CRM) to implement improved grazing management practices. After two decades of improved management, monitoring data indicate improved water quality, restored riparian areas, and improved fisheries.

Problem

Whitelaw Creek is a 2.4-mile-long tributary to Beaver Creek, approximately 8 miles north of the town of Sundance in the Belle Fourche River Basin of northeast Wyoming (Figure 1). The creek's headwaters originate at an elevation of approximately 6,100 feet near Warren Peak in the Black Hills National Forest. Whitelaw Creek is protected by the Wyoming Department of Environmental Quality (WDEQ) for drinking water, cold-water game and non-game fisheries, fish consumption, aquatic life (other than fish), recreation, wildlife, industry, agriculture, and scenic value uses. For the purposes of this project and its ongoing evaluation, WDEQ divides Whitelaw Creek into upper and lower segments, which are separated by USFS road 851.

Season-long historical livestock grazing practices in the mid- to late 20th century resulted in damaged upland and riparian areas and degraded stream banks, which consequently led to increased sediment loading, elevated water temperatures, and reduced dissolved oxygen in Whitelaw Creek. Biological information collected in the 1980s indicated the cold-water game fishery consisted entirely of brook trout in low densities.

In 1988 the USFS implemented a two-pasture, deferred-rotation livestock grazing system along Whitelaw Creek. Unfortunately, poor water distribution and a lack of late-season water limited the opportunities to implement the new grazing system, and thus the resource received minimal benefits.

Project Highlights

In 1992 WDEQ partnered with local landowners and grazing permittees, USFS, the Natural Resources Conservation Service, the Wyoming

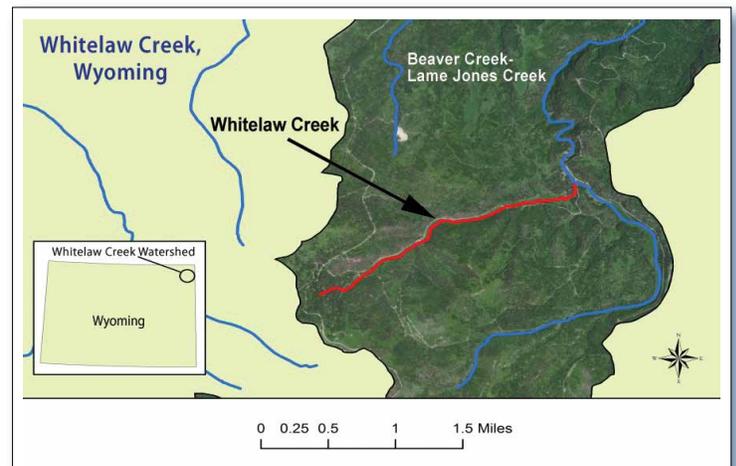


Figure 1. Whitelaw Creek is in northeastern Wyoming.

Riparian Association, the Wyoming Game and Fish Department, the Crook County Natural Resource District, and the Wyoming Department of Agriculture to initiate CRM in the Whitelaw Creek watershed to address the known water quality issues, including water quality problems from overgrazing. As part of the CRM, the collaborators managed a Clean Water Act section 319 project, known as the Whitelaw Riparian Improvement Project, in the early to mid-1990s. The partners implemented numerous agricultural best management practices (BMPs) that focused on improving riparian conditions, stabilizing stream banks, and enhancing water quality through short-duration, multi-pasture rotational grazing, the development of off-channel water sources, and cross-fencing (adding fences to limit pasture access for rotational grazing purposes). Project partners installed signs and conducted tours of the project area to offer opportunities for the public to learn about time-controlled grazing management and improvements in the resource that benefit multiple uses. Project partners monitored



Figure 2. Whitelaw Creek before (1995, left) and after (2013, right) riparian recovery efforts.

the effectiveness of the BMPs from 1992 to 2012 by periodically collecting fish and macroinvertebrate data, conducting vegetative surveys, and gathering chemical and physical water quality data.

