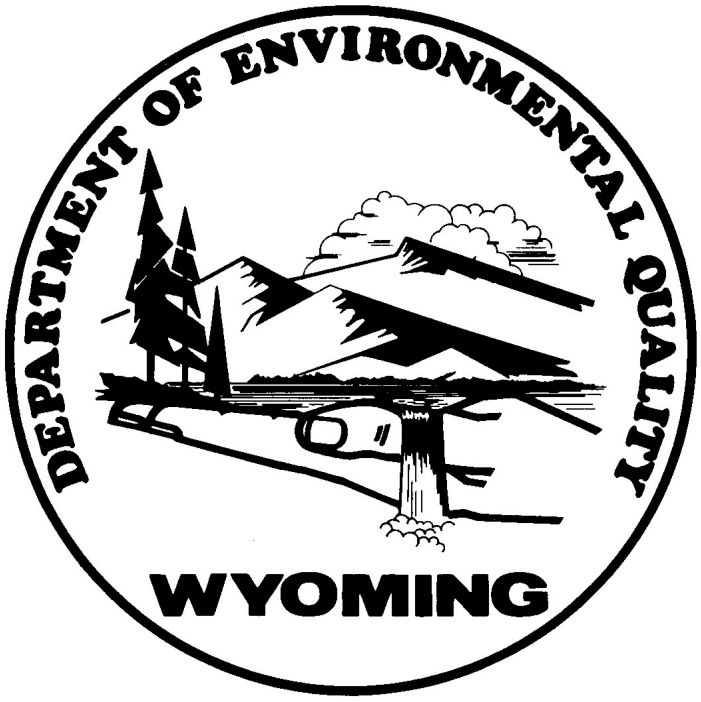
Wyoming's 2002 305(b)
State Water Quality Assessment Report

and

2002 303(d)
List of Waters Requiring TMDLs



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Executive Summary

Wyoming's 2002 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 2002 303(d) List of Waters Requiring TMDLs [303(d) List].

The federal section 305(b) guidance requests that this report also 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. In July, 2001 new water quality standards were adopted in Wyoming. In most instances, the revisions do not reflect a change in the philosophy or direction of the surface water program but have been made to clarify and enhance the meaning and application of the rules. The booming coal bed methane industry in Wyoming has generated a number of concerns regarding potential water quality impacts which are being addressed by DEQ.

In addition, the guidance suggests 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. The methodology meets all requirements of Wyoming's "credible data" law. This methodology has been updated and was again available for public comment along with this 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.

The 2002 303(d) List is incorporated into three tables (Tables A, B & C). DEQ is adding twenty-four new segments to Table A. Table A is a list of waters with water quality impairments requiring a TMDL. Four of these are for aquatic life use impairments, two for drinking water use impairments and eighteen for contact recreation use impairments. Twenty six new segments were added to Table B which are waters with waste load allocation discharge permits expiring, due to review of the TMDLs for ammonia, fecal coliform and chlorine. Sixteen new segments, all with contact recreation use threats, were added to Table C, representing waterbodies with water quality threats. The recreational use impairments are based on exceedences of a fecal coliform standard currently in the state standards. During 2002, DEQ will begin a process for changing the pathogen indicator organisms from fecal coliform to e. coli. E. Coli has been found to be a better indicator of actual risk to humans. It is unknown at this time what effect the change will have on current 303(d) listings.

Additionally, seventeen waterbody segments (found on Table D) are delisted from the 2000 303(d) list: all thirteen waters from the 2000 Table B due to EPA approval (or expected approval) of Waste Load Allocations/TMDLs on permitted discharges; one due to a TMDL for a pollutant (ammonia); one because the pollutant, cadmium, was never detected in sampling conducted over four years; one because a road impacting a stream was relocated out of the riparian area; and, one because of a revision of the water quality standards (arsenic).

Water Quality Standards Revision

After three years of effort, beginning in March, 1998 and final adoption in July, 2001, the Water Quality Division has established new water quality standards affecting all surface waters in the State. The surface water standards are contained in Chapter 1 of the Water Quality Rules and Regulations.

The new standards are substantially different than the rules that have been in effect since 1990. There are only a few sections of Chapter 1 that remain unchanged and 4 new sections have been added. In most instances, the revisions do not reflect a change in the philosophy or direction of the surface water program but have been made to clarify and enhance the meaning and application of the rules. The numeric criteria for toxic pollutants have all been updated to the nationally recommended 304(a) criteria, published by EPA in April, 1999.

Some of the modifications, however, are profound and will have a substantial effect in how the Department assesses and regulates surface water quality. The most important of these are the revisions of the water classification approach and how protected uses are designated on individual waters. Because classifications are so basic to how a water is regulated, changes in water class affect both the criteria and regulatory procedures that apply to that water.

The major modifications to the classification system are:

1. The elimination of the previous tributary approach for classifying unlisted waters;

2. The elimination of the previous blanket Class 2 designation for all waters on National Forests;

3. Incorporation of the Wyoming Game & Fish Department's "Streams & Lakes Inventory Database" as the means of classifying unlisted waters;

4. The merger of the old class 2 (game fish) and 3 (non-game fish) into a single class 2 category containing subclasses for game and non-game fish;

5. The creation of class 2 subcategories for waters that support fish but not drinking water supplies and waters that support drinking water but not fish;

6. The creation of a new class 3 category including 3 subcategories for waters that are protected for all forms of aquatic life other than fish and the reliance on the occurrence of wetlands to identify those waters on which aquatic life uses are attainable;

7. The re-designation of all previously class 4 waters except for artificial canals and ditches as class 3 unless supported by a Use Attainability Analysis providing the rationale for a class 4 designation;

8. The creation of 3 subcategories of class 4 waters based on use attainability factors.

Revised Surface Water Classifications

Substantial modifications have been made to the surface water classification approach. These modifications have been made to correct deficiencies in the previous classification system and to ensure EPA approval of the standards. The new classification system is more scientifically defensible and provides a number of advantages in relation to the department's water quality permitting programs and assessment responsibilities. These changes have a profound effect throughout the surface water protection program.

The language in the classification section of the regulations has been modified to clarify how waters are assigned a classification and which uses are protected under each classification. A detailed list of specific water classifications entitled "Wyoming Surface Water Classification List" and containing over 11,000 entries has also been developed in conjunction with the regulatory language.

The new classification approach is structured in such a way that there are no gaps, i.e., the classification and uses that are protected on any surface water in the state can be determined whether or not it is specifically listed in the Stream Classification List. This is a basic requirement of the federal regulations and is necessary to obtain EPA approval for Clean Water Act purposes. This requirement was previously met by the application of a "tributary rule" in the 1990 version of the rule.

The old tributary rule has been replaced by an approach that places greater reliance on factual data or known information about each water. Classification is more closely tied to documented fisheries information (Game & Fish inventory database), aquatic habitat occurrence (National Wetlands Inventory mapping), or known information on public drinking water supply use. This new approach has not totally eliminated the need to make assumptions on many waters because factual data is not always available. It does, however, provide for more valid assumptions on actual or potential water uses than the tributary rule and facilitates the future mechanism to have more accurate classifications.

The effect of this new approach to classification and use designation is described below for each water class.

> Class 1 waters (Outstanding Waters): No changes have been made to the process for designating Class 1 waters except that tributary designations are no longer used. Each new Class 1 designation must be specifically adopted through a rule making process. Tributaries to these specifically designated waters shall not be Class 1 but shall be Class 2, 3 or 4 depending upon existing or potential uses of the water. All waters which were previously designated Class 1 remain except for their unnamed or unlisted tributaries. All waters in congressionally designated wilderness and Yellowstone and Teton National Parks areas also remain Class 1.
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> Class 2 Waters (Fisheries & Drinking Water): Class 2 waters are waters that are known to support or have the potential to support fish populations or drinking water supplies. Subcategories have been developed to address whether a water is a game or non-game

fishery, cold or warm water fishery, a drinking water supply but not a fishery, or a fishery but not a drinking water supply. These categories are logical divisions to which different water quality criteria apply.

Several assumptions may be made in designations in this classification. All waters that appear in the Game & Fish Department's streams and lakes inventory database as having any fish present are placed in this classification according to the species present. These are the waters that are known to support fish and are protected for that use. Perennial tributaries to known fisheries are also included by rule, even if they are not listed in the G&F inventory database. It is logical to assume that perennial tributaries to known fisheries have a high potential to support the same species or serve as food supply or nursery areas and are afforded the same level of protection. Non perennial tributaries that are not listed in the G&F inventory database are not automatically designated Class 2.

