

# Big Horn River-Nowater Creek Watershed Plan

Developed by: Washakie Watersheds Steering Committee

2016 - 2018



Washakie County Conservation District  
Bighorn River-Nowater Creek Watershed Plan 2016 – 2018

# **Bighorn River – Nowater Creek Watershed Implementation Plan**

**WASHAKIE COUNTY, WYOMING**

**2016 - 2018**

**DEVELOPED & PREPARED BY:**

**WASHAKIE COUNTY CONSERVATION DISTRICT  
WASHAKIE WATERSHEDS STEERING COMMITTEE**

**ASSISTANCE PROVIDED BY:**

**WYOMING ASSOCIATION OF CONSERVATION DISTRICTS**

# Bighorn River - Nowater Creek Watershed Implementation Plan

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## I. INTRODUCTION

The Bighorn River – Horse Gulch, and the Nowater Creek - Wildcat Gulch watersheds are the two combined 12 digit USGS Hydrologic Unit Codes (HUC’s) of focus for this Bighorn River-Nowater Creek Watershed Plan. This watershed improvement effort is a collaborative partnership among the Washakie County Conservation District (WCCD) and the Washakie Watersheds Steering Committee, which is comprised of local landowners and residents, and local resource professionals from the Natural Resources Conservation Service, Wyoming Game & Fish Department, University of Wyoming Extension, Washakie County Conservation District, Bureau of Land Management, and Wyoming Association of Conservation Districts.

*Mission:* The mission of the Washakie Watershed improvement effort is to establish and maintain voluntary watershed plans that engage local citizens in the remediation of water quality issues in the Bighorn River Watershed, now and in the future.

## II. BACKGROUND

An initial assessment of the Big Horn River and its tributaries within the WCCD was accomplished by WCCD personnel in 1998-2000. In 2000 and 2002, the Bighorn River and several of its tributaries were placed on Wyoming Department of Environmental Quality (WDEQ) 303(d) list, or impaired waterbodies list, for exceeding the fecal coliform criterion. Under section 305(b) of the Clean Water Act (CWA), the State of Wyoming must report the condition of their water(s) to the U.S. Environmental Protection Agency (EPA) once every two years. This report, prepared by WDEQ, is known as the Integrated Report (Wyomings Draft 2014 Integrated 305(b) and 303(d) Report). In addition to this report, under section 303(d) of the CWA, States must identify those waters within its boundaries that are not meeting the water quality criteria (“impaired waters”) applicable to that waterbody based on its classification. In all waters designated for primary contact recreation, during the summer recreation season (May 1 through September 30), concentrations of *E.coli* bacteria shall not exceed a geometric mean of 126 organisms per 100 milliliters based on a minimum of five samples collected during a 60 day period, with samples separated by a minimum of 10 days. All waters within Wyoming are designated for primary contact recreation unless identified as secondary contact water. During the period of October 1 through April 30, all waters are protected for secondary contact recreation only.

**Table 1. Summary of DEQ’s Draft 2014 Integrated 305(b) & 303(d) Report for the Big Horn River and Nowater Creek**

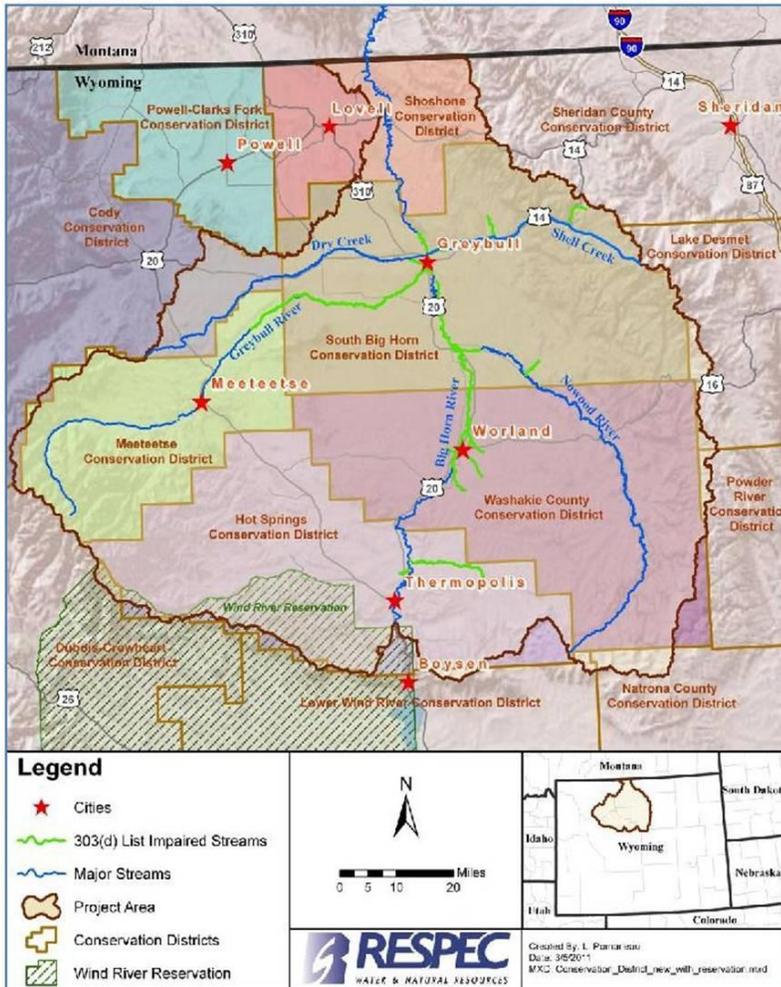
<b>Waterbody</b>	<b>Location</b>	<b>Initial Listing Date</b>	<b>Uses not Supported</b>	<b>Pollutant</b>	<b>Cause/ Source</b>
Nowater Creek	From the confluence with the Bighorn River to a point 6.6 miles upstream	2002	Recreation	<i>Fecal coliform</i>	Unknown
Big Horn River	From the Confluence with the Nowood River to a point 36.1 miles upstream	2002	Recreation	<i>E. coli</i>	Unknown

In response to the WDEQ listings, in 2006 the WCCD formed the Washakie Watersheds Steering Committee to develop the Big Horn River Watershed Plan (2006, WCCD) and also began water quality monitoring to collect baseline information on six streams; Sage Creek, Slick Creek, Fifteenmile Creek, Nowater Creek, Nowood River, and the Big Horn River. The Big Horn River Watershed Management Plan contained a variety of objectives and action items to address bacteria and other water quality concerns from septic systems, domestic animals and

livestock and stormwater runoff. In addition, several of the action items were directed toward increasing awareness of issues and programs.

In 2010, to address the severity of multiple listings and establish priority rankings for waters within the Big Horn basin, the WDEQ chose to combine those listings that were not meeting the recreational designated use standard for *E. coli* and fecal coliform since 2000 & 2002, to be included in one overall Total Maximum Daily Load (TMDL)\* document; the Big Horn River & Greybull River TMDL. This was the largest TMDL project to be initiated in the state’s history and required a lot of background information and organization. The streams in Washakie County within this TMDL study area were Sage and Slick Creeks, Fifteen Mile Creek, Nowater Creek, Nowood River, and the Bighorn River (*Figure 1*).

*\*A TMDL is a calculation of the maximum amount of a pollutant that a waterbody can receive and still meet water quality standards; it takes a more focused, targeted approach than a watershed plan. In this context, pollutant sources are characterized as either point sources, e.g. those sources that are regulated and require a permit such as wastewater treatment facilities or Confined Animal Feeding Operations (CAFOs), or nonpoint sources, e.g. those sources of pollution that do not require a permit and come from many diffuse sources such as field runoff. By taking the sum of the point source pollution loads, added to the sum of the nonpoint source pollution loads, and add a margin of safety, we obtain a Total Maximum Daily Load.*



**Figure 1 - Map of the Big Horn River & Greybull TMDL Study**

The Big Horn River and Greybull River TMDL (RESPEC, 2013) was approved by EPA on April 30, 2014. The TMDL provided several recommendations through an implementation plan, for the Conservation Districts and other stakeholders within the Big Horn Basin, to address bacteria contributions, many of which are appropriate for use in this watershed. Once EPA approved the TMDL, all listings were moved from the Category 5 303(d) list to Category 4A, which means they are still impaired, but a TMDL has been written and approved.

In the spring of 2012, WCCD saw the need to revisit the Big Horn River Watershed Management Plan and begin evaluating future implementation activities. WCCD re-established the Washakie Watersheds Steering Committee to help guide improvement activities in accordance with the implementation recommendations in the TMDL. Sage Creek and Slick Creek were selected as priority waterbodies where concentrated efforts could be made on a smaller watershed area, both of which were main tributaries within the Bighorn River-Slick Creek Watershed. Both waterbodies had been on the Wyoming 303(d) list for over 10 years.

