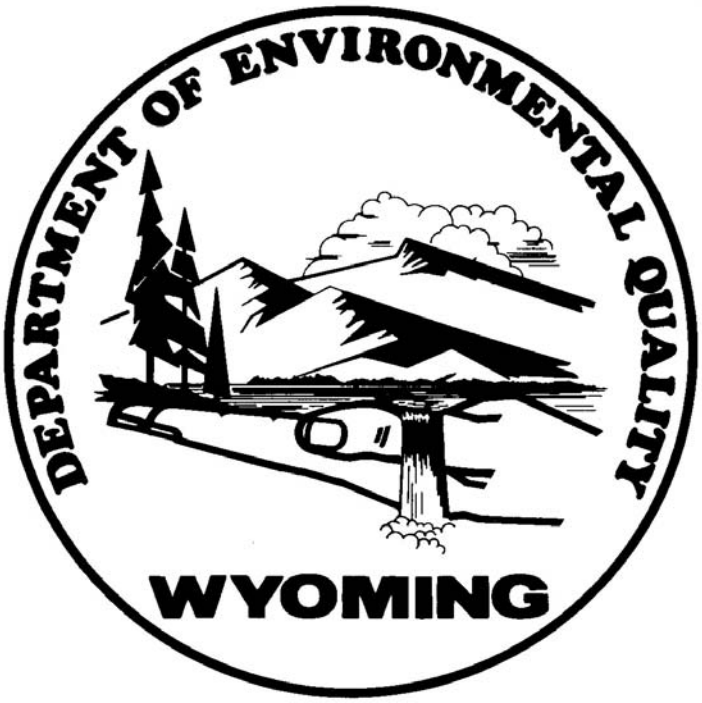
Wyoming's 2004 305(b)
State Water Quality Assessment Report

and

2004 303(d) List
of Waters Requiring TMDLs



June, 2004

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Executive Summary

Wyoming's 2004 305(b) Water Quality Assessment Report [305(b) Report] presents a summary of water quality conditions in the state, as required by Section 305(b) of the Clean Water Act. Included in this report is Wyoming's 2004 303(d) List of Waters Requiring TMDLs [303(d) List].

EPA's guidance for the 2004 305(b) Report asks that the same assessment methodology be used for both the 305(b) Report and the 303(d) List, and that the methodology used is developed with opportunity for public comment. Wyoming began using the same methodology for both the 305(b) and 303(d) processes in 2000, using publicly reviewed methodology, which meets all requirements of Wyoming's "credible data" law. This methodology was updated and was made available for public comment along with the 2002 305(b) report and 303(d) List. This methodology was used to develop the 2004 305(b) Report and the 2004 303(d) List.

In addition, the guidance asks that all waters of the state be placed into one of five categories of use attainment, based on all available data.

1. All designated uses are met.
2. Some designated uses met, but unknown on others.
3. Insufficient data to determine if any designated uses are met.
4. Water is impaired or threatened but a TMDL is not needed.
5. TMDLs are needed. The 303(d) List.

The federal section 305(b) guidance also requests that this report contain updates on programmatic changes and water quality issues in the state. Since the last 305(b) Report, Wyoming Department of Environmental Quality - Water Quality Division (DEQ) has continued to monitor ambient water quality as part of its comprehensive monitoring effort. Assessments on an additional 2141 miles of streams are included in this report. The booming coal bed methane (CBM) industry in Wyoming has generated a number of concerns regarding potential water quality impacts which are being addressed by DEQ. Wyoming has also entered into an agreement with Montana to ensure that discharges from CBM production in Wyoming does not impact designated uses in Montana's waters.

The 2004 303(d) List is incorporated into three tables (Tables A, B & C). Table A is a list of waters with water quality impairments requiring a TMDL. DEQ is adding six new segments to Table A. One segment is for aquatic life use impairments, and the other five for contact recreation use impairments. Twenty-seven new segments were added to Table B, which are waters with waste load allocation discharge permits expiring, due to review of the Waste Load Allocations/TMDLs for the discharge permits. No new segments were added to Table C, and two were removed because monitoring data indicated the streams were meeting their designated aquatic life uses. In addition to the two waters removed from Table C, another twenty six waterbody segments are delisted from Table B of the 2002 303(d) list due to EPA approval (or expected approval) of Waste Load Allocations/TMDLs on permitted discharges. The delisted waters can be found on Table D.

Monitoring and Assessment

Progress Toward Monitoring

2002 Statewide Biomonitoring

Monitoring efforts in 2002 were intended to complete the 1998-2002 comprehensive monitoring plan by focusing on mainstem segments of the North Platte River, the Bighorn River, the Green River, and the Belle Fourche River, as well as on lakes, ponds, and reservoirs. In addition, stream segments not monitored as scheduled in previous years were slated for monitoring in this final year, as were reference sites. In 2002, DEQ conducted monitoring on 32 of the stream/river segments and nine lakes/ponds/reservoirs of the 1998-2002 comprehensive monitoring plan, one "Table C" threatened segment, two segments with "Table B" NPDES permits expiring, and 21 reference sites.

2003 Statewide Biomonitoring

In 2003, DEQ initiated implementation of a new comprehensive monitoring plan. The 2003 effort focused on follow-up monitoring on stream/river segments of the previous monitoring plan that were not adequately assessed by one monitoring event alone. Also included is monitoring of reference sites, impaired waters, threatened waters, and monitoring in support of NPDES permitting and as follow up to watershed improvement projects. In 2003, follow-up monitoring was conducted on 22 stream/river segments of the 1998-2002 monitoring plan, four impaired waters, one threatened water, nine waters with past watershed improvement projects, five additional waters, and 23 reference sites.

Environmental Monitoring and Assessment Program

EPA is conducting the Environmental Monitoring and Assessment Program (EMAP) across the western United States, including Wyoming. The objectives of this project are to develop the monitoring tools (biological indicators, stream survey design, estimates of reference condition) necessary to produce unbiased estimates of the ecological condition of surface waters across large geographic areas of the west, and demonstrate those tools in a large scale assessment. Unbiased estimates require either a complete census of the ecological resource of interest (which is not practical) or a probability survey design that allows for extrapolation of monitoring results to the entire resource of interest. Such an approach will enhance the ability of the State to make unbiased statements about water quality and ecological condition at a much larger scale than is possible with the current design.

WDEQ has contracted the Wyoming district of the United States Geological Survey (USGS) to carry out this program in Wyoming. The USGS has recently completed the fourth and final year of data collection, which will be followed by data analysis and report writing, expected to be completed by 2005. It is possible that EMAP monitoring will continue beyond next year in a limited amount, most likely in the way of smaller scale focus projects. Such projects are dependent upon funding availability, as well as the prioritization of State and Federal monitoring needs.

Statewide Water Quality Network

WDEQ sponsors USGS water quality sampling at 25 strategically located fixed stations across Wyoming. Sampling is conducted quarterly in most cases, with sampled parameters dependent upon suspected pollutants. Sites are used to identify problem areas, trends in water quality condition, and for NPDES permitting and compliance uses.

Monitoring in Area of Coal Bed Methane Development

In addition to the statewide water quality network, WDEQ has sponsored USGS water quality monitoring at 20 fixed stations in the coal bed methane (CBM) region of northeast Wyoming since 2001. Monitoring is funded by a combination of State, federal, and USGS matching funds. Federal grants were also utilized to expand the suite of parameters sampled and to increase the frequency of sampling at some locations, conduct biological monitoring at a subset of those locations, and conduct bed sediment and fish tissue contaminant sampling at two locations. Objectives of this monitoring program were to determine baseline water quality and biological condition at locations presently unaffected by CBM discharges and to determine water quality and biological conditions at stream stations currently receiving CBM effluent.

2004-2008 Comprehensive Monitoring Plan

The WDEQ comprehensive monitoring plan for 2004-2008 (currently in draft form) builds upon the past monitoring plan by continuing to collect the data required to make defensible determinations of designated use support on the specific waters listed in the 1998-2002 monitoring plan. The past plan largely entailed a targeted-station design, where assessment station locations were selected based upon known or suspected influences on water quality (both natural and anthropogenic) within the stream segment or water body of interest, including tributaries, different geological strata, point-source discharges, urban areas, land uses, etc. The goal of this approach was to define water quality in a specific segment or region and at the same time partition out potential sources and causes of impairment. As stated previously, the initial monitoring effort on these waters, in many cases, did not provide conclusive evidence of designated use support.

The new plan differs from the past plan in many ways, but foremost it describes the multiple approaches that will be used to address WDEQ monitoring objectives and the approximate relative weight each will be given within each year of the five year period. It does not list specific water bodies to be monitored. The following approaches are integrated into the 2004-2008 plan:

1. Continued monitoring of stream reference stations;
2. Targeted stream station design using both screening and intensive-level monitoring to assess designated use support using a rotating basin approach;
3. Randomized stream station selection design;
4. Lakes/wetlands monitoring;
5. Monitoring in support of NPDES permitting;
6. Evaluation of projects funded through CWA Section 319 grants;
7. Special studies;
8. Contractual agreements (synoptic studies, fixed stations).

Monitoring by Conservation Districts

Conservation Districts have taken an active role in water quality monitoring. Wyoming Association of Conservation Districts (WACD) sponsors a four week watershed training curriculum. After undergoing this training, conservation district personnel are considered by WACD as qualified to develop Sampling and Analysis Plans, conduct monitoring, and interpret the results. Conservation Districts in Wyoming have spent approximately14.7 million dollars on monitoring and BMP implementation on 84 waters since the early 1990's (WACD, 2002). Conservation districts have provided data which meets "credible data" requirements and provides information that DEQ did not already have on approximately 19 of those waterbodies since 1996. Due, in part, to implementation activities by conservation districts, portions of 5 waters have been removed from the 303(d) List since 1998.

Wyoming's Method for Determining Water Quality Condition of Surface Water

Section 305(b) of the Clean Water Act requires the state to describe the condition of all waters of the State. In addition, Section 303(d) requires that the state develop a listing of all waters which are impaired and do not fully support existing or designated uses. Essentially, a water is deemed to be "impaired" or "non-supporting" if any narrative or numeric criteria are exceeded or designated uses are shown to be adversely affected by man's activities. Along with the 2002 305(b) Report and the 303(d) List, DEQ released "Wyoming's Method for Determining Water Quality Condition of Surface Water" as a separate document for public comment. The purpose of this methodology document is to outline the criteria and decision-making processes employed by the department for the purpose of making determinations about the quality of surface waters of the state. This methodology was used to develop the 2004 305(b) Report and the 303(d) List. "Wyoming's Method for Determining Water Quality Condition of Surface Waters" is available at the DEQ-WQD Website http://deq.state.wy.us/wqd.htm.

Discussion of "Habitat Degradation"

Watershed assessment involves looking at the combination of chemical, physical, and biological conditions to determine stream "health." The endpoint for aquatic or stream health is the biological community, which is controlled by both chemical and physical processes. Most of the numeric criteria in Wyoming are based on chemistry, while most narrative criterias address physical and biological integrity. Chemical health is usually fairly easy to understand: too much (or in some cases, such as dissolved oxygen, too little) of a substance dissolved in the water can have deleterious effects on the biological community. Therefore, a healthy biological community thrives best in water with certain chemical characteristics. But how do physical attributes affect the stream and its biological community?

As healthy streams flow through different types of terrain, they exhibit certain characteristics which can generally be predicted based on climate, flow regimes, substrate, valley shape, gradient, and other landscape features. Perhaps the most important attribute common to healthy streams in any environment is stream stability. Although streams are always changing somewhat, a healthy stream is relatively stable from one year to the next, in all flow regimes, from floods to low flows or even no flows. Stable streams have the ability to transport sediment

loads under bankfull conditions without significant erosion or instream sediment deposition. Because of this stability, aquatic organisms can establish themselves without being eradicated by severe scouring from floods and/or without being smothered by excessive sediment deposition. A stable stream also has a variety of habitats and physical features which provide living space for more age groups of fish and diverse communities of aquatic organisms. From a water quality standpoint, it will trap and remove sediment and nutrients in the flood plain and riparian area during high flows, which improves instream water quality for aquatic life, while benefitting riparian plants, which in turn benefit livestock and wildlife.

Not only does a stream in good physical condition benefit aquatic life, but it also reduces flood damage to adjacent property, and provides better sub-irrigation and production in valuable bottom lands. Because of the moisture holding capability of a healthy riparian system, peak flows are reduced and stream flow continues longer in the season, which is good for both aquatic life as well as users of the stream water.

Because these processes and effects are so interlinked, a physically degraded stream will nearly always exhibit more than one physical problem. For example, a stream with severely eroding banks will also usually be wider and shallower than a stream in good condition. Depending on the flow regime, it will also probably have areas of excessive instream sediment deposition as well as areas of high sediment transport which do not allow many stable areas for aquatic life to live. Generally, there will also be less variety of aquatic habitat. These physical and habitat problems are often compounded because the stream can be more prone to developing anchor ice in the winter and can also have higher summer temperatures. Obviously the end result has a large impact on the biological community.

When DEQ conducts stream assessments, chemical, physical, and biological conditions are examined and compared with the ranges of conditions expected, based on a suite of reference streams with similar geology, flow regimes, substrate, valley shape, gradient, and other landscape features. If, using a weight of evidence approach, a stream without chemical problems has substantially degraded physical and habitat features, with a resulting degraded biological community, it is considered impaired for aquatic life due to physical degradation of the aquatic habitat. For the purposes of 305(b) reporting and the 303(d) listing process, the combination of those degraded physical and habitat conditions is summed up in the broad term “Habitat Degradation.”

Although habitat degradation is not a pollutant, EPA feels that most habitat degradation that is seen in western streams is due to unbalanced sediment loading, and that sediment is a pollut**ant**. Therefore, those waters impaired or threatened by habitat degradation need to be listed on the 303(d) list, and not placed in Category 4C. Habitat degradation caused only by low flows is considered pollu**tion** and those waters could be placed in Category 4C, however, none of the waters on the current 303(d) List identified as threatened or impaired for habitat degradation have been identified as due solely to low flows or flow alteration. Additionally, no waters were added to the 2004 303(d) List for habitat degradation.

E. Coli as an Indicator of Fecal Contamination

Fecal coliform are a group of different coliform bacteria which live in fecal material of warm-blooded animals, including humans. Traditionally, counting fecal coliform colony forming units

(CFUs) has been the primary method to detect and quantify fecal contamination in water. However, counts of *E. coli*, one of the bacteria that make the fecal coliform group, has been found to better indicate risk of illness to people exposed to contaminated water. EPA is recommending that states use criteria based on *E. coli*, rather than fecal coliform, in their standards for contact recreation uses. Wyoming expects to transition to *E. coli* criteria in the next revision of its Water Quality Rules and Regulations for surface water standards.

Consequently, DEQ and several other entities in the state, have been sampling primarily for *E. coli* to quantify fecal contamination. Because *E. coli* is a subset of fecal coliform, counts of *E. coli* are compared with the current fecal coliform criterion to determine contact recreation use support, when fecal coliform data are not available.

Coal Bed Methane Development

The structural unit of the Powder River Basin, consisting of the hydrologic units of the Upper Cheyenne River, Upper Belle Fourche River, and most of the Little Powder River, Powder River, and Tongue River continues to experience increased Coal Bed Methane (CBM) activity. In addition, there continues to be expansion of coal mining operations in the structural unit of the Powder River Basin. The proposed CBM activities include 50,000 water and gas extraction wells and associated roads, pipelines, pumping stations, power lines, and other infrastructure to be constructed over a 20 to 30 year period.

CBM development is expanding into other areas of the state. Currently there is also CBM activity in the North Platte, Little Snake, and Green River basins.

To produce the gas, operators must partially de-water the coal seam. The produced water is often of high enough water quality that it can be discharged to surface waters, and in some cases has been successfully used for irrigation, or for pond and wetland development. However, there are some water quality issues associated with these discharges:

1. The discharges are often to stream channels that are ephemeral. These discharges, if not controlled, can potentially result in accelerated erosion and sedimentation.

2. In some parts of the basin, the discharge water may be elevated in sodium to the point that it is not suitable for irrigation. If not managed carefully, it could result in sodic soils.

3. Downstream states have raised concerns about how the chemistry of this discharge water may affect their designated uses of the main stem water.

4. Long-term chronic effects of CBM water discharges on fisheries, aquatic life, and other designated uses are not well known.

Wyoming and Montana continue to cooperate in the development of Coal Bed Methane (CBM) activities and to monitor the effects of these activities on the Powder River drainage. The cooperation between the two state DEQs provides assurance that Montana's downstream water uses will be protected while coal bed methane develops in the upper reaches of the drainage.

The cooperative effort recognizes that Wyoming can proceed with permitting additional CBM operations, but will do so in a cautious manner to protect Montana's downstream users of the Powder River. The effort includes a comprehensive monitoring network, collection of real time monitoring data at the border, and periodic analysis of trends. It sets reaction levels, based primarily on salinity and the sodium absorption ratio (SAR), should unexplained changes be observed in the recorded history of the system. If reaction levels are reached at the border, the comprehensive monitoring network is used to reassess the system to determine if the upsets may be associated with CBM operations or some other source or anomaly. This comprehensive watershed monitoring and analysis program also helps the two states develop a better understanding of the Powder River system and how it responds to the new CBM activity.

Wyoming continues to work cooperatively with Montana as they develop downstream TMDLs for the Powder and Tongue Rivers. These tools, along with the comprehensive monitoring data, will help shape continued cooperative understanding between the two states. The process allows Wyoming to issue additional permits and to renew existing permits in a manner that accounts for projected cumulative impacts to the Powder River system which can be verified with monitoring data. Wyoming encourages permittees to employ discharge management practices that will reduce potential adverse water quality impacts to the main stem Powder River, including such practices as consumptive use, storage, reinjection, etc.

All discharges to surface waters of the state from CBM operations require a state NPDES permit. These permits set effluent limits that assure protection of designated uses of the water, which include the basic uses for livestock, aquatic life and wildlife, and in many cases, higher uses for fish and public drinking water.

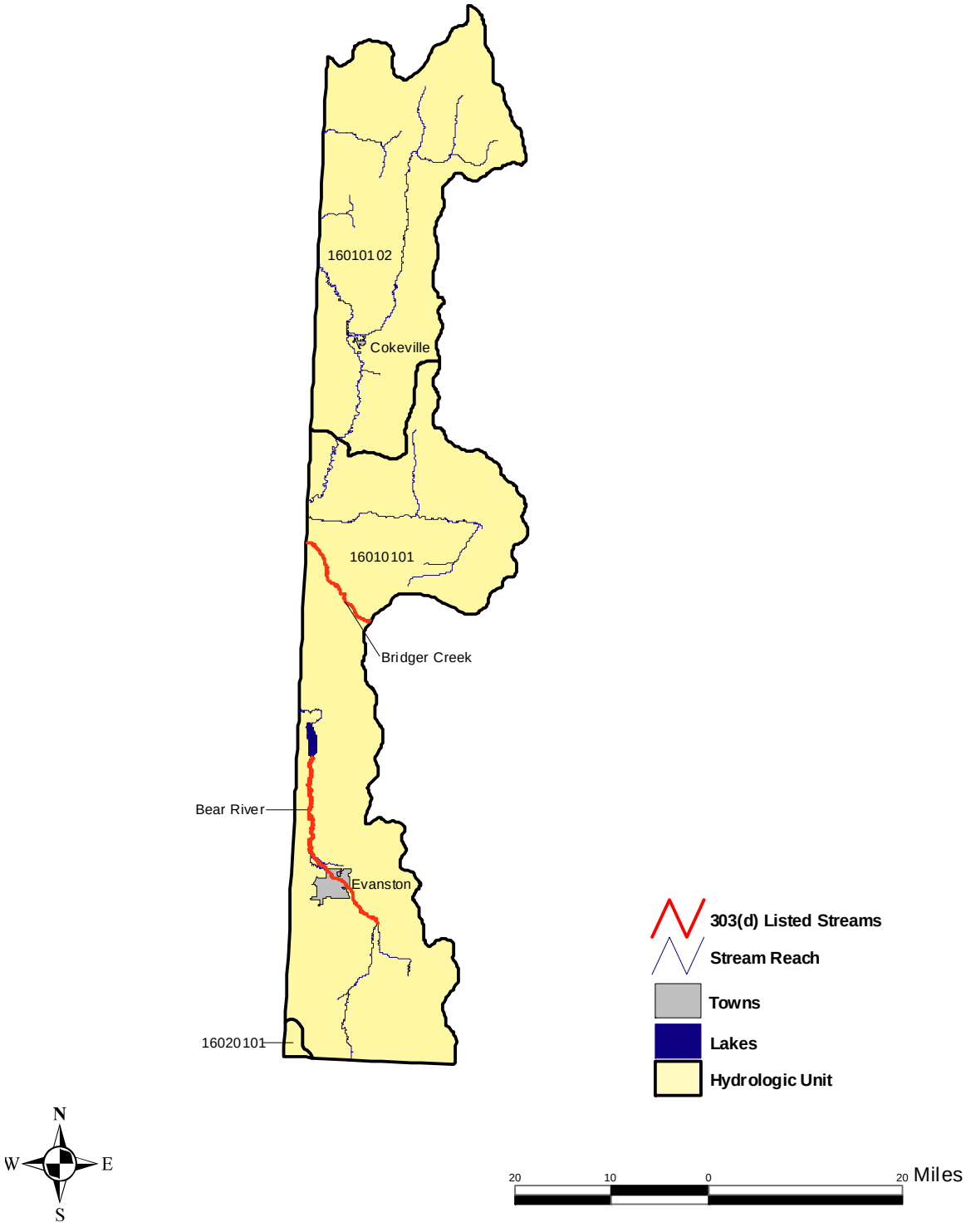
River Basin Descriptions and Summaries of Water Quality Conditions

The following sections describe the major river basins in Wyoming and summarize water quality conditions in each basin. Each basin section is preceded with a map that shows the major water bodies and eight digit Hydrologic Units (HUCs), and highlights the approximate location of the impaired and threatened waters on the 2004 303(d) List. Each basin section is then subdivided into HUCs, referred to as sub-basins in this report. Water quality conditions, based on existing data and information, are discussed in each of these sub-basin sections.

Please note that only "credible data", as defined by Wyoming Law, has been used to make designated use support decisions. However, in much of this report, probable water quality conditions or concerns may be described, based on valid data and information, because DEQ has a responsibility to the public to describe what is known about water quality in Wyoming. We have attempted to clearly distinguish between the designated use decisions and probable water quality conditions in this report. Both use attainment and water quality conditions can change over time and this report was written based on the best available knowledge at this time. If you know of available data or information which can be used to better describe water quality conditions, please notify our 305(b) Coordinator, Mark Conrad, in writing at DEQ-WQD, 122 West 25th Street, Herschler Building 4-W, Cheyenne, WY 82002, fax (307) 777-5973 or email to mconra@state.wy.us.

Also, please note that the maps and highlighted 303(d) waters are not necessarily drawn to scale, and the beginning and end points of the water quality limited reaches may not be accurate. The highlighted reaches are only shown to give an approximate location within a river basin. Please refer to the location description in the 303(d) List to determine the extent of the reach, as well as existing data allows. Additionally, because streams are dynamic entities, and because the extent of water quality limitations varies over time, the exact location of water quality limitations often can only be approximated. As further sampling is conducted, the extent of water quality limitations can be better described. If you know of available data which can be used to better delineate these stream reaches, please let us know.

Bear River Basin



Bear River Basin

The Bear River originates in the Uinta Mountains of Utah and flows north into Wyoming. Below Evanston it is dammed at Woodruff Narrows, flows back into Utah, then re-enters Wyoming near Sage. It flows toward the north through Cokeville and then crosses into Idaho, near the town of Border. Water from the Bear River is diverted into Bear Lake to increase storage capacity. Eventually the Bear River reaches the Great Salt Lake in Utah, making it the largest river in the western hemisphere without an ocean outlet.

Below Woodruff Narrows Reservoir the valley widens and water is extensively diverted and utilized for irrigation of alfalfa, pasture land and small grains. Bear River Basin streams are mostly perennial at higher elevations, but at lower elevations, stream flow in smaller streams is often intermittent or ephemeral. The basin contains many large reservoirs and hundreds of small stock ponds and reservoirs as well as extensive networks of irrigation canals.

The Bear River is apportioned among Idaho, Utah and Wyoming, under the interstate compact agreement of 1958 and amended in 1978. Many streams which were reportedly perennial in the past, now do not flow during some months (ERI, 1992; NRCS, 2001). This may be due in part to irrigation diversions, but channel down cutting, loss of riparian vegetation and damming of drainages are also possible causes. Many studies associated with the Bear River and its tributaries in Wyoming and Bear Lake in Utah have been completed and published.

In the Bear River Basin in Wyoming, much of the geology consists of fine-grain sedimentary formations which have been thrust faulted into steep, geologically young mountains which are easily eroded. As a result, surface waters have a high natural load of fine sediment, and often salts, carbonates, sulfates, and/or phosphate, which are found in the parent geologic material. Streams in much of the basin are highly dependent on vegetation for physical stabilization and are usually very sensitive to disturbance.

Two of the major water quality concerns in this basin are centered around the Bear River (Bonneville) cutthroat trout and the water quality of Bear Lake in Idaho and Utah. Historically, Bear River cutthroat trout were found throughout the Bear River Basin, but competition from non-native species, loss of aquatic habitat, and water quality changes have impacted the populations of these fish. The Bear River cutthroat trout was petitioned for listing under the Endangered Species Act as a threatened species throughout its range in 1998. In 2001, the U.S. Fish and Wildlife Service (USFWS) determined that listing was not warranted. It is the view of the Wyoming Game and Fish Department (WGFD) and of DEQ that the best and most economical ways to protect this species are through education, protecting and rehabilitating stream habitat, and reducing competition from unwanted introduced species.

Naturally high levels of calcium carbonate and historically crystal clear water in Bear Lake give it a very blue color. However, studies have shown that nutrient enrichment, and subsequent algal growth, has decreased the clarity of the water. In order to increase the range of Bear River cutthroat trout and improve the water quality in Bear Lake, numerous water quality studies and improvement projects have been conducted in the watershed, including Wyoming.

The Upper Bear River Sub-basin (HUC 16010101)
In Wyoming this sub-basin includes those areas from the Twin Creek drainage upstream. Primary land uses are grazing in the uplands, irrigated hay and small grain production along

valley bottoms, oil and gas production (including gas processing), and areas of historic phosphate and coal mining.

Water quality assessments conducted by DEQ on the Bear River in 1995, 1996, and 1998 indicate it is supporting its designated use as a cold water fishery above Sulphur Creek. DEQ also conducted monitoring on the Bear River below Sulphur Creek in 1998. Analysis of that data indicates that the Bear River, between Sulphur Creek and Woodruff Narrows Reservoir, is only partially supporting its aquatic life uses due to instream sediment deposition. Much of this reach is channelized, which has resulted in a significant loss of trout habitat. This reach was added to Table A of the 303(d) List in 2002. Uinta County Conservation District has formed a watershed steering committee and expects to have a watershed plan completed in 2006 (UCCD, 2004). The Bear River in and near Evanston is the site of a cooperative WGFD Riparian improvement project.

Assessments were also conducted by DEQ in 1998 and 1999 on Sulphur Creek, both above and below Sulphur Creek Reservoir. The data and information gathered as part of the assessment effort identified several stressors, including bank erosion, rapidly fluctuating flows below the reservoir, heavy riparian grazing, and seasonal low flows in the upper stream channel. The assessments confirm that Sulphur Creek is properly classified as a cold water fishery (Class 2AB), however, the data was insufficient to determine whether the physical and biotic condition was due to anthropogenic or natural stressors. Both segments were monitored again in 2003.

Oil has been produced in the Yellow Creek/Thief Creek drainage since the early 1900s and continues today. More recently, natural gas has been produced and processed, and grazing occurs throughout the drainage. Only the upper part of Thief Creek and some reaches of Yellow Creek are perennial. Soils in this drainage are highly susceptible to erosion and contain naturally high levels of calcium, magnesium, chloride, and sulfate. Streams are reported to be incised in these highly erodible and unstable geologic materials (ARE, 1983; ERI, 1985). The relative influence of natural and man caused activities cannot be determined at this time.

Streams in the Twin Creek drainage lie in highly erodible shales which contribute carbonates, salts, and metals to the streams. Rock Creek and many of its tributaries are perennial, but Twin Creek itself is non-perennial above the Rock Creek tributary confluence. In the upper Twin Creek drainage, the only perennial tributary reach is in Clear Creek below a spring. Loss of perennial flows in upper Twin Creek since the 1970s is a reported resource concern (NRCS, 2001). Both the road and the railroad line, built along the Twin Creek main stem in the late 1800's, have encroached on the stream channel. Phosphate was mined in the drainage between 1910 and 1977. In addition, a phosphate mill (crushing, pulverizing and bagging) operated until about 1985, with ore imported from Idaho. An unstable tailings pile and many eroding spoils piles are associated with the mining area. AML completed reclamation on 140 acres in 2002-2003, and the final 225 acres are expected to be reclaimed by 2008. DEQ has conducted monitoring in the Twin Creek drainage, and initial data review indicates concerns with bank erosion and sediment loading. Further data will be collected in 2004.