Waters that are protected as game fisheries are also assumed to have the potential to support drinking water supplies. This assumption is made because game fisheries are generally waters that have sufficient water quality and volume to be potentially developed as a drinking water supply. Therefore, game fisheries are all initially designated as Class 2AB and protected for both uses. In specific instances where it is shown through a Use Attainability Analysis (UAA) that a water may support game fish but cannot support a drinking water supply, that water can be reclassified to Class 2B - fish only. The numeric pollutant criteria that apply to Class 2B waters represent the levels necessary to protect human populations from exposure to pollutants from the consumption of fish. The numeric criteria that apply to 2AB waters are protective of two routes of exposure, drinking the water and eating fish.

Class 2C waters are waters that are known or have the potential to support only non-game species of fish. Perennial tributaries of known non-game fisheries are also classified 2C for the reasons explained above while non-perennial tributaries are not. Class 2C waters are not protected as drinking water supplies because it is not assumed that these waters have sufficient volume to support that use.

Class 3 waters (Aquatic Life other than Fish): Class 3 waters are those waters that support or have the potential to support species of aquatic life other than fish. Class 3 is the basic default classification for all waters and provides the minimum aquatic life and recreation protections required under Section 102(a)(2) of the Clean Water Act. It is not the lowest classification in the state rules, however, it is considered a default because a Use Attainability Analysis is required prior to removing any of the protections afforded in this classification. All of the waters designated as Class 3 in this rule making were previously designated as Class 4 and were not protected for aquatic life uses. This modification has been made to bring the Wyoming standards into compliance with the minimum federal requirements provided in 40 CFR Part 131.10.

There are three subcategories of Class 3 waters: (1) 3A contains isolated waters and wetlands that do not support fish species; (2) 3B contains non-perennial stream channels that do not support fish but may support other species of aquatic life; and (3) 3C contains

perennial waters that cannot support fish because of natural low water quality conditions. The same water quality criteria apply to all three subcategories. The different subcategories were created to help identify and clarify which types of waters fall into this classification.

Class 4 waters (Agriculture, Industry, Recreation & Wildlife): Class 4 waters are those that are not provided protection for aquatic life uses. All Class 4 designations must be based upon a UAA in order to comply with the federal regulations provided in 40 CFR 131.10(j). There are three subcategories of Class 4 waters.

Class 4A waters are artificial canals and ditches. These are considered to be "surface waters of the state" under the Environmental Quality Act and are protected for the basic industrial and agricultural uses for which they were constructed along with an additional minimum level of protection for wildlife uses and human contact. They are not protected for aquatic life uses because the managed flow conditions and other routine operation and maintenance procedures normally preclude aquatic life support. Water is only present in these systems during the irrigation season and aquatic vegetation and habitat that may begin to develop while water is present usually must be removed at some point for the canal or ditch to effectively deliver water. Any temporary occurrences of aquatic life within these facilities are generally insignificant and incidental to their primary purposes.

Class 4B waters are essentially ephemeral streams, dry washes, arroyos etc. where aquatic life uses cannot be attained because of low flow conditions. Though there is only one stream classified as 4B in this rule making, there are many stream channels which can potentially fall within this classification. Each, however, must first be individually identified through the requisite UAA. The relative occurrence of wetlands within or along the stream channels can be used as an indicator of whether there is normally sufficient hydrology to support and sustain species of aquatic life, however, the extent and occurrence of wetlands may not be the only indicator.

Class 4C waters are those for which it has been determined through a UAA that aquatic life uses are not attainable for any other acceptable reason. The acceptable reasons for making such a determination are provided in Section 33 of the revised rules and in 40 CFR Part 131.10(g) of the federal regulations. There were no waters classified as 4C when the rule became final, however, as with Class 4B there is a potential for this classification to become significantly populated over time. It is intended that this classification would include waters that are essentially comprised of 100% permitted effluent and support aquatic life only because of the artificially augmented flows.

Because this classification approach relies heavily upon UAAs to determine the appropriate level of protection for many waters, several new sections have been incorporated into the rules to provide a formal structure to that process. Two new sections have been written into the rules that are directly related to the requirements and implementation of UAAs. An additional "Use Attainability Analysis Implementation Policy" has also been developed in conjunction with the new rules to provide a level of detail necessary to interpret and implement the UAA requirements. This policy

document is not part of the regulation but has been developed to disclose the procedures that will be utilized by the agency to make decisions and take actions under the respective sections of the rules.

Other important revisions include the addition of a new section that establishes a narrative biological criterion to be used for assessing aquatic life uses and a new section that describes "credible data" requirements for assessment and use designation purposes.

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 have in the last several years experienced development of Coal Bed Methane (CBM) activities. These are in addition to the expansion of coal mining operations and siting of new Power Plants. The CBM activities propose some 50,000 wells and associated roads, pipelines, etc to be constructed over a 20 to 30 year period to extract the gas from the coal beds. To produce the gas, operators must partially de-water the coal seam. The produced water is of high enough water quality that it can be discharged to surface waters. 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 result in accelerated erosion and sedimentation.

2. In some parts of the basin, the discharge water is elevated in sodium to the point that it may not be usable for irrigation. If used without careful management it could result in sodic soils.

3. Downstream states are concerned about how the chemistry of this discharge water may affect their designated uses of the main stem water.

For example, the States of Montana and Wyoming announced their intentions to cooperate in the development of Coal Bed Methane (CBM) activities and to monitor the effects of these activities on the Powder River drainage. This announcement came after 6 months of negotiations between representatives of the two state DEQs to assure that Montana's downstream water uses would be protected while coal bed methane develops in the upper reaches of the drainage.

The cooperative effort is an interim step to the development of a final understanding. It recognizes that Wyoming can proceed with permitting additional CBM operations, but will do so in a cautious manner to keep Montana's downstream users of the Powder River water whole. It calls for a more comprehensive monitoring network, collection of real time monitoring data at the border, periodic analysis of trends and sets reaction levels should unexplained changes be observed in the recorded history of the system. If reaction levels, based primarily on salinity, are reached at the border the comprehensive monitoring network will be used to reassess the system using sodium as the surrogate to determine if the upsets may be associated with CBM operations or some other source or anomaly. This comprehensive watershed monitoring and analysis

program will also help the two states develop a better understanding of the Powder River system and how it responds to the new CBM activity.

In the interim, Wyoming will work cooperatively with Montana as they develop a downstream TMDL and protective standards. These tools along with the more aggressive monitoring data will help shape the contents of a future and final cooperative understanding between the two states. Wyoming can issue additional permits and can renew existing permits in a manner that accounts for projected cumulative impacts to the Powder River system and verified with monitoring data. Wyoming will encourage permittees to employee discharge management practices that will reduce potential adverse water quality impacts to the main stem, which includes such practices as consumptive use, storage, reinjection, etc.

If, through use of the monitoring network it can be established that the upsets are a result of CBM discharges, Wyoming DEQ will reconsider how and where it is authorizing surface discharge of the CBM water with the intention of restoring the targeted goals of the interim understanding. This cooperative understanding only applies to the Powder River drainage. The two states have agreed to start working on a similar understanding for the Tongue River drainage.

All surface discharges from CBM operations require a state NPDES permit, except in those few cases where the water is discharged to a non-discharging treatment pit permitted by the Wyoming Oil and Gas Conservation Commission. These permits set effluent limits that assure protection of designated uses of the water, which include the basic uses for livestock and wildlife and in many cases higher uses for aquatic system, fish and public drinking water.

Monitoring and Assessment

Progress Toward Monitoring

2000 and 2001 Biomonitoring

This section updates the original Five-Year Comprehensive Monitoring Plan as provided to the TMDL Workgroup and the 1997 TMDL Work Plan Monitoring efforts in 2000 and 2001 were designed to continue along the same statewide pattern as presented in the original monitoring plan by completing the assessments in the Powder and Green River Basins; continuing down the Bighorn/Wind, North Platte, and Belle Fourche River Basins; and initiating assessments in the Cheyenne River Basin. Much of the assessment effort in the Powder, Belle Fourche, and Cheyenne River Basins focused around obtaining bioassessment data in watersheds undergoing coal bed methane development.

In 2000, DEQ conducted monitoring on 43 of the Five-Year Comprehensive Monitoring Plan stream/river segments, 6 “Table A” Impaired Waterbody Segments, 1 “Table C” Threatened Waterbody Segment, and 18 Long Term Trend Reference Sites.

In 2001, Monitoring was conducted on 36 of the Five-Year Comprehensive Monitoring Plan stream/river segments, 3 "Table A" Impaired Waterbody Segments, 1 "Table C" Threatened Waterbody Segment, and 27 Reference Sites.

These monitoring efforts have resulted in the monitoring of 233 of the Five-Year Comprehensive Monitoring Plan waterbodies at the end of the year 2001 field season. In addition to these waters, the DEQ field staff have monitored a total of 41 other waterbodies during the first four years of the five-year comprehensive monitoring period. This supplemental monitoring effort has concentrated on waterbodies where inconclusive data were supplied to DEQ during past: 303(d) public participation efforts and other DEQ projects (i.e. spills, potential groundwater impacts to surface water, and coal bed methane development studies).