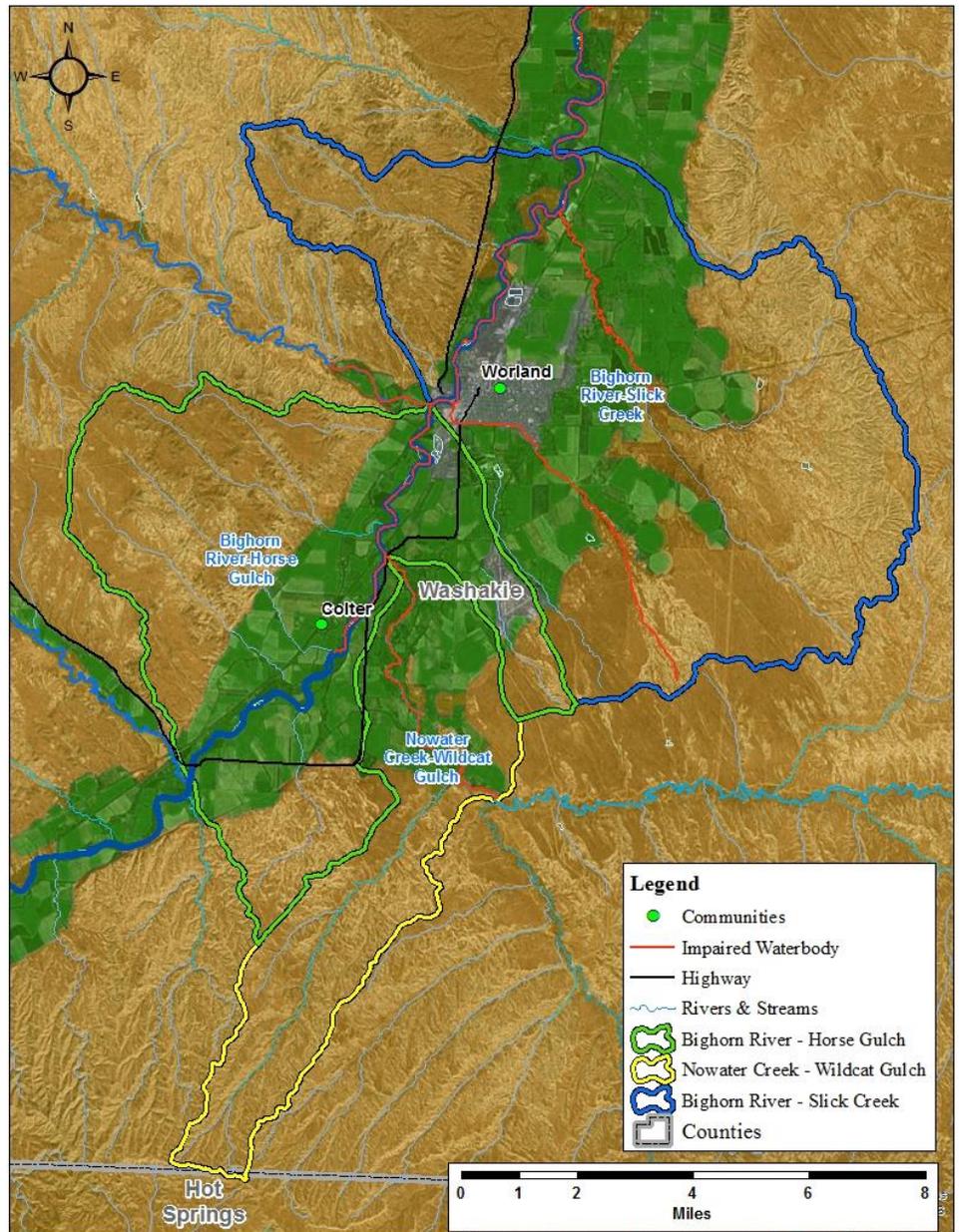
The TMDL indicated both waterbodies required overall load reductions of *E. coli* by 87% and 88% respectively, and had similar land use types. Implementation of the three-year Bighorn River-Slick Creek Watershed Plan (WCCD 2013) began in 2013, and continues utilizing WCCD funds, 319 grant funds approved through Wyoming DEQ, and Natural Resources Conservation Service (NRCS) National Water Quality Initiative (NWQI) funds. These funding sources and WCCD’s coordination represent a focused effort to address water quality issues in Sage and Slick Creeks. The Washakie Watersheds Steering Committee continues to meet on an “as needed” basis to review and rank proposals for projects within the Bighorn River-Slick Creek watershed. Implementation of Best Management Practices (BMP’s) identified as activities in this watershed plan will continue through 2016.

In 2014, in response to the required water monitoring component to the awarded NRCS NWQI grant, WCCD agreed to conduct water quality monitoring on Sage Creek and Slick Creek. In 2015, WCCD developed a Sampling and Analysis Plan, (WCCD 2015) which outlines the monitoring strategy used.

The purpose of WCCD’s monitoring study is to determine if an association between water quality changes in Sage and Slick Creeks and conservation practices implemented in the Bighorn River-Slick Creek watershed between 2013 and 2016 can be documented. Specifically, this monitoring study addresses the following objectives:

- \* Determine if water quality conditions (related to *E. coli* concentrations) have significantly improved in Sage Creek and Slick Creek beyond what would be expected given natural variability and other factors in the watershed.

- \*Determine if Sage and/or Slick Creek is now meeting water quality standards for bacteria and supporting recreational designated uses.



**Figure 2 – Big Horn River-Horse Gulch, Nowater Creek-Wildcat Gulch, and Big Horn River-Slick Creek Watersheds – Relationships -**

In June of 2015, the steering committee and WCCD began discussions regarding priority needs for future watershed implementation efforts. Since the TMDL indicates that the overall load reduction requirements of *E. coli* for the Big Horn River is 67% and Nowater Creek is 90%, the group agreed to move forward with the development of a new watershed plan for the Bighorn River-Horse Gulch watershed and combine it with the Nowater Creek-Wildcat Gulch watershed. WDEQ has determined that a 36.1 mile reach of the Big Horn River upstream of the confluence with the Nowood River, is impaired for *E. coli*, and approximately 10 miles of that reach falls within the Big Horn River-Horse Gulch watershed boundary. Additionally, the entire 21.8 miles of Nowater Creek, that WDEQ designated as impaired, is within the Nowater Creek-Wildcat Gulch watershed.

The Big Horn River-Horse Gulch and Nowater Creek-Wildcat Gulch watersheds are both 12 digit HUC's, they exhibit similar land use types, and due to their proximity to each other and the Big Horn River-Slick Creek watershed (*Figure 2*), have several of the same landowners with similar resource needs. The two watersheds combined, are similar in size to the Big Horn River-Slick Creek watershed, which through the previous planning process, was found to be a size where BMP's were successfully implemented during a three-year time period.

### **III. PLANNING AUTHORITY AND PUBLIC PARTICIPATION**

Wyoming Conservation Districts have planning authority under Wyoming Statutes 11-16-122 (xvi) (xvii) to develop comprehensive plans and to make public the plans and information and bring them to the attention of owners and occupiers of land within the district. All of the watershed plans within WCCD have been developed by the Washakie Watersheds Steering Committee and facilitated by the WCCD, and Wyoming Association of Conservation Districts (WACD) (*Appendix E*) under Wyoming Statutes 11-16-103 and 11-16-122. In addition, the process was guided by the 2000 WACD Watershed Strategic Plan, the USDA Natural Resource Conservation Service, and Wyoming Department of Agriculture.