Studies in the 1980s and early 1990s identified the Bridger Creek drainage as a significant contributor of both sediment and phosphates into the Bear River (ERI, 1992). In 1996, a 319 watershed improvement project was completed in Wyoming and Utah, which significantly reduced this loading to the river. In Wyoming, seven small detention reservoirs were rebuilt to reduce head cutting and a large gravel pit was incorporated into a sedimentation basin at the border. Additionally, grazing practices in the watershed were modified to improve riparian cover and vigor to stabilize stream banks. According to the BLM, these practices have also

increased stream flows. Bridger Creek is on Table C of the 303(d) List due to threats of aquatic life use support within the drainage. Recent monitoring suggests that the changes in grazing management have resulted in full aquatic life use support (Class 3B), however a complete report and data analysis were not available at the time of this report.

Central Bear River Sub-basin (HUC 16010102)
This sub-basin contains those drainages in Wyoming below Twin Creek, including the Smiths Fork and upper Salt Creek/Thomas Fork drainages. Land uses include historic phosphate mining, grazing, irrigated agriculture, and a number of recreational activities on the Bridger-Teton National Forest and BLM lands. Irrigated agriculture occurs at lower elevations, primarily along the main river and creek drainages throughout the sub-basin.

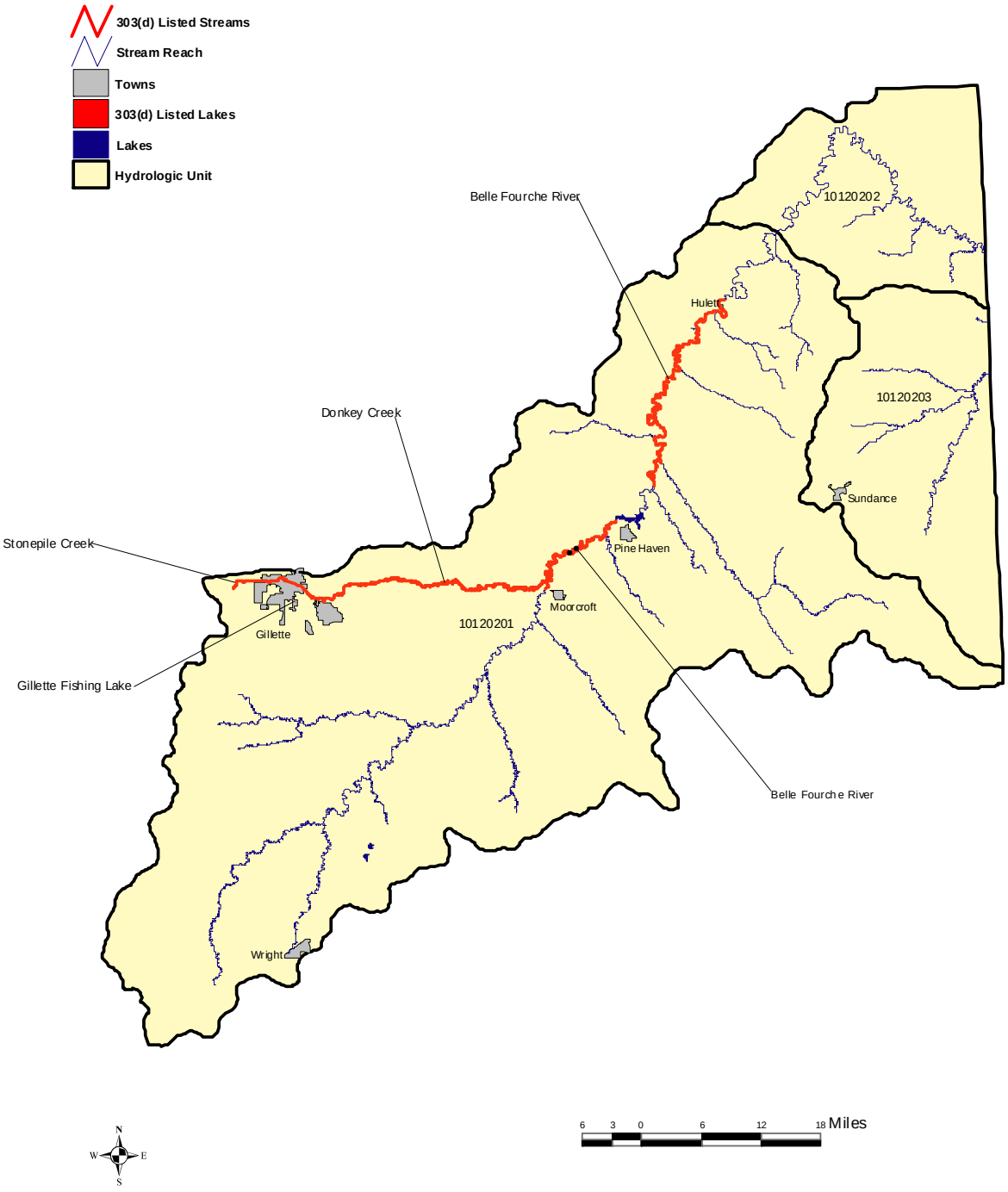
Primary land use along the main stem Smiths Fork is irrigated pasture and hayland, with year-round recreation, seasonal grazing, and some logging in the upper drainage. Channel straightening and willow removal, intended to increase productive acreage during the mid 1900s, are reported to have caused accelerated bank erosion and stream widening along much of the lower Smiths Fork. Steps are being taken to mitigate these impacts in places. A Smiths Fork Steering Committee has been formed to improve water quality, bank stability, and wildlife habitat by modifying grazing practices and controlled burns (WGFD, 2004). Water quality assessments conducted by DEQ in the Hobble Creek drainage, and the Smiths Fork drainage above North Smiths Fork indicate they are fully supporting their aquatic life uses.

Extremely low flows in the Bear River during the past several years of drought, apparently have contributed to elevated water temperatures near Cokeville.

Land ownership in the Salt Creek drainage, which flows into Idaho, where it is called the Thomas Fork, is primarily public with scattered small private holdings. Public lands are managed for multiple use, including recreation and grazing. Sediment and nutrients have been identified as possible water quality concerns in parts of this drainage, both in Idaho and Wyoming (ERI, 1992). Salt Creek has places with some unstable banks; much of this stems from the stream adjusting to the physical restrictions due to construction of the highway within the valley and from slumps and landslides in the unstable geology which have encroached on the stream. Results of monitoring conducted by DEQ on Salt Creek, indicate stabilizing riparian conditions, and the macroinvertebrate community is fairly healthy, however it is unclear whether the stream will support its cold water fisheries use during the summer months.

Giraffe Creek is a tributary to Salt Creek which originates in Idaho, then flows into Wyoming for a few miles before it joins with Salt Creek. DEQ assessment of Giraffe Creek indicates it is fully supporting its aquatic life uses in Wyoming.

Belle Fourche River Basin



Belle Fourche River Basin

The Belle Fourche River headwaters are in the plains south of Gillette. The river flows north-east, around the Bearlodge Mountains, then swings to the south-east and enters South Dakota. There are two distinct topographic regions: the rolling plains of the Powder River geologic basin in the west, and the Black Hills uplift in the east. Most streams originating in the plains are naturally intermittent, but discharges from coal mines, coal bed methane production, and the City of Gillette provide perennial flow in Donkey Creek, the Belle Fourche River and several other plains streams. Below Keyhole Reservoir, the Belle Fourche River has perennial flow due to reservoir releases as well as influences of perennial streams originating in the Black Hills. The Belle Fourche River Compact of 1943 regulates water rights in the Belle Fourche River Basin. Primary land uses in the basin are livestock grazing, hay production, and mineral extraction, including bentonite and coal mining, and oil, gas, and coal bed methane development.

Upper Belle Fourche Sub-basin (HUC 10120201)

The Upper Belle Fourche Sub-basin includes the drainages from Beaver Creek, north of Alva, upstream. Livestock grazing and hay production are the primary agricultural land uses. Coal mining and coal bed methane development are important land uses in the western portion of the sub-basin, and logging and recreation are other important land uses in the Black Hills.

Analysis of macroinvertebrate, chemical and physical data collected by DEQ indicates that the Belle Fourche River, from Keyhole Reservoir up to Raven Creek, is fully supporting its aquatic life and warm water fishery uses. However, two reaches of the Belle Fourche River are listed on Table A of the 303(d) List due to exceedences of the criteria for fecal coliform bacteria, indicating the contact recreation use is not supported. Monitoring by DEQ identified the extent of those reaches as between Keyhole Reservoir to above Rush Creek, and between Hulett and Arch Creek. Crook County Conservation District conducted a 319 watershed project to determine the sources of fecal contamination in these watersheds (including Donkey Creek, discussed below), begin locally led efforts to mitigate those sources, as well as conduct more monitoring to determine use support further downstream in the Belle Fourche River. Data from that sampling effort did not meet the QA/QC requirements to be used for use support decisions, but can be used for watershed planning efforts (DEQ, 2004b). Three animal feeding operation projects are currently being implemented in Crook County, with one additional project in the preliminary phases (WACD, 2002). Preliminary results of monitoring conducted by Campbell County Conservation District (Campbell CCD), indicate high fecal bacteria levels in the Belle Fourche River between Wagensen Road and Gillette (Campbell CCD, 2004). Final QA/QC checks on this data were not available in time to make a listing decision for this report.

Gillette is the fourth largest community in Wyoming and lies at the upper end of the Donkey Creek drainage. Results of monitoring conducted by DEQ in 1998 indicate that Donkey Creek below Stonepile Creek is impaired for human contact recreation by fecal coliform. Donkey Creek is listed on Table A of the 303(d) List. Fecal coliform samples were collected occasionally on Stonepile Creek in 2000 and 2001. The results varied over time with extremely high counts of fecal coliform bacteria at times, and low counts at others. Stonepile Creek has been listed as threatened for its contact recreation use on Table C of the 2002 303(d) List. Campbell CCD monitored 13 sites on Donkey Creek and Stonepile Creek in 2002 and 2003 (WACD, 2002). Results from that monitoring were not available for this report, but are expected in October, 2004 (WACD, 2004).

Assessment of Gillette Fishing Lake, conducted by Campbell CCD under a 205j grant, indicated impairments due to high amounts of sediment and phosphate coming from stormwater runoff.

Gillette Fishing Lake is listed on Table A. Campbell CCD submitted a final report to DEQ on an Information and Education Program funded in part by 319 funds. The district, in cooperation with the city, is currently developing a watershed plan and anticipates completion and submittal to DEQ by July 2004 (WACD, 2004). The City of Gillette is installing two stormceptors and constructing a wetland to trap sediment and phosphorus from runoff before it reaches the lake. There are additional plans by the City to dredge Gillette Fishing Lake to remove sediment, as well as plans to install bank stabilization (WACD, 2002).

Lower Belle Fourche Sub-basin (HUC 10120202)
The Lower Belle Fourche Sub-basin includes the drainages entering the Belle Fourche River below Beaver Creek and above Redwater Creek. Logging, grazing, irrigated hay, and small grain production, recreation and bentonite mining are the primary land uses.

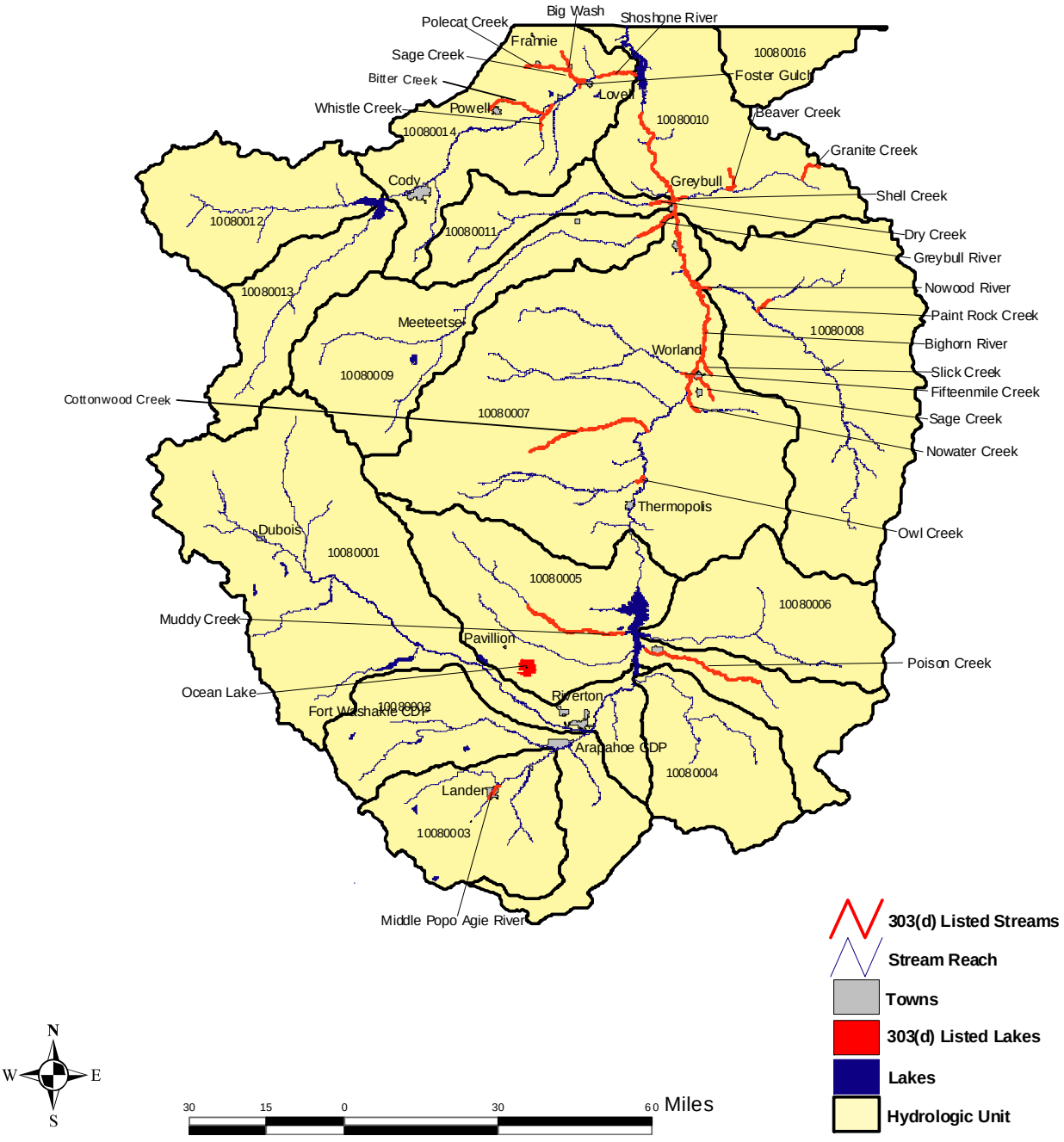
Approximately 1,500 acres of abandoned bentonite mine lands on both sides of the Belle Fourche River in the Colony area have been reclaimed by DEQ's Abandoned Mine Lands Division (AML). Many of the reclaimed sites were in direct contact with the Belle Fourche River. In addition, reclamation conducted under active mining permits has resulted in vastly improved, stable grassland landscapes revegetated with native grasses.

Crook County Conservation District has conducted monitoring in the lower Belle Fourche River as part of their 319 funded project. Data from that sampling effort did not meet the QA/QC requirements to be used for use support decisions, but can be used for watershed planning efforts (DEQ, 2004a).

Redwater Sub-basin (HUC 10120203)
The Redwater Sub-basin drains the eastern slope of the Bear Lodge Mountains before it joins the Belle Fourche in South Dakota. Logging, recreation, hay and livestock production are the primary land uses.

Sand Creek is protected as a Class 1 water. At Ranch A, springs discharge thousands of gallons of water per minute, and the stream below is considered a trophy trout fishery. DEQ has conducted monitoring on Sand Creek. Although a final report is not complete, the reach of Sand Creek extending a few miles below the springs appears to be supporting its aquatic life and fisheries uses.

Big Horn Basin



Big Horn River Basin

The Big Horn River Basin takes up a large portion of north-central Wyoming. For this report, the Basin includes the Wind River and all the other drainages into the Big Horn River in Wyoming, as well as the Little Big Horn River sub-basin. The basin is bounded by the Absoroka Range on the west, the Wind River Mountains, Beaver Rim and Bridger Mountains on the southwest, south and southeast respectively, and the Big Horn Mountains on the east. As with any river basin, water quality is strongly influenced by geology and terrain. Natural water quality characteristics in streams coming off the Wind River Range and Big Horn Mountains are fairly similar due to relatively similar terrain, geology and climate. Water quality is generally good in these mountain ranges, but water quality gradually changes as streams flow across the basin to the Big Horn River due to natural erosion and stream processes increasing sediment and total dissolved solid (TDS) loads. Accelerated erosion, irrigated agriculture runoff, discharge from oil and gas development and other dischargers, and other human activities have the potential to degrade the water quality further (USGS, 1956; USGS, 1995).

Streams draining the Absoroka Range naturally carry very high sediment loads due to the easily eroded volcanic geology and relatively young mountains. Most of the lower portions of the Big Horn Basin have thin soils derived from easily erodible saline, alkaline and/or phosphate-rich geologic materials. Additionally, much of the precipitation in the lower elevation portions of the basin (which typically receive less than 9 inches per year) emanates from thunderstorms, which tend to cause flash flooding and severe erosion of normally dry soils. Therefore, the Big Horn River naturally carries high sediment loads, but it is thought that human influences have increased the sediment loads. Man's influence on sediment transport in some of the lower elevation portions of the basin is believed to date to the 1880s, when a combination of old grazing practices (primarily long term with high densities of stock) removed the existing grasses and began a cycle of intense runoff and gullying which added to the impacts of naturally occurring existing conditions (Marston and Anderson, 1991). Construction of dams and other activities that modify the natural flow regime of the basin have also played a part (USGS, 1956; Bray, 1996). Recovery has been slow and difficult in the lower elevation, more arid parts of the basin.

Livestock grazing and irrigated hay production are the primary land uses in the basin. Large areas of the lower basin are irrigated to produce a variety of crops and small grains. Oil and natural gas are the basin's primary mineral resources, but bentonite, gypsum, and sand and gravel are mined in certain areas as well. Recreation is an important land use in most of the basin, and some logging occurs in the higher elevations.

Portions of the Upper Wind River and Little Wind River Sub-basins (HUCs 10080001 and 10080002) are within the Wind River Indian Reservation boundary. The reservation boundary used by DEQ conforms to the 1904 McLaughlin Agreement as ratified by the Congressional Act of March 3, 1905. DEQ does not include any assessment of the surface water conditions within the diminished reservation boundaries, but is working cooperatively with the tribal council to develop an assessment of surface waters.

Upper Wind Sub-basin (HUC 10080001)
The Upper Wind Sub-basin is the headwaters area for the Wind River, which flows into Boysen Reservoir. Land uses in the upper watersheds are primarily recreation, grazing, and timber production. Grazing, oil and gas production, and irrigated agriculture are primary land uses in the lower watersheds.

Limited *E. coli* sampling along the Wind River above the reservation boundary indicates that pathogens are a concern, so further monitoring will be conducted. The Dubois-Crowheart Conservation District has been sampling for water chemistry, as well as biological and physical parameters at several sites along the Upper Wind River and will be completing a final report in 2004 (DCCD, 2004).

Also of concern, is the habitat degradation documented by the Shoshone National Forest along a small unnamed tributary to Brooks Lake, on the west side of the lake. Further monitoring will be conducted to determine the use support of this stream.

Both Shoshone National Forest (SNF) and DEQ have conducted monitoring in several areas of the Upper Wind Sub-basin, including: the Wind River; the East Fork of the Wind River above the Wiggins Fork and a tributary, Bear Creek, and; Warm Springs Creek and a tributary, Trappers Creek. Results of that monitoring are inconclusive about support of aquatic life uses in the entire watersheds, so further monitoring is being scheduled.

Stabilization and revegetation work to control erosion and improve fish habitat in the Horse Creek drainage continues as a successful cooperative effort between SNF and WGFD. Monitoring conducted by DEQ and SNF indicate that portions of Horse Creek are in good physical condition, but further monitoring is needed to determine use support.

Little Wind Sub-basin (HUC 10080002)
The Little Wind sub-basin includes those watersheds, other than the Popo Agie Sub-basin, which drain into the Little Wind River. Waters within the diminished reservation boundaries are not discussed or included in the report. Primary land uses are grazing, irrigated agriculture, and oil and gas production.

Many concerns have been identified with possible physical degradation along Beaver Creek, but BLM data shows physical conditions are generally improving. DEQ has conducted monitoring in this drainage, but a final assessment report has not been completed.

Popo Agie Sub-basin (HUC 10080003)
Headwaters of the Popo Agie Sub-basin are within the Shoshone National Forest. In the upper watersheds, recreation and livestock grazing are the primary land uses. Irrigated agriculture and residential development are the primary land uses in the Lander area.

The Middle Fork of the Popo Agie River near Lander is listed on Table A of the 303(d) List because of contact recreation impairment indicated by exceedences of the criteria for fecal coliform. The Popo Agie Conservation District (PACD) is working on a watershed plan to conduct further monitoring to identify sources of fecal contamination and voluntarily remediate them. As a consequence, the Middle Fork of the Popo Agie River is listed as a low priority for TMDL development. PACD has also worked with an individual to remedy a faulty septic system (WACD, 2004).

A 319 watershed improvement project sponsored by PACD in the Squaw and Baldwin Creek drainages was reportedly very successful in rehabilitating physical degradation of the streams. Reports from that project suggest the streams in these drainages are supporting their aquatic life uses.

PACD has been conducting monitoring at 20 sites in the sub-basin since 1999. Use support determinations from that monitoring have not been conducted, but a final report is expected in

September, 2004 (PACD, 2001; WACD, 2004).

Muskrat Creek Sub-basin (HUC 10080004)
The Muskrat Creek Sub-basin is in the Gas Hills area east of Riverton. Primary land uses are livestock grazing, oil and gas production and uranium production. Since 1990, AML has completed remediation of five former uranium mine sites; two additional sites had ongoing work in 1996-97. Data which could be used for an assessment are not available at this time.

Lower Wind Sub-basin (HUC 10080005)
The Lower Wind Sub-basin is wing shaped - it includes the Muddy and Fivemile Creek drainages on the west side of Boysen Reservoir and the Poison Creek drainage on the east side. Primary land uses are grazing, irrigated agriculture, and oil and gas production. Flow from both the eastern and western drainages empties into Boysen Reservoir.

Ocean Lake is on Table C as threatened for supporting its aquatic life uses, due to physical degradation from irrigation return flows carrying sediment into the lake, which reduces aquatic life production. A watershed improvement project has been completed by the Lower Wind River Conservation District (LWRCD), which dramatically reduced the sediment loading to the lake. However, WGFD data show that other areas in the watershed contribute high sediment loads. Ocean Lake was monitored by DEQ and WGFD in 2003, but the results are not available at the time of this report.

Poison and Muddy Creeks, tributaries to Boysen Reservoir, are on Table C of the 303(d) List, because analysis of USGS data indicate the contact recreation use on these streams is threatened due to occasional high counts of fecal coliform bacteria. The LWRCD has collected *E. coli* data, but they were not available for this report.

Badwater Creek Sub-basin (HUC 10080006)
The Badwater Creek Sub-basin is on the northeast side of Boysen Reservoir. Land uses are primarily livestock grazing and oil and gas production in the Lysite/Lost Cabin area. AML completed remediation of a mine site in the Hoodoo Creek drainage.

Upper Big Horn Sub-basin (HUC 10080007)
Headwaters of the Upper Big Horn Sub-basin are in the southern end of the Absoroka range and the Owl Creek and Bridger Mountains. Grazing and oil and gas extraction are the basic land uses, along with irrigated agriculture in the lower elevations. Several hundred acres in the Owl Creek and Kirby Creek drainages are also currently mined for bentonite. Thermopolis Hot Springs contributes a naturally high TDS load to the Big Horn River, and is also the source of a natural temperature increase (Darton, 1906). Numerous watershed studies have been completed in the Fifteen Mile Creek drainage since the 1960's. These studies help provide information on potential natural vegetation, and responses of vegetation and stream morphology to different grazing strategies, that can be applied to much of the Big Horn Basin.

DEQ conducted monitoring on the Big Horn River and many other streams in 2001 to determine support of aquatic life uses, however, reports have not yet been completed. These streams include Owl, Kirby, Red Canyon, Lake, Buffalo, and Alkali Creeks.

The Big Horn River near Basin was listed on the 303(d) List in 2000 for impairment due to exceedences of the criteria for fecal coliform bacteria. WDEQ conducted monitoring in 2000, which showed that the impaired reach extends from below the Greybull River (in HUC 10080010) upstream to the Nowood River. A number of homes and businesses in Manderson

were found to be discharging largely untreated wastewater into the Nowood River, just above the Big Horn River. The Town of Manderson, working with the point source compliance program is developing a plan to remedy the situation. The plan is currently under review. Under the guidance of a local watershed steering committee formed in March 2001, the South Big Horn Conservation District (SBHCD) is scheduled to complete a watershed plan in 2006, and has collected fecal bacteria samples in the Big Horn River (WACD, 2004). Data from that monitoring are not available for this report.

Above the Nowood River, the Big Horn River is listed as threatened on Table C of the 303(d) List for contact recreation uses due to high levels of fecal coliform bacteria. Washakie County Conservation District (Washakie CCD) held a citizens meeting in 2002, and is pursuing watershed planning and assessment efforts within its district (WACD, 2002).

Owl Creek flows through fine grained sandstone, siltstone, and shales. Sodium and sulfate salts from these shales together with silt and clay naturally impact water quality (Ogle, 1992). In 1995, AML reclaimed a long-abandoned sulfur mine, which had been affecting water quality in the Owl Creek watershed. Owl Creek is listed on Table C of the 303(d) List because analysis of USGS data indicate the contact recreation use is threatened due to occasional individual counts of fecal coliform more than twice the geometric mean criterion. Hot Springs Conservation District (HSCD) began monitoring for fecal coliform in July 2003. The district will evaluate the need to pursue further watershed planning based on the results of that data, which were not available for this report (WACD, 2004).

Red Canyon Creek drains a watershed of easily eroded red soils developed from fine-grained red sandstone, siltstone, and shale. When the creek does flow, it delivers a distinctively colored sediment load to the Big Horn River. The relative influence of natural causes and development activities cannot be determined with available information.

Nowater, Sage, Fifteen Mile, and Slick Creeks, tributaries to the Big Horn River, are listed on Table C of the 303(d) List because analysis of USGS data indicate the contact recreation use on these streams is threatened due to occasional high counts of fecal coliform bacteria. Washakie County Conservation District (Washakie CCD) has received a 319 grant to conduct fecal bacteria monitoring and anticipates completion of a watershed plan in 2006 (WACD, 2004).

Extensive erosion has occurred in the Kirby Creek drainage due to a combination of channel manipulation, historic overgrazing, and responses to flow regime changes in the Big Horn River (Hurley, 2003; Bray, 1996). A 205j water quality assessment of the drainage, sponsored by HSCD, was completed and submitted to DEQ. The report identifies fecal bacteria as a problem in Kirby Creek. Because QA/QC checks have not been completed on the data, use support determinations cannot be made at this time. A Coordinated Resource Management (CRM) group is addressing these problems in the Kirby Creek drainage.

Cottonwood Creek receives discharges from the Hamilton Dome Oil Field. Data collected in Cottonwood Creek below the discharges show exceedences of the water quality criteria for both chloride and selenium. Therefore, Cottonwood Creek, below the discharges, has been added to Table A of the 303(d) List. Because the discharge water is used for irrigation and the oil field is an important part of the local economy, a Use Attainability Analysis (UAA) has been conducted on Cottonwood Creek. Site specific criteria of 43 ug/L of selenium and 860 mg/L of chloride have been proposed. Because of these proposed criteria changes, Cottonwood Creek is a low priority for TMDL development.

Grass Creek is a tributary to Cottonwood Creek. Assessment of DEQ monitoring data indicate that aquatic life uses are supported in the upper watershed, however, use support is unclear in the lower reach. Therefore, further monitoring was conducted in 2003, but the results of that monitoring are not yet available.

Washakie CCD conducted monitoring in 1999 to determine aquatic life use support of Nowater Creek, Gooseberry Creek, Cottonwood Creek, and Fifteen Mile Creek. Data from that monitoring was submitted to DEQ, but was not sufficient to make use support determinations.

Nowood Sub-basin (HUC 10080008)
Headwaters of the Nowood Sub-basin are on the southwestern side of the Big Horn Mountains. Livestock grazing and oil and gas extraction are the major land uses in upper elevations. In lower elevations, irrigated agriculture is the primary land use and the largest consumptive water user. Bentonite is mined in Wild Horse Draw.

Samples collected by DEQ near the mouth of the Nowood River, and analyzed for fecal coliform bacteria, indicate an exceedence of that criteria, hence the Nowood River is not supporting its use for contact recreation. The impaired reach is listed on Table A of the 303(d) List as extending from the confluence with the Big Horn River upstream an undetermined distance. A number of homes and businesses in Manderson were found to be discharging untreated sewage into the Nowood River, just above the Big Horn River. A Notice of Violation has been issued by DEQ, and a plan to remedy the problem is under review. Washakie CCD held a citizens meeting in 2002, and is pursuing watershed planning and assessment efforts. WCCD conducted monitoring in 1999 on the Nowood River, Buffalo Creek, and Otter Creek to determine aquatic life use support, and submitted the data to DEQ. However, the data was not sufficient to make use support determinations.

Paintrock Creek, a tributary to the Nowood River, has been added to Table C of the 303(d) List because analysis of DEQ data indicate the contact recreation use is threatened due to occasional high counts of fecal coliform bacteria. SBHCD has a 319 grant and has collected samples on Paintrock Creek, however, data were not available for this report (WACD, 2004).