2002 Biomonitoring
2002 is the final year of the Comprehensive Five-Year Monitoring Plan. In order to complete this plan, a total of 62 waterbodies would be scheduled for monitoring in the 2002 field season. Conservation districts have initiated monitoring or expressed the intention to monitor 12 of these waterbodies, leaving 50 that DEQ has scheduled to monitor.

Fecal Coliform Bacteria 2000 and 2001 Monitoring
DEQ placed 14 waterbodies on the Year 2000 303(d) List of Impaired Waters. Eight of those waterbodies were given a "low" priority for TMDL development because they were covered by Sheridan County's Goose and Little Goose Creek Watershed Planning efforts. The remaining six waterbodies were monitored by DEQ in an effort to delineate the extent of the impairment and partition loading sources. Several Of the Five-Year Comprehensive Monitoring Plan waterbodies were originally identified as not fully supporting Contact Recreation. Fecal coliform bacteria monitoring was conducted on those waterbodies scheduled for monitoring in 2000 and 2001 as part of their complete "credible data" assessment. In addition, the United States Geological Survey (USGS) conducted a Pathogen Indicator Synoptic Study in 2000 as part of the Yellowstone River Basin NAWQA project. Those sampling efforts have led to an expanded list of fecal coliform bacteria impacted waters on the 2002 303(d) List.

Non-bacteria Table A and Table C Monitoring
Waterbodies listed as Impaired and Threatened for non-bacteria pollutants, and not covered by approved Watershed Plans, were monitored in 2000 and 2001 to facilitate development of a TMDL as outlined in the DEQ's TMDL Workplan to USEPA. Monitoring was conducted on 8 Table A waterbodies and 2 Table C waterbodies in 2000 and 2001. This sampling effort concentrated on delineation of the extent of the impacted waterbody and partitioning of pollutant loading sources.

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 this 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 water quality of surface waters of the state. This document is available at the DEQ-WQD Website.

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 standards in Wyoming are based on chemistry, while most narrative standards 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 have 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 or by excessive sediment deposition - thus they have good "habitat" to live in. 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 references 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 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".

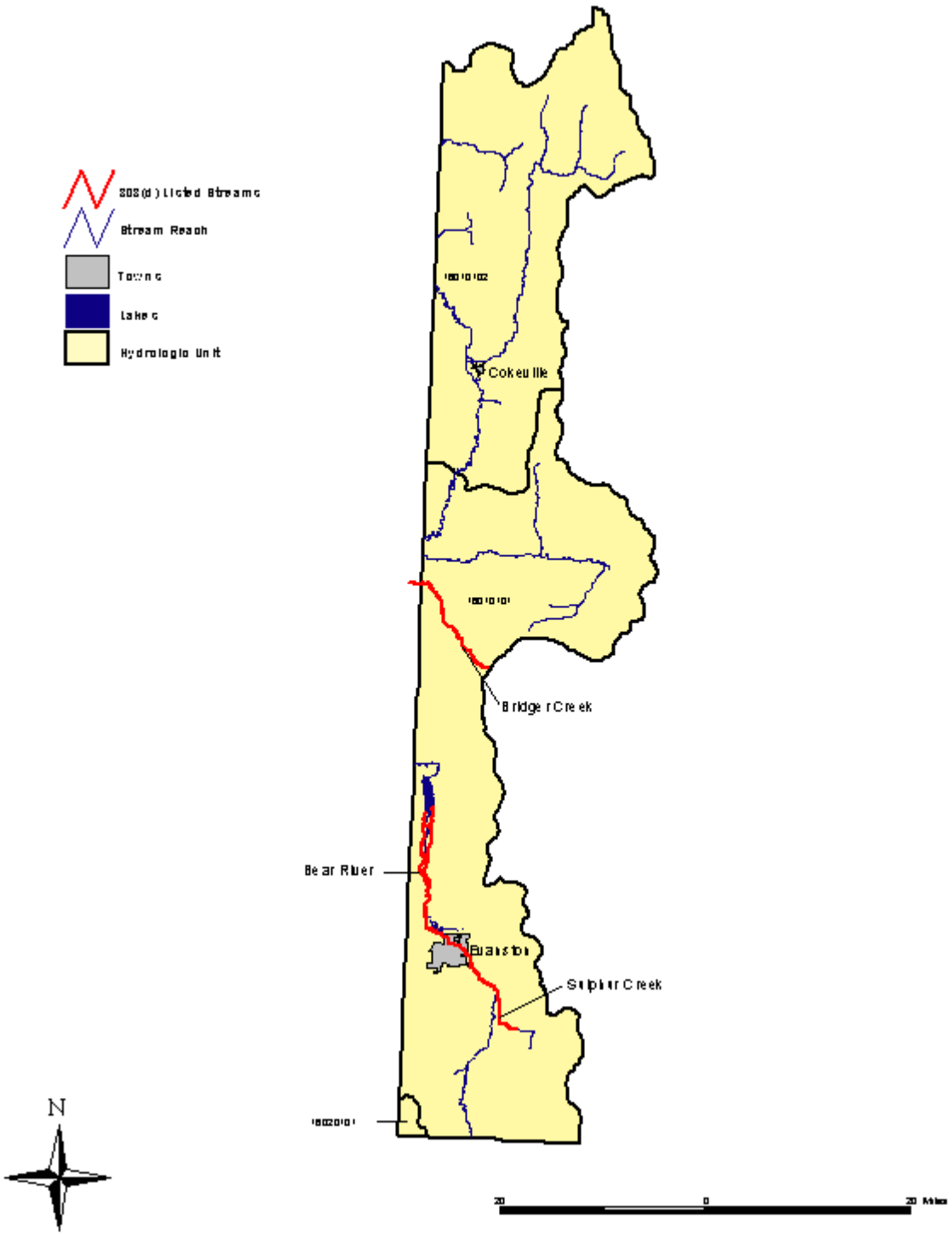
River Basin Descriptions and Summaries of Water Quality Conditions

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 2002 303(d) List. Each basin section is then subdivided into HUCs, referred to as watersheds in this report. Water quality conditions, based on existing data and information, are discussed in each of these watershed 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. Please understand that both use attainment and water quality conditions can change over time and that 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 supposed 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, please understand that because streams are dynamic entities, and because the extent of water quality limitations varies over time the exact location of water quality limitations can often 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 Mountain 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 1955. Irrigation is the largest consumptive water use, using about 82 percent of the available stream flow in Wyoming. Many streams which were reportedly perennial in the past, now do not flow during some months. 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. 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.

The Upper Bear River Watershed (HUC 16010101)
In Wyoming this watershed 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 the Wyoming Department of Environmental Quality - Water Quality Division (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.

Assessments were also conducted in 1998 and 1999 on Sulphur Creek, both above and below Sulphur Creek Reservoir. The assessments confirm that Sulphur Creek is properly classified as cold water fishery (Class 2AB), but identifies concerns that these stream segments may only be partially supporting their aquatic life uses due to bank erosion, rapidly fluctuating flows below the reservoir, and other undetermined factors. Both segments will be monitored again in 2002

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 reported to be highly susceptible to erosion and to contain naturally high levels of calcium, magnesium, chloride and sulfate. Streams are reported to be incised in these highly erodible and unstable geologic materials. The relative influence of natural and man caused activities cannot be determined at this time.

The Bear River in and near Evanston is the site of a cooperative WGFD Riparian improvement project.

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. 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, and the mine/mill sites reportedly have not been stabilized or successfully re-vegetated. DEQ has conducted monitoring in the Twin Creek drainage, and initial data review indicates concerns with bank erosion and sediment loading, although a final assessment report has not been completed.

A study by Ecosystem Research Institute in the early 1990s identified the Bridger Creek drainage as a significant contributor of both sediment and phosphates into the Bear River. 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. Bridger Creek remains on Table C of the 303(d) list due to

threats of aquatic life use support within the drainage. This drainage is scheduled for monitoring to determine the extent of water quality improvements.