### **IV. WATERSHED DESCRIPTION**

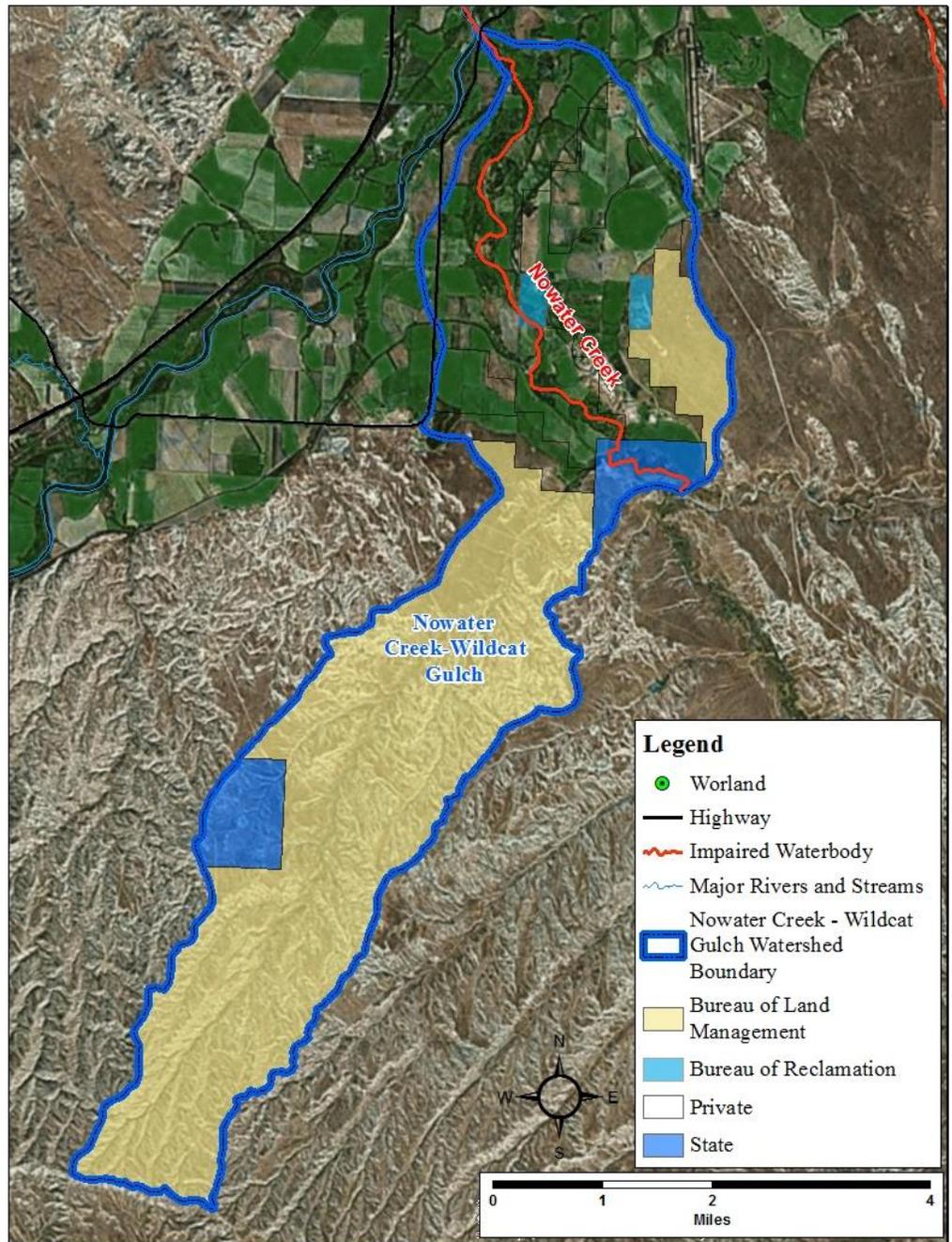
#### Nowater Creek-Wildcat Gulch

Nowater Creek is an ephemeral stream with headwaters originating in Hot Springs County, but the majority of the creek and its tributaries are located in Washakie County where it flows northwest to its confluence with the Big Horn River south of Worland. Nowater Creek and its tributaries identified on Wyoming DEQ's Table A Surface Water Classification Table, are currently designated as a 3B waterbody for its entire length, protected for primary contact recreation (*Table 1*). Class 3B waters are intermittent and ephemeral streams with sufficient hydrology to normally support and sustain communities of aquatic life including invertebrates, amphibians, or other flora and fauna which inhabit waters of the state at some stage of their life cycles. (WDEQ, 2013).

WDEQ has determined that Nowater Creek is impaired for *Fecal coliform*, from the confluence with the Bighorn River 6.6 miles upstream. The impaired reach runs through the Nowater-Wildcat Gulch sub-watershed (HUC 100800070809), which covers 19.61 square miles (12,551.66 acres). (Suitewater 2015)

According to calculations using Suitewater, a Natural Resource Planning and Analysis tool, a significant portion of the Nowater-Wildcat Gulch watershed is made up of erosive soils. Approximately 24% (3055 acres) is irrigated cropland with the majority of the 76% non-irrigated land (*Figure 5*) lying along the uplands composed of hills, ridges, escarpments, alluvial fans and terraces. (Iiams 1983). The populated areas lie along the flood plain of the Bighorn River, close to the town of Worland, and commonly within two miles of the river. The Nowater Creek-Wildcat Gulch stream reach is described as high priority in the 2014 Big Horn River Watershed TMDL Implementation Plan.

Land ownership within the Nowater Creek-Wildcat Gulch watershed is 35.70 % private, 56.95 % BLM, 6.16 % state and 1.19% owned by the Bureau of Reclamation (*Figure 3*). The estimated population (2010 Census) is 165, elevations range from 4,074 feet to 5,089 feet, and annual precipitation varies from 8 to 11 inches.

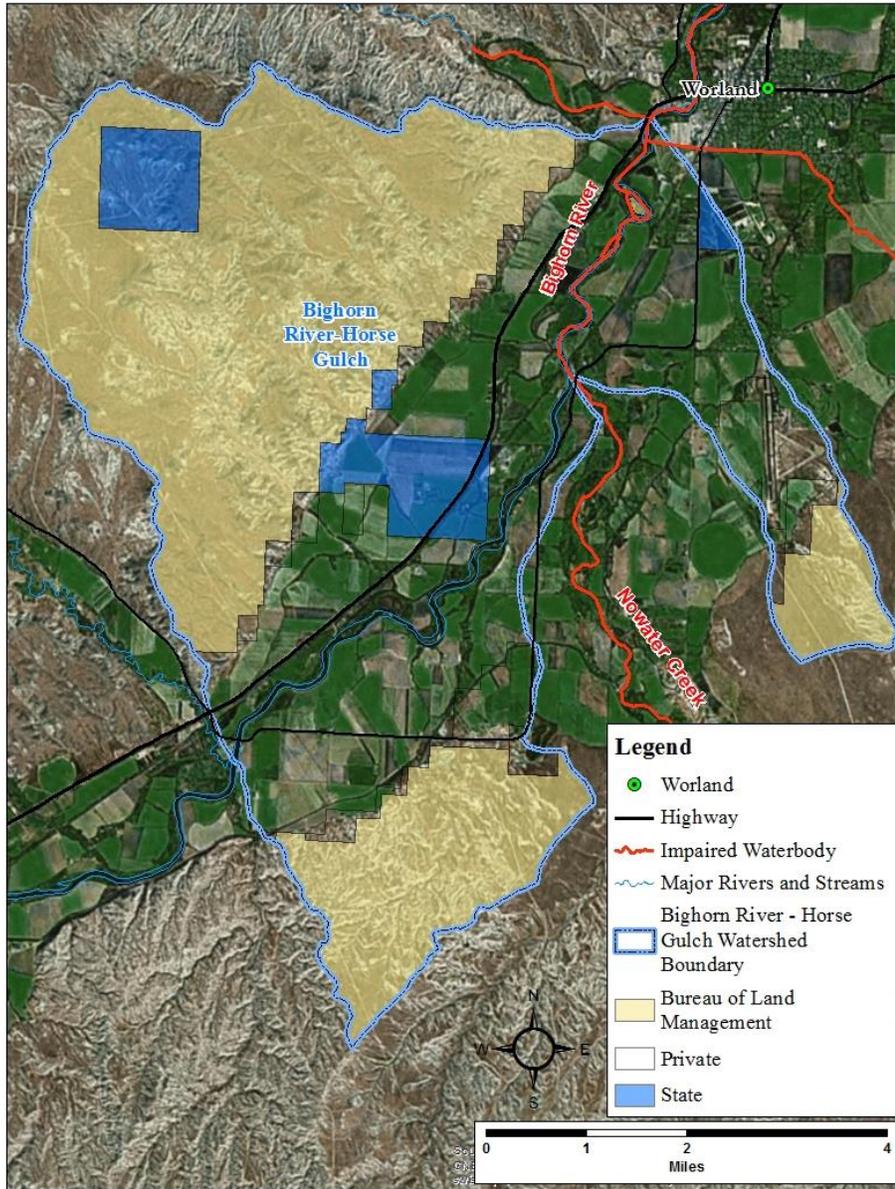


**Figure 3 – Land Ownership Map of Nowater Creek-Wildcat Gulch Watershed**

## Bighorn River-Horse Gulch

The Big Horn River, within the Big Horn River-Horse Gulch watershed, flows north through Washakie County. WDEQ has determined that a 36.1 mile reach of the Big Horn River upstream of the confluence with the Nowood River, is impaired for *E. coli*, and a portion of that reach falls within the Big Horn River-Horse Gulch watershed boundary. The Big Horn River is identified and designated on Wyoming DEQ’s Table A Surface Water Classification Table as a 2AB waterbody for its entire length, protected for primary contact recreation (*Table 1*).

Class 2AB waters are those known to support game fish populations or spawning and nursery areas, at least seasonally. This includes all their perennial tributaries, adjacent wetlands, and where a game fishery and drinking water use is otherwise attainable. Class 2AB waters include all permanent and seasonal game fisheries and can be either “cold water” or “warm water” depending upon the predominance of cold water or warm water species present. All Class 2AB waters are designated as cold water game fisheries unless identified as a warm water game fishery by a “ww” notation in the “Wyoming Surface Water Classification List”. Unless it is shown otherwise, these waters are presumed to have sufficient water quality and quantity to support drinking water supplies and are protected for that use. Class 2AB waters are also protected for nongame fisheries, fish consumption, aquatic life other than fish, recreation, wildlife, industry, agriculture and scenic value uses. (WDEQ, 2013).