Results

The Whitelaw Riparian Improvement Project has successfully improved riparian and water quality conditions throughout the length of Whitelaw Creek. Monitoring data collected from 1992 through 2012 show that the combination of improved water distribution and short-duration rotational grazing has improved riparian conditions. Assessments of four riparian vegetation transects distributed throughout the upper and lower segments all show an appreciable increase in desirable species, specifically sedges in the *Carex* and *Scirpus* genera. The increased density and diversity of riparian vegetation have stabilized segments of streambanks by allowing the channel to narrow and deepen and to become more sinuous. Approximately 20 percent of streambanks experienced improved stability and increased riparian vegetative cover between 1992 and 2012; nearly all stream banks are now at optimal stability and cover conditions (Figure 2). These enhancements have significantly reduced the sediment loading to the stream. The reduction is most apparent within the lower segment of Whitelaw Creek, which had been the segment most negatively affected by excess sediment. Data show that mean embeddedness (percent of coarse substrate covered or surrounded by sand and silt) in riffle substrates in this lower segment declined by approximately 30 percent between 1992 and 2012. Reductions in fine sediment corresponded to coarsening of the riffles, with 35 to 45 percent increases in gravel composition throughout Whitelaw Creek (though most notably in the lower segment) during the same period.

The in-stream and riparian changes, combined with reductions in sediment loading, have translated to cooler instantaneous water temperatures (a reduction of approximately 5 to 8°C) and improved instantaneous dissolved oxygen concentrations (an increase of approximately 1 milligram per liter) during early autumn over the 20-year monitoring period. Temperature and dissolved oxygen levels now meet WDEQ's water quality standards.

The biological condition of Whitelaw Creek has improved with the decreases in sediment loading and water temperature and the increase in dissolved oxygen. WDEQ's Wyoming River InVertebrate Prediction and Classification System (WYRIVPACS) indicated a significant (31 percent) increase in biological condition from 1992 to 2012 within lower Whitelaw Creek with respect to the taxa expected to occur under reference conditions. Moreover, increases in macroinvertebrate community density (from 833 to 2,047 individuals per square meter), percent EPT (Ephemeroptera, Plecoptera, Trichoptera) taxa (a 22 percent increase), and the ratio of EPT to Chironomidae taxa (from a ratio of 5.3 to a ratio of 12.3) were also evident in the lower segment. The percentage of pollutant-tolerant non-insects (e.g., aquatic worms, leeches, etc.) decreased 13 percent within the lower Whitelaw Creek segment from 1992 to 2012.

In the upper segment of Whitelaw Creek, the percentage of sensitive mayflies increased by 10 percent, while the percentage of tolerant organisms and number of burrower taxa decreased by 11 percent and seven taxa, respectively, over the same evaluation period. Both WDEQ's WYRIVPACS and the multimetric Wyoming Stream Integrity Index (WSII) show that the current biological condition throughout the creek is comparable to reference expectations.

Partners and Funding

The Whitelaw Riparian Improvement Project addressed water quality issues on nearly 3,400 acres of federal and private lands. The project received a total of \$9,635 of Clean Water Act section 319 funds and used \$10,839 of non-federal matching funds. Funding supported BMP implementation, educational deliverables, and effectiveness monitoring of the management changes. The project was a cooperative effort involving local landowners, grazing permittees, USFS, U.S. Department of Agriculture–Natural Resource Conservation Service, Wyoming Riparian Association, Wyoming Game and Fish Department, Crook County Natural Resource District, Wyoming Department of Agriculture, Wyoming Game and Fish Department, and WDEQ.



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Washington, DC

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For additional information contact:

Jennifer Zygmunt
Wyoming Department of Environmental Quality
Phone: 307-777-6080 • jennifer.zygmunt@wyo.gov



Section 319

NONPOINT SOURCE PROGRAM SUCCESS STORY

Wyoming

Coordinated Resource Management Restores Fish and Aquatic Life Habitat in Wyoming's Muddy and McKinney Creeks

Waterbodies Improved

Unstable stream channels and a loss of riparian function in the upper Muddy Creek watershed threatened aquatic life and cold-water fisheries in the early 1990s. As a result, in 1996, the Wyoming Department of Environmental Quality (WDEQ) added one segment of Muddy Creek and one segment of McKinney Creek to the state's Clean Water Act (CWA) section 303(d) list of impaired waters for habitat degradation due to livestock grazing. The Little Snake River Conservation District (LSRCD) led efforts to implement best management practices (BMPs) to address sediment resulting from habitat degradation. Water quality has improved, prompting WDEQ to remove both segments from the state's 2012 list of impaired waters.