Greybull Sub-basin (HUC 10080009)
Headwaters of the Greybull Sub-basin are in the Absaroka Range within the Shoshone National Forest. The foothills portions of the sub-basin are a mix of BLM, state, and private lands, and the basin portions are primarily BLM, with private lands adjacent to streams. The sub-basin has three major irrigation reservoir projects. Summer flows in the Greybull River at the confluence with the Big Horn River are reportedly almost entirely irrigation return water and at some times there may be minimal to no flow, due to appropriations on the river (RPO, 1979). Livestock grazing and areas of oil and gas extraction are major land uses, with irrigated agriculture nearby and adjacent to the major tributary streams.

The Greybull River is on Table A of the 303(d) list because exceedences of the criteria for fecal coliform bacteria at Greybull indicate it is not meeting its use for contact recreation. Although high fecal bacteria counts have been occasionally recorded as far upstream as Meteetse, samples were collected too infrequently to develop a valid geometric mean to compare with criteria upstream of Greybull. Meeteetse and South Big Horn Conservation Districts have monitored on the Greybull River. Analysis of their data sets indicate that the impairment may not extend above the Sheets Flat bridge, below Meeteetse. High water temperatures recorded during the recent drought raise concerns about the river's ability to support its use as a cold water fishery during low flows in summer. Future monitoring is required to better understand the temperature

regime and to determine sources of fecal bacteria.

Big Horn Lake Sub-basin (HUC 10080010)
The Big Horn Lake Sub-basin includes those areas, other than the Dry Creek and Shoshone River Sub-basins, which drain into the Big Horn River or Big Horn Lake below the Greybull River. Shell Creek is the largest watershed in the Big Horn Lake Sub-basin. Its upper reaches are sited on the western slope of the Big Horn Mountains within the Big Horn National Forest. It flows across National Forest, BLM, and private lands before it confluences with the Big Horn River. In lower elevations, the tributaries drain large areas of marine shales and other fine-grained geology, which produce naturally high TDS loading to the Big Horn River.

Bighorn Reservoir was created by Yellowtail Dam in Montana in 1963-67 for irrigation, power generation, and flood control. The upper third is in Wyoming; the lower two-thirds of the lake are in Montana. Livestock grazing and logging are the primary land uses, with bentonite mining on both sides of Shell Creek east of Greybull and also northeast of Spence. Gypsum is also mined in the area. The Porcupine Falls area in the Porcupine Creek Drainage is the site of a historic late 1800s-early 1900s placer and lode gold mining operation. Both mercury based amalgamation and potassium cyanide were used for gold extraction. In 1993, the Forest Service and Bureau of Reclamation began investigating reports that mercury from the historic mine was present in Porcupine Creek. However, sampling showed no mercury levels of concern. DEQ has also monitored Porcupine Creek, but an assessment report has not been completed.

Both WGFD and the Montana Department of Health and Human Services have conducted fish tissue analysis of walleyes from Bighorn Reservoir, caught in their respective states. Mercury concentration in the very largest walleyes from Montana caused them to post a fish consumption advisory. However, mercury concentrations in the Wyoming walleyes and the smaller walleyes from Montana were much lower. Wyoming does not have a fish consumption advisory for Bighorn Reservoir.

Results of fecal coliform sampling on the Big Horn River below its confluence with the Greybull River indicate it is not supporting its contact recreation use there, however, samples collected just upstream from Big Horn Lake did not exceed the criteria. Therefore, a segment of the Big Horn River, from the Greybull River downstream to an undetermined distance above Big Horn Lake (a continuation of the segment listed upstream in HUC (10080007), is listed on the 303(d) List. Further monitoring will be scheduled to better delineate the impaired reach as well as to identify other sources of fecal coliform bacteria.

Fecal coliform samples collected near the mouth of Shell Creek indicate that it does not meet its contact recreation use from its confluence with the Big Horn River upstream an undetermined distance. Granite Creek, a tributary to Shell Creek, was monitored for aquatic life use support and sampled for fecal coliform bacteria in 2001. The results of that monitoring indicated that it is not meeting its contact recreation uses from its confluence with Shell Creek upstream approximately 4 miles to the vicinity of Antelope Butte Ski Area. Both Shell and Granite Creeks are on Table A of the 303(d) List. The aquatic life use assessment report has not yet been completed. WGFD suggests impacted riparian area and flow diversions may have degraded water quality from Shell Canyon to the Big Horn River.

Beaver Creek is listed on Table C (Threatened Waterbodies) of the 303(d) List due to high fecal coliform counts recorded by USGS indicating it is threatened for its contact recreation use.

SBHCD has conducted monitoring on Shell Creek and Beaver Creek under a 319 grant

(WACD, 2004). Results from that monitoring were not available for this report.

Crooked Creek and Battle Creek have also been monitored by DEQ, however, the assessment reports have not been completed.

Dry Creek Sub-basin (HUC 10080011)
Land uses in the Dry Creek Sub-basin are primarily livestock grazing, recreation, and oil and gas development. Much of this sub-basin has high erosion rates due to fragile soils and historic livestock use (RPO, 1979). In many areas of the Dry Creek sub-basin, as well as other areas of the Big Horn Basin, the uplands are dominated by blue grama. Plant community modifications like this usually result in higher peak flows and reduced base flows, (i.e., more precipitation runs off and erosion is elevated on those areas that have been converted to blue grama dominance). Forage production is also reduced as a result of the change in plant species composition and reduced effective precipitation. Perennial native bunchgrasses have responded favorably to livestock grazing management changes that have been implemented in the area. The western half of the Dry Creek Sub-basin has been identified by the BLM as a high priority for watershed improvement.

Concerns have been expressed about precipitates in Oregon Coulee and Coalmine Gulch below the Oregon Basin Oil Field. According to the BLM, cattle and wild horses may avoid drinking the water in portions of Dry Creek below these areas.

BLM data indicate that livestock grazing practices may be preventing woody vegetation recruitment in the lower portion of the North Fork Dry Creek drainage, and this area is thought to be contributing excessive sediment to the Dry Creek system.

Lower Dry Creek is on Table C of the 303(d) List due to high fecal coliform counts recorded by USGS indicating it is threatened for its contact recreation use. SBHCD has conducted monitoring on Dry Creek under a 319 grant (WACD, 2004). Results from that monitoring were not available for this report.

Dry Creek has been monitored by DEQ to determine support of aquatic life uses, however, the assessment report has not been completed.

North Fork Shoshone River Sub-basin (HUC 10080012)
The headwaters of the North Fork Shoshone River Sub-basin are sited in the volcanic geologic materials of the northern Absaroka Range. Primary land uses are recreation, livestock grazing, timber production, and irrigated hayland in the lower watersheds. Soils are formed from Absaroka volcanic geologic materials, and are highly erodible. Mass wasting and landslides are common, and one landslide event in the spring of 1997 contributed hundreds of thousands of cubic yards of sediment to Middle Creek. Portions of this watershed burned in 1988, which is thought to have increased the sediment loading. This increased sediment loading has raised concerns about the amount of sediment being deposited in Buffalo Bill Reservoir. However, numerous watershed assessments indicate that despite these conditions, streams are meeting their aquatic life uses above the Shoshone National Forest boundary.

South Fork Shoshone River Sub-basin (HUC 10080013)
Most of the South Fork Shoshone River Sub-basin is within roadless or wilderness areas in the Shoshone National Forest, so human impact to water quality is minimal in much of the sub-basin. The dominant geology within the higher elevations is of volcanic origin and very unstable, so natural sediment loading is very high.

Parts of the mainstem South Fork of the Shoshone River have experienced considerable bank erosion, due to attempts to control the river through bank modifications, which did not adequately consider natural hydrologic processes. As a result, when a "fix" was attempted in one stretch, it often caused the river to erode banks in adjoining stretches as the river adjusted. However, landowners have now implemented measures to allow flows to disperse energy on the floodplain and reduce erosion (WACD, 2004). BLM data show watershed degradation in the upper drainages of Timber and Deer Creeks, on the flank of Sheep Mountain. This is thought to be due to past livestock grazing practices, combined with atypical high flow events.

Shoshone River Sub-basin (HUC 10080014)

The Shoshone River receives water from Buffalo Bill Reservoir and flows into Big Horn Lake. The settling pond effect of Buffalo Bill Reservoir removes sediment and many other potential water quality impairments. However, fine sediment deposited on the reservoir bottom becomes an air quality issue when the reservoir is low and the sediments are exposed to the high winds that frequent the area. The Bureau of Reclamation built dust abatement dikes to address this problem (WACD, 2004).

Irrigation development began in the early 1900's and included the first federal reclamation project. Buffalo Bill Dam and Reservoir (originally called Shoshone Dam), was built to contain runoff from the North and South Forks of the Shoshone River, and store water, primarily for irrigation. The reservoir is also used for recreation, as well as generating electricity.

Bottomlands and flat benches along the Shoshone River are extensively irrigated and farmed. Most of the other uplands are BLM land and are primarily grazed by livestock. Portions of the sub-basin have extensive oil and gas development, and bentonite and gypsum are presently being mined.

Most of the BLM land lying south of the river and north and east of Corbett Dam has been identified by the BLM as a high priority for watershed improvement. Much of this area has elevated erosion rates due to historic livestock impacts and subsequent conversion of native bunchgrasses to blue grama. A higher proportion of the precipitation runs off, which reduces effective soil moisture and further reduces forage production. The area contains significant amounts of badlands geology, which naturally produce high runoff and erosion rates. BLM data also indicates roads and grazing may be causing excessive erosion in parts of the Deer, Coon, and Whistle Creek watersheds.

Sage Creek, which flows into the Shoshone River, a little east of Cody, may be a possible contributor of excessive sediment and nutrients to the Shoshone River due primarily to irrigation return flows into Sage Creek, and areas of poor riparian condition along portions of Sage Creek and upper Hoodoo Creek (SCS, 1994).

The BLM portion of Sulphur Creek (about 1.25 miles) is very wide and shallow and BLM data indicates riparian vegetation in poor condition. This part of the stream has been grazed historically by cattle season-long. A deferred rotation livestock grazing strategy will be implemented on the majority of the BLM portion of this stream in 2004, which should improve the condition of the riparian vegetation. Produced water discharges from oil and/or gas development in the upper watershed have been permitted for the discharge of TDS and other pollutants at concentrations protective of existing designated uses.

BLM data indicate portions of Cottonwood Creek, north of Cody, are incised and actively eroding, probably in response to historic land uses such as mining, livestock grazing, and

development of several springs for a fish hatchery and livestock waters. There is also a failed and abandoned irrigation structure that has possibly initiated headcutting of the drainage just north of agricultural land on the outskirts of Cody. Current BLM management is addressing water quality concerns associated with livestock grazing on the BLM sections.

Excessive sediment has been identified as a possible water quality problem in Alkali Creek, which heads on Heart Mountain and drains Ralston Flats (SCS, 1994).

Samples which exceed the fecal coliform criteria for primary contact recreation have been collected by DEQ from Bitter Creek near Garland, and this stream is on Table A of the 303(d) List. The Powell Clarks Fork Conservation District has monitored water quality at five sites in the drainage and is completing a watershed plan (WACD, 2002). Data from that monitoring is not available at this time (WACD, 2004).

Discharge from the Garland Oil Field is a concern of the BLM, due to reported precipitates and impacts to vegetation below a discharge point. There are only two active NPDES permits in the Garland Field. WY-0001759 is the discharge from the Garland Tank Battery (OT) and WY-0036421 is the discharge from the Garland Gas Plant. There is no indication in either file of concerns with vegetation. Information from BLM also indicates bentonite and gypsum mining and roads may be creating some water quality problems around Little Sheep Mountain in the eastern part of the Shoshone River Sub-basin. Excessive alkalinity in soils in the Lovell Lakes area south of Lovell may be due to flood irrigation and poor drainage of these naturally alkaline soils.

Salinity, excessive sediment, nutrients, and pathogens have been identified by BLM, DEQ, WGFD, and the SCS (now the NRCS) as possibly impacting water quality in the Shoshone River. Extensive pesticide sampling by the USGS indicates pesticides are rarely measured above detection levels in the river. Shoshone Conservation District has monitored the Shoshone River for two years (WACD, 2004). That data was not available for this report.

In 2000 and 2001, DEQ conducted fecal coliform bacteria monitoring in several of the lower drainages in the lower Shoshone River watershed to better delineate the extent of impairment. This was done in response to concerns by an area physician who treated several cases of severe gastro-intestinal illness in patients who had been swimming in area waters. Results of the monitoring indicate several of the waterbodies had exceedences of the fecal coliform criteria and are impaired for contact recreation use. The following waterbodies in the Lower Shoshone River watershed are on the 303(d) List:

> The Shoshone River, from its confluence with Big Horn Lake upstream an undetermined distance.
>
> Bitter Creek, from its confluence with the Shoshone River upstream an undetermined distance above Powell.
>
> Sage Creek, from its confluence with the Shoshone River upstream an undetermined distance above Big Wash.
>
> Polecat Creek, from its confluence with Sage Creek upstream an undetermined distance.
>
> Big Wash, from its confluence with Sage Creek upstream to Sidon Canal.

Whistle Creek, from its confluence with the Shoshone River upstream an undetermined distance.

Additionally, the lower reach of Foster Gulch, is on Table C of the 303(d) List due to high fecal coliform counts recorded by USGS indicating it is threatened for its contact recreation use.

The sources of fecal coliform contamination in the streams listed above have not been determined, although a 1978 section 208 study identified many cases of poorly operating septic systems in the watershed. County commissioners and conservation districts are investigating establishing a Clean Water Act - State Revolving Loan funding program to provide low interest loans for septic system rehabilitation. The Shoshone Conservation District (SCD) has also initiated monitoring at 16 sites and has received 319 funding to conduct additional watershed assessment. The SCD will pursue watershed plan development by 2006 (WACD, 2002). Data from that monitoring were not available for this report.

Information from SCD, WGFD, and Cooperative River Basin Study (SCS, 1994) suggest that salinity, oil, nutrients, and streambank degradation may be problems in Sage Creek in northwest Big Horn County. The BLM also identified these concerns in one of its tributaries, Polecat Creek. Possible sources may be bentonite mining, roads, farming, or oil production. SCD has conducted monitoring on these streams, but the data were not available for this report (WACD, 2004).

Monitoring was conducted by DEQ on Sage, Alkali, Polecat, and Whistle Creeks, as well as the Shoshone River, in 2001. Final data assessment and monitoring reports have not been completed.

Little Big Horn River Sub-basin (HUC 10080016)

The upper portion of the Little Big Horn River Sub-basin headwaters is in Wyoming before draining into Montana. Except for a few main stem miles near the border, most reaches in this sub-basin are within the Big Horn National Forest. Grazing, recreation, logging, and some recreational gold mining are the primary land uses. Stream habitat inventories were collected by the Big Horn National Forest. Fish habitat enhancement and changes in grazing management practices have addressed some past concerns about the effects of increasing sedimentation on water quality. DEQ conducted monitoring on the Little Big Horn River in 2000, but an assessment report has not been completed.

Cheyenne River Basin

Cheyenne River Basin

The Cheyenne River Basin lies in eastern Wyoming and drains areas of the Powder River geologic basin as well as the southern portion of the Black Hills uplift. Other than the southern Black Hills and some breaks and escarpments, most of the basin consists of rolling plains. The Thunder Basin National Grasslands occupies a large portion of the central part of this basin. Streams originating in lowland areas are usually intermittent or ephemeral, and most perennial streams originate in the Black Hills or Pine Ridge escarpment. Because the sedimentary rocks in the Powder River geologic basin contribute significant levels of iron, manganese, and sulfate to surface waters, several streams in that portion of the basin are not protected by aesthetic criteria for iron and manganese. Primary land uses are grazing, with areas of hay production, coal mining, and oil and gas production.

Antelope Creek Sub-basin (HUC 10120101)
The headwaters of the Antelope Creek Sub-basin are east of Edgerton. Land uses are primarily grazing and oil production, with coal mining in the northeastern third of the sub-basin. A reach of Antelope Creek has been nominated as a possible plains reference stream.

Dry Fork Cheyenne Sub-basin (HUC 10120102)
Land uses in the Dry Fork Cheyenne Sub-basin are primarily grazing and oil and gas development. Uranium exploration and mining occurred from the 1950s through the 1980s in the southern portion of this sub-basin, an area where all reaches are non-perennial.

Upper Cheyenne Sub-basin (HUC 10120103)
Coal mining occurs in the Upper Cheyenne Sub-basin east of Wright. Other land uses include grazing and oil and gas development.

Niobrara County Conservation District (Niobrara CCD) has conducted monitoring on both the Cheyenne River and Snyder Creek. Their data show that Snyder Creek does not flow during periods of drought.

Lance Creek Sub-basin (HUC 10120104)
Land uses in the Lance Creek Sub-basin include grazing, and oil and gas development. Niobrara CCD has conducted monitoring on Lance Creek.

Lightning Creek Sub-basin (HUC 10120105)
Land uses in the Lightning Creek Sub-basin are chiefly grazing, with some oil and gas development.

Angostura Reservoir Sub-basin (HUC 10120106)
Land uses in the Angostura Reservoir Sub-basin are primarily grazing, with some oil and gas development. The Cheyenne River in South Dakota is listed as impaired on their 303(d) list due to sediment and high total dissolved solids, and TMDLs are being developed. Existing data and information do not suggest water quality problems currently exist in Wyoming. However, Niobrara CCD has raised concerns about coal bed methane produced water discharges into the Cheyenne River basin. Niobrara CCD has conducted monitoring on the Cheyenne River since 1999. DEQ conducted monitoring on the Cheyenne River in 2003, but the complete results are not yet available.

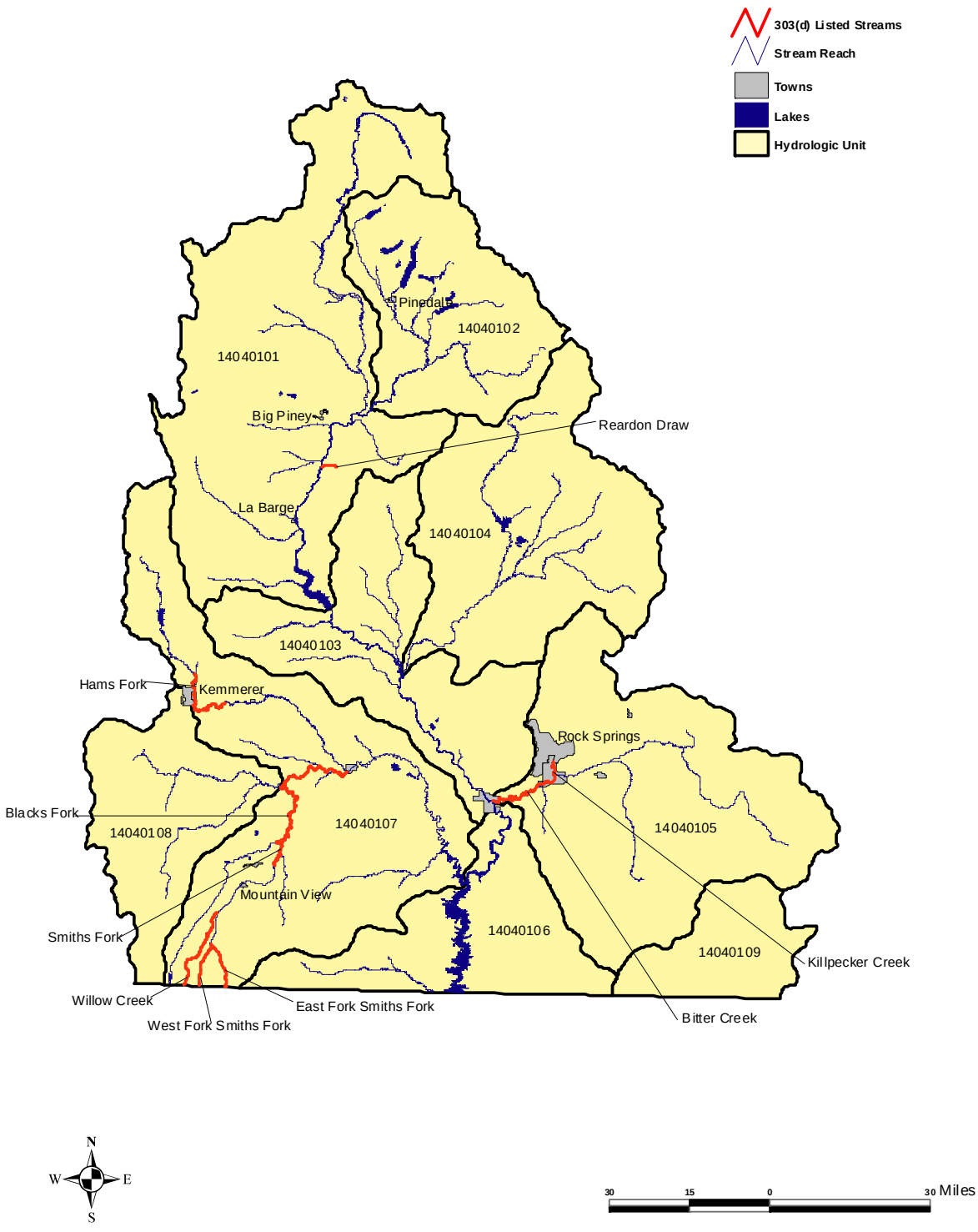
Beaver Creek Sub-basin (HUC 10120107)
Land uses in the Beaver Creek Sub-basin include grazing, hay production, and oil and gas development. Many of the streams in this sub-basin originate in the Black Hills and are perennial.

Poison Creek flows through the Osage Oil Field into Beaver Creek near Osage. Numerous small oil seeps, some of which reach Poison Creek, have been identified in sections 16 &17, T 46 N, R 63 W. Because of the considerable exploration and production of both oil and bentonite, it is difficult to determine whether the seeps are natural, human induced, or a combination of the two. The Wyoming Oil and Gas Conservation Commission determined it would be more efficient to mitigate the problems than to attempt to identify all causes, and conducted a cleanup effort to prevent the contamination of Poison Creek and to protect aquatic life and wildlife. Those portions of Poison Creek in Sections 16 and 17 are on Table C of the 303(d) List, and are scheduled for monitoring in 2004.

Salt Creek, a tributary to Stockade Beaver Creek, was named for the natural brine springs which contribute a large salt load to Stockade Beaver Creek and the Cheyenne River basin. DEQ conducted monitoring on Beaver Creek and Stockade Beaver Creek in 2001, however, assessment reports have not yet been completed.

Hat Creek Sub-basin (HUC 10120108)
Primary land use in the Hat Creek Sub-basin is grazing. DEQ conducted a bioassessment of the Sage Creek watershed which indicates full aquatic life use support. Existing data and information also suggest that no significant water quality problems exist on Sage Creek.

Green River Basin



Green River Basin

The Green River Basin is in the southern part of Wyoming. Snowpack and snow melt runoff from higher elevations are the major water sources for the Green River and most of its tributary systems. Almost all of these headwaters are in granitic or metamorphic rock and have some of the best quality water in the basin. Lower elevations have the least precipitation, and most streams originating there are intermittent or ephemeral. As streams flow through more arid lower elevations and the easily eroded sedimentary geologic materials found there, TDS values and sediment loads generally increase. Peak flows usually occur in May and June as snowmelt water moves through the basin, and sudden severe summer thunderstorms occasionally add to July and August flows. There are spring fed perennial reaches throughout the river basin.

Because the Green River is part of the Colorado River Compact of 1922, its waters are apportioned among the participating states. The Green River has the largest amount of unappropriated water in the state. It is the largest tributary of the Colorado River, and its waters are subject to salinity control through the Colorado River Basin Salinity Control Program. Although there are few salinity problems in Wyoming compared with the lower Colorado River Basin, it is often more economically feasible to reduce salinity in upper parts of the Colorado Basin. Because irrigated agriculture can contribute to salinity by percolation, evaporation, and return flows through shallow soils developed on saline geologic materials, major salinity control measures to reduce irrigation related salinity input to the Green River have been implemented in the Big Sandy and Flaming Gorge Sub-basins.

Extensive natural salt deposits of trona (a sodium carbonate) were inferred from late 1890's well water quality. Trona deposits were investigated in the late 1930s. Mining began in the late 1940s and mining and prospecting continue today. Trona typically occurs with halite and gypsum. These Wyoming deposits are the world's largest natural source of trona. Coal deposits have also been mined in parts of the basin. Oil development began around 1920, and both oil and natural gas are produced throughout much of the basin. The primary agricultural land uses are grazing and irrigated hay production.

Upper Green Sub-basin (HUC 14040101)
The Upper Green Sub-basin includes all tributaries into the Green River above Fontenelle Dam, except the New Fork Sub-basin. Fontenelle Reservoir is in the southern part of this sub-basin below LaBarge, Wyoming. It was constructed from 1961-64 and modified in 1984-86. Headwaters are in the Bridger-Teton National Forest, primarily in well indurated igneous and metamorphic geology. Lower elevation areas of the sub-basin lie in primarily fine grained sedimentary rocks which are a natural source of fine sediment and TDS in surface waters. Primary land uses are grazing, recreation, irrigated hay production, and oil and gas development.

Kendall Warm Spring is the only known habitat of the Kendall Warm Springs dace, a unique fish subspecies which is the only Wyoming fish listed (in 1980) under the Endangered Species Act. Its listing is not due to any water quality problems, but due to the naturally limited area it is found.

Dry Piney Creek is perennial in its headwaters and part of the main stem, but becomes non-perennial before its confluence with the Green River (WGFD, 2002). Results from DEQ monitoring conducted on Dry Piney Creek were inconclusive, so further monitoring will be conducted to determine use support. A gas processing facility, and oil and gas wells are located in the upper portions of the LaBarge Creek-Dry Piney Creek-South Piney Creek drainages. Concerns with oil seeps and ponds associated with oil wells, and physical degradation of the

stream have been identified by DEQ. Seasonal dewatering of North Piney, Middle, and South Piney Creeks may limit potential aquatic life (WGFD, 2002; WGFD, 2004).
Extensive monitoring by DEQ in the watershed between Highway 191 and the Green River Lakes indicate that streams in this portion of the watershed are supporting their aquatic life uses.

Bioassessments conducted by DEQ on LaBarge and Fontenelle Creeks indicate that aquatic life uses are supported in the upper drainages within the Bridger-Teton National Forest, and in the lower mainstem of Fontenelle Creek, just above Fontenelle Reservoir. However, concerns have been identified by DEQ with physical degradation in parts of the lower La Barge Creek drainage, as well as seasonal dewatering due to irrigation withdrawal (WGFD, 2002). DEQ data collected on Rock Creek, a tributary to LaBarge Creek, indicate it is fully supporting its aquatic life uses.

Sublette County CD sponsored a watershed improvement project on Reardon Draw to correct physical degradation of the stream channel, which reportedly was threatening aquatic life use support and impacting the Green River. Implementation measures included development of a stock water system and livestock herding for grazing management. At this time it is undetermined if there have been water quality improvements. The lower three miles of Reardon Draw is on Table C of the 303(d) List and the Green River below Reardon Draw has been scheduled for monitoring.

New Fork Sub-basin (HUC 14040102)
Headwaters of the New Fork Sub-basin are in granitic and metamorphic geologic materials in the Wind River Mountains. The headwaters area contains hundreds of lakes, a remnant of past glaciation. Water quality is reported as good in most of the upper watersheds, however full use attainment monitoring has not been conducted. Geologic materials in the lower sub-basin include fine to coarse grained sedimentary rocks and are a natural source of fine sediment and TDS. Land uses in the sub-basin include recreation, forestry, grazing, irrigated hay production, and oil and gas development. Limited uranium exploration was carried out in the Pinedale area.

Bioassessments conducted by DEQ in the watershed between Highway 191 and the New Fork Lakes indicate that this portion of the watershed is supporting its aquatic life uses.

Pine Creek below the Pinedale WWTP has been removed from the 303(d) List, due to approval of the TMDLs for ammonia, fecal coliform, and TRC associated with routine renewal of the discharge permit, and recalculation/verification of the TMDL.

Slate Creek Sub-basin (HUC 14040103)
Slate Creek Sub-basin includes the Green River and its tributaries, other than the Big Sandy River, below Fontenelle Reservoir and above Bitter Creek, near Rock Springs. Geologic materials include sandstone, mudstone, limestone, oil shale, and conglomerate. Soils developed in these materials tend to be saline and alkaline, erode easily, and can be very difficult to stabilize after being disturbed. Many streams are intermittent or ephemeral and water quality is usually similar to basin streams derived in this type of geology. The Seedskadee National Wildlife Refuge lies along the Green River below Fontenelle Reservoir. This refuge supports a unique population of waterfowl and is an important recreational fishery. Land uses include grazing, oil and gas development, and trona mining and processing. Oil and gas production began in the early 1900s and continues today.

Big Sandy Sub-basin (HUC 14040104)
Headwaters of the Big Sandy Sub-basin are in the granitic rocks of the southern Wind River Range. Because of this geology, much of the substrate in the streams is coarse sand derived from decomposed granite. Land uses in the Big Sandy Sub-basin are primarily grazing, irrigated hay production, recreation, oil and gas development.