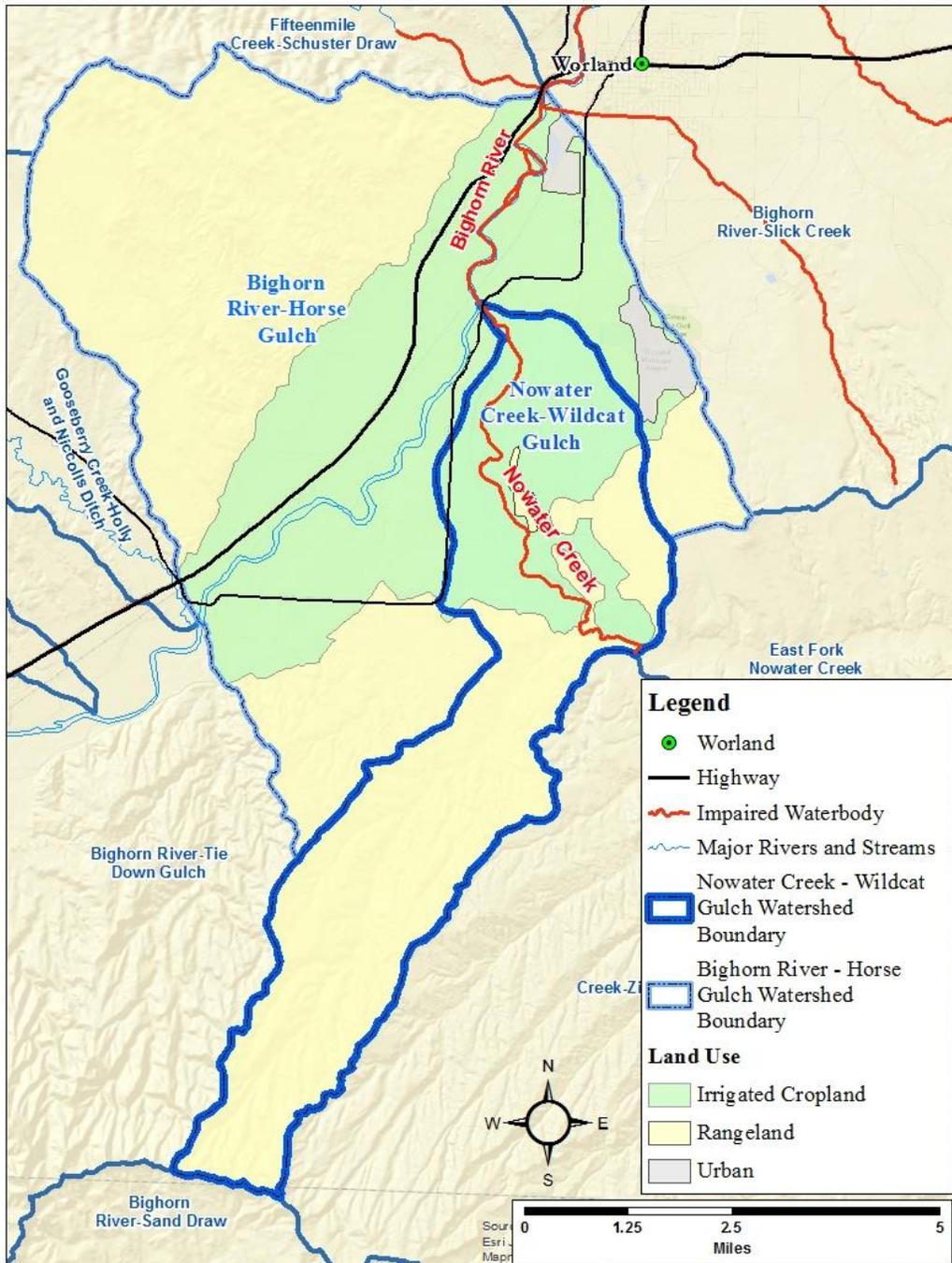


**Figure 4 – Land Ownership Map of Big Horn River-Horse Gulch Watershed**

The Bighorn River-Horse Gulch watershed (HUC 100800070406) covers 26,412.67 acres and is described as a high priority stream reach in the 2014 Big Horn River Watershed TMDL Implementation Plan.

Landownership within Big Horn River-Horse Gulch is 41.31% private, 51.27% BLM, 6.36% state, and 1.06% drainage districts (*Figure 4*). The estimated population (2010 Census) is 619, elevations range from 4,045 feet to 4,712 feet, and the annual precipitation varies from 8 to 10 inches.

Irrigated cropland comprises 28.9% (7623 acres) of the sub-watershed with the non-irrigated area comprising 71.1% (Figure 5). Over one half of the watershed is comprised of upland soils on hills, ridges, escarpments, alluvial fans and terraces, although a significant portion, roughly 42%, is designated as moderately sloping alluvial fans and flood plain (Iiams 1983). Within the moderately sloping and flood plain lands, are found the majority of irrigated cropland and human habitation, which is mostly within three miles of the Big Horn River.



**Figure 5 – Land Use Map of Big Horn River-Horse Gulch & Nowater Creek-Wildcat Gulch Watersheds**

## V. WATERSHED ASSESSMENT & HISTORIC MONITORING RESULTS

### Nowater Creek

Nowater Creek was listed on WDEQ's 303(d) list as threatened due to high fecal coliform concentrations, based on the United States Geological Survey (USGS) synoptic study (one-time sample) completed in 2000. USGS measured fecal coliform at 770 cfu/100 mL and *E. coli* bacteria at 550 cfu/100 mL (Clark and Gamper, 2003). In 2005, WCCD established one monitoring site on Nowater Creek, near the confluence of the Big Horn River, for the 2005-2008 monitoring project.

### *Nowater Creek Water Quality Results*

WCCD completed field measurements (temperature, pH, EC, turbidity, DO) and collected samples for bacteria, and water chemistry analysis in Nowater Creek throughout the 2005-2008 monitoring project. Field and water chemistry results were compared to water quality standards in Chapter 1 of the WDEQ Water Quality Rules and Regulations (WDEQ, 2013). One temperature measurement, on July 17, 2007 was found to exceed the WDEQ standards, but the water chemistry results did not vary significantly throughout the monitoring project and were well below WDEQ standards. The water type of Nowater Creek can be classified as sodium/calcium sulfate with a strong bicarbonate influence.

Water samples were analyzed for total coliform and *E. coli* for five sampling seasons during the four year monitoring program between 2005 and 2008. The geometric mean values exceeded the WDEQ standard during each sampling season, with significantly high concentrations measured in fall 2006 and summer 2007. Throughout the monitoring project, 4 samples measured the Colilert® method maximum *E. coli* concentration of 2,419.6, while 22 of the 25 samples exceeded the single sample *E. coli* limit of 410 cfu/100 mL. WCCD measured discharge rates a total of 24 times, which did not vary significantly throughout the monitoring project. However, corresponding *E. coli* concentrations demonstrated considerable fluctuations.

The data was analyzed and the following conclusions were provided by WWC Engineering, in a report completed for WCCD, called UPPER BIGHORN WATERSHED AND NOWOOD RIVER DATA ANALYSIS REPORT, December 2008, which is housed in the WCCD office.

A relationship between bacteria and stream temperature was apparent. As temperatures exceeded 15°C, all *E. coli* concentrations exceeded 500 cfu/100 mL. The average *E. coli* concentrations measured at stream temperatures greater than 15°C was 1,478 cfu/100 mL, while the average *E. coli* concentrations below 15°C was 838 cfu/100 mL.

### *Nowater Creek Monitoring Conclusions*

Bacteria in Nowater Creek exceeded the WDEQ standard during each of the five sampling seasons. Overall, the following generalizations were made. (WWC Engineering, 2008)

- The highest concentrations of bacteria were measured during the fall 2006 and summer 2007 sampling season.
- Overall, 88% of the *E. coli* samples exceeded the single sample limit of 410 cfu/100 mL.
- The elevated concentrations of *E. coli* support WDEQ's 303(d) listing of Nowater Creek as polluted for bacteria.
- With the exception of stream temperature, field measurements and water chemistry samples did not indicate a relationship to bacteria.
- A relationship between stream temperature and bacteria was most evident at temperatures greater than 15°C.

## **Big Horn River**

The Big Horn River was listed on WDEQ's 303(d) list as impaired for *E. coli* based on the United States Geological Survey (USGS) synoptic study (one-time sample) completed in 2000 on two different sites; one located just north of the Big Horn County line, in close proximity to Rairden, and the other at Worland. USGS measured fecal coliform at 830 cfu/100 mL and 540 cfu/100 mL, and measured *E. coli* bacteria at 670 cfu/100 mL and 400 cfu/100 mL respectively (Clark and Gamper, 2003). In 2005, WCCD established one monitoring site on the Big Horn River at the USGS Rairden site, for the 2005-2008 monitoring project.

### ***Big Horn River Water Quality Results***

WCCD completed field measurements (temperature, pH, EC, turbidity, DO) and collected samples for bacteria, and water chemistry in the Big Horn River throughout the 2005-2008 monitoring project. Field and water chemistry results were compared to water quality standards in Chapter 1 of the WDEQ Water Quality Rules and Regulations (WDEQ, 2013). The water temperature exceeded 20°C six times with all but one exceedance occurring during the summer 2007 sampling season. The major ion chemistry of the Big Horn River is sodium/calcium sulfate with a moderate bicarbonate influence. The data showed a positive linear relationship between Total Suspended Solids (TSS) and total phosphate, indicating that phosphorous is likely a product of runoff.

Discharge data was obtained from two gaging stations; one is located upstream of the WCCD monitoring site south of Worland (Wyoming State Engineer's Office (WSEO) and one located downstream, near the town of Basin in Big Horn County (USGS). WCCD's monitoring site was located between the two gaging stations, therefore neither gaging station was completely representative of the actual flows at the monitoring site. In general, discharge data from the WSEO gaging station are lower than the USGS gaging station because the WSEO keeps minimal flow below Lower Hanover Dam to contain water in Boysen Reservoir. Higher flow rates at the USGS gaging station are generated by return flow from field delivery irrigation systems and tributaries along the river, including considerable contributions from the Nowood River.

A total of 26 bacteria samples were collected between spring 2005 and summer 2008 at the WCCD monitoring site. Bacteria concentrations during the fall 2006 and summer 2007 sampling seasons were the highest and correlated to lower discharge rates during those seasons. Additionally, 13 of the 25 valid bacteria samples (52%) exceeded the single sample maximum concentration of 410 cfu/100 mL. A relationship between *E. coli* and temperature was apparent as the average concentrations for bacteria at stream temperatures above and below 17°C were 712 cfu/100 mL and 459 cfu/100 mL, respectively. Turbidity and *E. coli* concentration data were plotted showing a weak relationship, which suggested that bacteria may be fixed to sediment particles, which was a similar observation in the Clark and Gamper (2003) study.