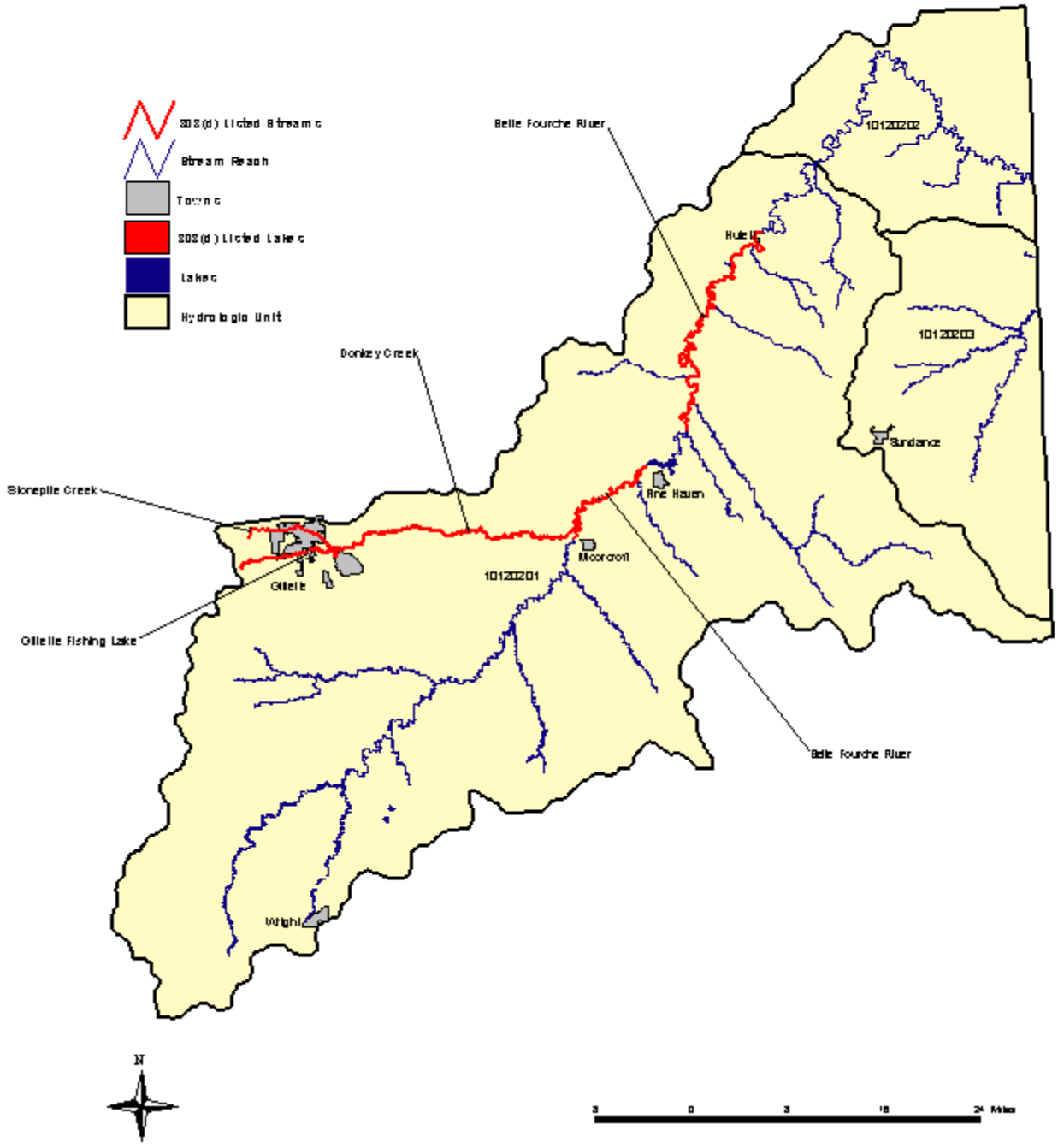
Central Bear River Watershed (HUC 16010102)
This watershed contains those drainages in Wyoming below Twin Creek, including the Smiths Fork and upper Salt Creek/Thomas Fork drainages. Land uses include historic phosphate mining, agriculture (farming and ranching), and a number of recreational activities 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 watershed.

Primary land use along the main stem Smith's 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 CRM group in parts of the drainage is working together to improve water quality, bank stability and wildlife habitat by modifying grazing practices and controlled burns. Water quality assessments in the Hobble Creek drainage, and the Smith's Fork drainage above North Smith's Fork indicate they are fully supporting their aquatic life uses.

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. 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. 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 and 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 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 Watershed (HUC 10120201)
The Upper Belle Fourche Watershed includes the drainages from Beaver Creek, north of Alva, upstream. Livestock grazing and hay production are the primary agricultural land uses, along with Coal mining and coal bed methane development are important land uses in the western portion of the watershed, and logging and recreation are other important land uses in the Black Hills.

Two reaches of the Belle Fourche River were placed on Table A of the 1998 303(d) List due to exceedences of the standard for fecal coliform bacteria. Subsequent monitoring by DEQ in 1998 and 1999 better identified the extent of those reaches as between Keyhole Reservoir to above Rush Creek, and between Hulett and Arch Creek. Crook County Conservation District has started a 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.

Additionally, the Belle Fourche River below the Hulett WWTP and Rush Creek below Moorcroft's WWTP have been added to Table B of the 303(d) List, due to re-evaluation of the TMDLs for ammonia, fecal coliform and chlorine associated with routine renewal of the discharge permits.

Gillette is the fourth largest community in Wyoming and lies at the upper end of the Donkey Creek drainage. Results of the monitoring conducted in 1998 also indicated 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. DEQ is working with the City of Gillette to better understand these fecal coliform concerns.

Assessment of Gillette Fishing Lake, conducted 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 County Conservation District is currently using 319 funds to educate the public about non point source pollution in the watershed, and to develop a water quality improvement plan with the City of Gillette.

Lower Belle Fourche Watershed (HUC 10120202)
The Lower Belle Fourche Watershed 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.

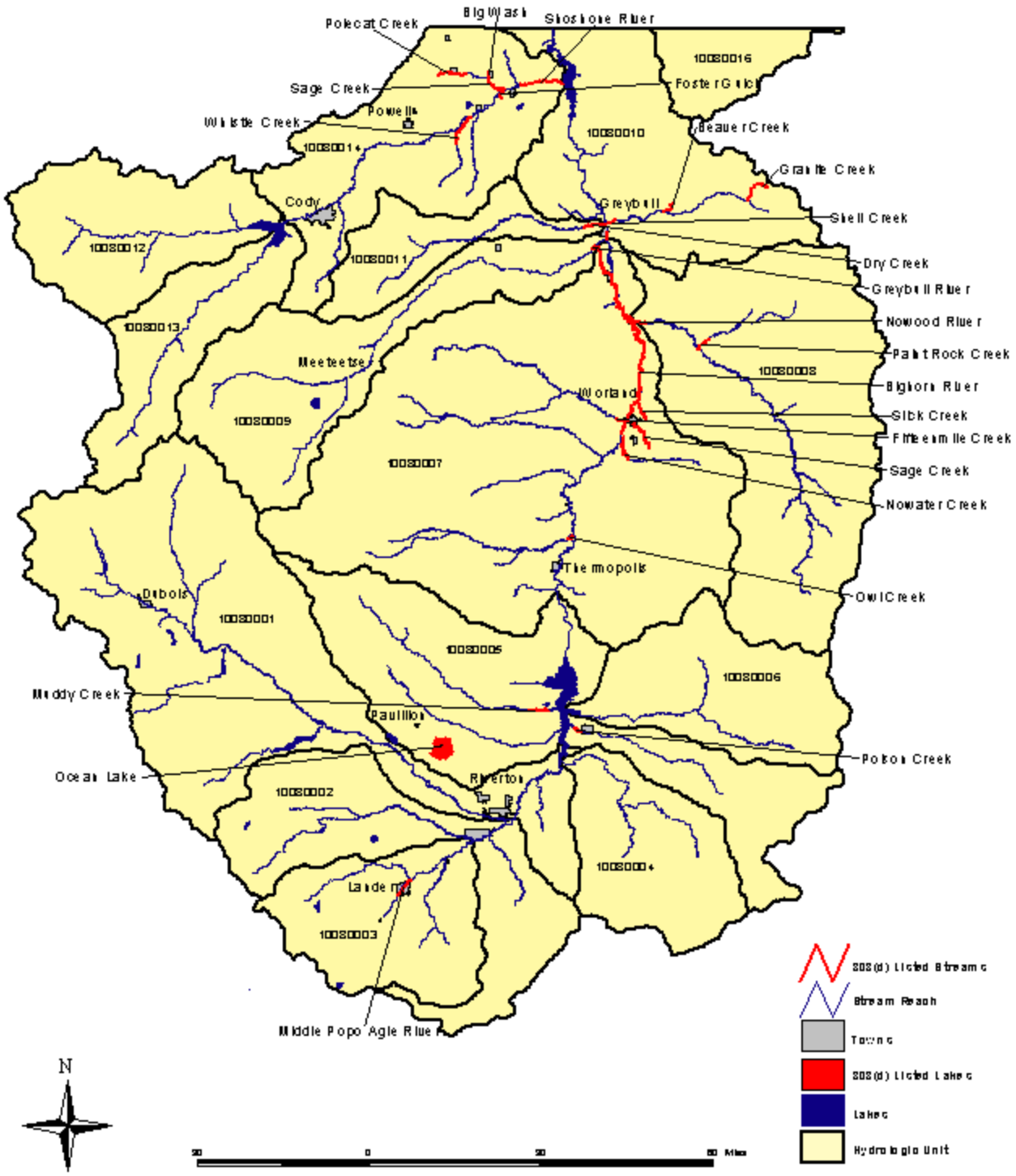
Approximately 1,500 acres of abandoned bentonite mine lands on both sides of the Belle Fourche River in the Colony area have been reclaimed by AML. Many of the reclaimed sites were in direct contact with the Belle Fourche River. In addition, reclamation conducted under active mining permits has reportedly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

Crook County Conservation District has committed to monitoring the lower Belle Fourche River as part of their watershed planning effort in the basin.