Water is diverted from the Big Sandy River, below Big Sandy Reservoir, to irrigate lands in the Eden Project. Irrigation seepage into shallow aquifers has created saline seeps and springs below the Eden Project, which contributed about 116,000 tons of salt annually into the Green River. The USDA Big Sandy River Unit Plan, published in1988, consists of converting 15,700 acres of surface irrigation to low-pressure sprinkler irrigation to reduce salt loading by approximately 52,900 tons per year (CRBSCF, 2002). This program is being managed through the NRCS, and has converted 10,790 acres of irrigated lands to date, which has resulted in a salt load reduction of 42,319 tons per year. Effects of the salinity reduction on streams in the Big Sandy and Green River drainages have not been determined, however crop production and water savings have reportedly increased where irrigation conversion has occurred (SWCCD, 2004).

Several riparian exclosures were created in the 1980s to protect parts of the riparian area along the Big Sandy River, between Little Sandy Creek and the Green River, and to enhance fish habitat. Rock sill structures have been built in Big Sandy River and in Bone Draw with the goals of raising the water table, increasing riparian vegetation, providing habitat for juvenile fish, and improving channel conditions. Erosion, unstable banks, and lack of woody riparian vegetation have been identified as problems in this reach of the Big Sandy River. The primary sources of these problems are thought to be due to changes in flow regime since the construction of Big Sandy Reservoir, and to the partial conversion from sheep grazing to cattle grazing, which changes the utilization of vegetation. The Big Sandy Working Group (BSWG), comprised of the BLM, grazing permittees, WGFD, Trout Unlimited, Sweetwater County Conservation District (then Big Sandy CD), other stakeholders, and a facilitator, was formed in 1996 to address these problems. BSWG developed a 10 year goal and a 50 year vision statement that identified some of the trends the river corridor should follow. In order to meet these goals, the allotment management plans for the four allotments that use this reach of the Big Sandy River have been changed. Some of these changes include: modification of grazing rotation, allotment boundaries and season of use; installation of electric fencing; development of upland water sources, and; implementing the monitoring plan developed by BSWG (BLM-RS, 2003).

Despite the riparian and bank stability problems, assessments conducted by DEQ in 1998 indicate that aquatic life uses are supported on the Big Sandy River, between the Green River and the confluence with Little Sandy Creek.

Monitoring conducted by DEQ on Little Sandy Creek has identified areas of habitat degradation and streambank instability, as has BLM data. Complete results of all data are not yet available to determine aquatic life use support. The BLM and grazing permittees are cooperatively working to modify grazing practices along portions of Little Sandy Creek to improve the riparian and stream habitat. These modifications include installation of electric fencing and rotation of stock through the allotment so riparian areas are only grazed once per season (BLM-GR, 2002). DEQ and BLM will cooperatively monitor in 2004 and future years to track improvements in habitat quality and bank stability.

Bitter Creek Sub-basin (HUC 14040105)
The Bitter Creek Sub-basin lies entirely within sedimentary basin geology, composed of mostly fine grained sedimentary rocks containing salts and other evaporite minerals. Because of the arid climate and relatively low elevation and basin terrain, most reaches in this drainage are non-perennial. Snowmelt and occasional rainstorm events often transport high loads of sediment and dissolved salts. Land uses include grazing, coal mining, phosphate mining, uranium exploration, and oil and gas development.

Bitter Creek, a tributary to the Green River, drains a large arid area (an outlying part of the Red Desert) in the eastern portion of the sub-basin, including a western fringe area of the Red Desert basin. Monitoring conducted by DEQ in 1998 on Bitter Creek near Rock Springs and a tributary, Killpecker Creek, indicates that both these streams are impaired for recreational use due to elevated fecal coliform bacteria counts. Bitter Creek is classified as a non-game fishery (Class 2C). A fish kill was noted on Bitter Creek during sampling in 1998. Chloride samples collected by DEQ indicate that Bitter Creek below Killpecker Creek is partially impaired for its non-game fishery use due to chloride concentrations above the criteria of 230 mg/L. Chloride has been added as a cause of impairment on the 303(d) List. Diurnal oxygen fluctuations and habitat degradation are also concerns on these streams. A current 319 watershed improvement project, administered by the Sweetwater County Conservation District (SWCCD) is investigating the problems and concerns on these waters. As part of this project, a historical review of Bitter and Killpecker Creek is being conducted. Depending on the outcome of the assessment, SWCCD will develop a watershed plan by 2006. No implementation is planned until assessment provides additional information on extent of impairment. (SWCCD, 2004).

Flaming Gorge Sub-basin (HUC 14040106)
The Flaming Gorge Sub-basin includes all the tributaries to the Green River and Flaming Gorge Reservoir below Bitter Creek and above the confluence with Vermillion Creek (in Colorado), except the Blacks Fork. Flaming Gorge Reservoir, built in 1958-64 and modified in 1978 and 1984, and the Flaming Gorge National Recreation Area are within this sub-basin although the dam itself is in Utah. Green River and the Black's Fork flow directly into the upper part of the reservoir; the Henry's Fork flows into the lower part of the reservoir in Utah. Most of the sub-basin consists of fine grained sedimentary rocks, many of which are easily eroded and contain large amounts of evaporite minerals. Land uses include grazing, irrigated agriculture (mostly in the Henry's Fork drainage), recreation, and oil and gas production.

The Little Mountain Watershed Enhancement project was initiated in 1990 because of concerns with declining Colorado River Cutthroat trout populations due to deteriorated stream habitat conditions, and concerns with the mule deer population. This project is sponsored by WGFD, BLM, landowners, and a number of organizations, and is designed to restore watershed function and decrease eutrophication of Flaming Gorge Reservoir via modification of grazing management, prescribed burns, re-introduction of beaver, and other measures. The project currently includes Currant Creek and parts of the Trout, Sage, and Red Creek watersheds, and has shown marked improvement of both riparian and upland areas, and increases in perennial flows.

Blacks Fork Sub-basin (HUC 14040107)
Headwaters of the Blacks Fork Sub-basin are in the Uinta Mountains in northeastern Utah, and the Tunp and Wyoming Ranges in Wyoming. The Black's Fork flows in a loop through the Bridger Basin before flowing into the upper part of Flaming Gorge Reservoir. Major tributaries include the Smiths Fork which also headwaters in Utah, and the Hams Fork, which drains from the north. Muddy Creek is another tributary, but its sub-basin (HUC 14040108, discussed

below) is not included in the Black's Fork Sub-basin. Land uses in this sub-basin include grazing, irrigated hay production, trona and coal mining, and oil and gas production.

The Hams Fork near Diamondville is listed on Table A of the 1998 303(d) list due to high pH (above the criteria of 9.0 standard units) measurements indicating it is partially impaired for its aquatic life uses. Lincoln County Conservation District used 205j moneys to conduct additional monitoring (Lincoln CCD, 2002). Although the data did not meet "credible data" requirements, it also showed high pH levels. The elevated pH is thought to be due, at least in part, to excessive photosynthetic activity, which can result from nutrient enrichment problems, and can also result in very low dissolved oxygen concentrations when photosynthesis is not occurring. Further monitoring will be needed to better understand the factors leading to high pH, and whether or not they are natural or are attributed to human activities.

The Blacks Fork, from its confluence with the Hams Fork upstream to an undetermined point above the Smiths Fork, is on Table A of the 303(d) List for impairment of contact recreation uses due to exceedences of the criteria for fecal coliform bacteria. The source of fecal contamination and the extent of contamination above and below the sample point is unknown at this time. The Black's Fork below the Hams Fork has been monitored, but the results are inconclusive regarding aquatic life use support. Further monitoring will be needed in the future.

The Smiths Fork of the Green River is on Table A of the 303(d) List after DEQ monitoring determined the stream was only partially supporting its aquatic life uses as a Class 2 water due to loss of biological integrity and physical degradation of the stream. Smiths Fork from the confluence with the Black's Fork upstream an undetermined distance was added to Table A of the 303(d) List after fecal coliform monitoring, conducted by DEQ, showed the stream was not meeting its use for contact recreation.

Uinta County Conservation District (UCCD) has conducted monitoring at 22 sites on the Black and Smiths Forks in 2002 and 2003, funded in part by DEQ (UCCD, 2004; WACD,2004). However, data from that monitoring were not available for this report. UCCD expects to complete a watershed plan in 2006 (UCCD, 2004).

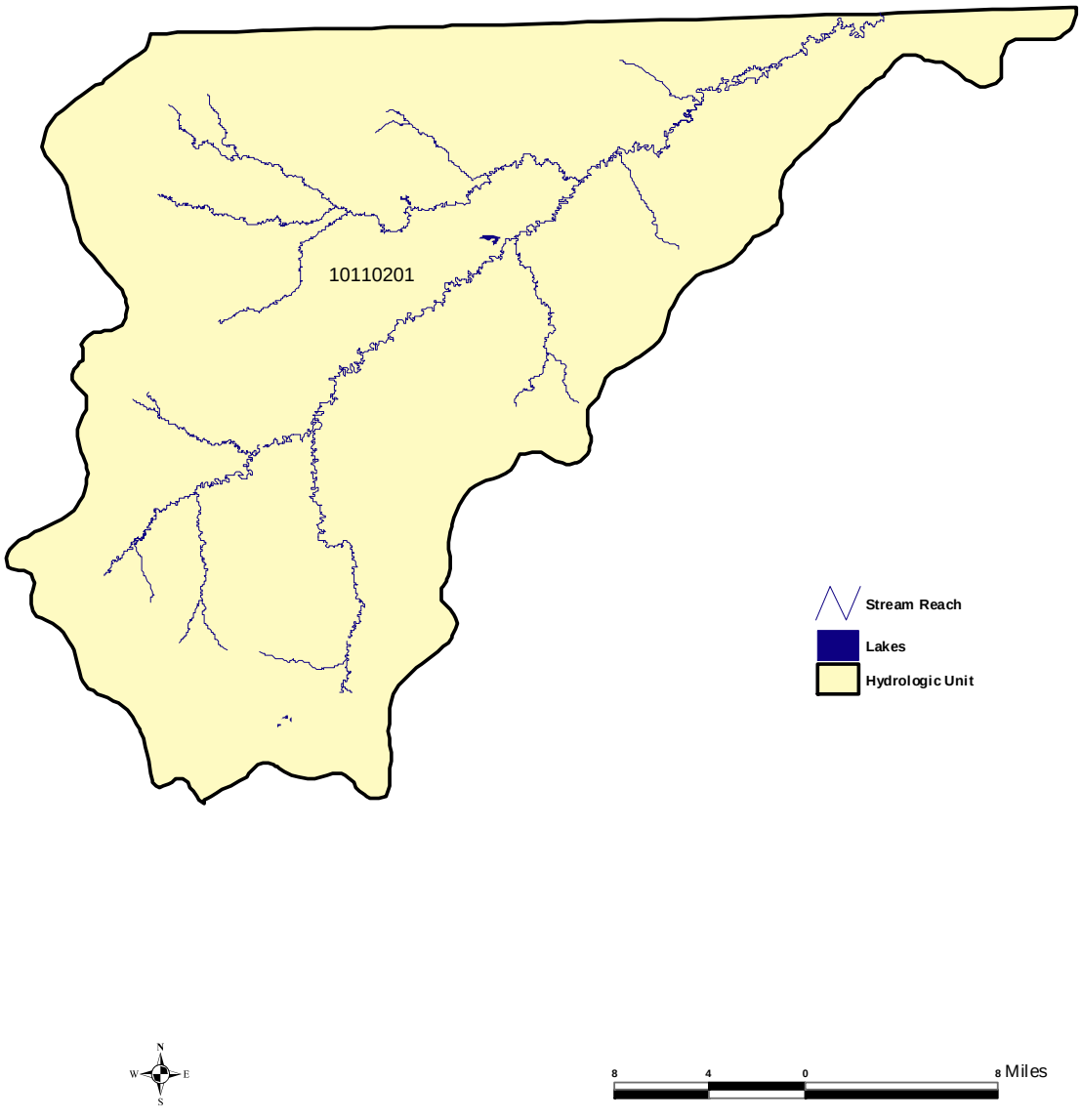
The East and West Fork of Smiths Fork, and Willow Creek above the Black's Fork, were placed on Table C of the 1998 303(d) List due to threats of aquatic life use support due to physical degradation of the stream channels. UCCD completed a 319h watershed improvement project in 1999 to improve the physical condition of the stream channels and riparian areas. Data submitted by UCCD were not sufficient to determine use support, but indicate improvement of the habitat in these streams (UCCD, 2001). DEQ monitored these streams in 2003, but results are not yet available.

Muddy Creek Sub-basin (HUC 14040108)

Muddy Creek Sub-basin drains the east slope of the Bear River Divide, north of Evanston, and Oyster Ridge, south of Kemmerer, and then flows into the Black's Fork of the Green River. Soils in this sub-basin were developed from shale and sandstone geologic materials, with added windblown sand. These arid soils tend to have high carbonate content and are usually easily eroded by wind or water. The Oyster Ridge area has been mined for coal at least since the early 1900's and is the site of the historic Cumberland Mining District. Land uses include grazing, some irrigated hay production, oil and gas development and production, and historic coal mining.

Vermillion Sub-basin (HUC 14040109)
The Vermillion Sub-basin drains a portion of the southern Red Desert before flowing into Colorado and the Green River. The primary land uses are grazing, and oil and gas development. Perennial reaches in this sub-basin include portions of the main stem of Vermillion Creek, the main stems of Coyote Creek and Canyon Creek. Vermillion Creek drains into the Green River in Colorado and contributes a TDS load of mostly sulfate and sodium from the area's geologic materials. In the Vermillion Creek and Coyote Creek watershed, BLM, WGFD, landowners, permittees, and the National and Wyoming Wildlife Federation are cooperating in an allotment management plan, which is reducing sediment loads and improving riparian areas.

Little Missouri River Basin



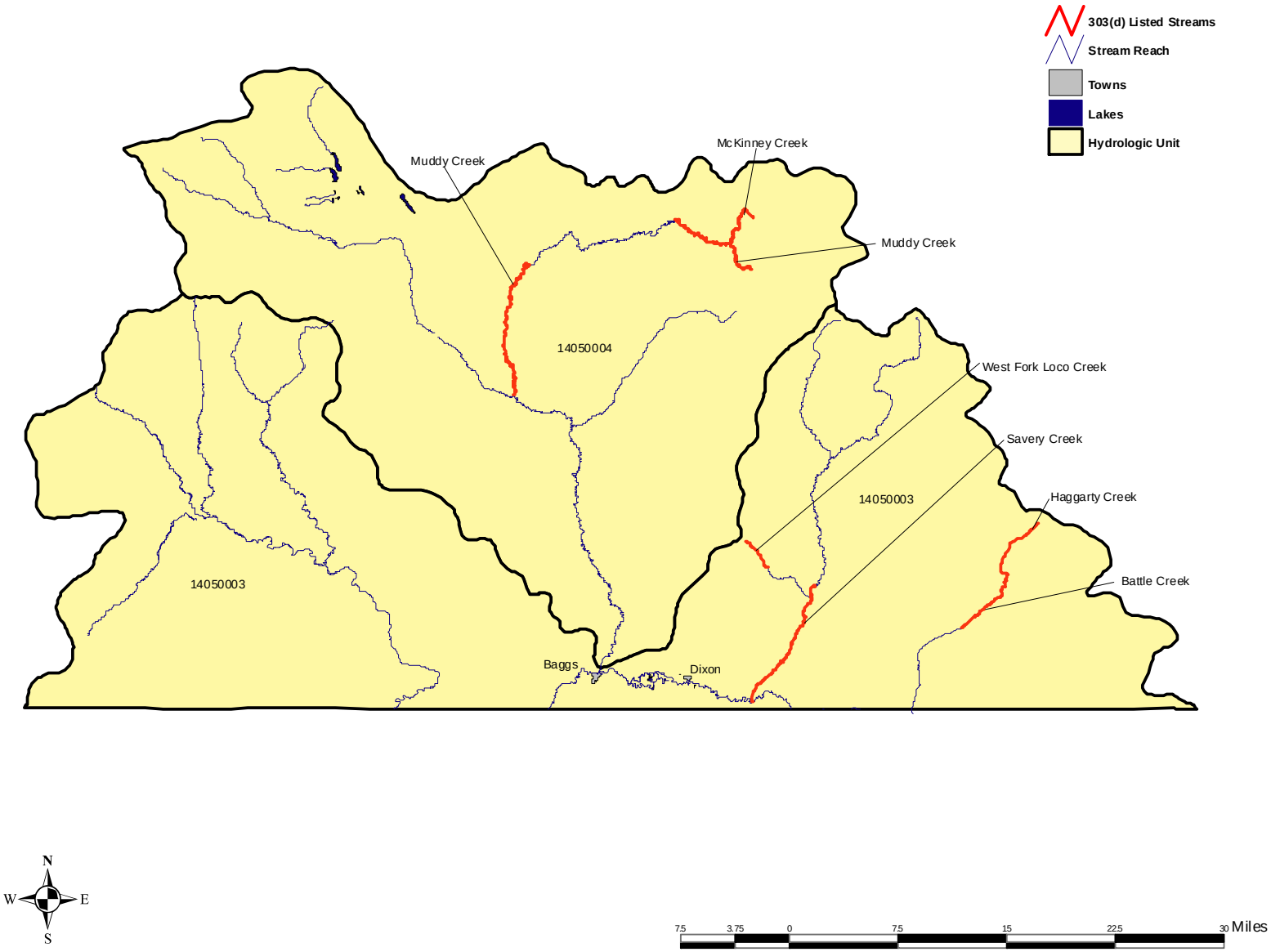
Little Missouri River Basin

The Little Missouri Basin in Wyoming includes only one defined sub-basin (HUC 10110201). Land uses include grazing, farming (both dryland and irrigated), bentonite mining in the lower drainages, and oil production in the upper drainages. Concerns with siltation and flow alteration in the Little Missouri and the North Fork of the Little Missouri were identified by Devils Tower Conservation District (now Crook County Resource District). However, bentonitic clays often remain suspended in water, and a certain degree of turbidity is natural. Stream flow is often intermittent, however, water generally remains in pools, even during dry periods. Many of the ephemeral tributaries in this sub-basin have been dammed by earth berm dams. Approximately 500 acres of abandoned bentonite mine lands have been reclaimed by AML in the sub-basin. Bentonite companies continue to mine and reclaim land in this area.

A large wetland complex is being developed on the North Fork of the Little Missouri River, at the site of a large breached earthen dam. This project is expected to improve both wildlife and aquatic habitat.

DEQ collected monitoring data in the basin in 2002, with complete results not yet available.

Little Snake Basin



Little Snake River Basin

The Little Snake River Basin is bordered on the east by the Continental Divide along the Sierra Madre Mountains, the north by the Great Divide Basin, and to the west by the Green River Basin. The Little Snake River is a tributary to the Yampa River, in the Green and Colorado River System. The Sierra Madre mountains are primarily composed of Precambrian igneous and metamorphic rocks which are relatively resistant to erosion. However, in the lower elevations the geology consists of mostly fine grained sedimentary rocks, most of which are easily eroded and often contain high levels of various salts.

Little Snake Sub-basin (HUC 14050003)
Haggarty Creek is the site of an inactive copper mine, the Ferris-Haggarty/Osceola Tunnel, which dates from 1898. Haggarty Creek originates near the Continental Divide and confluences with Lost Creek to form West Fork Battle Creek. Monitoring on Lost Creek by DEQ indicates it fully supports its aquatic life uses. Haggarty Creek has been on past 303(d) lists due to metal exceedences (primarily copper with less toxic amounts of silver and cadmium) discharging from the Ferris-Haggarty Mine. The Department of Environmental Quality - Abandoned Mine Lands Program has funded a remediation project to treat the effluent and a proposed TMDL has been sent to EPA. However, because it is not economically feasible to remove 100% of the copper from the effluent, and because there is natural loading of copper in the watershed, some portions of the stream will probably not meet all criteria after treatment, although water quality to support fish should dramatically improve in much of the stream. AML is presently working on a proposal to plug the upper shaft above the mine tunnel. This could potentially reduce the volume of discharge from the mine. Therefore, EPA has not fully accepted the TMDL. Additional information on background (natural) concentrations of metals in tributaries and above the mine effluent is needed. Review of data during the TMDL process on Haggarty Creek revealed that copper criteria are also exceeded on the West Fork of Battle Creek, downstream of Haggarty Creek, so this stream was added to Table A of the 303(d) List. The treatment of the Ferris-Haggarty/Osceola Tunnel effluent is thought to be more than adequate to allow the West Fork of Battle Creek to meet standards.

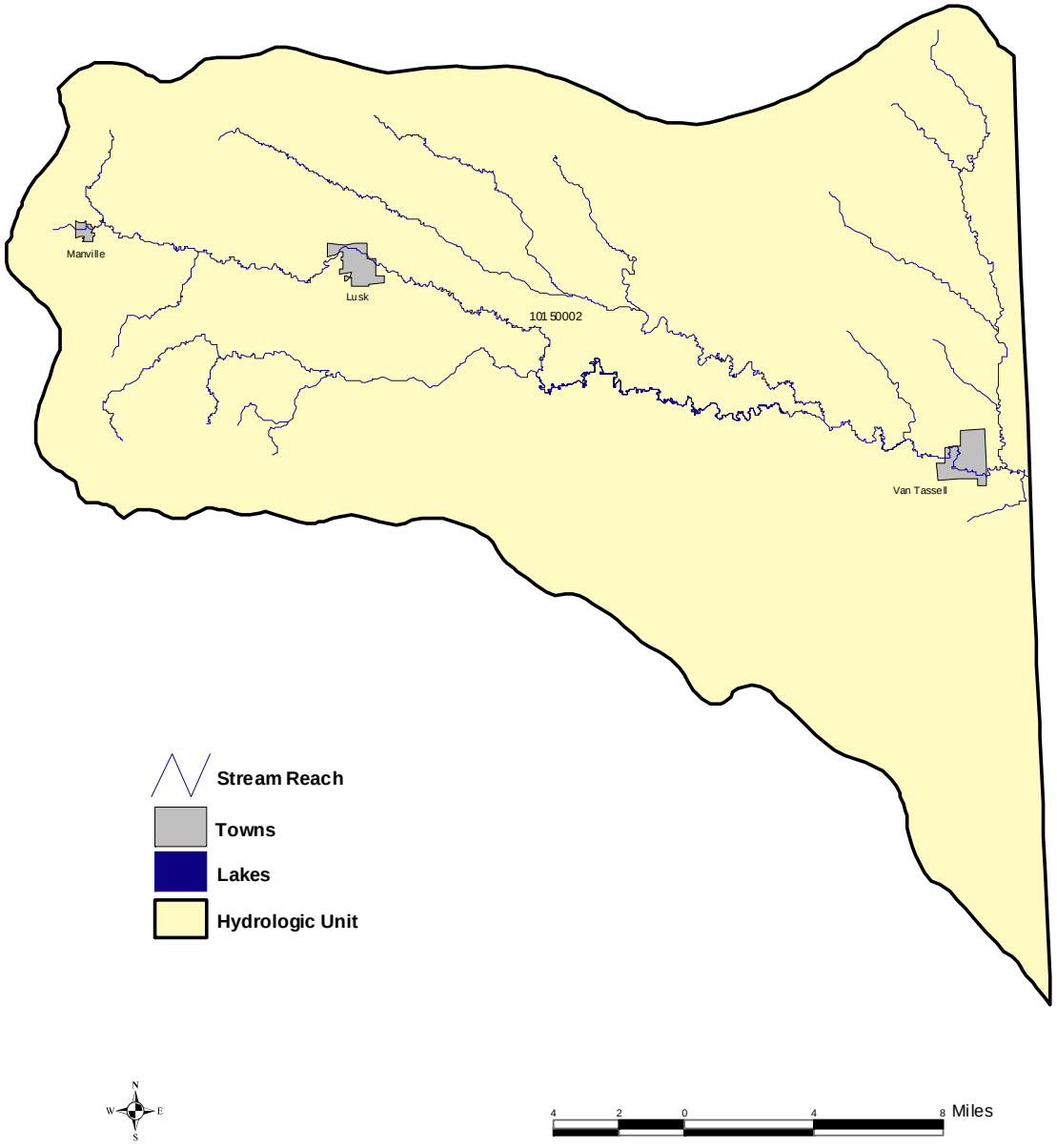
DEQ has monitored water quality in the Little Snake watershed which indicates that aquatic life uses are fully supported on the portions of Savery Creek and North Fork Little Snake drainages within the National Forest and much of the upper watershed of Little Savery Creek. However, physical degradation of lower Savery Creek and West Loco Creek is threatening full aquatic life use support, and these streams are on Table C of the 303(d) List. Currently, a 319 watershed improvement project, implemented by Little Snake River Conservation District (LSRCD) is in place to address those threats.

Muddy Creek Sub-basin (HUC 14050004)
The Muddy Creek Sub-basin includes all the tributaries to Muddy Creek, which flows into the Little Snake River at Baggs. Unstable stream channels and loss of riparian function have been a problem in much of the sub-basin. Muddy Creek below Littlefield Creek, and McKinney Creek below Eagle Creek are listed on Table C of the 303(d) List because physical degradation of the stream channels and riparian areas are considered threats to aquatic life uses. LSRCD has been working in a Coordinated Resource Management (CRM) process with the BLM, landowners, grazing permittees, WGFD, and other stakeholders, since 1992, to address these water quality and riparian habitat problems. As part of the CRM process, LSRCD has managed several 319 watershed improvement projects in the Upper Muddy Creek drainage. Implementation measures include upland water development, cross fencing, vegetation management and grazing management, while maintaining livestock numbers. Other watershed function restoration has

been implemented in the Grizzly Wildlife Habitat Management Area (WHMA), which includes the upper Littlefield Creek drainage and other portions of the upper Muddy Creek drainage. In the Grizzly WHMA,WGFD has been working with the BLM, the grazing permittee, and LSRCD to implement similar measures, however, the grazing strategy is to defer grazing for several years to allow better willow re-establishment. Data collected by LSRCD and WGFD indicate that implementation measures and management changes in both these projects have resulted in considerable improvement to stream stability, aquatic habitat, and riparian areas, especially in the upper Muddy Creek tributaries. Data collected by LSRCD show that Muddy Creek and Littlefield Creek above their confluence, and McKinney Creek above Eagle Creek are meeting their aquatic life uses, and these reaches were removed from Table C of the 303(d) List in 2000. Colorado River Cutthroat trout have been re-introduced into their former habitat in Littlefield Creek, and are planned to be re-introduced into Muddy Creek, above McKinney Creek.

Another project was implemented by LSRCD and other stakeholders on the reach of Muddy Creek, lying west of Highway 789, to address physical degradation of the stream channel, which threatens its aquatic life use support. This reach of Muddy Creek is also on Table C of the 303(d) List. Implementation measures include wetland development, re-establishment of the floodplain and irrigation water management. Results of this project show an improving trend in riparian condition and bank stability above Red Wash. However, habitat degradation has been identified by the BLM and LSRCD as a serious water quality concern on Muddy Creek, from Red Wash downstream to the Little Snake River. The habitat degradation is likely caused by season long riparian grazing, exacerbated by accelerated erosion associated with oil and gas activities. Several grazing management BMPs are being implemented in much of this lower watershed, including changes in length, timing and duration of grazing, and cross fencing. However, projected increases in coal bed methane development have the potential to lead to increased surface disturbance and possible increased erosion and sediment loading.

Niobrara Basin



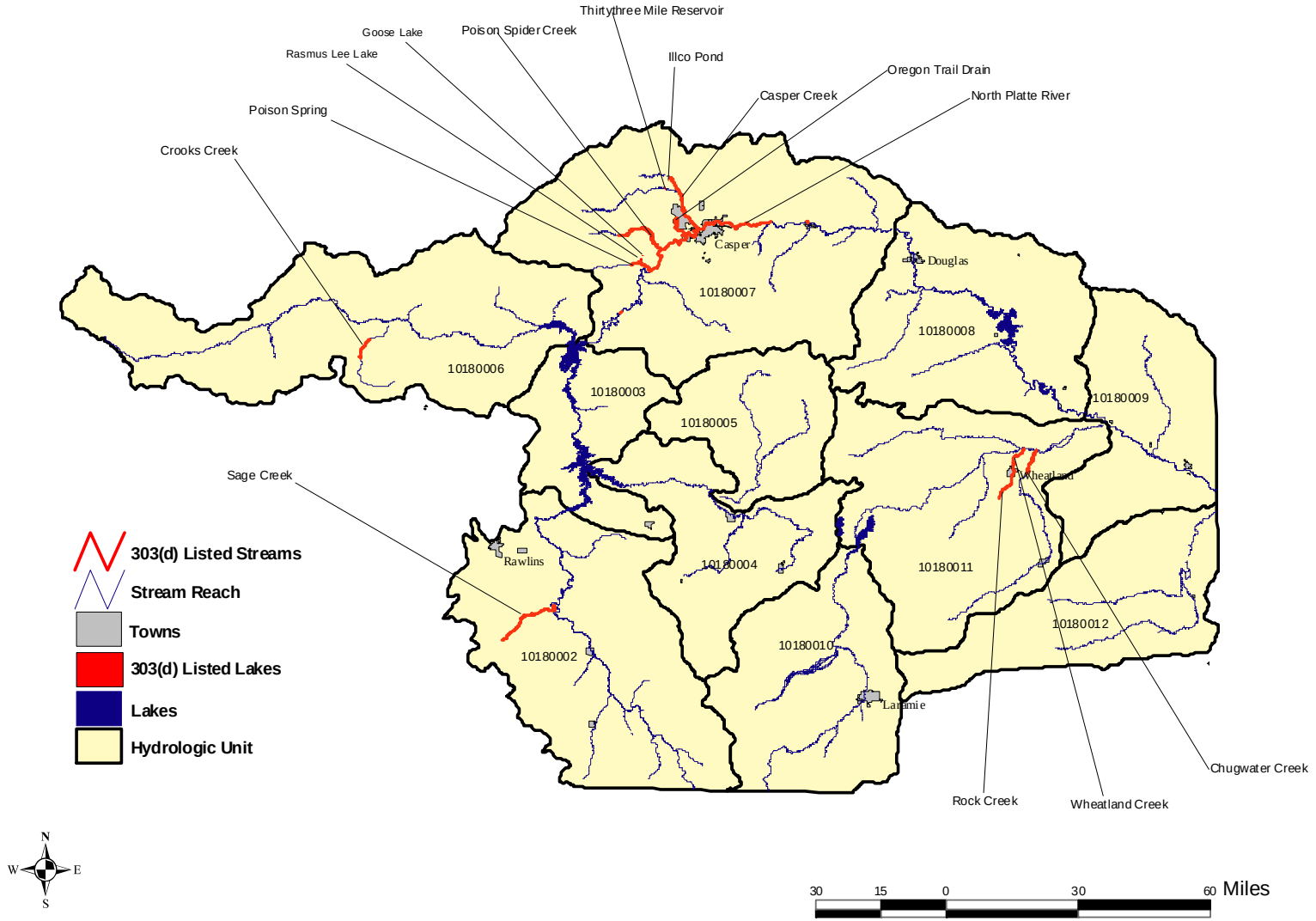
Niobrara River Basin

The Niobrara Headwaters Sub-basin is the only sub-basin in the Niobrara River Basin in Wyoming. Land uses are primarily grazing, with dryland and sprinkler irrigated crop and hay production. Sandy soils essentially prohibit flood irrigation and limit surface flow in streams.