### ***Big Horn River Monitoring Conclusions***

Bacteria exceeded the WDEQ standard during each of the five sampling seasons during the four year monitoring program between 2005 and 2008. Overall, the following generalizations were made. (WWC Engineering, 2008)

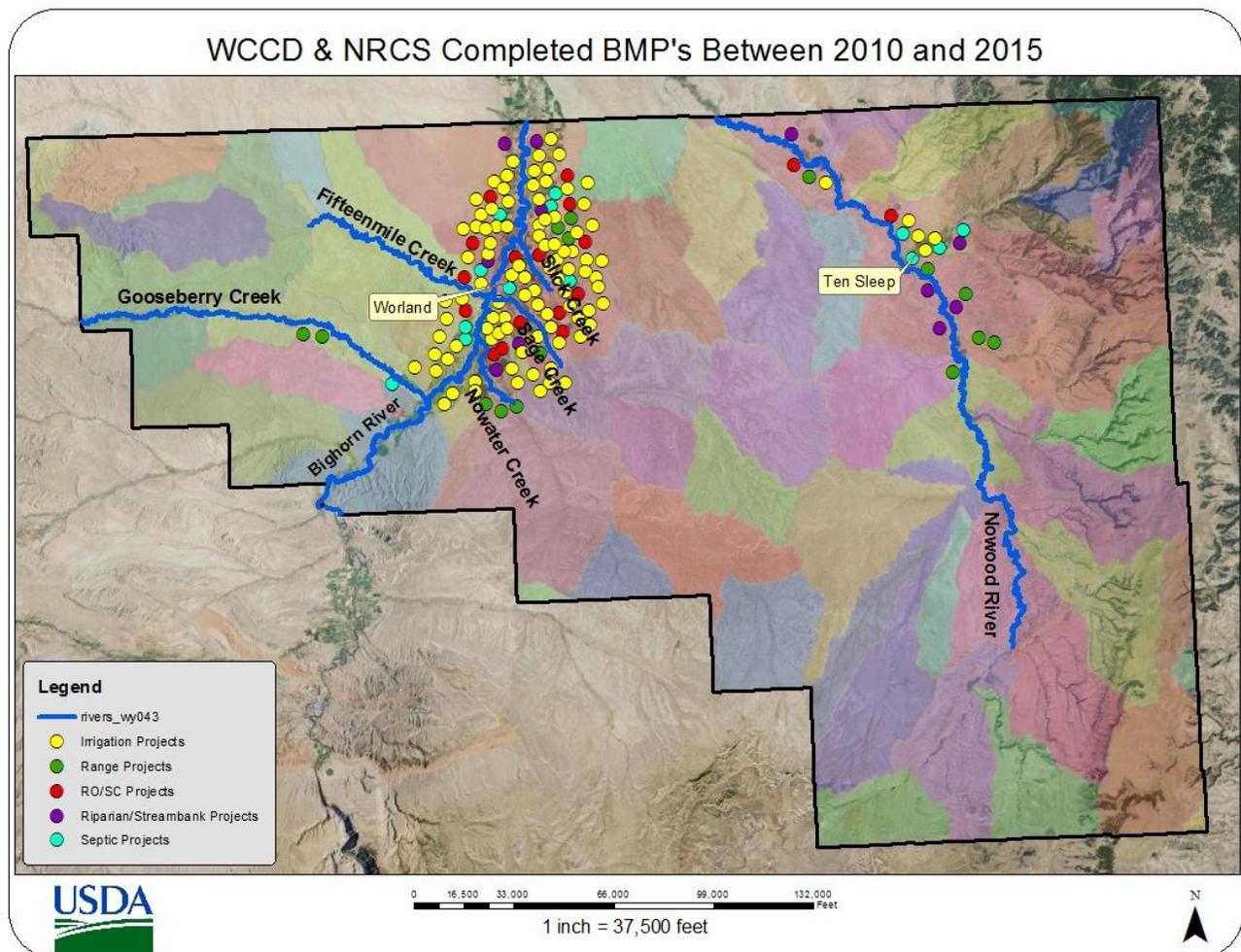
- WCCD completed five seasons of water quality monitoring during the four year monitoring program between 2005-2008, on the Big Horn River, with all seasons meeting the 5-in-30 protocol.
- During each of the sampling seasons, the *E. coli* geometric mean standard of 126 cfu/100 mL was exceeded.
- 52% of all samples exceeded the single sample maximum concentration of 410 cfu/100 mL.
- Data often confirmed relationships between *E. coli* and discharge, temperature, and turbidity. All of these relationships are interrelated and in large part driven by runoff.

## **BMP Implementation**

Voluntary BMP implementation has occurred in the watershed, which illustrates the commitment of local residents and land managers to improving water quality and compliance with Wyoming's Nonpoint Source Management Plan. However, as is typical, there is a lag between BMP implementation and improved measurements.

BMPs are designed to reduce the quantities of pollutants that are introduced to surface and groundwater. BMPs are a practice or combination of practices that, after problem assessment and examination of alternative practices, are determined to be the most technically and economically feasible means of preventing or reducing nonpoint source pollution. A BMP should be based on existing physical, operational, and economic conditions, opportunities and constraints.

Figure 6 depicts all of the completed BMP's between 2010 & 2016 in Washakie County, where landowners were provided with cost share utilizing funds from NRCS Farm Bill programs, WCCD's 319 grant program, or WCCD's local mill levy funds. Projects include septic system updates, feedlot relocations, underground pipelines, pivot sprinklers, Russian olive and salt cedar removal, riparian/streambank, and range.



**Figure 6 – WCCD & NRCS Completed BMP's 2010 - 2015**

## **VI. WATERSHED IMPROVEMENT ACTIONS AND RECOMMENDATIONS**

The bacterial impairments in the Big Horn River-Nowater Creek watershed are thought to be the result of contributions from a combination of sources, including human, wildlife, and domestic animals. It is impossible to adequately address impairments by focusing on any single source. However, it is preferable to address as many potential contributors as possible through an incentive-based, voluntary program that encourages widespread cooperation, and participation from landowners. The overarching goal of the steering committee is that by working with landowners and implementing Best Management Practices to reduce runoff, prevent runoff from becoming polluted or treat runoff before it reaches surface waters, we will see an improvement in the water quality. The committee will use resources such as the USDA NRCS Conservation Practices Physical Effect (CCPE) guide and the WDEQ BMP Manuals for guidance with landowners within the watershed (*See Appendix B - BMP Resources*). It is a priority of the Washakie Watersheds Steering Committee to ensure that all practices installed to improve water quality also consider the economic impacts on agricultural producers and other residents within the community.

WCCD incorporated items from the Big Horn River TMDL, other studies, and input from steering committee members into Objectives with Action Items and Milestones as follows:

### **PRIORITY: Watershed Plan Implementation - Public Awareness and Education**

Recognition of water quality issues by landowners and the public at large within the Big Horn River-Nowater Creek watershed is the initial challenge. In order to encourage participation in voluntary Best Management Practice (BMP) activities, the WCCD will inform watershed residents of the schedule of activities and cost-share opportunities available for BMP implementation. Continual updates provided to the community could enhance future participation, and documentation of implementation activities associated with this watershed plan could be beneficial to future applications for grant funds.

### ***OBJECTIVE***

Maintain an active, collaborative Big Horn River-Nowater Creek watershed improvement effort; increase awareness through outreach strategies; and coordinate discussions with the community.

### ***ACTION ITEMS***

1. Steering committee will meet periodically to review progress on implementation efforts.
  - a. Meet quarterly/as needed to review progress.
  - b. Incorporate recommendations from Big Horn River TMDL
  - c. Update Implementation Plan as needed
  - d. Develop and prioritize parameters for information pertaining to grants
2. Participate in and/or host special forums or meetings to educate the public on implementation efforts.
  - a. Develop informational booths to showcase before and after, implementation projects during WESTI Ag Days, Washakie County Fair, and other events.
  - b. Develop articles pertaining to the water quality issues associated with Nowater Creek and the Big Horn River.
  - c. Inform the public through Radio, area News sources, and Social Media opportunities.
  - d. Host educational workshops for landowners during WESTI Ag Days and also separate workshops for small acreage landowners, range monitoring, and other natural resource topics of interest.
  - e. Continue partnerships with others to host tours/forums to showcase projects that have provided an economic and environmental improvement.
  - f. Survey landowners to gather local input regarding specific watershed project needs (offer drawing prize for return of survey)

3. Improve Delivery of Cost-Share Programs to encourage participation and effective use of resources.
  - a. Host special meetings with landowners to encourage participation in project implementation using 319 or other grant funds.
  - b. Continue to provide materials to landowners on septic systems, livestock feeding operations, and BMP's for small acreages.
  - c. Distribute localized mailings to provide information on specific issues and programs.

**COOPERATIVE PARTNERS:** Washakie Watersheds Steering Committee, WCCD

**PRIORITY: Runoff from Cropland**

The TMDL model calculated that by implementing Best Management Practices on Cropland such as irrigation efficiency projects, Nowater Creek and the Big Horn River could result in bacteria load reductions of 76% and 71%, respectively.

On cropland, pastureland, or hayland where manure is applied, or where wildlife and/or livestock directly defecate in the stream, there is the potential for excessive levels of pathogen or heavy metal loading into nearby surface or groundwater. The use of BMPs can help ensure that ground and surface water resources are protected.

Cropland activities have the potential to contribute to nonpoint source pollution. The application of fertilizers to cropland can introduce nutrients, such as nitrogen and phosphorous, to surface and/or groundwater. In addition, the decomposition of organic matter from croplands and crop residue may be a source of mobile forms of nutrients that can be transported by surface water runoff or groundwater infiltration from agricultural lands to water systems. When nutrients are introduced to a natural water body, it can result in dramatic increases in aquatic plant growth and dramatic decreases in available oxygen. This ecological response is known as eutrophication.