Redwater Watershed (HUC 10120203)
The Redwater Watershed 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.

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 watershed. 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 is fairly similar due to relatively similar terrain, geology and climate. Generally water quality is good in these mountain ranges. 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 11 inches per year), emanates from warm season 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 impact 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) and drought removed the existing grasses and began a cycle of intense runoff and gullying which added to the impacts of naturally occurring existing conditions. Recovery has been slow and difficult in lower elevation, more arid parts of the basin.

Livestock and wildlife grazing are the primary land uses in the basin, along with irrigated hay production. 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 Watersheds (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 Watershed (HUC 10080001)
The Upper Wind Watershed is the headwaters area for the Wind River, which flows into Boysen Reservoir. Land uses in the upper watershed are primarily recreation, grazing and timber production. Grazing, oil and gas production and irrigated agriculture are primary land uses in the lower watershed.

The Wind River below the Riverton WWTP has been added to Table B, due to re-evaluation of the TMDLs for ammonia, fecal coliform and chlorine associated with routine renewal of the discharge permit.

Stabilization and revegetation work to control erosion and improve fish habitat in the Horse Creek drainage continues as a successful cooperative effort between the Shoshone National Forest (SNF) and WGFD. The SNF 1997 Monitoring and Evaluation Plan states that this work has met its overall objectives.

Little Wind Watershed (HUC 10080002)
The Little Wind watershed includes those areas, other than the Popo Agie Watershed, 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. DEQ has conducted monitoring in this drainage, but the results have not been analyzed yet.

Popo Agie Watershed (HUC 10080003)
Headwaters of the Popo Agie Watershed are within the Shoshone National Forest. In the upper watershed, 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 has been added to Table A of the 303(d) List because of contact recreation impairment due to exceedences of the standard for fecal coliform. The Popo Agie Conservation District 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.

The Popo Agie River below the Hudson WWTP has been added to Table B, due to re-evaluation of the TMDLs for ammonia, fecal coliform and chlorine associated with routine renewal of the discharge permit.

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

Muskrat Creek Watershed (HUC 10080004)
The Muskrat Creek Watershed 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 Watershed (HUC 10080005)
The Lower Wind Watershed 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 production. A watershed improvement project has been completed, but sufficient data to determine if those threats still exist has not been reported to DEQ.

Poison and Muddy Creeks, tributaries to Boysen Reservoir, have been added to 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.

Badwater Creek Watershed (HUC 10080006)
The Badwater Creek watershed 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 Watershed (HUC 10080007)
Headwaters of the Upper Big Horn Watershed 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. Owl Creek and Thermopolis Hot Springs reportedly contribute a natural high TDS load to the Big Horn River, and the hot springs are also the source of a natural temperature increase. 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. 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. In 1995, AML reclaimed a long-abandoned sulfur mine which had been affecting water quality in the Owl Creek watershed north of Thermopolis.

The Big Horn River near Basin was listed on the 303(d) List in 2000 for impairment due to exceedences of the standard for fecal coliform bacteria. DEQ conducted monitoring in 2000 which showed that the impaired reach extends from below the Greybull River (in HUC 10080010) upstream to the Nowood River. Above the Nowood River, the Bighorn River is considered threatened for contact recreation uses and has been listed on Table C of the 303(d) List. Additionally, segments of the Bighorn River below the Worland WWTP and the Thermopolis WWTP have been added to Table B of the 303(d) List, due to re-evaluation of the TMDLs for ammonia, fecal coliform and chlorine associated with routine renewal of the discharge permits.

Owl, Nowater, Sage, Fifteen Mile and Slick Creeks, tributaries to the Bighorn River, have been added to 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. Further monitoring will be scheduled to determine the sources of contamination in the tributaries as well as directly to the Bighorn River.

Nowood Watershed (HUC 10080008)
Headwaters of Nowood Watershed 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 standard, 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 Bighorn River upstream an undetermined distance.

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. Future monitoring will be required to determine the extent of these reaches and the sources of contamination.

Tensleep Creek below the Tensleep WWTP has been removed from the 303(d) List, due to EPA approval of the TMDLs for fecal coliform and TRC associated with routine renewal of the discharge permit. Likewise, the West Fork of Tensleep Creek below the Deer Haven Lodge WWTP has been removed because approval of the TMDLs for the same constituents is expected before the 303(d) List is submitted.

Greybull Watershed (HUC 10080009)
Headwaters of the Greybull Watershed are in the Absaroka Range within the Shoshone National Forest. The foothills portions of the watershed are a mix of BLM, state and private lands, and the basin portions are primarily BLM, with private lands adjacent to streams. The watershed has three major irrigation reservoir projects. Summer flows in the Greybull River at the confluence with the Bighorn 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. Livestock/wildlife grazing and areas of oil and gas extraction are major land uses, with irrigated agriculture nearby and adjacent to the major streams.

The Greybull River has been added to Table A the 303(d) list because exceedences of the standard 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 standards upstream of Greybull. The listed impairment is between the confluence with the Bighorn River upstream an undetermined distance. High water temperatures recorded during some sampling events in 2000 and 2001 (a period of extreme drought in this portion of the state) 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 delineate the reach impaired for contact recreation.

Big Horn Lake Watershed (HUC 10080010)

The Big Horn Lake Watershed includes those areas, other than the Dry Creek and Shoshone River Watersheds, which drain into the Big Horn River or Lake below the Greybull River. Shell Creek is the largest drainage in the Big Horn Lake Watershed and its upper reaches begin in the western slope of the Big Horn Mountains within the Big Horn National Forest and flow through National Forest and BLM land. In lower elevations the tributaries drain large areas of marine shales and other fine grained geology. These tributaries deliver a high natural TDS load to the Big Horn River. Big Horn Lake was created in 1963-67 for irrigation, power generation and flood control. The upper third is in Wyoming; the downstream lower two-thirds of the lake are in Montana. 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.

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 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.

Information suggests impacted riparian areas and flow diversions may have degraded water quality from Shell Canyon to the Big Horn River, however management practices have reportedly changed and water quality improvements are expected.

Results of fecal coliform sampling on the Bighorn River below the Greybull River indicate it is not supporting its contact recreation use there, however samples collected just upstream from Bighorn Lake did not exceed the standard. Therefore, a segment of the Bighorn River, from the Greybull River (a continuation of the segment listed upstream in HUC 10080007) downstream an undetermined distance, has been added to the 303(d) List. A portion of this segment is also listed on Table B due to re-evaluation of the TMDLs for ammonia, fecal coliform and chlorine associated with routine renewal of the Greybull WWTP discharge permit. 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 the confluence with the Bighorn River upstream an undetermined distance. Granite Creek, a tributary to Shell Creek, was sampled for fecal coliform bacteria in several locations 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 have been added to Table A of the 303(d) List. Beaver Creek has been added to 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. Future monitoring will be scheduled to better delineate the extent of the reaches and the sources of fecal contamination on these streams.

Dry Creek Watershed (HUC 10080011)
Land uses in the Dry Creek Watershed are primarily grazing, with scattered oil fields. Numerous watershed and rangeland studies have been conducted in the Dry Creek watershed since at least the 1960s. According to several reports, much of this watershed has high erosion rates due to fragile soils and excessive historic livestock use. In many areas of the Dry creek watershed as well as the Big Horn Basin, the uplands are dominated by blue grama and cactus, but with grazing modifications, cool season grasses have responded. However in the northern part of the Dry Creek Watershed, there apparently is no longer a seed source for the cool season grasses, so early and late precipitation is not well utilized by forage species, and much of it runs off. As a result, forage production is minimal and erosion potential is high in this area, and much of the northern portion of the Dry Creek Watershed 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 a federal agency, cattle and wild horses reportedly avoid drinking the water in portions of Dry Creek below these areas, and some cattle die-offs in the early 1990s were thought to be from drinking the water. Current 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. However, grazing impacts on water quality in most of the Upper Dry Creek drainage south of Highway 20 are reportedly being addressed by current management plans.

Lower Dry Creek has been added to 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. Future monitoring will be scheduled to better delineate the extent of the reach and the source of fecal contamination.