Problem

Muddy Creek is in the Little Snake River Basin in south-central Wyoming (Figure 1). Both Muddy Creek and McKinney Creek (a Muddy Creek tributary) are protected by WDEQ for drinking water, cold-water game and nongame fisheries, fish consumption, aquatic life (other than fish), recreation, wildlife, industry, agriculture and scenic value uses.

The Muddy Creek watershed produces naturally high sediment loads because of its highly erodible soils. In addition, historical livestock grazing practices resulted in damaged riparian areas and stream banks, greatly increasing erosion and sediment loading in the lower watershed during precipitation events and periods of spring snowmelt. Biological and physical data collected in the mid-1990s indicated that excessive sedimentation was threatening the cold-water fisheries and aquatic life uses along a 5.1-mile section of McKinney Creek and an 11.4-mile section of Muddy Creek. WDEQ subsequently placed both creek segments on the CWA section 303(d) list of impaired waters in 1996 as threatened for their cold-water fish and aquatic life uses.

Project Highlights

In 1992, LSRCD, the Bureau of Land Management (BLM), local landowners, grazing permittees, Wyoming Game and Fish Department (WGFD), and other stakeholders initiated a Coordinated Resource Management (CRM) process in the Muddy Creek watershed to address threats to water quality. As part of the CRM, LSRCD managed several CWA section 319 projects between 1993 and 2005 in the

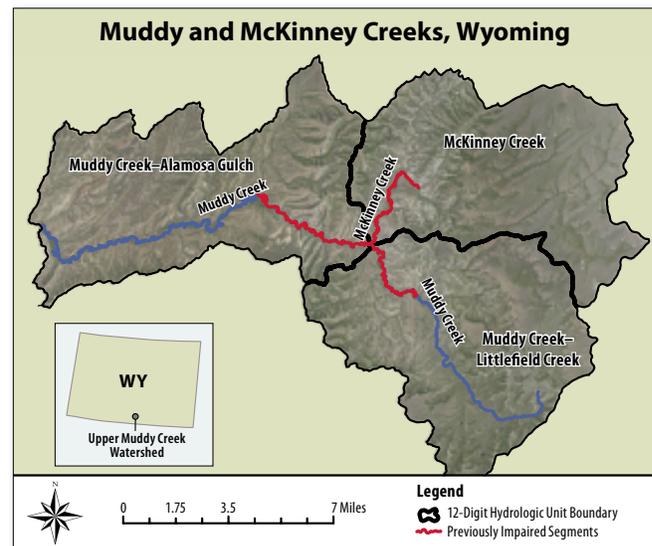


Figure 1. The upper Muddy Creek watershed.

upper Muddy Creek watershed. Project partners implemented agricultural BMPs aimed at reducing agricultural runoff, including upland water development, cross fencing, revegetation, road improvements, prescribed burning, brush management, and improved grazing management. WGFD worked with BLM, livestock grazing permittees and LSRCD to implement new grazing strategies, such as the use of herders in some allotments, deferred grazing, and rest-rotation grazing. BLM, in cooperation with Trout Unlimited, WGFD, LSRCD, a local school, and the Natural Resources Conservation Service (NRCS), removed a culvert, installed 14 grade control structures, reconstructed 0.75 mile of Muddy Creek