Cultivated croplands can also destabilize soils and lead to excess soil erosion and sedimentation. Transported soil and sediment from croplands often contain nutrients and chemicals, which can further impact water quality. In addition, irrigation waters generally have a natural base load of dissolved mineral salts. The repeated introduction of salts to surface waterbodies can progressively degrade water quality.

**OBJECTIVE**

Reduce indirect and direct bacteria contributions from Agricultural production on Cropland; improve water quality from return flows.

**ACTION ITEMS**

1. Implement Cropland Best Management Practices with an emphasis on water quality, including:
  - a. Irrigation Water Management with an emphasis on water efficiency
    - i. Work with producers and partners to improve irrigation and delivery systems.
  - b. Appropriate Tillage Practices
    - i. Work with producers to apply deep tillage practices in flood irrigation systems where applicable.
    - ii. Work with producers to apply minimum tillage practices in crop rotation systems where applicable.
  - c. Nutrient Management

- i. Work with producers to maximize utilization of nutrients by crops and minimize losses to groundwater and/or surface water.
- 2. Implement Cropland Best Management Practices with producers with an emphasis on proper vegetation techniques to include:
  - a. Conservation Crop Rotation practices
  - b. Cover Cropping
  - c. Filter Strips
  - d. Riparian Buffers
  - e. Wastewater Sediment Basins
  - f. Soil Moisture Sensors
- 3. Implement Cropland Best Management Practices for Livestock and Wildlife grazing on Cropland, to include:
  - a. Manage Waste
    - i. Work with producers to implement relocation of waste and/or proper application
  - b. Manage Winter Feeding areas
    - i. Work with producers and partners to develop off-stream watering facilities
    - ii. Work with producers to manage crop stubble height
- 4. Encourage the use of Ag technologies:
  - a. Work with producers to install P.V. Solar, and other innovative practices that also encompass NRCS's Integrated Pest Management and or Nutrient Management recommendations.
  - b. Encourage producers to use Soil Zoning and Remote Sensing Technology for in-depth soils data.
  - c. Encourage producers to use Variable Rate Irrigation Technology to improve management of irrigation water and nutrients, thereby reducing pollutant loading.

**COOPERATIVE PARTNERS:** Washakie Watersheds Steering Committee, WCCD

**PRIORITY: Runoff from Urban and Small Acreages**

The Big Horn River-Nowater Creek watershed areas are adjacent to Worland, the county seat and most populated town within Washakie County. As stated in Section IV of this document, private ownership is responsible for approximately 39 percent of the combined watersheds. The TMDL model calculated that by fixing septic systems and reducing other loadings from the Urban and/or Small Acreage environment, Nowater Creek and the Big Horn River could result in bacteria load reductions of 7% and 8% respectively, which could also include removal of direct human defecation.

The TMDL Implementation Plan reported that BMP's that reduce *E. coli* contributions from humans and pets should continue to focus on rehabilitating failing septic systems, reducing pet waste contributions, and urban stormwater detention and/or infiltration. In addition, recommended BMP's, with a high probability of pollutant removal included Wet Detention Ponds, Stormwater Wetlands, Infiltration Trenches, and Infiltration Basins.

**OBJECTIVE**

Reduce indirect and direct bacteria contributions from straight pipe and faulty septic systems, manure stockpiling, at-risk animal feeding operations, and direct access to streams from urban and small acreage sources

**ACTION ITEMS**

- 1. Implement Urban and Small Acreage Best Management Practices with an emphasis on water quality to include:
  - a. Septic system and straight pipe replacement

- b. Fencing livestock off streams and/or installing water gaps
  - c. Off-stream livestock and wildlife watering facilities
2. Implement Urban and Small Acreage Best Management Practices with landowners emphasizing proper vegetation techniques to reduce runoff and increase infiltration
- a. Conservation Crop Rotation practices
  - b. Cover Cropping
  - c. Filter Strips
  - d. Riparian Buffers
  - e. Small acreage grazing management
3. Implement Urban and Small Acreage Best Management Practices for Nutrient Management, including fertilizers and manure
- a. Work with landowners to maximize utilization of nutrients by crops and minimize losses to groundwater and/or surface water.
    - i. Wastewater sediment basins to capture manure runoff
    - ii. Provide technical assistance for soil analysis and proper application of fertilizer, including urban lawn fertilizer use and/or manure
    - iii. Implement relocation of manure stockpiles and assist with waste management
4. Provide community recycling education/events for proactive efforts
- a. Continue involvement with Reduce, Reuse, Recycle Coalition regarding every two year Household Hazardous Waste Collection Day event.
  - b. Continue coordination and implementation of annual Christmas tree recycling efforts.
  - c. Complete demonstration project to reduce erosion, such as bank stabilization using natural channel design methodologies such as toe wood, and riparian area re-vegetation such as willow plantings and/or cottonwood pole plantings

**COOPERATIVE PARTNERS:** Washakie Watersheds Steering Committee, WCCD

**PRIORITY: Runoff from Rangeland and Riparian Areas**

The TMDL model calculated that by implementing Best Management Practices on Rangeland and Riparian areas, and reducing the possibility for direct defecation, Nowater Creek and the Big Horn River could result in load reductions of 7% and 1% respectively.

Overgrazing of upland areas by domestic livestock and wildlife can lead to unstable, exposed soil that is more susceptible to erosion. Livestock and wildlife management are important considerations to ensure proper forage utilization. Significant populations of livestock and big game species congregating on riparian areas and upland winter feeding areas may reduce vegetative cover. Excessive bank trampling and wading can result in increased erosion of stream banks and in-stream sedimentation.

Overgrazing of riparian areas can also have detrimental effects on vegetation that is essential for stable aquatic ecosystems and stable channel geomorphology. In addition, all warm-blooded animals have the potential to contribute pathogens to waterways through excretion directly into waterbodies, or from runoff carrying excrement from riparian and upland areas to surface waters. Animal population densities, the species present, the amount of time spent within or near waterbodies, and other site-specific factors will affect the amount of pollution that actually occurs.

## ***OBJECTIVE***

Reduce indirect bacteria contributions from Livestock and Wildlife on Rangeland and Riparian Areas.

## ***ACTION ITEMS***

1. Implement Rangeland and Riparian Best Management Practices with an emphasis on water quality to include:
  - a. Alternative Water Sources
    - i. Work with producers and partners to evaluate existing reservoirs, and to determine the need for new reservoirs, retention ponds and stock ponds within the watershed to improve upland erosion
    - ii. Work with producers and partners to develop off-stream watering facilities to move livestock and wildlife away from streams.
  - b. Work with producers and partners to enhance stream crossings and to control access to waterbodies
  - c. Work with producers and partners to develop proper techniques for streambank and channel stabilization to include:
    - i. Vegetative buffer strips
    - ii. Woody vegetation and grass plantings
    - iii. Weed management
    - iv. Riparian fencing
    - v. Channel realignment and reconstruction
2. Work with landowners and other partners to replace invasive species with natives within the Riparian areas
  - a. Continue working with landowners on invasive species removal, control, and native re-establishment, and provide cost share from grants when possible.
3. Implement Rangeland and Riparian BMP's with an emphasis on vegetation.
  - a. Work with producers to integrate proper Grazing Management such as proper timing and pasture rotation.
4. Encourage the use of Ag technologies
  - a. Encourage producers to use Remote Sensing Technology to help aide in range utilization assessments.

***COOPERATIVE PARTNERS:*** Washakie Watersheds Steering Committee, WCCD

## ***PRIORITY: Runoff from Confined and Animal Feeding Areas***

Poorly maintained and unlined corrals that are hydrologically connected to surface waters, allow contaminated wastewater to seep into groundwater and pollute rivers and streams. Inadequately sized and poorly-lined ponds or other storage structures allow manure to escape into the surrounding environment. Manure and wastewater-containing manure can severely harm river and stream ecosystems. Manure contains ammonia which is highly toxic to fish at low levels. Increased amounts of nutrients, such as nitrogen and phosphorus, from confined animal feeding operations can cause algal blooms which block waterways and deplete oxygen as they decompose.

## ***OBJECTIVE***

Reduce indirect bacteria contributions from livestock feeding area runoff.

## ***ACTION ITEMS***

1. Implement Confined and Animal Feeding Area Best Management Practices with an emphasis on water quality, including:
  - f. Vegetative filter strips
  - g. Sediment basins
  - h. Corral relocation
2. Manage winter feeding areas by providing off-stream watering facilities.
3. Manage livestock mortalities to prevent the spread of disease through composting or appropriate burial.

***COOPERATIVE PARTNERS:*** Washakie Watersheds Steering Committee, WCCD

## **VII. FUTURE MONITORING**

With the aid of this watershed plan, the Washakie Watersheds Steering Committee and WCCD plan to work with landowners and partners to implement BMP projects to improve the water quality in Nowater Creek and the Big Horn River. After these projects have been implemented and established, the WCCD will evaluate the effectiveness of these BMPs by collecting data where previous monitoring was conducted on Nowater Creek and the Big Horn River, if possible. Depending on available funds, additional monitoring sites may also be considered.