North Fork Shoshone River Watershed (HUC 10080012)
Headwaters of the North Fork Shoshone River Watershed are in the volcanic geologic materials of the northern Absaroka Range. Primary land uses are recreation and livestock grazing, timber production and irrigated hayland in the lower watershed. Soils are formed in the Absaroka volcanic geologic materials, and are naturally 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 were also burned in the Yellowstone fires of 1988, which has probably also increased sediment loading. This high sediment loading has raised concerns with a federal agency 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 Watershed (HUC 10080013)
Most of the South Fork Shoshone River Watershed is within roadless or wilderness areas in the Shoshone National Forest, so human impact to water quality is minimal in much of the upper watershed. The dominant geology within the higher elevations is of volcanic origin and very unstable, so natural sediment loading to much of the watershed is very high. Parts of the mainstem South Fork of the Shoshone River have experienced considerable bank erosion, according to a state agency, due to attempts to control the river through bank modifications

which did not adequately consider natural stream hydrology. As a result, when a "fix" was attempted in one stretch, it often caused the river to erode banks in adjacent stretches as the river adjusted. Grazing practices, combined with high flow events, may have cause some watershed degradation in the upper drainages of Timber and Deer Creeks, on the flank of Sheep Mountain.

Shoshone River Watershed (HUC 10080014)
The Shoshone River receives water from Buffalo Bill Reservoir and flows into Bighorn Lake. Water quality is believed to be improved by the settling pond effect of Buffalo Bill Reservoir. 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 contains high flows from the North and South Forks of the Shoshone River, and store water, primarily for irrigation. The Shoshone River Watershed is extensively irrigated and farmed in the bottom lands and on several flat benches. The other uplands, which are mostly BLM land, are primarily grazed. Portions of the watershed have extensive oil and gas development, and bentonite is mined in much of the western part of the watershed.

Most of the BLM land south of the river has been identified by the BLM as a high priority for watershed improvement. Much of this area has high erosion rates due to fragile soils and excessive historic livestock use and resulting lack of cool season grasses. Therefore, early and late precipitation is not well utilized by forage species, so much of it runs off, and forage production is low. The McCullough Peaks area is a badlands area, so it has a naturally high erosion rate, but roads and grazing may be causing excessive erosion in parts of the Deer and Whistle Creek watersheds.

Sage Creek, which flows into the Shoshone River southwest of the McCullough Peaks and a few miles below Cody, has been identified by a federal agency as a possible contributor of excessive sediment and nutrients to the Shoshone River due to some of the irrigation return flows into Sage Creek, and areas of poor riparian condition along portions of Sage Creek and upper Hoodoo Creek. The BLM portion of Sulphur Creek is very wide and shallow and has almost no riparian vegetation.

According to reports by a federal agency, portions of Cottonwood Creek, north of Cody, are incised and actively eroding, but water quality concerns associated with grazing are being addressed by the current AMP. Excessive sediment has been identified as a possible water quality problem in Alkali Creek, which drains Ralston Flats. Samples which exceed the fecal coliform standard for primary contact recreation have been collected from Bitter Creek near Garland, and this stream is on Table A of the 303(d) List. Discharge from the Garland Oil Field is a concern due to precipitates and dead vegetation below a discharge point.

Bentonite mining and roads may be creating some water quality problems in the Dry Creek watershed and around Little Sheep Mountain in the eastern part of the Shoshone River Watershed. Excessive salinity in soils in the Lovell Lakes area south of Lovell may be due to flood irrigation of these naturally alkaline soils.

Salinity, excessive sediment, nutrients and pathogens have all been identified by federal and state agencies 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.

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 in Bitter Creek (listed in 2000) and 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 standard and are impaired for contact recreation use. The following waterbodies in the Lower Shoshone River watershed have been added to the 303(d) List:

> The Shoshone River, from its confluence with Bighorn Lake upstream an undetermined distance.
>
> The extent of the impairment on Bitter Creek has been determined to extend from the confluence with the Shoshone River upstream an undetermined distance above Powell. Additionally, a reach of Bitter Creek below the Powell WWTP is on Table B, due to re-evaluation of the TMDLs for ammonia, fecal coliform and chlorine associated with routine renewal of the discharge permit.
>
> Sage Creek from it 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, has been added to 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. Monitoring will be scheduled to identify sources of contamination.

The Shoshone River below Lovell's WWTP was on the 2000 303(d) List due to re-evaluation of the TMDLs for fecal coliform and chlorine associated with routine renewal of the discharge permit. Although the WLA for these constituents was approved by the EPA, the lower portion (see description above), still remains on the 303(d) List due to exceedences of the contact recreation use standard for fecal coliform bacteria. Additionally, two reaches of the Shoshone River below the Byron and Cody WWTPs have been added to Table B of the 303(d) List, due to re-evaluation of the TMDLs for ammonia, fecal coliform and chlorine associated with routine renewal of the discharge permits.

Information from a local conservation district and federal and state agencies suggests that salinity, oil, nutrients and streambank degradation may be problems in Sage Creek in northwest Big Horn County. A federal agency also identified these concerns in one of its tributaries, Polecat Creek. Possible sources may be bentonite mining, roads, farming or oil production. The short portion of Sage Creek below the Frannie WWTP has been removed from the 303(d) List due to expected EPA approval of the TMDLs for fecal coliform and TRC associated with routine renewal of the discharge permit. At this time, this upper portion of Sage Creek is not considered impaired, but further monitoring will be needed to better determine the extent of the contact recreation impairment listed above.

Little Big Horn River Watershed (HUC 10080016)

The upper portion of the Little Big Horn River Watershed headwaters is in Wyoming before draining into Montana. Except for a few main stem miles near the border, most reaches in this watershed 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.

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 exempt from human health standards for iron and manganese. Primary land uses are grazing, with areas of hay production, coal mining and oil and gas production.

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

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

Upper Cheyenne Watershed (HUC 10120103)
Coal mining occurs in the Upper Cheyenne Watershed east of Wright. Other land uses include ranching and oil and gas development.

Reports indicate that Snyder Creek does not flow during periods of drought.

Lance Creek Watershed (HUC 10120104)
Land uses in the Lance Creek Watershed include ranching, and oil and gas development.

Lightning Creek Watershed (HUC 10120105)
Land uses in the Lightning Creek Watershed are chiefly ranching, with some oil and gas development.

Angostura Reservoir Watershed (HUC 10120106)
Land uses in the Angostura Reservoir Watershed are primarily ranching, 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. However, existing data and information do not suggest water quality problems currently exist in Wyoming.

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

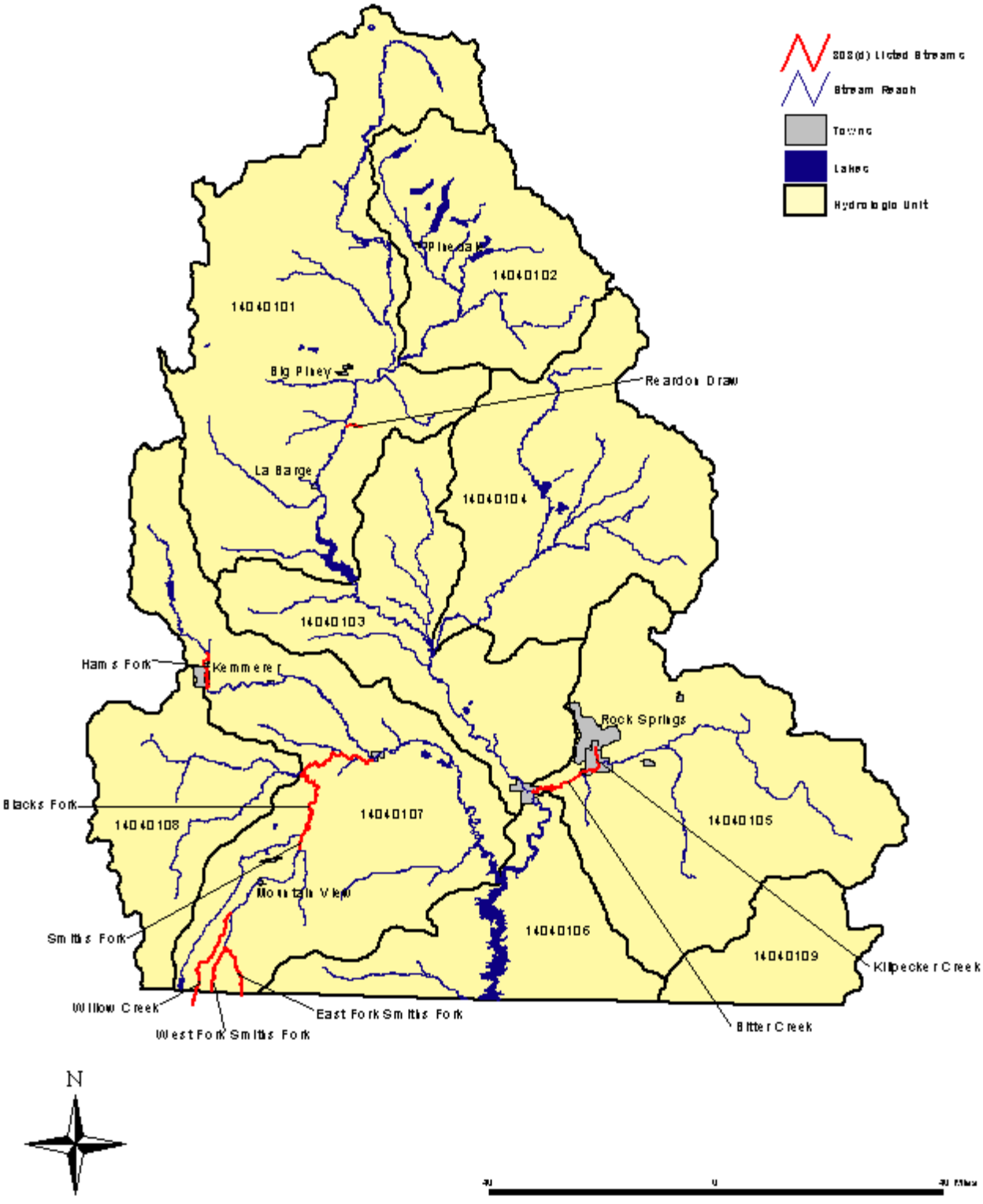
Poison Creek flows through the Osage Oil Field into Beaver Creek near Osage. Numerous small oil seeps, some of which reach Poison Creek, have been identified in sections 16 &17, T 46 N, R 63 W. Because of the considerable exploration and production of both oil and bentonite, it is difficult to determine 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 is currently overseeing 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 have been placed on Table C of the 303(d) List.