Niobrara Headwaters Sub-basin (HUC 10150002)
Flows in a large stretch of the Niobrara River below Lusk apparently never flow above ground, even during recent catastrophic flooding upstream. The river channel is an undefined grassy swale. Further downstream flows surface and form an extremely slow moving, swamp-like stream, choked with bull rushes and cattails. Historical reports by local residents indicate that in the 1930s the lower stream channel was more defined and supported a population of trout. However, at that time, it appears that the Niobrara River had higher flows than today.

Niobrara CCD has conducted monitoring on Silver Springs Creek, however results of that monitoring were not available for this report (WACD, 2004).

North Platte River Basin



North Platte River Basin

The North Platte River originates in North Park in Colorado and flows into Wyoming from the south. Major tributaries in Wyoming include the Encampment, Medicine Bow, Sweetwater, and Laramie Rivers. Because it is dammed seven times before it enters Nebraska, both its flow regime and water quality characteristics have been significantly changed from its natural state.

All available water (under a US Supreme Court decree governing water use) within the North Platte drainage in Wyoming is allocated for beneficial use. Like the other rivers in the state, most of the allocated water is used for irrigation.

Trout never existed in the North Platte drainage until they were first stocked in the middle 1800's and now many areas in the basin are famous for their trout fishing opportunities. Walleye, the other principal game fish in the basin, have been stocked in Glendo Reservoir and several other smaller reservoirs. They are now abundant in all the mainstem reservoirs and many other off- mainstem reservoirs within the basin.

Upper North Platte Sub-basin (HUC 10180002)
The Upper North Platte Sub-basin is that area upstream of Seminoe Reservoir to the Colorado Line. Like most of the high elevation basins in Wyoming, most of the bottom lands are privately owned and irrigated for hay production. Generally, the uplands are grazed at lower elevations primarily early and late in the year, and the higher elevations are grazed in the summer.

Logging occurs mostly on Medicine Bow National Forest lands, and much of the forested area was historically harvested for railroad ties. Many of the larger mountain streams were straightened and had logs and boulders removed to facilitate tie driving.

There is some oil and gas production in the sub-basin, and Sinclair has an oil refinery. There are no large scale mining operations, but historically there has been considerable gold and copper mining in both the Sierra Madre and Medicine Bow mountains. DEQ's Abandoned Mine Lands Division (AML) has funded restoration projects in many of the mining areas within the sub-basin. Iron oxide was mined near Rawlins for use primarily as a paint pigment and has been applied on barns across the country. There has also been some limited coal mining in this basin, and gravel mines are scattered throughout.

Stream bank modification within the town limits of Saratoga, intended to reduce flooding, resulted in increased erosion in several other places as the river adjusted its channel. However, recent stabilization has been conducted with natural river processes in mind, which should reduce erosion. Natural hot springs in and near Saratoga slightly increase the temperature and dissolved solids content of the river. DEQ has conducted extensive monitoring on the mainstem of the North Platte River above Sage Creek and data indicates full support of aquatic life uses. However, there are reports that nutrient and sediment loads from Colorado may be increasing (WGFD, 2002). Monitoring of the reach above Seminoe Reservoir was conducted in 2002.

Tie driving probably occurred for a longer period of time on Douglas Creek than any stream in the state, continuing from the late 1860s until 1940, when the Union Pacific stopped the use of hand hewn, river driven ties. Devils Gate Creek was too steep and rocky to drive ties, so an extensive flume was built to carry ties and logs to Douglas Creek. Another impact in the Douglas Creek drainage was mining. Placer gold was first discovered near Keystone in 1868 and by 1870 hardrock ore bodies were also discovered and mined. Most gold production ceased

by the 1890s, but copper was mined between 1900 and 1918. Today, a number of gold dredgers still operate in the watershed above the Platte River Wilderness boundary. Rob Roy Reservoir was completed in 1965 to regulate flows in Douglas Creek, where water is diverted via a pipeline to Lake Owen in the Upper Laramie River Sub-basin before it is piped further east to be used for a portion of Cheyenne's water supply. Since all the water is allocated in the drainage, water is simultaneously diverted from the Little Snake drainage into the Encampment River drainage to replenish water taken from the North Platte Drainage. Fish habitat structures, primarily tree revetments, have been installed in Douglas Creek to improve aquatic habitat. Because of past mining, heavy metals were of concern in Rob Roy Reservoir, but monitoring conducted by United States Geological Survey (USGS) and the Cheyenne Board of Public Utilities as part of a 205j grant did not detect any high metal levels of concern for drinking water. Much of the lower watershed is in the Platte River Wilderness area, designated in 1984. Despite historic impacts to Douglas Creek, the reach within the wilderness has been monitored and assessed by DEQ as fully supporting its aquatic life uses as a cold water fishery and Class 1 water. Dredging and roads have been identified by the Forest Service as water quality concerns on Douglas Creek below Rob Roy Reservoir and above the wilderness boundary (MBRNF, 2003).

The watershed of Pelton Creek, which flows into Douglas Creek near the wilderness boundary, has been used as an example by the Forest Service of how good grazing management can improve water quality.

Based on Forest Service reports, roads and dredging were identified as water quality concerns on Smith North Creek and impacts from historic mining are a concern on Bear Creek. DEQ has monitored both these streams, but reports have not been completed.

Much of the Muddy Creek drainage was cut for ties in the 1930s and remnants of an old splash dam for driving ties are still evident in the upper meadow. A road along most of the drainage was of concern and DEQ monitored and assessed the stream in 1998. Although a couple of road crossings contribute some sediment to the stream, their impacts are minimal and isolated, and the data indicates the stream meets its designated aquatic life uses as a Class 2AB water.

Much of the Cottonwood, Savage Run, and Mullen Creek Drainages lie within the Savage Run Wilderness Area. Although considerable timber harvesting has occurred in the drainages (both outside the wilderness and inside the present boundary prior to its designation in 1978) much of these drainages exhibit good riparian and streambank condition, based on observations by a DEQ biologist. Existing data and information do not suggest any water quality problems.

French Creek, Brush Creek, and Pass Creek were all modified to some extent for tie driving in the 1800s, and timber has also been recently harvested in these drainages, creating a fairly large network of roads. Much of the lower watersheds are irrigated via diversions from the streams. However, based on monitoring DEQ has conducted in the French Creek drainage, impacts from these sources, as well as historical placer and hard rock mining, do not appear to be affecting water quality. According to the Forest Service, streambank condition on Fish Creek, a tributary to North Brush Creek, is thought to have been impacted somewhat by season-long grazing, but a new grazing plan to reduce time of use intends to correct those impacts (MBRNF, 2004).

A large stakeholder driven watershed project was recently completed in the Cedar Creek drainage to address erosion problems from prior irrigation water delivery. North Brush Creek, Cedar Creek, and the South Fork of Cedar Creek are in a monitoring program conducted by the Saratoga-Encampment-Rawlins Conservation District (SERCD) associated with the project. An

assessment report is expected in 2006.

Streams in the Big Creek Drainage are fully supporting aquatic life uses on most of the forest, based on DEQ and Forest Service assessments. Problems with sediment loading from forest roads has been recently addressed (MBRNF, 2003).

The Encampment River originates in the Mt. Zirkel Wilderness area in Colorado before it flows into Wyoming. Within a couple miles it flows into the Encampment River Wilderness Area. Flows are augmented in this drainage due to a trans-basin diversion of water from the Little Snake drainage into Hog Park Reservoir for replenishing the North Platte water that Cheyenne diverts out of Douglas Creek. The increased flows in Hog Park Creek did cause some initial channel adjustment after the reservoir was completed in 1965, but the stream appears to be stabilizing. South Hog Park Creek was tie driven and carried a large sediment load and was unstable, so tree revetments were installed to help the stream establish a more natural shape and to improve the fishery. But the revetments were being removed by beaver for dam building because dams built with the small available willows could not withstand high spring runoff. Aspens are now being cut and hauled to the beaver so they will utilize the aspens instead of the revetments, so both can work to trap the sediment and restore the stream. A diversion ditch in the Billie Creek drainage breached in the late 1990s, which eroded a gully and deposited approximately 3300 tons of sediment in Billie Creek and its flood plain. Restoration work on the gully was completed in 2001 to curtail erosion, however, recovery from the impacts to the stream and its aquatic life will likely take several years. Billie Creek was monitored in 2003, but the results are not yet available.

A 1984-86 AML remediation project removed a large (approximately 65,000 cubic yards) tailings pile generated by the mill and smelter in Encampment during the early 1900s, which reportedly resulted in considerable water quality improvement in the river. DEQ has conducted extensive monitoring in the drainage, and the majority of the stream miles are fully supporting their aquatic life uses.

Assessments conducted by DEQ in the upper Jack Creek drainage indicate it is supporting its aquatic life uses, as is upper Spring Creek. The BLM recently changed grazing management on portions of Centennial Creek to improve riparian condition. SERCD has conducted monitoring on Jack Creek, below the National Forest, and the data indicate it is also fully supporting its aquatic life uses.

Sage Creek has a naturally high sediment load due to the highly erosive soils and arid climate in much of the watershed. It has been identified by several studies as the most significant contributor of sediment to the Upper North Platte River and is on Table C of the 303(d) List (WGFD, 1969; SCS, 1980; SERCD, 1998). Additionally, dam failures, road building, and past grazing practices have resulted in increased erosion and sediment loading, especially from the lower portion of the watershed. In 1997, SERCD, in cooperation with land owners, BLM, NRCS, and WGFD, began the Sage Creek Watershed 319 project. The project is using a combination of short duration grazing, riparian and drift fencing, off channel water development, improved road management, grade control structures and water diversion and vegetation filtering to reduce sediment loading from Sage Creek to the North Platte, as well as to improve water quality within Sage Creek. Data collected as part of the project already show reduced sediment loading to the North Platte River and improved riparian and range condition.

Hugus and Iron Springs Draw drainages are Class 3B waters, with intermittent to ephemeral stream channels. According to the BLM, new and developing AMPs are expected to result in

improved watershed condition. Sugar Creek flows through Rawlins and enters the North Platte just upstream of Seminoe Reservoir. Rawlins' waste water treatment plant discharges to Sugar Creek, but the stream rarely flows all the way to its confluence with the North Platte River.

Pathfinder-Seminoe Sub-basin (HUC 10180003)
In the Pathfinder-Seminoe Sub-basin, North Platte River flow is regulated by Seminoe, Kortes, and Pathfinder Reservoirs. The sub-basin includes those areas, other than the Sweetwater and Medicine Bow Rivers, which drain into the North Platte River, or its reservoirs, between Pathfinder dam and the head of Seminoe Reservoir. Primary land uses in this sub-basin are grazing, irrigated hay production, coal mining and recreation. Underground coal mining began in the Hanna-Elmo area in the late 1860s to supply fuel for the transcontinental railroad, and resulted in extensive underground coal workings created over a period of years. AML completed three remediation projects in the Hanna area, which corrected the erosion and standing water impacts associated with coal slag piles and almost 200 coal mine related subsidence holes. Current coal mining activities are thought to have little impact on the water quality in this sub-basin or the Medicine Bow Sub-basin (HUC 10180004).

Pathfinder dam was completed in 1909, and provided the first regulation of flows on the river. Reservoirs also trap sediment and lower average water temperature, so the natural flow characteristics of the North Platte have not existed since then. An extremely productive tailwater fishery resulted after Seminoe Dam was completed in 1939, and was given the name Miracle Mile. Completion of Kortes Reservoir below Seminoe dam shortened the Miracle Mile area, but with the establishment of instream flow releases, it is still considered a premiere blue ribbon fishery.

Deweese Creek, which flows into Pathfinder Reservoir, is one of the few perennial streams in this sub-basin and is considered by DEQ as a reference stream for sand bottom streams in the Wyoming Basin Ecoregion.

Medicine Bow Sub-basin (HUC 10180004)
The headwaters of the Medicine Bow Sub-basin are on the north slope of the Snowy Range. Water quality characteristics change drastically as the streams flow from the metamorphic geology of the mountains through the easily erodible, fine grained sedimentary geology of the basin. This sub-basin drains into Seminoe Reservoir. Land uses include logging in the mountains, grazing, irrigated hay production, recreation, coal mining, and oil and gas development. Irrigation in the Medicine Bow River drainage (including Rock Creek) dates to at least 1870-1880, the time of railroad construction. The transcontinental railroad reached this area in 1868 and coal production began in 1869 near Carbon to supply fuel for the railroad. AML has completed ten site investigations in this sub-basin, most related to coal and gravel production, and completed remediation of one early 1900s coal mine.

Water quality assessments conducted in the upper Medicine Bow River drainage above the town of Elk Mountain indicate full support of aquatic life uses. Extensive monitoring by DEQ, as well as several agencies and universities, also indicate full aquatic life use support in the Rock Creek drainage above McFadden. The Medicine Bow Conservation District has conducted considerable monitoring in the lower portion of this sub-basin as part of a 205j monitoring study, however, data did not meet QA/QC requirements to be used for use support determination.

Little Medicine Bow Sub-basin (HUC 10180005)
The Little Medicine Bow Sub-basin drains the northwestern edge of the Laramie Mountains and the Shirley Basin. Land uses are primarily grazing and oil and gas development, together with historic uranium mining (1955 to the early 1980s). AML completed reclamation of about 1,650 acres of open pit uranium mines in Shirley Basin. The Little Medicine Bow River originally flowed through the uranium ore location. During mining operations in 1972, the river was diverted to the east and shortened. The unstable new channel had down cut as much as fifty feet and drastically increased the sediment input to the drainage system. During reclamation the river channel was restored to its former location and pre-mining condition, with stabilized, revegetated banks and a revegetated riparian area. Eroding radioactive mine waste piles which also contained elevated levels of selenium and heavy metals were removed. Leaching and runoff water from these waste piles had been impacting surface and ground water quality. Reclamation improved water quality and reduced off-site sediment transport. The Medicine Bow Conservation District has monitored the Little Medicine Bow River as part of a 205j monitoring study, however, data did not meet QA/QC requirements to be used for use support determination.

Sweetwater Sub-basin (HUC 10180006)
The Sweetwater Sub-basin headwaters are in the South Pass area of the southern Wind River Mountains. The Sweetwater River is designated as a Class 1 water above Alkali Creek. Land uses in this sub-basin include grazing, irrigated hay production, historic gold and iron mining in the South Pass area, uranium mining in the Jeffrey City area, recreation, and oil and gas development.

At the western end of the sub-basin, AML has remediated and/or stabilized over 100 sites in the old Atlantic City - South Pass mining districts. The Clarissa Mine site, a gold mine which operated from the late 1860s to the early 1970s, included a tailings pond and pile in a perennial tributary to Willow Creek near South Pass City. The tailings appear to have caused elevated levels of arsenic, cyanide, and mercury in local waters and soils. Approximately 7,000 cubic yards of tailings and contaminated subsoil were removed from the drainage, including clearing 1,200 feet of stream channel.

Ambient monitoring of Crooks Creek, a tributary to the Sweetwater River near Jeffrey City, revealed a significant amount of oil in the sediments, in violation of water quality standards. The source of the oil is unknown at this time, but this stream is a high priority targeted water on Table A of the 303(d) List, and is scheduled for monitoring in 2004.

Middle North Platte Sub-basin (HUC10180007)
The Kendrick Reclamation Project takes water out of Seminoe and Alcova Reservoirs for irrigation northwest of Casper. However, much of the irrigated soil contains naturally high levels of selenium, which is readily dissolved and transported by the irrigation water. Extensive studies by the U.S. Geological Survey (USGS), US Fish and Wildlife Service (USFWS), and the Bureau of Reclamation (BR) have determined the irrigation return flows contain high levels of selenium which result in selenium loading into the North Platte River and several streams, wetlands, and reservoirs within the project area. These loadings have resulted in numerous water quality criteria exceedences in the higher class waters (North Platte River, Casper Creek, and lower Poison Spider Creek) as well as documented impairments to wildlife in these and other waters within Kendrick (Oregon Trail Drain, Poison Spring Creek, Goose Lake, Rasmus Lee Lake, Thirtythree Mile Reservoir, and Illco Pond). These waters have all been listed on Table A of the 303(d) List since 2000. An infrastructure repair project has been designed to improve the water quality in Goose Lake, Rasmus Lee Lake, Thirtythree Mile Reservoir, and

Illco Pond to protect migratory birds, and these waters have been given a low priority for TMDL development. The Casper-Alcova Irrigation District (CAID), in partnership with the Natrona County Conservation District (Natrona CCD) and the NRCS, are in the process of securing funding for the purpose of eliminating seepage in the irrigation water conveyance system (WACD, 2004). However, additional mitigation will be required to provide water quality improvement in the creeks or the North Platte River. The Natrona CCD received a 319 grant, and is conducting quarterly monitoring at 20 sites and implementing management practices to reduce selenium levels. These practices include: increasing irrigation efficiency; enhanced irrigation water efficiency through canal and lateral lining; piping; and, growing crops that capture selenium. Currently one phase of the project is complete with 6069 feet of pipe installed for irrigation water delivery. Water quality data are not available at this time, however a final report is expected in 2004, and a watershed plan is expected to be completed in 2005. Natrona CCD's second 319 project, expected to begin in 2004, proposes to enclose a conveyance system and conduct monitoring of water, soil, and vegetation to illustrate the environmental and financial benefits of conversion to efficient irrigation systems (WACD, 2004).

Glendo Sub-basin (HUC 10180008)

The Laramie Mountains border the Glendo Sub-basin on the southwest. This sub-basin includes all the drainages entering the North Platte River below LaPrele Creek (above Douglas) and above the Fort Laramie Canal (below Guernsey). North Platte water flow is regulated by Glendo and Guernsey Reservoirs. Primary land uses are grazing, irrigated agriculture, oil and gas development, and scattered gravel and limestone quarries.

Sunrise Mining District is located east of Hartville Canyon in a tributary drainage of the North Platte River. Copper mining began in the 1870s; long term iron mining in the district began in the 1890s. An AML reclamation and remediation project in the Sunrise Mining District remediated multiple water quality impacts from the mining.

Guernsey Reservoir is the site of the annual Guernsey silt run, an exception to the state turbidity criteria. After Guernsey Reservoir was completed in 1927, water released from the reservoir was described as practically sediment-free and is believed to have removed years of silt accumulation which had acted as a water seal in irrigation canals, and led to seepage and bank collapses which in turn impeded water flow. The practice known as the annual silt run was first tried in 1936 as an attempt to deliberately remove accumulated sediment from Guernsey Reservoir and put enough silt and sediment into irrigation canals to seal them and prevent further erosion. The silt run took place approximately once each year from 1936-1957 by a planned flow reduction from Pathfinder and subsequent drawdown of Guernsey. Glendo Reservoir, built between Pathfinder and Guernsey, was completed in 1958. Glendo functioned as a second sediment settling area for water entering Guernsey, with the result that water releases from Guernsey were referred to as "crystal clear." The 1958 irrigation season was carried out without a silt run, but the practice was reinstated in 1959 and has been implemented each year since. The annual complete drawdown of Guernsey Reservoir, usually after July 4, takes about ten days and moves a significant amount of sediment out of the reservoir and into the downstream irrigation canals with return flow into the North Platte River. As a result of actions begun in 1983, the annual Guernsey silt run has been authorized in Wyoming turbidity standards.

Lower North Platte Sub-basin (HUC 10180009)
In Wyoming, this sub-basin includes the drainages, other than the Laramie River, which enter the North Platte River from the Fort Laramie Canal diversion downstream to above the confluence with Horse Creek (in Nebraska). Primary land uses are irrigated agriculture, dryland farming, and grazing.

Upper Laramie Sub-basin (HUC10180010)
This sub-basin includes all the drainages above Wheatland Reservoir #2. Major drainages in the Upper Laramie Sub-basin are the Laramie and Little Laramie Rivers whose headwaters are in the Medicine Bow Mountains. Land uses are logging, recreation, and grazing at higher elevations; grazing, irrigated hay production, and some oil and gas development in the lower elevations. The City of Laramie (third largest in Wyoming) lies in this sub-basin.

Extensive water quality assessments by universities, the Forest Service, and DEQ in the Little Laramie Drainage above Millbrook indicate that the majority of the streams and lakes are meeting their aquatic life uses.

Water quality monitoring on the Big Laramie River also indicates full aquatic life use support above Jelm.

Lower Laramie Sub-basin (HUC10180011)
This sub-basin runs from Wheatland Reservoir #2 downstream to the confluence with the North Platte River. Land uses include irrigated agriculture, grazing, dryland farming, and some logging in the Laramie Range.

Ammonia levels in Wheatland Creek often exceed water quality criteria in the winter and spring, indicating that aquatic life uses are not fully attained. Monitoring indicates Wheatland's waste water treatment facility is a primary source of ammonia and a TMDL has been approved by EPA. Although still partially impaired, Wheatland Creek is not listed on the 303(d) list for ammonia because of the approved TMDL. The City of Wheatland is working with DEQ/WQD on the installation of a non-discharging treatment system to address this issue.

Concerns expressed by several residents prompted DEQ to begin monitoring fecal coliform in the Wheatland/Rock Creek drainage. Results of this monitoring indicate that Rock Creek and a portion of Wheatland Creek for an undetermined distance above and below Highway 320, are not meeting their uses for contact recreation. Therefore, they have been listed on the 303(d) List. The Platte County Natural Resource District is beginning the watershed planning process to identify and address sources of fecal contamination, and is expecting to have a watershed plan completed in 2006. However, implementation of projects aimed at reducing fecal contamination will occur concurrently with the planning process. Four animal feeding operation projects and three septic rehabilitation projects are being planned in the Rock Creek drainage (WACD, 2004).

Assessments conducted by DEQ along the length of Chugwater Creek indicate the stream appears to meet its designated aquatic life uses as a class 2AB water above Antelope Gap Road west of Wheatland, although nutrients are a concern. However, the character of the stream dramatically changes in a reach below the road. The stream bed changes to a mobile sand bed which supports very little aquatic life, compared with upstream reaches and other similar

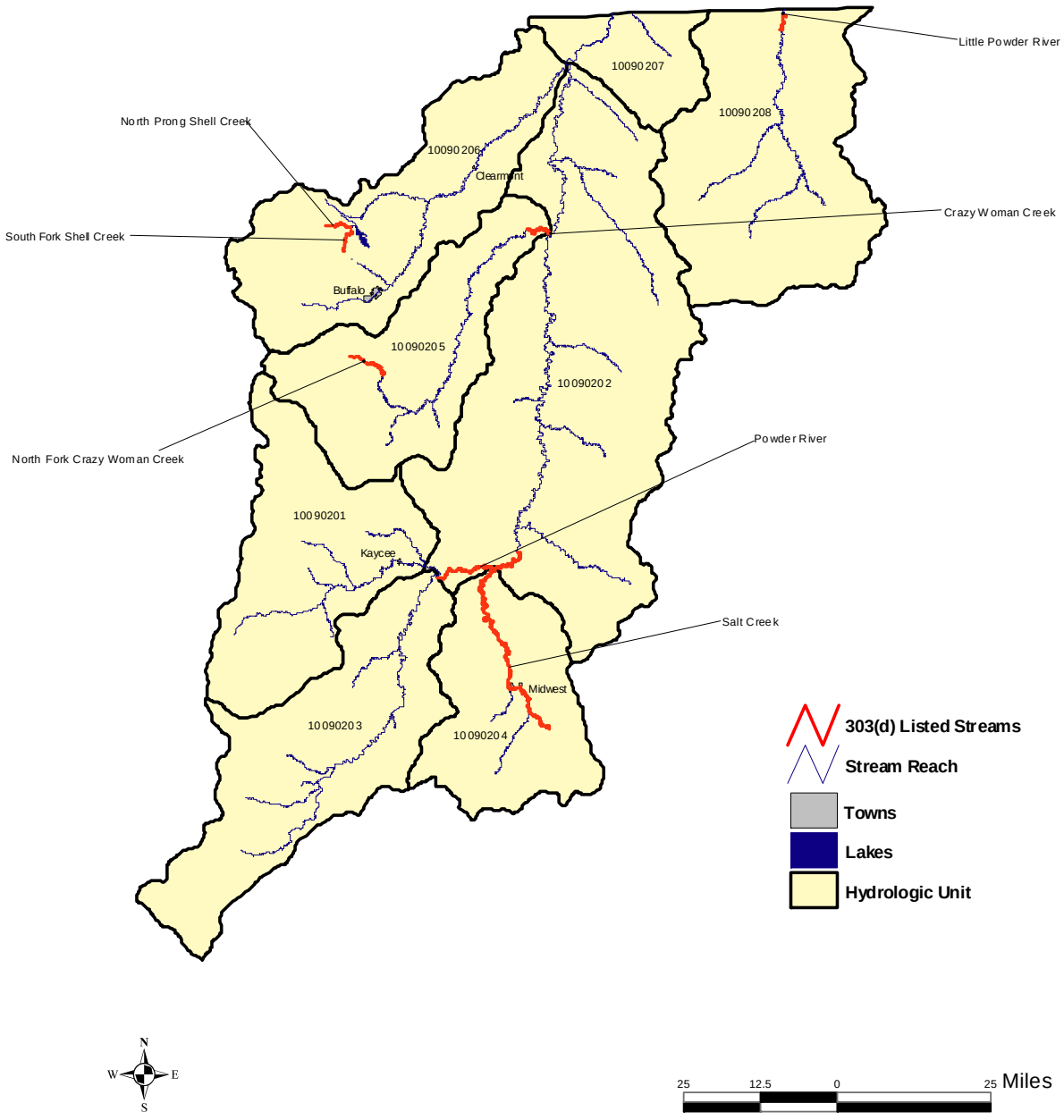
streams, and threatens use support. All the reasons for this change are not immediately apparent, but cooperative efforts with landowners, sponsored by WGFD and Pheasants Forever, to improve riparian condition to benefit wildlife have been implemented along this portion of the creek. Additionally, the irrigation district is proposing a small reservoir on the bench above the creek to improve irrigation efficiency. While both these projects were not specifically designed to benefit water quality, DEQ believes that they will dramatically reduce sediment loading and bed transport. Data collected by Platte County Resource District (PCRD), concurs with DEQ's findings above Antelope Gap Road and indicates that the sediment problem does not extend below a diversion dam, below the site where DEQ identified the problem. PRCD did not conduct monitoring in the vicinity of that DEQ monitoring site, so it is unknown whether the sediment problem has improved. The reach of Chugwater Creek is listed on Table C of the 303(d) List, but has been given a low priority for TMDL development, to allow these measures time to improve water quality. PCRD data also show very high nitrate levels in Chugwater Creek, approximately 10 times higher than recommended concentrations for streams which ultimately flow into reservoirs. Affects of this nutrient loading on Gray Rocks Reservoir, downstream of Chugwater Creek on the Laramie River, are unknown.

The Tunnel Reservoir on the Laramie River dams up water so it can be diverted through a tunnel into Bluegrass Creek to supply irrigation water in the Sybille Creek drainage. The reservoir is drained in the fall to prevent damage of the gates at the head of the tunnel. Because the reservoir was designed to release water from the bottom, the annual fall drawdown often discharged anoxic sediment from the bottom of the reservoir which resulted in fish kills downstream in the Laramie River. In 1997 reservoir modifications were made which allow the water to be released without disturbing the accumulated sediment.

Horse Creek Sub-basin (HUC 10180012)
Head waters of the Horse Creek Sub-basin are in the Laramie Mountains. Land uses are primarily grazing and irrigated hay production, with considerable dryland and irrigated cropping at lower elevations.

Watershed assessments on upper Horse Creek show that aquatic life uses are fully supported. Watershed assessments were conducted by DEQ on Bear Creek in 1999, which indicate the stream is meeting its aquatic life uses, however, elevated temperature is a concern in the lower watershed since the stream is protected as a cold water fishery. WGFD manages lower Horse Creek as a warm water fishery.