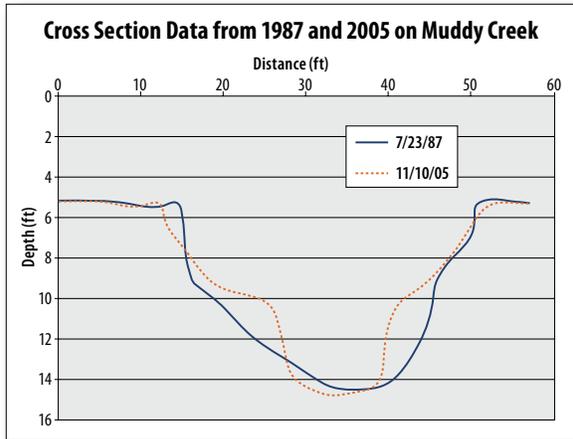


Figure 2. Muddy Creek cross section data.

in the upper watershed, and planted thousands of cuttings and bare-root woody riparian species to help stabilize stream banks.

Results

Over the past two decades, various local, state and federal agencies have produced reports, theses, technical manuscripts and raw data relating to the Muddy Creek watershed. In 2010, WDEQ hired Timberline Aquatics, Inc., to review and summarize this information and to produce a report including trend analysis for the threatened reaches of Muddy Creek and McKinney Creek. WDEQ used physical, chemical and biological data summarized in the report to conclude that the upper Muddy Creek and McKinney Creek segments should no longer be listed as threatened on the 2012 CWA section 303(d) list of impaired waters.

The report indicated marked improvements in macroinvertebrate communities. Multi-metric index scores (representing combined scores of Taxa Richness, EPT Taxa, Shannon Diversity, Hilsenhoff Biotic Index, and Clinger Taxa) indicated that macroinvertebrate communities at sampling sites improved from a 1993 score of 36 to a 2004 score of 93.

In addition, the report showed improvements in stream channel structure. For example, a comparison of cross section data from Muddy Creek sites in 1987 and 2005 showed evidence of terrace formation, improved bank stability and channel deepening (Figure 2). Similar data from McKinney Creek showed narrowing and deepening of the stream channel. Channel stabilization has been enhanced by the recovery of the riparian community, as

documented through extensive photo-point monitoring (Figure 3).

Moreover, basic water quality parameters (pH, dissolved oxygen, turbidity, total dissolved solids, and temperature) were found to be within WDEQ's water quality standards, and values remained relatively constant from 2008 to 2010. On the basis of these data, WDEQ has removed the two segments (16.5 miles total) from the 2012 CWA section 303(d) list of impaired waters. The recovery of the creeks' ability to support cold-water fisheries has been further demonstrated by WGFD's reintroduction of native Colorado River cutthroat trout into the upper Muddy Creek watershed.



Figure 3. Photo-point monitoring shows Muddy Creek in 1989 (top) and 2005 (bottom).

Partners and Funding

When Wyoming's Upper Muddy Creek CRM Project began, it was the largest watershed improvement project in the state, encompassing nearly 300,000 acres of mixed federal, state and private lands. In cooperation with CRM partners, LSRCD led restoration efforts in the Muddy Creek watershed. LSRCD managed a total of \$752,952 in CWA section 319 grants, which supported four project phases implemented between 1993 and 2005. In addition, a total of \$952,338 in non-federal matching funds and \$454,000 in other federal funding supported the implementation of BMPs, project effectiveness monitoring, and coordination of the CRM and stakeholder involvement.

Success in the Muddy Creek watershed is largely attributed to coordination between more than 30 members representing private landowners; federal, state and local agencies; environmental and conservation organizations; industry and the public. Major partners included the LSRCD, BLM, NRCS, WGFD, Trout Unlimited, Wyoming Department of Agriculture, WDEQ, Wyoming Water Development Commission, Wyoming Natural Resource Trust Fund, Rocky Mountain Elk Foundation, Ducks Unlimited, Wyoming Land Conservation Initiative, U.S. Fish and Wildlife Service, and numerous private landowners.



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For additional information contact:

Larry Hicks, Little Snake River Conservation District
307-383-7860 • lsrkd@yahoo.com

Jennifer Zygmunt, Wyoming Department
of Environmental Quality
307-777-6080 • jennifer.zygmunt@wyo.gov