Salt Creek is a tributary to Stockade Beaver Creek, and is reportedly impacted by saline flow from artesian wells, but the magnitude of human caused impact is not known at this time. Due to concerns about whether Stockade Beaver Creek is properly classified as a cold water fishery in the lower elevation of the watershed, a Use Attainability Analysis was requested by some landowners. DEQ conducted monitoring on Stockade Beaver Creek in 2001.

Hat Creek Watershed (HUC 10120108)

Primary land use in the Hat Creek Watershed is ranching. DEQ conducted a bioassessment of the Sage Creek watershed which indicates full aquatic life uses support. Existing data and information also suggest that no significant water quality problems exist in the watershed.

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 reportedly 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. 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 Watersheds.

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 Watershed (HUC 14040101)
The Upper Green Watershed includes all tributaries into the Green River above Fontenelle Dam, except the New Fork Watershed. Fontenelle Reservoir is in the southern part of this watershed 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 watershed 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 reportedly becomes non-perennial before its confluence with the Green River. 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, and Dry Piney Creek is scheduled for monitoring. Seasonal dewatering of North Piney Creek may limit aquatic life.

Extensive monitoring by DEQ in the watershed between Highway 191 and the Green River Lakes indicate that this portion of the watershed is supporting its 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 state agencies with physical degradation in parts of the lower La Barge Creek drainage, as well as seasonal dewatering due to irrigation withdrawal.

Reardon Draw had a watershed improvement project in place to correct physical degradation of the stream channel, which reportedly was threatening aquatic life use support and impacting the Green River. Because their has not been a report documenting 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.

North Piney Creek below the Big Piney WWTP has been removed from the 303(d) List, due to expected approval of the TMDLs for ammonia, fecal coliform and TRC associated with routine renewal of the discharge permit.

Muddy Creek, below the Marbleton WWTP has been added to Table B of the 303(d) List, due to re-evaluation of the TMDLs for ammonia, fecal coliform and chlorine associated with routine renewal of the discharge permit.

New Fork Watershed (HUC 14040102)

Headwaters of the New Fork Watershed 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 watershed, however full use attainment monitoring has not been conducted. Geologic materials in the lower watershed include fine to coarse grained sedimentary rocks and are reportedly a natural source of fine sediment and TDS. Land uses in the watershed 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.

Slate Creek Watershed (HUC 14040103)
Slate Creek Watershed 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 Watershed (HUC 14040104)
Headwaters of the Big Sandy Watershed 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 Watershed are primarily grazing, irrigated hay production, recreation, oil and gas development.

In 1976, the BLM put a riparian habitat recovery program in place in Bone Draw, and in the early 1990s this watershed became the location of the Big Sandy Sill Project (a cooperative effort of the Bureau of Reclamation, Trout Unlimited, Wyoming Game and Fish and the Bureau of Land Management). Rock sill structures have been built in Big Sandy River with the goals of raising the water table, increasing riparian vegetation, providing habitat for juvenile fish, and improving in channel conditions Many rock dams, sills and habitat structures have also been placed in Bone Draw itself.

Since 1988 a salinity reduction program has been in place in the Big Sandy drainage as a part of the Colorado River Basin Salinity Control Program. Compared with flood irrigation, sprinkler irrigation is a usually a more efficient use of water resources and manpower, and is believed to lessen the amount of water available for seepage and groundwater return flow through saline geologic materials into the Big Sandy River and its tributaries. This program is being managed through the NRCS, replacing flood irrigation with enter pivot irrigation, with about half of the irrigated land converted at this time.

Bitter Creek Watershed (HUC 14040105)
The Bitter Creek Watershed lies entirely in the basin geology composed of mostly fine grained sedimentary rocks containing salts and other evaporate minerals. Because of the relatively low elevation and basin terrain, most reaches in this drainage are non-perennial. Occasional snowmelt and spring rainstorm events often transport high loads of sediment and dissolved salts. Land uses include ranching, 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 watershed, 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 standard 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.

Flaming Gorge Watershed (HUC 14040106)
The Flaming Gorge Watershed 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 watershed 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 watershed consists of fine grained sedimentary rocks, many of which are easily eroded and contain large amounts of evaporate minerals. Land uses include grazing, irrigated agriculture (mostly in the Henrys Fork drainage), recreation and oil and gas production.

In the Red Creek basin in the eastern part of the watershed, BLM continues to be involved in salinity control through stream bank stabilization and surface disturbance mitigation.

Blacks Fork Watershed (HUC 14040107)
Headwaters of the Blacks Fork Watershed are in the Uinta Mountains in northeastern Utah. 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 watershed (HUC 14040108, discussed below) is not included in the Blacks Fork Watershed. Land uses in this watershed include grazing, irrigated hay production, trona and coal mining, and oil and gas production.

The Hams Fork near Diamondville was listed on Table A of the 1998 303(d) list due to high pH measurements indicating it is partially impaired for its aquatic life uses, and a local watershed group has been assessing and addressing this problem. The Hams Fork below the Kemmerer-Diamondville water treatment plant has been removed from the 303(d) List, due to approval of the TMDL for Total Residual Chlorine associated with routine renewal of the discharge permit for the water treatment plant. However, the reach below the Kemmerer-Diamondville waste water treatment plant has been added to Table B of the 303(d) List, due to re-evaluation of the TMDLs for ammonia, fecal coliform and chlorine associated with routine renewal of the discharge permit.

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 standard 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, so further monitoring will be planned to identify the sources. The Blacks Fork below the Granger

WWTP has also been added to Table B of the 303(d) List, due to re-evaluation of the TMDLs for ammonia, fecal coliform and chlorine associated with routine renewal of the discharge permit.