Powder River Basin



Powder River Basin

The Powder River flows north from Central Wyoming into Montana. Nearly all of the naturally perennial streams which reach the Powder River originate in the Bighorn Mountains. The core of the Bighorn mountains is composed of igneous and metamorphic rocks flanked by mostly well-indurated sedimentary rocks. The water quality of mountain streams is generally high quality, except in isolated areas where land use practices have led to excessive erosion and sediment loading. In the Powder River geologic basin away from the mountains, the geology consists of primarily fine grained sedimentary strata which are often high in dissolved constituents and most formations are easily eroded. Streams originating in the basin terrain, unless receiving discharge water, are generally ephemeral, flowing only in response to snowmelt and rainfall events. These streams are generally high in dissolved solids picked up from the soils and are often turbid due to the nature of the geology and thin soils. Because of these natural conditions, the numeric human health criteria for manganese and iron do not apply in most Class 2 waters originating in the Powder River geologic basin. The Powder River Basin contains aquatic communities and certain fishes, such as the sturgeon chub - a former candidate for listing under the Endangered Species Act, which are adapted to living in naturally turbid conditions. Although effects of CBM development on these aquatic biota are unknown at this time, DEQ, WGFD, and USFWS have concerns that these aquatic communities may be affected.

Middle Fork Powder Sub-basin (HUC 10090201)
The upper Middle Fork of the Powder River flows through a steep canyon with little potential for disturbance. Watershed assessments conducted by DEQ indicate that the Middle Fork Powder River above Buffalo Creek, and Rock Creek, an upper tributary, are fully supporting their aquatic life uses. Near Barnum, Blue Creek, and upper Beaver Creek (above the Blue Creek confluence) have been assessed by DEQ and have been determined to be fully supporting their aquatic life uses.

Beartrap Creek is a spring fed tributary of Red Fork, and historically, the upper Beartrap Creek drainage has been used as a stock driveway and holding ground. Management practices have changed over the past twenty years. Today, stock have controlled access to creek water, are moved through relatively quickly, and are only in the drainage for a short time in spring and fall. In a cooperative effort between BLM and WGFD, log spill structures were installed in 1989 to create additional pool and riffle habitat. Bioassessments conducted by DEQ show that both upper Beartrap Creek and Sawmill Creek are fully supporting their aquatic life uses.

Upper Powder River Sub-basin (HUC 10090202)
The Upper Powder Sub-basin encompasses most of the drainages into the Powder River main stem from the confluence of the North and Middle Forks downstream to the confluence of the Powder River and Clear Creek. Except for the main stem, most reaches in this semi-arid sub-basin are non-perennial. The Powder River got its name from the large amounts of very fine sediment it naturally carries. Sturgeon chub, a native fish considered rare by WGFD and now found only in the Powder River, are believed to be adapted to, and require, turbid water. Primary land uses are grazing, coal bed methane, and oil and gas production.

The Powder River below Salt Creek was listed on the 1998 303(d) List for exceedences of the chloride criteria. Analysis of data show that the majority of the chloride load in the Powder River in this reach comes from Salt Creek. Data collected at Sussex also shows exceedences of

the selenium criteria, so selenium was added as an impairment on Table A of the 303(d) List in 2000. Historic USGS data indicates the likely source of the selenium is the South Fork of the Powder River, however, it is undetermined whether the selenium loading is natural or human induced. The Powder River Conservation District (PRCD) has received a 319 grant to conduct further water quality assessment and begin implementation once sources are discerned. Data from that monitoring were not available for this report. PRCD has requested additional funding to implement a second year of monitoring, and is expected to complete a watershed plan by 2006 (WACD, 2002; WACD, 2004).

South Fork Powder Sub-basin (HUC 10090203)
The South Fork Powder Sub-basin lies mostly in Natrona County, extending into the Waltman area. The few perennial reach miles in this sub-basin are primarily in the Rattlesnake Hills headwaters area of Wallace Creek, the lower portions of Willow and Cottonwood Creeks and the lower portion of the South Fork main stem. Grazing and oil and gas development are the primary land uses.

Review of decade old water quality data on the South Fork of the Powder River shows that it was the primary contributor of selenium to the Powder River. Because land use practices appear to have changed little in the sub-basin, it is presumed that the South Fork is still the primary source, but more study is needed to determine whether the high selenium load is a natural occurrence or whether it has increased due to some type of human activity.

Salt Creek Sub-basin (HUC 10090204)
Midwest and Edgerton lie almost in the center of the Salt Creek Sub-basin. Land uses are primarily grazing and oil and gas production. Several natural oil seeps have been documented along Salt Creek in the Midwest area, which led to development of the oil fields beginning in 1908. Most reaches in this semi-arid sub-basin are non-perennial. Salt Creek now has perennial flow due to discharge water from oil treaters, but reportedly is naturally non-perennial. Soils developed from fine grained sandstone and calcareous shales, are dry and easily eroded by wind or water.

The WGFD database, as well as field observations by DEQ personnel, shows that there are several species of non-game fish which live in Salt Creek, which is classified as class 2C, a non-game fishery. However, because of the high chloride concentrations in the creek, it exceeds the criteria for protection of aquatic life. Salt Creek naturally carries a high load of salts, hence its name. Several reports indicate that the majority of the stream flow is due to effluent from oil treaters in the sub-basin, with a component from flowing artesian wells (WACD, 2004). Further study is being planned to calculate the chloride loads from both natural and human sources to determine whether Salt Creek has unnaturally high loads that are impacting both Salt Creek and the Powder River. The Powder River Conservation District (PRCD) received a 319 grant and began water quality monitoring in 2003, but data were not available for this report. PRCD has also requested additional funding for more monitoring (WACD, 2004). PRCD is expected to complete a watershed plan by 2006 (WACD, 2002).

Salt Creek also remains on the 303(d) List of threatened waters due to a high number of oil spills in the watershed, perhaps due to the age of the oil handling facilities. Although most of those spills usually do not make it to live water, some do. At the request of DEQ, the current operator of the field has developed a long term upgrade and maintenance plan for the field to reduce the potential for large spills that may affect the water.

Crazy Woman Sub-basin (HUC 10090205)
Headwaters of the Crazy Woman Sub-basin are on the east side of the Big Horn Mountains. Land uses are primarily oil and gas development, recreation, grazing, and irrigated agriculture.

The North Fork of Crazy Woman Creek is listed on Table C of the 303(d) list due to water quality threats from physical degradation of the stream channel. Several 319 watershed improvement projects have been conducted in this watershed which changed both irrigation and grazing practices in large portions of the watershed. Considerable water quality data has been gathered in this watershed, however, it is inconclusive whether these practices have benefitted water quality due to inconsistent sampling and implementation of best management practices within the watershed (BIO-WEST, 2001). DEQ conducted monitoring in the North Fork watershed in 2003, however, results are not yet available to determine the effects the 319 projects had on improving water quality.

USGS data collected near the mouth of Crazy Woman Creek indicate it is exceeding the aesthetic drinking water criteria for manganese, and the creek has been added to Table A of the 303(d) List. The manganese concentrations in Crazy Woman Creek do not appear to be high enough to present a health threat but can cause discoloration of the water, so Crazy Woman Creek has been given a low priority for TMDL development. It is likely that the high manganese concentrations are due to the natural geology of the area, and a site specific criteria is being considered. DEQ collected dissolved manganese samples from Crazy Woman Creek during high and low flow periods in 2003. The complete data set is not yet available.

Many of the streams in this watershed have been monitored by DEQ, and assessment of the data indicate that the following streams are fully supporting their aquatic life uses:

Crazy Woman Creek (from confluence of North and Middle Crazy Woman down to approximately 2 miles below Wallows Creek)
Little North Fork Crazy Woman Creek
Pole Creek (tributary to North Fork Crazy Woman Creek)
Middle Fork Crazy Woman Creek
Doyle Creek (above Taylor Creek)
Poison Creek
South Fork Crazy Woman Creek
Beaver Creek
Pole Creek (tributary to Beaver Creek)

Clear Creek Sub-basin (HUC 10090206)
Clear Creek, Piney Creek, and Rock Creek headwaters in the Clear Creek Sub-basin are in granitic geologic materials in the Cloud Peak Wilderness area within the Bighorn National Forest. Recreation, grazing, and logging are land uses within the higher elevations. Below the Forest boundary, the main stems of Rock Creek, Piney Creek, and Clear Creek are perennial but tributary reaches are generally non-perennial. Grazing, oil and gas development, irrigated agriculture and residential development are the primary land uses. Clear Creek is the last major tributary to join the Powder River before the Wyoming-Montana state line.

A 205j water quality assessment project in the Rock Creek and North and South Fork Shell Creek drainages indicated that these watersheds are threatened by physical degradation of the stream channel. The primary degradation to Rock Creek has been identified as heavy grazing in

small horse pastures. Data collected and analyzed by DEQ indicate that aquatic life uses are supported in Rock Creek, however, there are areas where intensive land uses threaten use support. Impacts to the North and South Fork Shell Creek drainages are primarily due to irrigation diversions and conveyance. Lake DeSmet Conservation District recently completed a 319 grant which addressed these problems primarily through installation of more efficient irrigation and irrigation delivery systems. North and South Fork Shell Creeks are listed on Table C of the 303(d) List.

A short reach of Hunter Creek was impacted from excessive sediment which washed off an adjacent road and was listed as threatened on the 1998 303(d) List. Road modifications and changes in maintenance have been implemented to reduce this impact, and data indicates that Hunter Creek is now fully supporting all its aquatic life uses. Hunter Creek has been delisted (Table D) from the 303(d) List.

Based on DEQ assessment data, Little Piney Creek fully supports its aquatic life uses.

DEQ data also shows that Boxelder Creek supports its aquatic life uses as a class 3B stream. Because many non-game fish were noted during the assessment, Boxelder Creek may not be properly classified. However, even if Boxelder Creek was classified as a 2C non-game fishery, it appears that it would be fully supporting that use in the lower reach.

Clear Creek was monitored by DEQ in 1999, however, a final assessment report has not been completed.

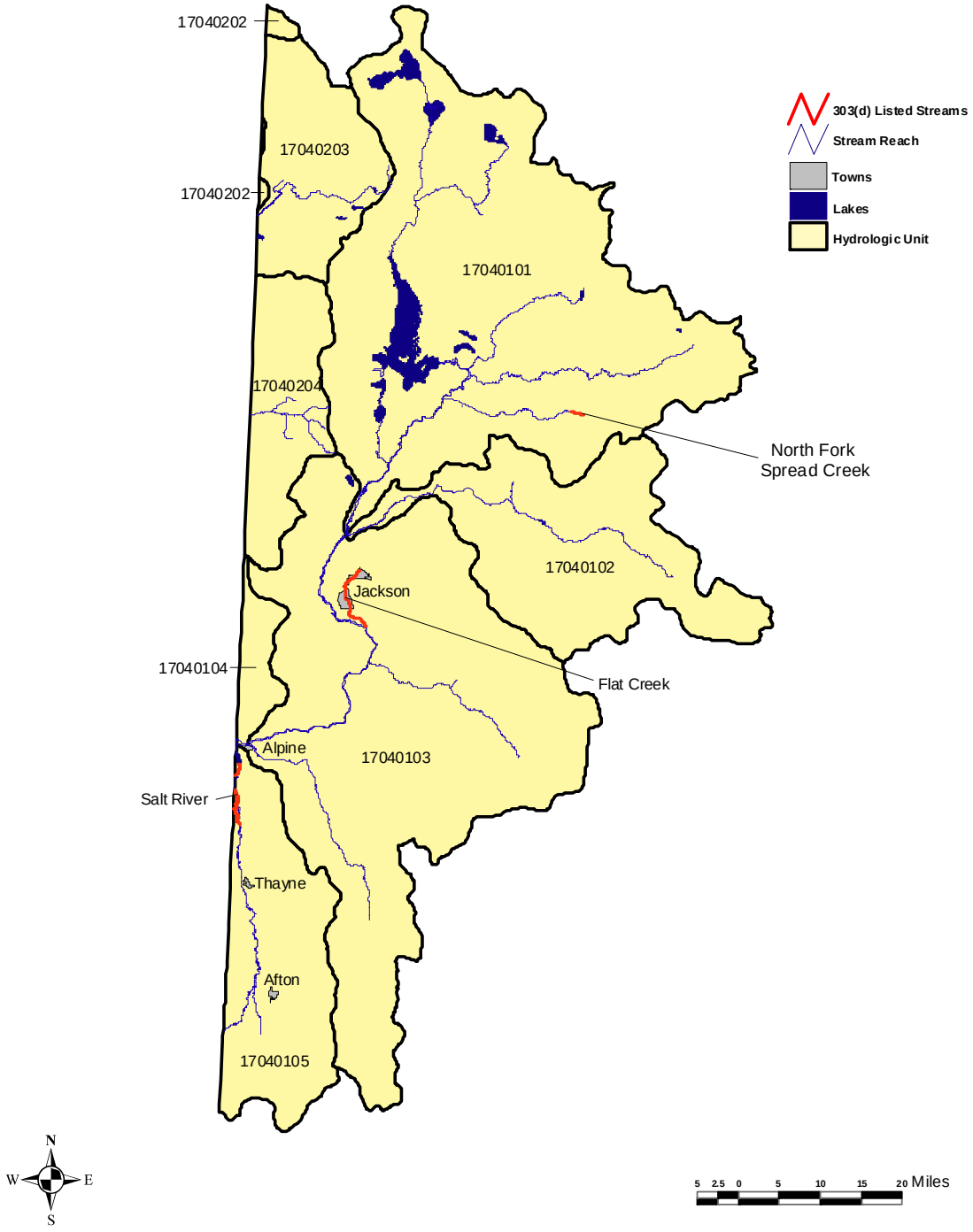
Middle Powder Sub-basin (HUC 10090207)
Middle Powder Sub-basin includes the lower portion of the Powder River in Wyoming before the Powder River flows into Montana. Historically, land uses have been primarily related to grazing with some oil and gas development. However, coal bed methane development is becoming a major land use in much of the sub-basin. Except for the Powder River main stem, reaches in this sub-basin are generally non-perennial. However, many of these stream beds are receiving discharge of coal bed methane produced water.

Monitoring was conducted on the Powder River by DEQ in 2000, but due to the very low to no flow conditions prior to sampling, it is expected that more biological sampling will need to be completed. The DEQ ambient data will need to be combined with the other available data (both from DEQ and other entities) to formulate an assessment of the Powder River.

Little Powder Sub-basin (HUC 10090208)
The Little Powder River originates near Gillette and flows north into Montana, east of the Powder River in Wyoming. Primary land uses in the Little Powder Sub-basin include coal mining, coal bed methane development, and grazing. Moyer Spring is fed by water accumulated in scoria beds.

USGS data collected from the Little Powder River, near the Montana line, shows occasional exceedences of the fecal coliform criteria, indicating the contact recreation use is threatened. The Little Powder River is on Table C of the 303(d) List. The Campbell County Conservation District has received a 319 grant to initiate a water quality assessment effort in the Little Powder River Drainage and a final report interpreting current and historical data is expected in October 2004. The district also plans to use additional 319 funds to implement BMPs for animal feeding operations and to continue monitoring (WACD, 2004).

Snake River Basin



Snake River Basin

Headwaters of the Snake River are in the Western Wyoming Mountains. Several tributaries join at Palisades Reservoir which straddles the Idaho border. The Snake River crosses Idaho and joins with the Columbia River. In Wyoming the Snake River moves a lot of sediment during high flow because of the relatively young, erosive geology in much of the basin. The basin in Wyoming consists mostly of steep mountains with several intermontane valleys. Outdoor recreation is the primary land use and drives the economy in the basin.

Snake Headwaters Sub-basin (HUC 17040101)
Waters of the Snake Headwaters Sub-basin originate in southern Yellowstone National Park, Grand Teton National Park, and the Bridger-Teton Wilderness area. This sub-basin extends from just above the Gros Ventre River confluence upstream. Buffalo Fork, Pacific Creek, and the Lewis River are the major tributaries in this sub-basin. Land use is primarily recreation, with areas of residential development, grazing and irrigated hay production.

A watershed improvement project, sponsored by the Bridger-Teton National Forest, on the North Fork of Spread Creek has rehabilitated the stream channel and improved the stream's ability to support aquatic life. This stream was thought to be meeting its aquatic life uses, but was considered threatened until the riparian vegetation is better established, so it is listed on Table C of the 303(d) List. Monitoring was conducted in 2003, but the data is not available yet.

Gros Ventre Sub-basin (HUC 17040102)
Waters of the Gros Ventre Sub-basin originate in the Bridger-Teton National Forest. Recreation, grazing, irrigated hay production, and logging are primary land uses.

Greys-Hoback Sub-basin (HUC 17040103)
Waters of the Greys-Hoback Sub-basin originate in the Bridger-Teton National Forest. Much of the southern part of this sub-basin is in the overthrust belt, which has naturally high rates of erosion due to a combination of poorly indurated, sedimentary geology, and geologically young mountains. Principal land uses are recreation, grazing, hay production, and considerable residential development.

Residential development and the rapidly growing population is a concern from a water quality standpoint. Water quality assessments conducted on Flat Creek by Teton Conservation District clearly indicate that its ability to meet its aquatic life use support is threatened, primarily by urban runoff. Flat Creek is on Table C of the 303(d) List, and a watershed improvement project is underway to reduce sediment loading to the stream from urban sources. This project includes education and monitoring efforts, and installation of stormwater filtration systems to filter stormwater from the rodeo grounds as well as five urban sites. The Town of Jackson also has a commercial stormwater code, has initiated full time summer street sweeping, and has modified the type of salts it uses for ice control on town streets.

Geologic investigations along the Hoback River indicate heavy sediment loadings as a result of mass wasting, mudflows, slumping, snow and rock avalanches and landslides, but it is unknown how much this natural process has been accelerated by human activity (Ryan et al, 2003).

Palisades Sub-basin (HUC 17040104)
Waters of Palisades Sub-basin originate on the west side of the Teton Range in the Targhee

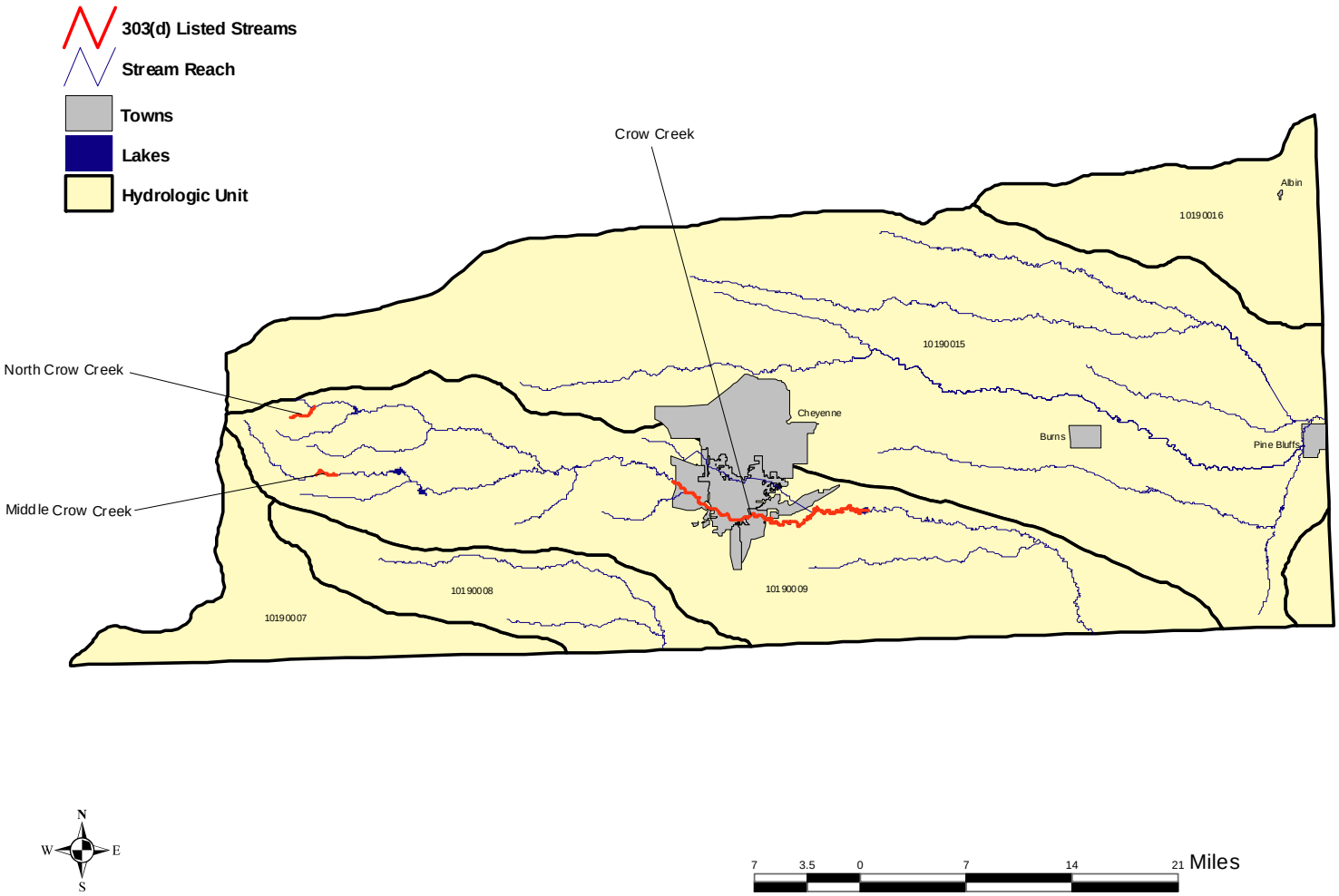
National Forest. Land uses are primarily recreation and residential development.

Salt River Sub-basin (HUC 17040105)
The Salt River Sub-basin lies in an area of Wyoming known as Star Valley. Historically, land uses in the Valley have been predominantly associated with agriculture - irrigated small grain and hay production, dairy farming and beef production. However, today much of Star Valley is undergoing residential development. Recreation, grazing, and logging are primary land uses in the mountains surrounding the valley.

Studies have indicated that nutrient enrichment may be causing problems in some of the streams, but it has not been determined if the sources are due to agricultural activities, residential development, or both. The Star Valley Conservation District (SVCD) recently utilized a 319 project to provide public education and implement best management practices for agricultural nutrient management to reduce nutrient and fecal bacteria loading to streams in the watershed.

The lower Salt River is listed on Table C of the 303(d) List as threatened, because USGS fecal coliform data indicates that contact recreation uses are threatened. Water quality data collected by SVCD in the watershed indicate fecal coliform bacteria may be a problem in much of the Salt River and in Stump Creek. However, the data collected by SVCD did not meet QA/QC requirements for a use support decision, but is helpful for watershed planning (DEQ, 2004a). SVCD is initiating a watershed planning effort in Star Valley.

South Platte River Basin



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South Platte River Basin

The South Platte River Basin in Wyoming is only about 2000 square miles, or 2% of the state's total land area. Most sub-basins (except the Lower Lodgepole Sub-basin) in the basin have their headwaters in the granitic Sherman mountains of the Laramie range. These sub-basins generally drain toward the east and south into Nebraska and Colorado. Stream flows are generally perennial in the mountains and become intermittent on the plains. Native, non-game fish are adapted to these intermittent flows, and can even benefit from them because the flow regime limits colonization by many non-native fish species. Because of the sandy soils and low stream flows in much of the basin, most irrigation uses groundwater via sprinklers.

Cache La Poudre Sub-basin (HUC 10190007)
A small portion of the Cache La Poudre Sub-basin is in Wyoming in the Laramie Mountains, before it drains south into Colorado. Land use is primarily grazing, with limited hay production.

Lone Tree Sub-basin (HUC 10190008)
Headwaters of the Lone Tree Sub-basin are in the Laramie Mountains, and the sub-basin drains to the east. Grazing is the primary land use, with limited irrigated and non-irrigated agriculture in the lower elevations.

Crow Creek Sub-basin (HUC 10190009)
The Crow Creek Sub-basin originates in the Vedauwoo area between Laramie and Cheyenne. Its flows are supplemented by water from the Cheyenne Stage II Project which pipes water from the Douglas Creek drainage in the Upper North Platte Sub-basin to Crow Creek for a portion of Cheyenne's municipal water supply. Crystal, Granite, and Middle Crow reservoirs all lie in this sub-basin. Primary land uses are grazing, residential development, irrigated hay production, and both irrigated and dryland cropping in the lower sub-basin.

The city of Cheyenne appears to have a major impact on the water quality of Crow Creek (King, 1995; BRW/Noblitt & Wright-McLaughlin, 1978). Fecal coliform contamination is a constant problem in Crow Creek, from Dry Creek upstream through Warren Air Force Base, and exceedences of the criteria for ammonia have also been recorded. Crow Creek is listed on Table A of the 303(d) List for these two pollutants. Cadmium was listed as an impairment on Crow Creek, but after no cadmium was detected in any samples collected over four years by DEQ and the Laramie County Conservation District (Laramie CCD), cadmium was delisted as a cause of impairment from the 303(d) List in 2002. Although Wyoming does not have numeric criteria for nitrates and phosphates for protection of aquatic life, high levels of these nutrients are another concern, since DEQ data show they increase more than ten-fold as Crow Creek flows through Cheyenne, to levels well above any EPA proposed criteria. Currently, Laramie CCD is conducting monitoring, working to provide education about water quality, and with the City of Cheyenne, is beginning implementation of management practices to reduce pollutant loading in Crow Creek. These practices include construction of wetlands to trap pollutants, buffer strips and riparian fencing, irrigation system improvements, animal feeding operation projects, small acreage grazing projects, and drain stenciling. The district has also initiated a watershed planning effort and a watershed plan has been completed. Additionally, the greater Cheyenne metropolitan area will be developing plans to address stormwater over the next three to ten years, and both of Cheyenne's waste water treatment plants will be using tertiary treatment by 2007 to nearly eliminate the ammonia loading to Crow Creek.

Fecal coliform and *E. coli* samples collected by DEQ in the North Branch of North Fork Crow Creek and Middle Crow Creek exceed the fecal coliform criteria, which indicates these streams are not meeting their contact recreation uses. Based on field observations, it is suspected that grazing practices play a role in the high fecal bacteria counts, however, other sources may also contribute. Because the Crow Creek Watershed Steering Committee has agreed to address this issue, these streams have been given a low priority for TMDL development.

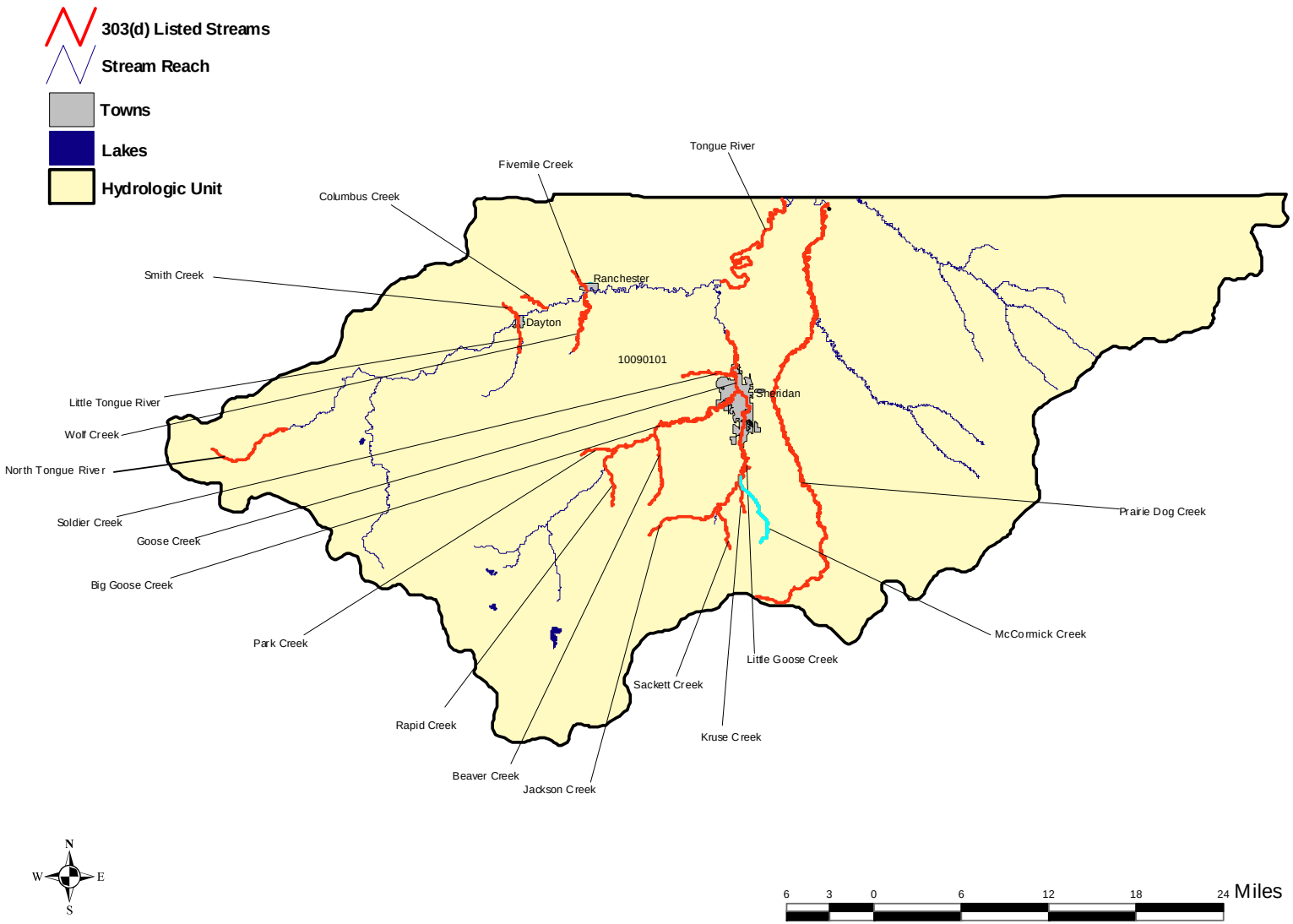
Sloans Lake in Cheyenne is frequented by a large number of ducks and geese, and also receives runoff from parks and streets. As a consequence, fecal coliform levels occasionally exceed the level of concern for primary contact recreation for a short period nearly every year. Laramie County Environmental Health Officials routinely monitor those levels and close the lake to swimming when fecal coliform levels exceed the criteria for primary contact recreation. Although there are these occasional high counts, the state water criteria, which is based on a geometric mean, is not exceeded.