The Steering Committee and WCCD realize that even by making changes to some practices and with the implementation of BMPs, the probability of exceeding *E. coli* numbers may still be high. *E. coli* is a pathogen and is measured because it provides a good indication of other harmful pathogens which are hard to measure. However, *E. coli* is also thought to live in underwater sediments for extended periods of time, then re-suspend during high flows and storm events. These situations can be problematic when trying to analyze trend data and when trying to understand which BMPs are most effective.

## **VIII. TECHNICAL AND FINANCIAL RESOURCES**

### **1. Wyoming Department of Environmental Quality Programs**

Wyoming Department of Environmental Quality (WDEQ) offers an abundance of information and technical assistance. They provide detailed information about grant programs, enforcement programs and approved BMPs. They promulgate standards for drinking water, fish, livestock and irrigation water which can be compared to local conditions to identify problems. They also employ groundwater and surface water experts that are available to answer questions.

**205j Funds** - These funds are available annually from DEQ through a competitive proposal process. They can be used for water quality management planning projects, such as assessment, watershed planning, feasibility studies, and BMP design/engineering. When existing water quality data do not provide enough information to pinpoint problems, 205(j) funds can be used to establish a water quality monitoring network. A 25% nonfederal match is usually required. These funds can be allocated only to local governments such as Conservation Districts, Counties, and Municipalities.

**319 Funds** - These funds are used for implementation of locally-led, voluntary projects that reduce unregulated nonpoint sources of pollution. For example, after a nonpoint source pollution problem has been pinpointed through existing water quality data and/or additional monitoring,

319 funds can be used to pay for corrective measures or for evaluation of improvement. The corrective measures are often referred to as BMPs and typically include practices such as streambank stabilization, animal feeding operation improvements, grassed waterways, filter strips, sedimentation basins, etc.

## **2. University of Wyoming Extension**

University of Wyoming (UW) Extension will provide educational programming for local landowners on the topics of soil and manure management, water quality, and rangeland management. Extension Educators and State Specialists are available to assist landowners and homeowners with on-site assessments of operations. In addition, technical assistance will be provided to aid landowners in developing Best Management practices, including soil and water tests, and nutrient management.

## **3. Natural Resources Conservation Service**

The Natural Resources Conservation Service (NRCS) Worland Field Office has been heavily involved with water quality BMP projects in Washakie County. WCCD receives technical assistance from our NRCS partners for design and implementation of BMPs for local Ag producers and currently has several cost-share programs available. They also have an Agricultural Waste Management Field Handbook which includes other Ag waste management options for producers.

## **4. Farm Service Agency**

The Farm Service Agency (FSA) offers the Continuous Conservation Reserve Program (CCRP) and Conservation Reserve Program (CRP). These programs provide 50% cost share on approved conservation practices and annual rental payments to landowners, to manage acres on 10 to 15 years contracts.

## **5. Wyoming Department of Agriculture**

The Wyoming Department of Agriculture (WDA), Natural Resource Section, is responsible for providing agriculture producers with the assistance needed to protect and enhance Wyoming's natural resources while maintaining agriculture productivity. The Department also coordinates and disseminates information between local Conservation Districts and offers grants to Conservation Districts for water quality and range monitoring programs.

## **6. Wyoming Game and Fish Department**

The Wyoming Game and Fish Department (WGFD) is the steward of all Wyoming's wildlife. They are also dedicated to the conservation of sustainable, functional ecosystems capable of supporting wildlife populations at least as healthy, abundant and diverse as they were at the dawn of the 21st century. The WGFD will promote a holistic approach to habitat management, integrating management and various land uses through collaborative efforts with the general public, conservation partners, private landowners and land management agencies. The WGFD will increase public awareness of the need for managing for quality wildlife habitat today to help ensure healthy and abundant wildlife populations in the future.

In addition to technical support, WGFD can provide some financial support through the Wyoming Game and Fish Department Trust Fund. These funds can be used for acquisition, maintenance or improvement of wildlife habitat; or for the promotion of human understanding and enjoyment of the fish and wildlife resource (habitat or information & education projects). Funds can be used for internal projects or paid as grants to an outside entity (grant projects must have Department sponsor).

## **7. Wyoming Wildlife & Natural Resource Trust**

The Wyoming Wildlife and Natural Resource Trust (WWNRT) was created by legislative action in 2005 for the purposes of preserving and enhancing Wyoming's wildlife and natural resources. The trust account is governed by a Board of nine citizens, each representing a geographic district, and collectively reflecting "...a broad spectrum of experiences including wildlife, agriculture, energy, sportsmen, and tourism" (WS 9-15-104a). Income from the trust account will be used to fund a wide variety of wildlife and natural resource conservation programs.

Projects are required to provide a public benefit. Applicants are encouraged to fully document all public benefits, such as continued agricultural production to maintain open space and healthy ecosystems; enhanced opportunities for outdoor recreation; enhancements to air, land, or water quality; maintenance or enhancement of wildlife habitat; preclusion of soil loss or disease; or other perceived public benefits.

**APPENDIX A**

**MILESTONE TABLE**

**Bighorn River – Nowater Creek Watershed Implementation Plan  
2016-2018  
Milestone Table**

**Priority:** Watershed Implementation Awareness and Education

**Objective:** Maintain an active, collaborative Big Horn River-Nowater Creek watershed improvement effort, increase awareness through outreach strategies, and coordinate discussions with the community.

Action Item	2016	2017	2018
<b>Action 1. Steering Committee will meet periodically to review progress on implementation efforts</b>			
Meet quarterly/as needed to review progress. (either meeting/via email/teleconference)	Jan April July Oct	Jan April July Oct	Jan April July Oct
Incorporate recommendations from Big Horn River TMDL.	Ongoing	Ongoing	Ongoing
Update Implementation Plan as needed.	Ongoing	Ongoing	Ongoing
Develop and prioritize parameters for information pertaining to grants.	Ongoing	Ongoing	Ongoing
<b>Action 2. Participate in and/or host special forums or meetings to educate the public on implementation efforts</b>			
Develop informational booths to showcase before and after implementation projects during WESTI Ag Days, Washakie County Fair, and other events.	Feb Aug	Feb Aug	Feb Aug
Develop articles pertaining to the water quality issues associated with the Big Horn River and Nowater Creek.	Ongoing	Ongoing	Ongoing
Inform the public through radio, area news sources, and social media opportunities.	Ongoing	Ongoing	Ongoing
Host educational workshops for landowners during WESTI Ag Days and also separate workshops for small acreage landowners, range monitoring, and other natural resource topics of interest.	Feb March May Sept	Feb Sept	Feb Sept
Continue partnerships with others to host tours/forums to showcase projects that have provided an economic and environmental improvement.	Aug	Aug	Aug
Survey landowners to gather local input regarding specific watershed project needs.	Feb	Feb	Feb
<b>Action 3. Improve Delivery of Cost-Share Programs to encourage participation and effective use of resources</b>			
Host special meetings with landowners to encourage participation in project implementation using 319 or other grant funds.	April	April	April
Continue to provide informational resources to landowners on septic systems, livestock feeding operations, and BMP's for small acreages.	Ongoing	Ongoing	Ongoing
Distribute localized mailings to provide information on specific issues and programs.	Ongoing	Ongoing	Ongoing

**Priority:** Runoff from Cropland

**Objective:** Reduce indirect bacteria contributions from Agricultural production on Cropland; improve water quality from return flows.

Action Item	2016	2017	2018
<b>Action 1. Implement Cropland BMP's with an emphasis on water quality, including:</b>			
<b>Water Efficiency:</b> -Work with producers and partners to improve irrigation and delivery systems.	Ongoing	Ongoing	Ongoing
<b>Tillage Practices:</b> -Work with producers to apply deep tillage practices in flood irrigation systems where applicable. -Work with producers to apply minimum tillage practices in Crop Rotation systems where applicable.	Ongoing	Ongoing	Ongoing
<b>Nutrient Management:</b> -Work with producers to maximize utilization of nutrients by crops and minimize losses to groundwater and/or surface water.	Ongoing	Ongoing	Ongoing

**Priority: Runoff from Cropland CONTINUED...**

Action Item	2016	2017	2018
<b>Action 2. Implement Cropland Best Management Practices with producers, with an emphasis on proper vegetation techniques to include:</b>			
Conservation Crop Rotation practices, Cover Cropping, Filter Strips, Riparian Buffers, Wastewater Sediment Basins, and Soil Moisture Sensors	Ongoing	Ongoing	Ongoing
<b>Action 3. Implement Cropland BMP's for Livestock and Wildlife grazing on Cropland to include:</b>			
<b>Manage Waste:</b> -Work with producers to implement relocation of waste and/or proper application.	Ongoing	Ongoing	Ongoing
<b>Manage Winter Feeding areas:</b> -Work with producers and partners to develop off-stream watering facilities. -Work with producers to manage crop stubble height.	Ongoing	Ongoing	Ongoing
<b>Encourage Use of Ag Technologies</b> -Work with producers to install P.V. Solar and other innovative practices that also encompass NRCS's Integrated Pest Management and/or Nutrient Management recommendations. -Encourage producers to use Soil Zoning and Remote Sensing Technology for in-depth soils data. -Encourage producers to use Variable Rate Irrigation Technology to improve management of irrigation water and nutrients, thereby reducing pollutant loading.	Ongoing	Ongoing	Ongoing

**Priority: Runoff from Urban and Small Acreages**

**Objective: Reduce indirect and direct bacteria contributions from straight pipe and faulty septic systems, manure stockpiling, at-risk animal feeding operations, and direct access to streams from urban and small acreage sources.**