Although Dry Creek has intermittent flows near its confluence with Crow Creek, because of various water sources within Cheyenne, it is now a perennial stream within the city limits and supports a population of non-game fish, based on observations by DEQ biologists.

Upper Lodgepole Sub-basin (HUC 10190015)
The Upper Lodgepole Sub-basin originates in the Laramie Range, north of the Crow Creek Sub-basin and flows east through Pine Bluffs. Much of the stream is intermittent in the lower elevations with only isolated pools of standing water during the summer. The primary land use is agriculture - grazing in the upper sub-basin and irrigated and dryland crop production in the lower sub-basin. However, there has been considerable residential growth in the sub-basin in recent years, but effects of this growth on water quality are unknown.

Lower Lodgepole Sub-basin (HUC 10190016)
A small portion of the Lower Lodgepole Sub-basin is in eastern Laramie County, and it drains east into Nebraska. The sub-basin is small, with no perennial streams, and land uses are primarily dryland and sprinkler irrigated crop production and grazing.

Tongue River Basin



Tongue River Basin

The Tongue River Basin in Wyoming consists of a single sub-basin (HUC 10090101), originating in the Big Horn Mountains west of Sheridan. Land uses in the National Forest are recreation, grazing and logging. In the lower sub-basin, primary land uses are irrigated agriculture and grazing, with increasing residential development and coal bed methane activity.

Tongue Sub-basin (HUC 10090101)

Big Goose and Little Goose Creeks were placed on the 1998 303(d) List due to exceedences of the criteria for fecal coliform bacteria. Subsequent monitoring by DEQ in 1998 and 1999 revealed exceedences in several other locations in these watersheds (Kruse Creek, Sacket Creek, and Jackson Creek irrigation canal - tributaries of Little Goose Creek; Beaver Creek, Park Creek, and Rapid Creek - tributaries of Big Goose Creek), as well as in Goose Creek and a tributary, Soldier Creek. All these streams are on Table A of the 303(d) List. SCCD, under the guidance of a local watershed steering committee, will be developing a watershed plan, which is expected to be completed by the end of 2004. Implementation projects have already begun, including four animal feeding operations, riparian buffer development, streambank stabilization, reservoir development and changes in grazing management.

SCCD conducted fecal coliform monitoring in the Goose Creek Watershed in 2001 and 2002, which generally confirm the findings from the 1998-1999 DEQ study. Their findings also extend the reach of Goose Creek that is not meeting its contact recreation uses from the confluence of Big and Little Goose Creeks downstream to the Highway 339 bridge crossing, and indicate that McCormick Creek is not meeting its contact recreation uses from the confluence of Little Goose Creek upstream an undetermined distance. McCormick Creek has been added to Table A of the 303(d) List and the impaired reach description of Goose Creek has been modified. SCCD data also show exceedences of the temperature criteria for cold water fisheries in lower parts of the drainage, and less than optimal biotic condition close to Sheridan. However, the data was collected during near record low flows, which can mimic pollution effects on both water temperature and biotic condition. Therefore, the data must be analyzed more thoroughly before aquatic life use support decisions can be made. According to SCCD, the watershed steering committee has committed to investigate the temperature issues and concerns with dewatering in the drainage, as part of the watershed plan. Additionally, DEQ has begun a study of stormwater runoff effects within Sheridan and will be sampling stormwater and will conduct further biological assessment of the streams in town.

Beaver Creek is classified as 3B, however SCCD reports it to have perennial flow, even during drought conditions, and suggests that it be reclassified to class 2AB (SCCD, 2000; SCCD, 2002).

DEQ has conducted assessments and completed an assessment report on the Tongue River which concludes that the lower Tongue River is impaired as a cold water fishery due to high temperatures. Additionally, the USGS recently began continuous monitoring of temperature which shows that the temperature criteria was exceeded every day for a 30 day period in 2001, and it was only met during portions of 4 of those 30 days. It has not been determined whether high temperature is a natural occurrence, but the reports cite loss of riparian cover and irrigation diversion as possible contributing factors. Because of the chronic high temperatures, the Tongue River, below Goose Creek, is on Table A of the 303(d) list. DEQ conducted continuous temperature monitoring in the Tongue River at several sites in 2003. The results of that monitoring have not yet been completely analyzed.

Assessments conducted by SCCD (SCCD, 2000) indicate that the lower reach of the Little Tongue River from its mouth up to an undetermined distance above the town of Dayton is not meeting its contact recreation use due to exceedences of the criteria for fecal coliform bacteria. This reach has been listed on Table A of the 303(d) List. Additionally, SCCD analysis of "credible data" identified concerns about effects of habitat degradation on the biological community in and near Dayton, although further evidence or assessment clarification is required to determine whether it is impaired for its aquatic life uses. Other fecal coliform data collected in Dayton by SCCD indicate that Smith Creek also does not meet is contact recreation use, therefore it has been listed on Table A of the 303(d) List.

SCCD also conducted assessments on Columbus Creek which indicate that its contact recreation use is impaired (SCCD, 2000), and the stream has been listed on Table A of the 303(d) List due to high fecal coliform counts near the Highway 14 crossing. Occasional high fecal coliform counts (over 400 cfu/100 mL) on Wolf Creek indicate that its contact recreation use is threatened and it has been listed on Table C of the 303(d) List.

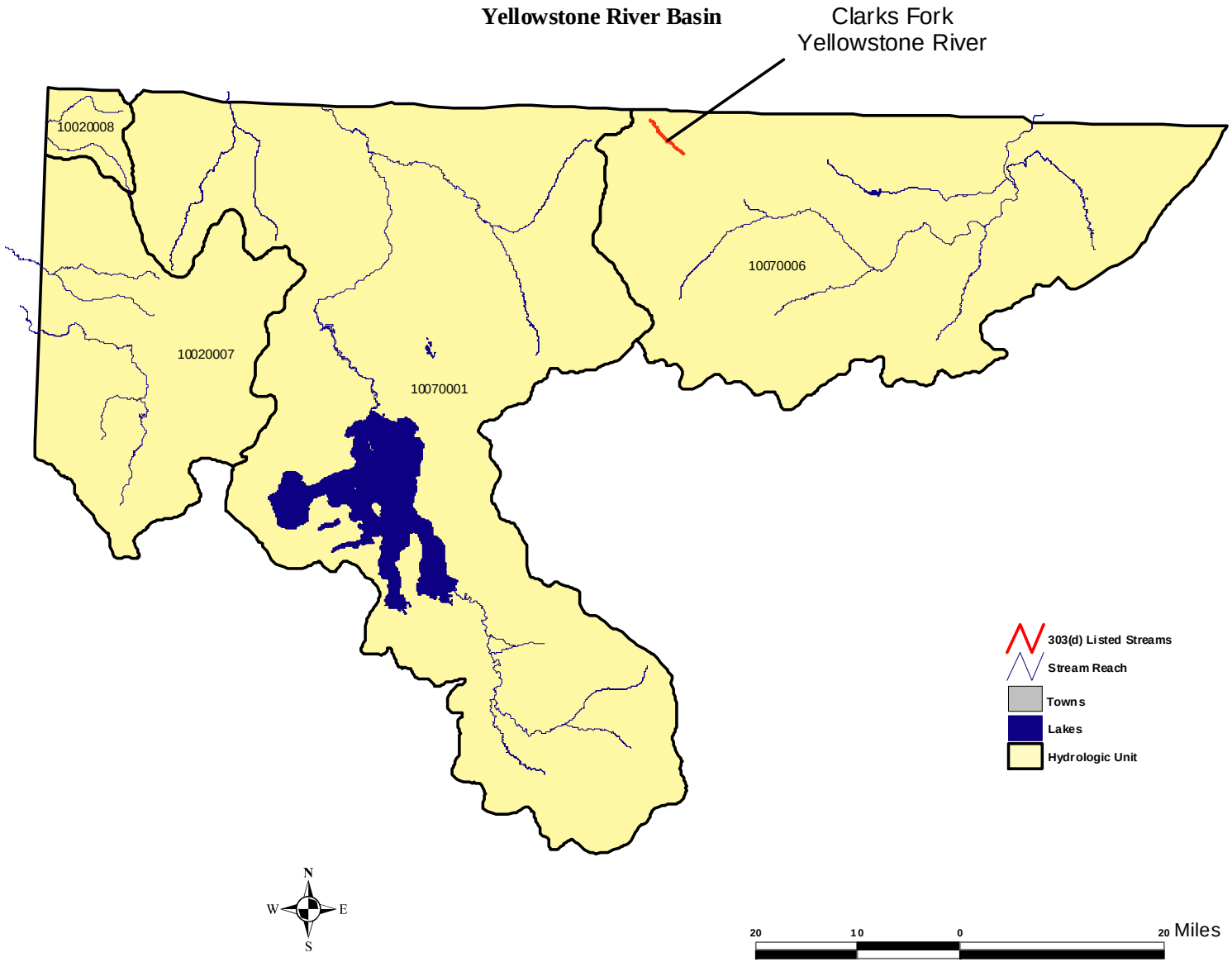
In Ranchester, a monitoring site on Five Mile Creek has recorded fecal coliform counts whose geometric mean exceeds the criterion, indicating it does not meet its recreational contact use (SCCD, 2000). Five Mile Creek is listed Table A of the 303(d) List).

SCCD developed and finalized a watershed plan for the Tongue River watershed from the town of Ranchester upstream to the Bighorn National Forest boundary. The District has received a 319 grant to address these issues. Implementation measures include animal feeding operation projects, riparian buffer development, streambank stabilization, reservoir development, and grazing management changes.

Prairie Dog Creek, a tributary to the Tongue River, receives water from a trans basin diversion, and that added flow is thought to have contributed to habitat degradation of the stream channel (EnTech, Inc., 2001). A joint riparian improvement project between the WGFD and a landowner has rehabilitated part of the stream channel with a marked improvement in the habitat in the stream and riparian area.

E. coli is a fecal coliform bacterium, and, therefore, is a subset of the fecal coliform group, for which Wyoming has criteria to protect human health. High *E. coli* counts in Prairie Dog Creek exceed the criteria for fecal coliform bacteria, indicating that it does not support its contact recreation use, so Prairie Dog Creek is listed on Table A of the 303(d) List. Because there has not been a commitment to develop a watershed plan to address the fecal pollution issue, Prairie Dog Creek has been listed as high priority for TMDL development for fecal bacteria. Prairie Dog Creek is also on the 303(d) List due to exceedences of the water quality criteria for manganese which indicates it is partially impaired for its aesthetic drinking water use. The manganese concentrations in Prairie Dog Creek are much below the human health criteria, but can cause discoloration of the water. It is likely that the high manganese concentrations are due to the natural geology of the area, which is similar to much of the Powder River geologic basin (Rice et al, 2002). A site specific criteria is being considered and the manganese impairment has a low priority for TMDL development.

E. coli (a fecal coliform bacterium) counts above the fecal coliform criteria in the North Tongue River indicate it is not supporting its contact recreation use. A diverse stakeholder group already works together in this watershed to manage this resource, so the North Tongue River has been given a low priority for TMDL development.


Yellowstone River Basin
Clarks Fork
Yellowstone River
10020008
10020007
10070001
10070006
303(d) Listed Streams
Stream Reach
Towns
Lakes
Hydrologic Unit
N
W
E
S
20
10
0
20 Miles

Yellowstone River Basin

The headwaters of the Yellowstone River originate in the Teton Wilderness Area south of Yellowstone National Park (YNP). The river flows north into YNP and then into a large caldera, where it forms Yellowstone Lake. After leaving the lake, the river flows north through the park and enters Montana and confluences with the Missouri River.

Yellowstone Headwaters Sub-basin (HUC 10070001)
In Wyoming, this sub-basin lies entirely within the Teton Wilderness Area or Yellowstone National Park; subsequently all its waters are designated Class 1. More than half of YNP lies in this sub-basin. Recreation is the primary land use in the sub-basin, and millions of people visit YNP each year, however, most of the sub-basin is wilderness and sees very few people.

Concerns about contamination by pathogens have been expressed after several recent sewage spills in YNP. However, major overhaul of some sewage infrastructures has begun, which should greatly reduce the risk of future spills.

Large portions of this sub-basin were involved in the 1988 Yellowstone fires, however, any water quality impacts from the fires are considered natural, so would not be considered an impairment for the purposes of this report or the 303(d) List. Likewise, water quality criteria exceedences associated with the many geothermal features in this sub-basin are not considered an impairment.

Many areas within YNP have been heavily grazed by elk and/or bison and many concerns of water quality impacts have been reported (Houston, 1982; Singer, 1996; YNP 1997). For example, historical photos of the lower Lamar River Valley show thick stands of willows which are very important for stabilizing this type of stream. However, most of the willows have been eradicated by long duration grazing and browsing by wildlife, and, as a consequence, considerable bank erosion is occurring along the river. With the reintroduction of wolves to YNP, riparian areas are making a dramatic recovery (Ripple and Beschta, 2003).

Slough Creek, a tributary to the Lamar River, originates in Montana in an area of historical mining disturbance, including the McLaren mill tailings and defunct Republic Smelter. As a result of these impacts, Slough Creek is on the Montana 303(d) list, but impacts in Wyoming have not yet been determined.

Clarks Fork Yellowstone Sub-basin (HUC 10070006)
The Clarks Fork headwaters are in Montana, and it flows southeast into Wyoming. Near the confluence with Sunlight Creek, it swings to the northeast, then flows back into Montana where it confluences with the Yellowstone River. The section of the Clarks Fork in Shoshone National Forest is Wyoming's only designated Wild and Scenic River. The upper two-thirds of the sub-basin in Wyoming is primarily Shoshone National Forest land, with small private in-holdings. Land uses in the upper sub-basin are primarily recreation, with some logging, grazing, irrigated hay production, and historic mining. Portions of the upper sub-basin were involved in the 1988 Yellowstone fires and subsequently salvage logged. Land uses in the lower sub-basin are primarily grazing, irrigated agriculture, and areas of oil and gas production.

The Clarks Fork of the Yellowstone is on Table A of the 303(d) List due to exceedences of the criteria for copper, silver, and cadmium, indicating partial impairment of its aquatic life uses. The source of these metals is most likely from past mining activities in the New World Mine area in Montana, where remediation is currently taking place. This remediation in Montana is expected

to fully address the metal impairment in Wyoming in a reasonable period of time. Therefore, TMDL development on the Clarks Fork has been given a low priority in Wyoming.

A 319 watershed improvement project on Squaw Creek moved a stretch of the road out of the riparian area to reduce sediment loading and degradation of the stream. The final report from this project shows that the water quality threat has been removed and that the stream is supporting its aquatic life and cold water fishery uses (Page & Zubik, 2001).

A Shoshone National Forest stream bank stabilization project completed in 1997 on Pilot Creek successfully stabilized about 150 feet of stream bank and has reduced sediment transport from this drainage into the Clarks Fork.

Categorization of all the Waters of Wyoming

EPA guidance asks that all waters of the state get placed into one of five categories of designated use attainment, based on all available data. Because of the data requirements to make a use support determination in Wyoming, only the 4575 miles of waters assessed (approximately 4% of the total waters in Wyoming) can be in a category other than #3. Following is the list of the categories these waters will be placed in.

1. All designated uses are met. *(Wyoming does not have any waters in this category because the intensive, long-term sampling data does not exist to determine if contact recreation and drinking water uses are always supported.)*

2. Some designated uses supported, but unknown on others. *(All of the waters assessed as fully supporting all designated aquatic life uses are in this category, because the intensive, long-term sampling data does not exist to determine if drinking water and contact recreation uses are always supported. It is assumed that agricultural, industrial, scenic value, and wildlife uses are also supported, if the aquatic life uses are supported.)*

3. Insufficient data to determine if any designated uses are met. *[All waters in Wyoming that are not identified in Table 1 (Category 2 Waters) or on the 303(d) List are in this category. These waters will not be listed individually.]*

4. Water is impaired or threatened but TMDL is not needed.

> 4A. TMDLs approved by EPA. *(All former Table B waters - Waters with NPDES Discharge Permits Containing WLAs/TMDLs.)*
>
> 4B. Other required pollution control requirements are expected to address all water-pollutant combinations and attain WQS in reasonable period of time. *(Wyoming does not have any other pollution control regulations.)*
>
> 4C. Pollution, not pollutants, are the sole source of impairment. *(Wyoming does not have any waters identified as such.)*

5. TMDLs needed. The 303(d) List. *(Wyoming splits the 303(d) List into three tables, listed below.)*

> Table A: 303(d) Waterbodies with Water Quality Impairments
>
> Table B: 303(d) Waterbodies with NPDES Discharge Permits Containing WLAs/TMDLs Expiring
>
> Table C: 303(d) Waterbodies with Water Quality Threats

Table 1. Category 2 Waters: Some Designated Uses Supported, but unknown on others.
(Fisheries and aquatic life uses are supported. It is assumed that agricultural, industrial, scenic value, and wildlife uses are also supported.)

Basin	HUC	Name	Size
BH	10080003	Baldwin Creek	44.2
BH	10080003	Squaw Creek	22.5
BH	10080007	Upper Grass Creek	65.6
BH	10080012	North Fork Shoshone River above National Forest boundary	754.3
BR	16010101	Bear River Upper	51.4
BR	16010101	Mill Creek	20.9
BR	16010101	Pleasant Valley Creek above Crompton Reservoir	35.9
BR	16010102	Coantag Creek	55.3
BR	16010102	Smiths Fork Upper	203.3
GR	14040101	Green River above Hwy 191	135.1
GR	14040101	Lower Fontenelle Creek	13.3
GR	14040101	Rock Creek	8.4
GR	14040101	Upper Fontenelle Creek Drainage	127.7
GR	14040101	Upper Green River below Green River Lakes	320.4
GR	14040101	Upper LaBarge Creek Drainage	93.6
GR	14040102	New Fork River between Hwy 191 & New Fork Lakes	136.0
GR	14040104	Big Sandy River below Little Sandy	31.2
LS	14050003	Little Savery Creek - Grizzly	4.0
LS	14050003	Loco Creek	8.4
LS	14050003	Lost Creek	4.9
LS	14050003	North Fork/ Roaring Fork Little Snake River	30.6
LS	14050003	Upper Savery drainage	82.7
LS	14050004	Littlefield Creek	10.4
LS	14050004	McKinney Creek above Eagle Creek	23.1
LS	14050004	Muddy Creek above Littlefield Creek	21.1
NP	10180002	Big Creek Upper	28.3
NP	10180002	French Creek	56.6
NP	10180002	Hog Park Creek, South Fork	2.2
NP	10180002	Jack Creek Drainage	147.0
NP	10180002	Lower Douglas Creek	39.4
NP	10180002	Muddy Creek	9.2
NP	10180002	N Platte River above Sage Creek	108.0
NP	10180002	Upper Encampment	117.8
NP	10180002	Upper Spring Creek	68.5

NP	10180004	Upper Medicine Bow River Drainage	63.8
NP	10180004	Upper Rock Creek Drainage	127.2
NP	10180010	Little Laramie River South Fork Upper	6.0
NP	10180010	Little Laramie River Upper Drainage	153.3
NP	10180010	Mill Creek Middle Fork Upper	2.9
NP	10180010	Upper Big Laramie	81.4
NP	10180011	Upper Chugwater Mainstem	100.7
NP	10180012	Bear Creek Drainage	313.5
NP	10180012	Upper Horse Creek	45.7
PR	10090201	Beaver Creek above Blue Creek	58.2
PR	10090201	Blue Creek	17.6
PR	10090201	Middle Fork Powder above Buffalo Creek	69.7
PR	10090201	Upper Beartrap/Sawmill Creek	13.1
PR	10090202	Pumpkin Creek	200.7
PR	10090205	Beaver Creek; Pole Creek	46.7
PR	10090205	Crazy Woman Creek	24.5
PR	10090205	Doyle Creek Upper	8.6
PR	10090205	Little North Fork Crazy Woman Creek	19.3
PR	10090205	Middle Fork Crazy Woman Creek	53.0
PR	10090205	Poison Creek	22.8
PR	10090205	Pole Creek	8.3
PR	10090206	Boxelder Creek	42.1
PR	10090206	Hunter Creek	1.9
PR	10090206	Little Piney Creek	13.6
PR	10090206	Piney Creek	211.4
PR	10090206	Rock Creek Lower	22.9
PR	10090206	South Piney Creek	22.9
TR	10090101	Coney Creek	14.1
TR	10090101	Prune Creek	5.4
YR	10070006	Squaw Creek	2.2

Designated Use Support Summary Tables

Miles are based on the National Hydrography Dataset (NHD). According to the NHD, Wyoming has 116,398 miles of perennial, intermittent, and ephemeral rivers and streams. Numbers are rounded to the nearest mile.

Table 2a. Individual Use Support Summary for Assessed Wyoming Streams and Rivers

Designated Use	Miles Assessed	Miles Fully Supporting	Miles Fully Supporting and Threatened	Miles Not Supporting
Aquatic Life	5263	4654	284	325
Fisheries	4888	4376	202	310
Wildlife	5263	5196	2	65
Contact Recreation	614	0.00	113	501
Drinking Water	16	0.00	0.00	16
Agriculture	5263	5231	0.00	32

Table 2b. Individual Use Support Summary for Assessed Wyoming Lakes

Designated Use	Acres Assessed	Acres Fully Supporting	Acres Fully Supporting and Threatened	Acres Not Supporting
Aquatic Life	6249	0	6076	162
Fisheries	6103	0	6076	15
Wildlife	6249	6103	0	146
Agriculture	6249	6103	0	146

Table 3. Summary of Fully Supporting, Threatened, and Impaired Waters in Wyoming

Degree of Designated Use Support	River Miles Assessed	Percentage of River Miles Assessed	Lake Acres Assessed	Percentage of Lake Acres Assessed
Fully Supporting All Assessed Uses	4654	79.2	0	0
Fully Supporting All Assessed Uses but Threatened for At Least One Use	398	6.8	6076	97.4
Impaired for One or More Uses	826	14.0	162	2.6
Total Assessed	5877	100.0	6238	100.0

Table 4. Summary of Causes Impairing Wyoming's Assessed Waters

Cause	River Miles	Lake Acres
Metals (Includes individual metals listed below)	193	
Cadmium	13	
Copper	17	
Manganese	16	
Selenium	160	146
Silver	13	
Ammonia	7	
pH	23	
Phosphorus		15
Siltation	48	6091
Chlorides	87	
Temperature	55	
Physical/Habitat Degradation	286	
Pathogens (Fecal Coliform, *E. coli*)	620	
Oil	29	

Table 5. Summary of Sources Impairing Wyoming's Assessed Waters

Source	River Miles	Lake Acres
Municipal Point Sources	7	
Agriculture - Irrigated Crop Production	99	6222
Agriculture -Grazing in Riparian or Shoreline Zones	248	
Habitat Alterations - Loss of Riparian Habitat	16	
Urban Runoff/ Storm Sewers	34	15
Resource Extraction - Petroleum Activities	75	
Resource Extraction - Abandoned Mining	7	
Resource Extraction - Subsurface hardrock mining	11	
Natural Sources	83	
Sources Unknown	825	
Sources outside State Jurisdiction or Borders	12	

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2004 303(d) List of Waters Requiring TMDLs

The 2004 303(d) List is incorporated into three tables (Tables A, B & C). Table A is a list of waters with water quality impairments requiring a TMDL. DEQ is adding six new segments to Table A. One segment is for aquatic life use impairments, and the other five for contact recreation use impairments. Twenty-seven new segments were added to Table B, which are waters with waste load allocation discharge permits expiring, due to review of the Waste Load Allocations/TMDLs for the discharge permits. No new segments were added to Table C, and two were removed because monitoring data indicated the streams were meeting their designated aquatic life uses. In addition to the two waters removed from Table C, another twenty six waterbody segments are delisted from Table B of the 2002 303(d) list due to EPA approval (or expected approval) of Waste Load Allocations/TMDLs on permitted discharges. The delisted waters can be found on Table D.

Wyoming's "Method for Determining Water Quality Condition for Surface Waters" (available on the DEQ-WQD website) outlines how waters on the 303(d) List are to be prioritized for TMDL development. Most waters on Tables A and C of the 303(d) List have been given low priorities for TMDL development because local watershed stakeholder groups have established, or have committed to establish, watershed management plans. These plans must identify the problems and develop an implementation strategy to ensure designated uses will be restored in a reasonable amount of time. All waters on Table B have a high priority for TMDL development since Waste Load Allocations/TMDLs must be developed within two years.