Action Item	2016	2017	2018
<b>Action 1. Implement Urban and Small Acreage BMP's with an emphasis on water quality to include:</b>			
Septic system and straight pipe replacement, fencing off streams and/or installing water gaps, and off-stream water facilities	Ongoing	Ongoing	Ongoing
<b>Action 2. Implement Urban and Small acreage BMP's for Nutrient Management including fertilizers and manure.</b>			
Work with landowners to maximize utilization of nutrients by crops and minimize losses to groundwater and/or surface water to include: -Wastewater sediment basins to capture manure runoff -Provide technical assistance for soil analysis and proper application of fertilizer and/or manure. -Implement relocation of manure stockpiles and assist with waste management..	Ongoing	Ongoing	Ongoing
<b>Action 3. Implement Urban and Small Acreage BMP's for Nutrient management, including fertilizers and manure.</b>			
Work with landowners to maximize utilization of nutrients by crops and minimize losses to groundwater and/or surface water to include: -Wastewater sediment basins to capture manure runoff -Provide technical assistance for soil analysis and proper application of fertilizer and/or manure -Implement relocation of manure stockpiles and assist with waste management	Ongoing	Ongoing	Ongoing
<b>Action 4. Provide community recycling education/events for proactive efforts to include:</b>			
Continue involvement with Reduce, Reuse, Recycle Coalition regarding every two year Household Hazardous Waste Collection Day event.	Jan - May		Jan - May
Continue coordination and implementation of annual Christmas tree recycling efforts.	Jan	Jan	Jan
Complete demonstration project to reduce erosion, such as bank stabilization using natural channel design methodologies such as tow wood, and riparian area re-vegetation such as willow plantings and/or cottonwood pole plantings.		April	

**Priority:** Runoff from Rangeland and Riparian Areas

**Objective:** Reduce indirect bacteria contributions from Livestock and Wildlife on Rangeland and Riparian Areas.

Action Item	2016	2017	2018
<b>Action 1. Implement Rangeland and Riparian BMP's with an emphasis on water quality to include:</b>			
<b>Alternative Water Sources:</b> -Work with producers and partners to evaluate existing reservoirs, and determine the need for new reservoirs, retention ponds, and stock ponds within the watershed to improve upland erosion. -Work with producers and partners to develop off-stream watering facilities to move livestock and wildlife away from streams.	Ongoing	Ongoing	Ongoing
Work with producers and partners to enhance stream crossings and to control access to waterbodies	Ongoing	Ongoing	Ongoing
Work with producers and partners to develop proper techniques for streambank and channel stabilization to include: Vegetative buffer strips, woody vegetation and grass plantings, weed management, riparian fencing, and channel realignment and reconstruction.	Ongoing	Ongoing	Ongoing
<b>Action 2. Work with landowners and other partners to replace invasive species with natives within the Riparian areas</b>			
Continue to work with landowners on invasive species removal, control, and native plant re-establishment, and provide cost share from grants when possible.	Ongoing	Ongoing	Ongoing
<b>Action 3. Implement Rangeland and Riparian BMP's with an emphasis on vegetation</b>			
Work with producers to integrate appropriate grazing management practices such as proper timing and pasture rotation.	Ongoing	Ongoing	Ongoing
<b>Action 4. Encourage the use of Ag technologies</b>			
Encourage producers to use Remote Sensing Technology to help aide in range utilization assessments.	Ongoing	Ongoing	Ongoing

**Priority:** Runoff from Confined and Animal Feeding Areas

**Objective:** Reduce indirect bacteria contributions from runoff from livestock feeding area runoff.

Action Item	2016	2017	2018
<b>Action 10. Implement Confined and Animal Feeding Area BMP's with an emphasis on water quality, to include:</b>			
Vegetative filter strips, sediment basins, and corral relocation	Ongoing	Ongoing	Ongoing
Manage winter feeding areas by providing off-stream water facilities.	Ongoing	Ongoing	Ongoing
Manage livestock mortalities to prevent the spread of disease through composting or appropriate burial.	Ongoing	Ongoing	Ongoing

## **APPENDIX B**

### **USDA NRCS CONSERVATION PRACTICES PHYSICAL EFFECT (CPPE) GUIDE**

**AND**

### **WDEQ BMP MANUALS**

Cropland ***BMP Manual - Wyoming Department of Environmental***  
Urban ***BMP Manual - Wyoming Department of Environmental***  
Livestock/Wildlife - ***Wyoming Department of Environmental Quality***

**A PAPER COPY OF EACH OF THE ABOVE IS AVAILABLE UPON REQUEST TO:**

**WASHAKIE COUNTY CONSERVATION DISTRICT  
208 SHILOH ROAD  
WORLAND, WYOMING 82401  
(307) 347-2456 EXT. 101**

wccd@rtconnect.net

# APPENDIX C

## REFERENCES

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## **APPENDIX D**

### **MEMBERS OF STEERING COMMITTEE PLANNING TEAM WCCD BOARD OF SUPERVISORS**

#### **WASHAKIE WATERSHEDS STEERING COMMITTEE:**

Dave Slover, WCCD Board Member

Steve Snyder, Landowner

Vance Lungren, Jr., Landowner

Gary Throntveit, Landowner

Brian Perry, Landowner

Caitlin Youngquist, University of Wyoming Extension, Washakie County Extension Educator

Kitsy Barnes, Landowner

Peggy Truman, Landowner

Jared Dalebout, Bureau of Land Management (BLM) Hydrologist

Ray Gullion, NRCS Range Conservationist

Laura Burckhardt, Wyoming Game & Fish Department Aquatic Habitat Biologist

#### **PLANNING TEAM:**

Cathy Rosenthal, Wyoming Association Of Conservation Districts

Victoria Dietz; Director Washakie County Conservation District

Karen Fenton; Program Assistant, Washakie County Conservation District

Jennifer Zygmunt, Wyoming Department Of Environmental Quality

#### **WASHAKIE COUNTY CONSERVATION DISTRICT BOARD OF SUPERVISORS**

Dan Rice

Vance Lungren

Charley Orchard

Dave Slover

Susan Pennington

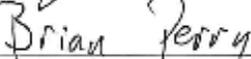
## APPENDIX E

### Big Horn River-Nowater Creek Watershed Implementation Plan

#### Signature Page

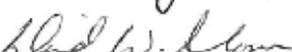
On December 14, 2015, the Washakie Watersheds Steering Committee adopted the Big Horn River-Nowater Creek Watershed Implementation Plan as a method for addressing water quality concerns in the Big Horn River-Horse Gulch and the Nowater Creek-Wildcat Gulch watersheds in Washakie County.

  
Washakie Watersheds Steering Committee Member

  
Washakie Watersheds Steering Committee Member

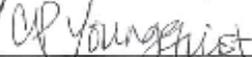
  
Washakie Watersheds Steering Committee Member

  
Washakie Watersheds Steering Committee Member

  
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Washakie Watersheds Steering Committee Member

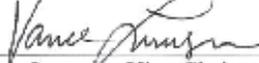
  
Washakie Watersheds Steering Committee Member

The Washakie County Conservation District's Board of Supervisors approved the Big Horn River-Nowater Creek Watershed Management Plan on December 21, 2015

  
Dan Rice, Chairman

  
Dave Slover, Secretary/Treasurer

  
Susan Pennington, Member

  
Vance Lungren, Vice-Chairman

  
Charley Orchard, Member

Washakie County Conservation District  
Big Horn River-Nowater Creek Watershed Plan 2016 – 2018

# APPENDIX F

## Public Notice of Big Horn River-Nowater Creek Watershed Implementation Plan

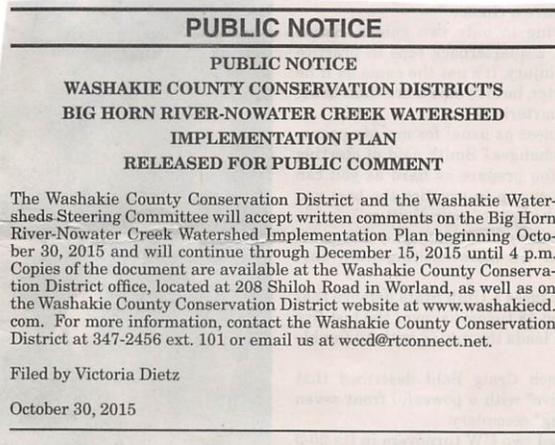
### Affidavit of Publication

STATE OF WYOMING )  
 ) s.s.  
COUNTY OF WASHAKIE )

I, Patrick Murphy

Do solemnly swear that I am Publisher  
of "THE NORTHERN WYOMING DAILY NEWS -  
WORLAND GRIT - WYOMING NEWS - WASHAKIE  
SIGNAL FIRE," a daily newspaper of general circulation,  
published daily at Worland, Washakie County, State of  
Wyoming; that the notice attached hereto, and which is a part  
of this affidavit and part of the proof of:

Washakie County Conservation District's  
Big Horn River-Nowater Creek Water-  
shed Implementation Plan Released  
for Public Comment



was published in said newspaper for 1 consecutive  
weeks, the first publication having been made on the

30th day of October, 2015,

and the last publication on the 30th day of

October, 2015.

that said notice was published in the regular and entire issues  
of the paper during the period and time of publication and that  
the notice was published in the newspaper proper and not in a  
supplement.

IN WITNESS WHEREOF, I have hereunto set my hand this

30th day of October, 2015

Patrick Murphy  
Publisher

Subscribed and sworn to before me this 30th day

of October, 2015.

My commission expires on the 6th day of May  
2019.

Jeanette Maya  
Notary Public