Table A: 2004 303(d) Waterbodies with Water Quality Impairments

Basin	HUC	Name	Class	Location	Cause of Impairment	Sources	Data Sources	Uses Impaired	Date Listed	Priority
BF	10120201	BELLE FOURCHE RIVER	2ABWW	Exceedences measured between Arch Ck and Hulett.	Fecal Coliform	Undeterm.	DEQ	Contact Recreation	1996	L
BF	10120201	BELLE FOURCHE RIVER	2ABWW	From Keyhole Reservoir upstream an undetermined distance above Rush Ck.	Fecal Coliform	Undeterm.	DEQ	Contact Recreation	1996	L
BF	10120201	DONKEY CREEK	3B	From confluence with Belle Fourche R upstream to Stonepile Ck.	Fecal Coliform	Point, Undeterm.	DEQ	Contact Recreation	2000	L
BF	10120201	GILLETTE FISHING LAKE	2AB	Gillette Fishing Lake.	Phosphate	Non-point	Intermountain CD	Warm Fish, Aquatic Life	1996	L
BF	10120201	GILLETTE FISHING LAKE	2AB	Gillette Fishing Lake.	Siltation	Non-point	Intermountain CD	Warm Fish, Aquatic Life	1996	L
BR	16010101	BEAR RIVER	2AB	From Woodruff Narrows Res up to Sulphur Ck.	Sediment	Undeterm.	DEQ	Aquatic Life	2002	L
BH	10080003	MIDDLE FORK POPO AGIE RIVER	2AB	Undetermined distances upstream and downstream of City of Lander.	Fecal Coliform	Point Undeterm.	DEQ	Contact Recreation	2002	L
BH	10080007	BIG HORN RIVER	2AB	From Greybull R upstream to Nowood R.	Fecal Coliform	Undeterm.	DEQ	Contact Recreation	2000	L
BH	10080007	COTTONWOOD CREEK	2AB	From Bighorn River up to Hamilton Dome Oil Field.	Chloride	Point	Merit Energy, DEQ	Cold Fish, Aquatic Life	2004	L
BH	10080007	COTTONWOOD CREEK	2AB	From Bighorn River up to Hamilton Dome Oil Field.	Selenium	Point	Merit Energy	Cold Fish, Aquatic Life, Wildlife	2004	L
BH	10080008	NOWOOD RIVER	2AB	From confluence with Bighorn R upstream an undetermined distance.	Fecal Coliform	Undeterm.	DEQ	Contact Recreation	2002	L
BH	10080009	GREYBULL RIVER	2AB	From confluence with Bighorn R upstream to the Highway bridge.	Fecal Coliform	Undeterm.	DEQ	Contact Recreation	2002	L
BH	10080010	BIG HORN RIVER	2AB	From Greybull R downstream undetermined distance above Big Horn Lake.	Fecal Coliform	Undeterm.	DEQ	Contact Recreation	2002	L
BH	10080010	GRANITE CREEK	2AB	From confluence with Shell Ck upstream approximately 4 miles to an undetermined point near Antelope Butte Ski Area.	Fecal Coliform	Undeterm.	DEQ	Contact Recreation	2002	L
BH	10080010	SHELL CREEK	2AB	From confluence with Bighorn R upstream an undetermined distance.	Fecal Coliform	Undeterm.	DEQ	Contact Recreation	2002	L

Basin	HUC	Name	Class	Location	Cause of Impairment	Sources	Data Sources	Uses Impaired	Date Listed	Priority
BH	10080014	BIG WASH	3B	From confluence with Sage Ck upstream to Sidon Canal.	Fecal Coliform	Undeterm.	DEQ	Contact Recreation	2002	L
BH	10080014	BITTER CREEK	2AB	From Shoshone R up an undetermined distance above Powell.	Fecal Coliform	Undeterm.	DEQ	Contact Recreation	2000	L
BH	10080014	POLECAT CREEK	2AB	From confluence with Sage Ck upstream an undetermined distance.	Fecal Coliform	Undeterm.	DEQ	Contact Recreation	2002	L
BH	10080014	SAGE CREEK	2AB	From confluence with Shoshone R upstream an undetermined distance above Big Wash.	Fecal Coliform	Undeterm.	DEQ	Contact Recreation	2002	L
BH	10080014	SHOSHONE RIVER	2AB	From confluence with Bighorn Lake upstream an undetermined distance.	Fecal Coliform	Undeterm.	DEQ	Contact Recreation	2002	L
BH	10080014	WHISTLE CREEK	3B	From confluence with Shoshone R upstream an undetermined distance.	Fecal Coliform	Undeterm.	DEQ	Contact Recreation	2002	L
GR	14040105	BITTER CREEK	2C	From Green R up to Killpecker Ck.	Fecal Coliform	Undeterm.	DEQ	Contact Recreation	2000	L
GR	14040105	BITTER CREEK	2C	From Green R up to Killpecker Ck.	Chloride	Undeterm.	DEQ	Non-game Fish, Aquatic Life	2002	L
GR	14040105	KILLPECKER CREEK	3B	Near Rock Springs, tributary to Bitter Ck.	Fecal Coliform	Undeterm.	DEQ	Contact Recreation	2000	L
GR	14040107	BLACKS FK GREEN RIVER	2AB	From confluence w/ Ham's Fk upstream to an undetermined distance above Smiths Fork.	Fecal Coliform	Undeterm.	DEQ, USGS 9222000	Contact Recreation	2000*	L
GR	14040107	HAMS FORK GREEN RIVER	2AB	Exceedences measured at Diamondville.	High pH>9	Undeterm.	USGS 9224050, LCCD	Cold Fish, Aquatic Life	1996	L
GR	14040107	SMITHS FORK GREEN RIVER	2AB	From confluence with Blacks Fork past Cottonwood Ck.	Habitat Degradation	Non-point Undeterm.	DEQ	Cold Fish, Aquatic Life	2000	L
GR	14040107	SMITHS FORK GREEN RIVER	2AB	From confluence with Blacks Fork an undetermined distance upstream.	Fecal Coliform	Undeterm.	DEQ	Contact Recreation	2002	L
LS	14050003	BATTLE CREEK WEST FORK	2AB	From Battle Cr to Haggarty Ck.	Copper	Point, Natural	USGS 9253465, DEQ	Cold Fish, Aquatic Life	2000	L
LS	14050003	HAGGARTY CREEK	2AB	From Ferris-Haggarty Mine to W. Fk. Battle Ck.	Silver	Point	USGS 9253455, DEQ	Cold Fish, Aquatic Life	1996	L
LS	14050003	HAGGARTY CREEK	2AB	From Ferris-Haggarty Mine to W. Fk. Battle Ck.	Copper	Point, Natural	USGS 9253455, DEQ	Cold Fish, Aquatic Life	1996	L
LS	14050003	HAGGARTY CREEK	2AB	From Ferris-Haggarty Mine to W. Fk. Battle Ck.	Cadmium	Point	USGS 9253455, DEQ	Cold Fish, Aquatic Life	1996	L

Basin	HUC	Name	Class	Location	Cause of Impairment	Sources	Data Sources	Uses Impaired	Date Listed	Priority
NP	10180006	CROOKS CREEK	2AB	From SW NE S18 T28N R92W undetermined distance downstream.	Oil Deposits	Undeterm.	DEQ-WQD	Cold Fish, Aquatic Life	1998	H
NP	10180007	CASPER CREEK	2AB	In Kendrick Reclamation Project below Casper Canal.	Selenium	Non-point Natural	USFWS, USGS	Cold fish, Aquatic Life, Wildlife	2000	L
NP	10180007	GOOSE LAKE	3B	In Kendrick Reclamation Project.	Selenium	Non-point Natural	USFWS, USGS	Aquatic Life, Wildlife	2000	L
NP	10180007	ILLCO POND	3B	S13 T35N R81W	Selenium	Non-point Natural	USFWS, USGS	Non-game Fish, Aquatic Life, Wildlife	2000	L
NP	10180007	NORTH PLATTE RIVER	2AB	Exceedences measured at Casper. Impairment extends undetermined distance upstream and downstream.	Selenium	Non-point Natural Undeterm.	DEQ, USFWS, USGS 6645000	Cold fish, Aquatic Life, Wildlife	1998	L
NP	10180007	OREGON TRAIL DRAIN	3B	In Kendrick Reclamation Project.	Selenium	Non-point Natural	USFWS, USGS	Aquatic Life, Wildlife	2000	L
NP	10180007	POISON SPIDER CREEK	2AB,2C,3B	In and above Kendrick Reclamation Project.	Selenium	Non-point Natural	USFWS, USGS	Aquatic Life, Fish, Wildlife	2000	L
NP	10180007	POISON SPRING CREEK	3B	In Kendrick Reclamation Project below Casper Canal.	Selenium	Non-point Natural	USFWS, USGS	Aquatic Life, Wildlife	2000	L
NP	10180007	RASMUS LEE LAKE	3B	In Kendrick Reclamation Project.	Selenium	Non-point Natural	USFWS, USGS	Aquatic Life, Wildlife	2000	L
NP	10180007	THIRTYTHREE MILE RESERVOIR	3B	On South Fork Casper Ck in Kendrick Reclamation Project.	Selenium	Non-point Natural	USFWS, USGS	Aquatic Life, Wildlife	2000	L
NP	10180011	ROCK CREEK	2C	Above Town of Wheatland.	Fecal Coliform	Undeterm.	DEQ	Contact Recreation	2002	L
NP	10180011	WHEATLAND CREEK	2C	Impairment undetermined distance above and below Hwy 320.	Fecal Coliform	Undeterm.	DEQ	Contact Recreation	2002	L
PR	10090202	POWDER RIVER	2ABWW	From S Fk Powder R to an undetermined distance downstream below Sussex.	Selenium	Undeterm.	DEQ, USGS 6313500	Warm Fish, Aquatic Life, Wildlife	2000	L
PR	10090202	POWDER RIVER	2ABWW	From Salt Ck to an undetermined distance downstream.	Chloride	Undeterm.	DEQ, USGS 6313500	Warm Fish, Aquatic Life	1998	L
PR	10090204	SALT CREEK	2C	From Powder R to an undetermined distance upstream.	Chloride	Undeterm.	USGS	Non-game Fish, Aquatic Life	2002	L
PR	10090205	CRAZY WOMAN CREEK	2ABWW	From Powder R to an undetermined distance upstream.	Manganese	Undeterm.	USGS 6316400	Drinking Water	2002	L

Basin	HUC	Name	Class	Location	Cause of Impairment	Sources	Data Sources	Uses Impaired	Date Listed	Priority
SP	10190009	CROW CREEK	2AB, 2C	Impairment undetermined distance above and below Cheyenne.	Ammonia	Point, Undeterm.	USGS 6756060	Fisheries, Aquatic Life	1996	L
SP	10190009	CROW CREEK	2AB, 2C	Impairment undetermined distance above and below Cheyenne.	Fecal Coliform	Non-point Undeterm.	DEQ	Contact Recreation	1996	L
SP	10190009	MIDDLE CROW CREEK	2AB	Exceedences measured at FS Road 700.	Fecal Coliform	Non-point Undeterm.	DEQ	Contact Recreation	2004	L
SP	10190009	NORTH BRANCH NORTH FORK CROW CREEK	2AB	Exceedences measured at FS Road 701.	Fecal Coliform	Non-point Undeterm.	DEQ	Contact Recreation	2004	L
TR	10090101	BEAVER CREEK	2AB	From Big Goose Ck to an undetermined distance upstream.	Fecal Coliform	Undeterm.	DEQ	Contact Recreation	2000	L
TR	10090101	BIG GOOSE CREEK	2AB	From Sheridan to above Beckton.	Fecal Coliform	Undeterm.	DEQ	Contact Recreation	1996	L
TR	10090101	COLUMBUS CREEK	2AB	From confluence with Tongue River an undetermined distance above Highway 14.	Fecal Coliform	Undeterm.	Sheridan County CD	Contact Recreation	2002	L
TR	10090101	FIVE MILE CREEK	3B	From confluence with Tongue River an undetermined distance above Ranchester.	Fecal Coliform	Undeterm.	Sheridan County CD	Contact Recreation	2002	L
TR	10090101	GOOSE CREEK	2AB	From confluence of Big and Little Goose Creeks an undetermined distance downstream.	Fecal Coliform	Undeterm.	DEQ	Contact Recreation	2000	L
TR	10090101	JACKSON CREEK	2AB	From Little Goose Ck to an undetermined distance upstream.	Fecal Coliform	Undeterm.	DEQ	Contact Recreation	2000	L
TR	10090101	KRUSE CREEK	2AB	From Little Goose Ck to an undetermined distance upstream.	Fecal Coliform	Undeterm.	DEQ	Contact Recreation	2000	L
TR	10090101	LITTLE GOOSE CREEK	2AB	From Sheridan upstream to above Big Horn.	Fecal Coliform	Undeterm.	DEQ	Contact Recreation	1996	L
TR	10090101	LITTLE TONGUE RIVER	2AB	From confluence with Tongue River an undetermined distance above Dayton.	Fecal Coliform	Undeterm.	Sheridan County CD	Contact Recreation	2002	L
TR	10090101	McCORMICK CREEK	2AB	From Little Goose Ck to an undetermined distance upstream.	Fecal Coliform	Undeterm.	DEQ	Contact Recreation	2004	L
TR	10090101	NORTH TONGUE RIVER	1	From confluence of Bull Creek upstream an undetermined distance above Hwy 14A.	Fecal Coliform	Non-point Undeterm.	DEQ	Contact Recreation	2004	L
TR	10090101	PARK CREEK	2AB	From Big Goose Ck to an undetermined distance upstream.	Fecal Coliform	Undeterm.	DEQ	Contact Recreation	2000	L

Basin	HUC	Name	Class	Location	Cause of Impairment	Sources	Data Sources	Uses Impaired	Date Listed	Priority
TR	10090101	PRAIRIE DOG CREEK	2AB	Entire Prairie Dog Creek Drainage.	Fecal Coliform	Undeterm.	DEQ	Contact Recreation	2004	H
TR	10090101	PRAIRIE DOG CREEK	2AB	From Tongue R to an undetermined distance upstream.	Manganese	Undeterm.	USGS 06306250	Drinking Water	2002	L
TR	10090101	RAPID CREEK	2AB	From Big Goose Ck to an undetermined distance upstream.	Fecal Coliform	Undeterm.	DEQ	Contact Recreation	2000	L
TR	10090101	SACKET CREEK	2AB	From Little Goose Ck to an undetermined distance upstream.	Fecal Coliform	Undeterm.	DEQ	Contact Recreation	2000	L
TR	10090101	SMITH CREEK	2AB	From confluence with Tongue River an undetermined distance above Dayton.	Fecal Coliform	Undeterm.	Sheridan County CD	Contact Recreation	2002	L
TR	10090101	SOLDIER CREEK	2AB	From Goose Ck to an undetermined distance upstream.	Fecal Coliform	Undeterm.	DEQ	Contact Recreation	2000	L
TR	10090101	TONGUE RIVER	2AB	From Goose Ck downstream.	Temperature	Undeterm.	DEQ, Sheridan County CD USGS 06306300	Cold Fish	2002	L
YR	10070006	CLARKS FORK YELLOWSTONE RIVER	1	Exceedences measured at Montana border. Impairment undetermined distance below.	Cadmium	Undeterm.	USGS 06205450	Cold Fish, Aquatic Life	2000	L
YR	10070006	CLARKS FORK YELLOWSTONE RIVER	1	Exceedences measured at Montana border. Impairment undetermined distance below.	Silver	Undeterm.	USGS 06205450	Cold Fish, Aquatic Life	2000	L
YR	10070006	CLARKS FORK YELLOWSTONE RIVER	1	Exceedences measured at Montana border. Impairment undetermined distance below.	Copper	Undeterm.	USGS 06205450	Cold Fish, Aquatic Life	1998	L

Table B: 2004 303(d) Waterbodies with NPDES Discharge Permits containing WLAs Expiring

Basin & HUC	Water Name	Facility Name	Permit	TMDLs	Expires
BF10120201	Belle Fourche River	Hulett	WY0020214	Ammonia, Chlorine, Fecal Coliform	11/30/04
BF10120201	Donkey Creek	Pacificorp	WY0001384	Copper, Iron	9/30/05
BH10080001	Wind River	Dubois	WY0020834	Ammonia, Chlorine, Fecal Coliform	4/30/04
BH10080003	Popo Agie River	Lander	WY0020389	Ammonia, Chlorine, Fecal Coliform	6/30/05
BH10080008	East Tensleep Creek	Big Horn Mtn. Resort	WY0042218	Ammonia, Chlorine, Fecal Coliform	10/31/04
BH10080008	Tensleep Creek	Tensleep	WY0020168	Ammonia, Chlorine, Fecal Coliform	5/31/05
BH10080014	Shoshone River	Byron	WY0020281	Ammonia, Chlorine, Fecal Coliform	3/31/04
BH10080014	Shoshone River	Lovell	WY0020061	Ammonia, Chlorine, Fecal Coliform	6/30/05
BH10090009	Beck-Allen Canal	Burlington	WY0034606	Ammonia, Chlorine, Fecal Coliform	10/31/04
BR16010101	Bear River and Yellow Creek	Evanston	WY0020095	Ammonia, Chlorine, Fecal Coliform	8/31/04
GR14040101	N. Piney Creek	Big Piney	WY0020133	Ammonia, Chlorine, Fecal Coliform	9/30/05
LS14050003	Ledford Slough	Baggs	WY0022888	Ammonia, Chlorine, Fecal Coliform	9/30/05
LS14050003	Little Snake River	Dixon	WY0021938	Ammonia, Chlorine, Fecal Coliform	1/31/05
NP10180002	Hot Slough Creek	Saratoga	WY0020214	Total Residual Chlorine	11/30/04
NP10180002	Hot Slough Creek	Saratoga	WY0021491	Ammonia, Chlorine, Fecal Coliform	11/30/04
NP10180007	North Platte River	Glenrock	WY0020630	Ammonia, Chlorine, Fecal Coliform	6/30/05
NP10180009	Rawhide Creek	Lingle	WY0021849	Ammonia, Chlorine, Fecal Coliform	3/31/04
NP10180010	Laramie River	Laramie	WY0022209	Ammonia, Chlorine, Fecal Coliform	7/31/04
NP10180011	Wheatland Creek	Wheatland	WY0020150	Ammonia, Chlorine, Fecal Coliform	4/30/04
PR10090201	Middle Fork Powder R.	Kaycee	WY0021733	Ammonia, Chlorine, Fecal Coliform	6/30/05
PR10090206	Clear Creek	Clearmont	WY0022063	Ammonia, Chlorine, Fecal Coliform	9/30/05
TR10090101	North Fork Tongue River	US Forest Service	WY0020931	Ammonia, Chlorine, Fecal Coliform	6/30/04
TR10090101	Piney Creek	J.M. Huber Corp.	WY0038903	Chlorides, Total Radium 226	4/30/04
TR10090101	Piney Creek	J.M. Huber Corp.	WY0038911	Chlorides, Total Radium 226	4/30/04
TR10090101	Piney Creek	J.M. Huber Corp.	WY0038920	Chlorides, Total Radium 226	4/30/04
TR10090101	Prairie Dog Creek	J.M. Huber Corp.	WY0038857	Chlorides, Total Radium 226	4/30/04
TR10090101	Tongue River	Ranchester	WY0022161	Ammonia, Chlorine, Fecal Coliform	8/31/05

Table C: 2004 303(d) Waterbodies with Water Quality Threats

Basin	HUC	Name	Class	Location	Cause of WQ Threat	Sources	Data sources	Threatened Uses	Date Listed	Priority
BR	16010101	BRIDGER CREEK	3B	Utah Line Upstream	Habitat Degradation	Non-point	Bear Lake Regional Commission	Aquatic Life	1998	L
BF	10120201	STONEPILE CREEK	3B	Confluence with Donkey Creek upstream an undetermined distance	Fecal Coliform	Undeterm.	DEQ	Contact Recreation	2002	L
BH	10080005	OCEAN LAKE	2ABWW	Ocean Lake	Habitat Degradation	Non-point	Lower Wind River NRD	Warm Fish, Aquatic Life	1996	L
BH	10080005	POISON CREEK	2AB	From Boysen Reservoir upstream an undetermined distance	Fecal Coliform	Undeterm.	USGS 06255500	Contact Recreation	2002	L
BH	10080005	MUDDY CREEK	2AB	From Boysen Reservoir upstream an undetermined distance	Fecal Coliform	Undeterm.	USGS 06258000	Contact Recreation	2002	L
BH	10080007	BIGHORN RIVER	2AB	Confluence with Nowood River upstream an undetermined distance above the City of Worland	Fecal Coliform	Undeterm.	USGS 06268600, 441138107545501, 06269500, DEQ	Contact Recreation	2002	L
BH	10080007	FIFTEEN MILE CREEK	3B	Confluence with Bighorn River upstream an undetermined distance	Fecal Coliform	Undeterm.	USGS 440044107584301	Contact Recreation	2002	L
BH	10080007	NOWATER CREEK	3B	Confluence with Bighorn River upstream an undetermined distance	Fecal Coliform	Undeterm.	USGS 06267420	Contact Recreation	2002	L
BH	10080007	OWL CREEK	2AB	Confluence with Bighorn River upstream an undetermined distance	Fecal Coliform	Undeterm.	USGS 06264500 DEQ	Contact Recreation	2002	L
BH	10080007	SAGE CREEK	3B	Confluence with Bighorn River upstream an undetermined distance	Fecal Coliform	Undeterm.	USGS 440045107581401	Contact Recreation	2002	L
BH	10080007	SLICK CREEK	3B	Confluence with Bighorn River upstream an undetermined distance	Fecal Coliform	Undeterm.	USGS 062686600	Contact Recreation	2002	L
BH	10080008	PAINTROCK CREEK	2AB	Confluence with Nowood River upstream an undetermined distance	Fecal Coliform	Undeterm.	DEQ	Contact Recreation	2002	L
BH	10080010	BEAVER CREEK	2AB	Confluence with Shell Creek Upstream an undetermined distance	Fecal Coliform	Undeterm.	USGS 443229107503501	Contact Recreation	2002	L
BH	10080011	DRY CREEK	2ABWW	Confluence with Bighorn River upstream an undetermined distance	Fecal Coliform	Undeterm.	USGS 443055108252101, 06278000	Contact Recreation	2002	L
BH	10080014	FOSTER GULCH	2C	Confluence with Shoshone River upstream an undetermined distance	Fecal Coliform	Undeterm.	USGS 444932108254201	Contact Recreation	2002	L
CR	10120107	POISON CREEK	3B	S16-17 T46N R63W	Oil Seeps	Point, Undeterm.	DEQ, WOGCC	Wildlife, Aquatic Life	2000	L

Basin	HUC	Name	Class	Location	Cause of WQ Threat	Sources	Data sources	Threatened Uses	Date Listed	Priority
GR	14040101	REARDON DRAW	3B	Lower 3 miles from confluence with Green River.	Habitat Degradation	Non-point	Sublette County CD	Aquatic Life	1998	L
GR	14040107	EAST FK SMITHS FK	2AB	From confluence with West Fork upstream to Utah Line.	Habitat Degradation	Non-point	Uinta County CD	Cold Fish, Aquatic Life	1998	L
GR	14040107	WEST FK SMITHS FK	2AB	From confluence with East Fork upstream to Utah Line.	Habitat Degradation	Non-point	Uinta County CD	Cold Fish, Aquatic Life	1998	L
GR	14040107	WILLOW CREEK	2AB	From confluence with Black's Fork upstream to Utah Line	Habitat Degradation	Non-point	Uinta County CD	Cold Fish, Aquatic Life	1998	L
LS	14050003	LOCO CREEK W FK	2AB	All of West Fork Watershed above Loco Creek.	Habitat Degradation, Nutrients, Temperature	Non-point	Little Snake River CD	Cold Fish, Aquatic Life	1996	L
LS	14050003	SAVERY CREEK	2AB	Below Little Sandstone Creek to Little Snake River	Habitat Degradation	Non-point	Little Snake River CD	Cold Fish, Aquatic Life	1998	L
LS	14050004	MCKINNEY CREEK	2AB	Above Muddy Creek to Eagle Creek.	Habitat Degradation	Non-point	Little Snake River CD	Cold Fish, Aquatic Life	1996	L
LS	14050004	MUDDY CREEK	2C	West of State Hwy 789.	Habitat Degradation	Non-point	Little Snake River CD	Non-game Fish, Aquatic Life	1996	L
LS	14050004	MUDDY CREEK	2AB	Above Alamosa Gulch to Littlefield Creek.	Habitat Degradation	Non-point	Little Snake River CD	Cold Fish, Aquatic Life	1996	L
NP	10180002	SAGE CREEK	2AB	From confluence with North Platte River to State Hwy 71.	Habitat Degradation	Non-point	Saratoga-Encampment-Rawlins CD	Cold Fish, Aquatic Life	1996	L
NP	10180011	CHUGWATER CREEK	2AB	Between Laramie River and Antelope Gap Road	Habitat Degradation	Undeterm.	DEQ	Cold Fish, Aquatic Life	2000	L
PR	10090204	SALT CREEK	2C	Downstream of Oil Fields	Oil Spills	Undeterm.	DEQ	Non-game Fish, Aquatic Life	1996	M
PR	10090205	CRAZY WOMAN CREEK NORTH FK	2AB	Reaches within T49N R82W.	Habitat Degradation, Nutrients	Non-point	Crazy Woman Watershed improvement District	Cold Fish, Aquatic Life	1996	L
PR	10090206	SHELL CREEK N FK	3B	Above Shell Creek Reservoir	Habitat Degradation	Non-point	Lake DeSmet CD	Aquatic Life	2000	L
PR	10090206	SHELL CREEK S FK	3B	Above Shell Creek Reservoir	Habitat Degradation	Non-point	Lake DeSmet CD	Aquatic Life	2000	L
PR	10090208	LITTLE POWDER RIVER	2AB	Wyoming/Montana state line upstream an undetermined distance	Fecal Coliform	Undeterm.	USGS 06324970	Contact Recreation	2002	L

Basin	HUC	Name	Class	Location	Cause of WQ Threat	Sources	Data sources	Threatened Uses	Date Listed	Priority
SR	17040101	SPREAD CREEK NORTH FK	2AB	1 mile reach in S13&14 T44N R111W.	Habitat Degradation	Non-point	Bridger-Teton NF	Cold Fish, Aquatic Life	1998	L
SR	17040103	FLAT CREEK	2AB	Between Snake River and Cache Creek	Habitat Degradation	Non-point	Teton County NRD	Cold Fish, Aquatic Life	2000	L
SR	17040105	SALT RIVER	2AB	Undetermined distance upstream and downstream of Gaging Station (3.4 Miles NW of Etna)	Fecal Coliform	Undeterm.	USGS 13027500	Contact Recreation	2002	L
TR	10090101	WOLF CREEK	2AB	From confluence with Tongue River an undetermined distance above County Road 67	Fecal Coliform	Undeterm.	Sheridan County CD	Contact Recreation	2002	L

Table D: Waterbodies Delisted from Wyoming's 2002 303(d) List

Basin	HUC	Name	Class	Location	Former Impairments/Threats	Listing Reason	Delisting Reason
BF	10120201	BELLE FOURCHE RIVER	2ABWW	Undetermined distance below Hulett WWTP	Ammonia, Fecal Coliform, Chlorine	WY0020214 WLA Re-evaluation	EPA Approved TMDL
BF	10120201	RUSH CREEK	3B	Undetermined distance below Moorcroft WWTP	Ammonia, Fecal Coliform, Chlorine	WY0021741 WLA Re-evaluation	EPA Approved TMDL
BH	10080001	WIND RIVER	2AB	Undetermined distance below Riverton WWTP	Ammonia, Fecal Coliform, Chlorine	WY0020672 WLA Re-evaluation	EPA Approved TMDL
BH	10080003	POPO AGIE RIVER	2AB	Undetermined distance below Hudson WWTP	Ammonia, Fecal Coliform, Chlorine	WY0020664 WLA Re-evaluation	EPA Approved TMDL
BH	10080007	BIGHORN RIVER	2AB	Undetermined distance below Worland WWTP	Ammonia, Fecal Coliform, Chlorine	WY0020176 WLA Re-evaluation	EPA Approved TMDL
BH	10080007	BIGHORN RIVER	2AB	Undetermined distance below Thermopolis WWTP	Ammonia, Fecal Coliform, Chlorine	WY0020192 WLA Re-evaluation	EPA Approved TMDL
BH	10080010	BIGHORN RIVER	2AB	Undetermined distance below Greybull WWTP	Ammonia, Fecal Coliform, Chlorine	WY0020583 WLA Re-evaluation	EPA Approved TMDL
BH	10080014	BITTER CREEK	2AB	Undetermined distance below Powell WWTP	Ammonia, Fecal Coliform, Chlorine	WY0020648 WLA Re-evaluation	EPA Approved TMDL
BH	10080014	SHOSHONE RIVER	2AB	Undetermined distance below Byron WWTP	Ammonia, Fecal Coliform, Chlorine	WY0020281 WLA Re-evaluation	EPA Approved TMDL
BH	10080014	SHOSHONE RIVER	2AB	Undetermined distance below Cody WWTP	Ammonia, Fecal Coliform, Chlorine	WY0020451 WLA Re-evaluation	EPA Approved TMDL
BR	16010101	BEAR RIVER	2AB	Undetermined distance below North Uinta County W&S District WWTP	Ammonia, Fecal Coliform, Chlorine	WY0031712 WLA Re-evaluation	EPA Approved TMDL
GR	14040101	MUDDY CREEK	2AB	Undetermined distance below Marbleton WWTP	Ammonia, Fecal Coliform, Chlorine	WY0021997 WLA Re-evaluation	EPA Approved TMDL
GR	14040107	BLACKS FORK GREEN RIVER	2AB	Undetermined distance below Granger WWTP	Ammonia, Fecal Coliform, Chlorine	WY0022373 WLA Re-evaluation	EPA Approved TMDL
GR	14040107	HAMS FORK GREEN RIVER	2AB	Undetermined distance below Kemmerer-Diamondville WWTP	Ammonia, Fecal Coliform, Chlorine	WY0020320 WLA Re-evaluation	EPA Approved TMDL
GR	14040107	SMITHS FOR GREEN RIVER	2AB	Undetermined distance below Mountain View WWTP	Ammonia, Fecal Coliform, Chlorine	WY0022896 WLA Re-evaluation	EPA Approved TMDL
NP	10180004	MEDICINE BOW RIVER	2AB	Undetermined distance below Medicine Bow WWTP	Ammonia, Fecal Coliform, Chlorine	WY0020257 WLA Re-evaluation	EPA Approved TMDL

Basin	HUC	Name	Class	Location	Former Impairments/Threats	Listing Reason	Delisting Reason
NP	10180007	NORTH PLATTE RIVER	2AB	Undetermined distance below Casper WWTP	Ammonia, Fecal Coliform, Chlorine	WY0021920 WLA Re-evaluation	EPA Approved TMDL
NP	10180008	NORTH PLATTE RIVER	2AB	Undetermined distance below Guernsey WWTP	Ammonia, Fecal Coliform, Chlorine	WY0021831 WLA Re-evaluation	EPA Approved TMDL
NP	10180008	NORTH PLATTE RIVER	2AB	Undetermined distance below Douglas WWTP	Ammonia, Fecal Coliform, Chlorine	WY0020109 WLA Re-evaluation	EPA Approved TMDL
NP	10180009	NORTH PLATTE RIVER	2AB	Undetermined distance below Torrington WWTP	Ammonia, Fecal Coliform, Chlorine	WY0020231 WLA Re-evaluation	EPA Approved TMDL
NP	10180009	RAWHIDE CREEK	2AB	Undetermined distance below Lingle WWTP	Ammonia, Fecal Coliform, Chlorine	WY0021849 WLA Re-evaluation	EPA Approved TMDL
NP	10180011	CHUGWATER CREEK	2AB	Undetermined distance below Chugwater WWTP	Ammonia, Fecal Coliform, Chlorine	WY0021431 WLA Re-evaluation	EPA Approved TMDL
PR	10090206	HUNTER CREEK	2AB	S10 T50N R84W-11 mi. W. of Buffalo	Heavy Siltation	Heavy Siltation from road	Road design changed. Meets Aquatic Life Uses
PR	10090206	ROCK CREEK	2AB	Watershed below Forest Boundary, Tributary to Clear Creek.	Habitat Degradation	Habitat Degradation threatened aquatic file uses	DEQ data show full Aquatic Life Uses are supported
SR	17040105	FLAT CREEK	2AB	Undetermined distance below Thayne WWTP	Ammonia, Fecal Coliform, Chlorine	WY0025895 WLA Re-evaluation	EPA Approved TMDL
SR	17040105	SNAKE RIVER	2AB	Undetermined distance below Alpine WWTP	Ammonia, Fecal Coliform, Chlorine	WY0035611 WLA Re-evaluation	EPA Approved TMDL
TR	10090101	BIG GOOSE CREEK	2AB	Undetermined distance below Sheridan WWTP	Ammonia, Fecal Coliform, Chlorine	WY0020010 WLA Re-evaluation	EPA Approved TMDL
TR	10090101	TONGUE RIVER	2AB	Undetermined distance below Dayton WWTP	Ammonia, Fecal Coliform, Chlorine	WY0020435 WLA Re-evaluation	EPA Approved TMDL

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