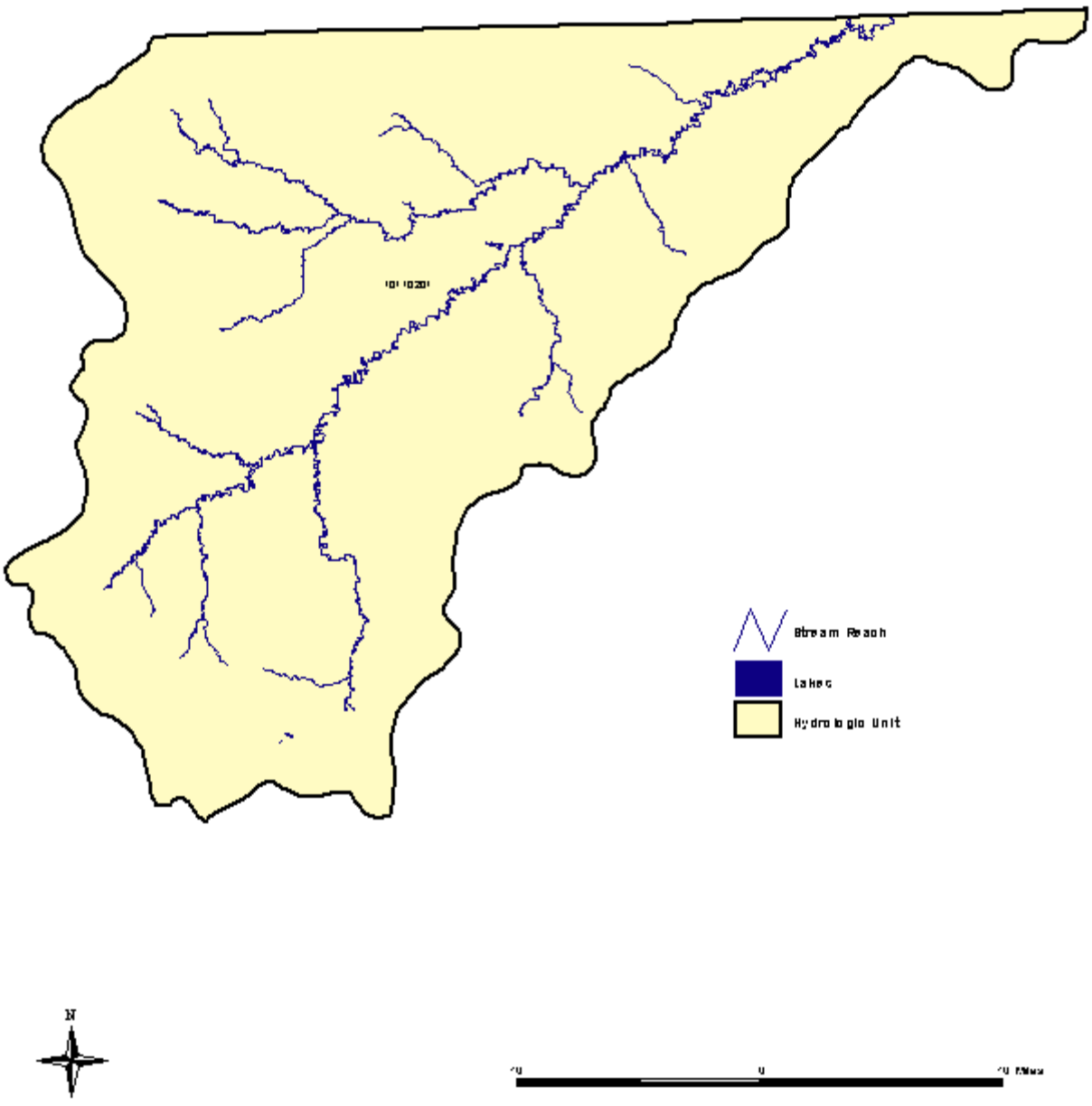
In the same area, the Smiths Fork is on Table A of the 303(d) List after DEQ monitoring determined the stream was only partially supporting its aquatic life uses as a Class 2 water due to loss of biological integrity and physical degradation of the stream. Smiths Fork from the confluence with the Blacks Fork upstream an undetermined distance has been added to Table A of the 303(d) List after fecal coliform monitoring showed the stream was not meeting its use for contact recreation. Additionally, a reach of the Smiths Fork below the Mountain View WWTP has been added to Table B of the 303(d) List, due to re-evaluation of the TMDLs for ammonia, fecal coliform and chlorine associated with routine renewal of the discharge permit.

The East and West Fork of Smiths Fork, and Willow Creek above the Blacks 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. Currently, a 319h watershed improvement project is in place to improve the physical condition of the stream channels and riparian areas.

Muddy Creek Watershed (HUC 14040108)
Muddy Creek Watershed drains the east slope of the Bear River Divide, north of Evanston, and Oyster Ridge, south of Kemmerer, and then flows into the Blacks Fork of the Green River. Soils in this watershed 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 Watershed (HUC 14040109)
The Vermillion Watershed 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 watershed include portions of the main stem of Vermillion Creek, the main stem of its tributary Coyote Creek, and the main stem of Canyon Creek. Vermillion Creek drains into the Green River in Colorado and contributes a TDS load of mostly sulfate and sodium from the areas's geologic materials. The BLM and WGFD are cooperating in a management plan initiated by local landowners and permittees for the perennial portions of Vermillion Creek and Coyote Creek which is reducing sediment loads and improving riparian areas.

Little Missouri River Basin

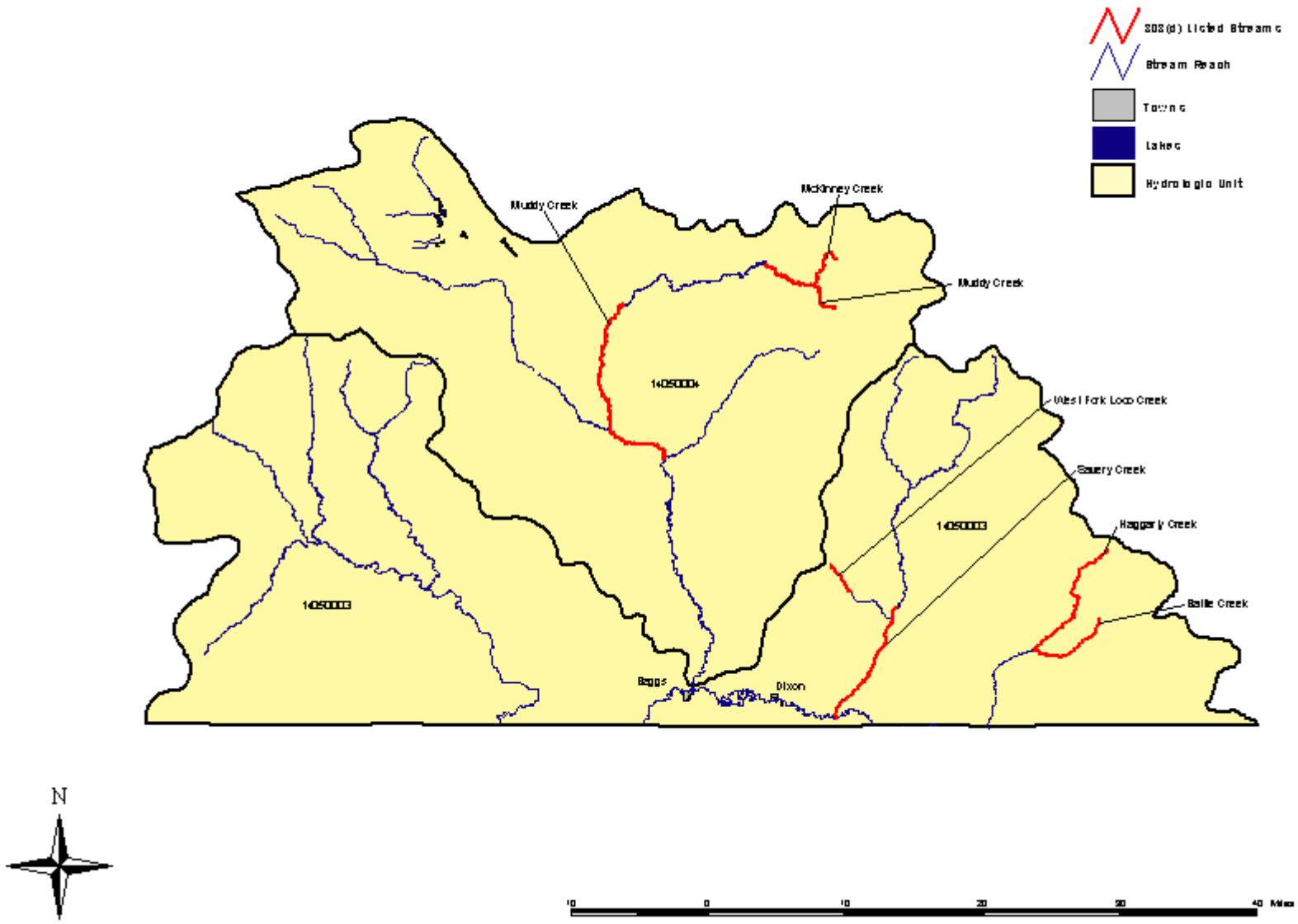


Little Missouri River Basin

The Little Missouri Basin in Wyoming includes only one defined watershed (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 have been identified by a local conservation 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 watershed have been dammed by earth berm dams. Approximately 500 acres of abandoned bentonite mine lands have been reclaimed by AML in the watershed. 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. Although information is available which suggests aquatic life uses may be fully supported, no monitoring data are available at this time which can be used to determine use support.

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 fined grained sedimentary rocks, most of which are easily eroded and often contain high levels of various salts

Little Snake Watershed (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 standards after treatment, although water quality to support fish should dramatically improve in much of the stream. Therefore, EPA has not fully accepted the TMDL. Review of data during the TMDL process on Haggarty Creek revealed that copper standards 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 the 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 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 in place in the lower Savery Creek drainage to address those threats.

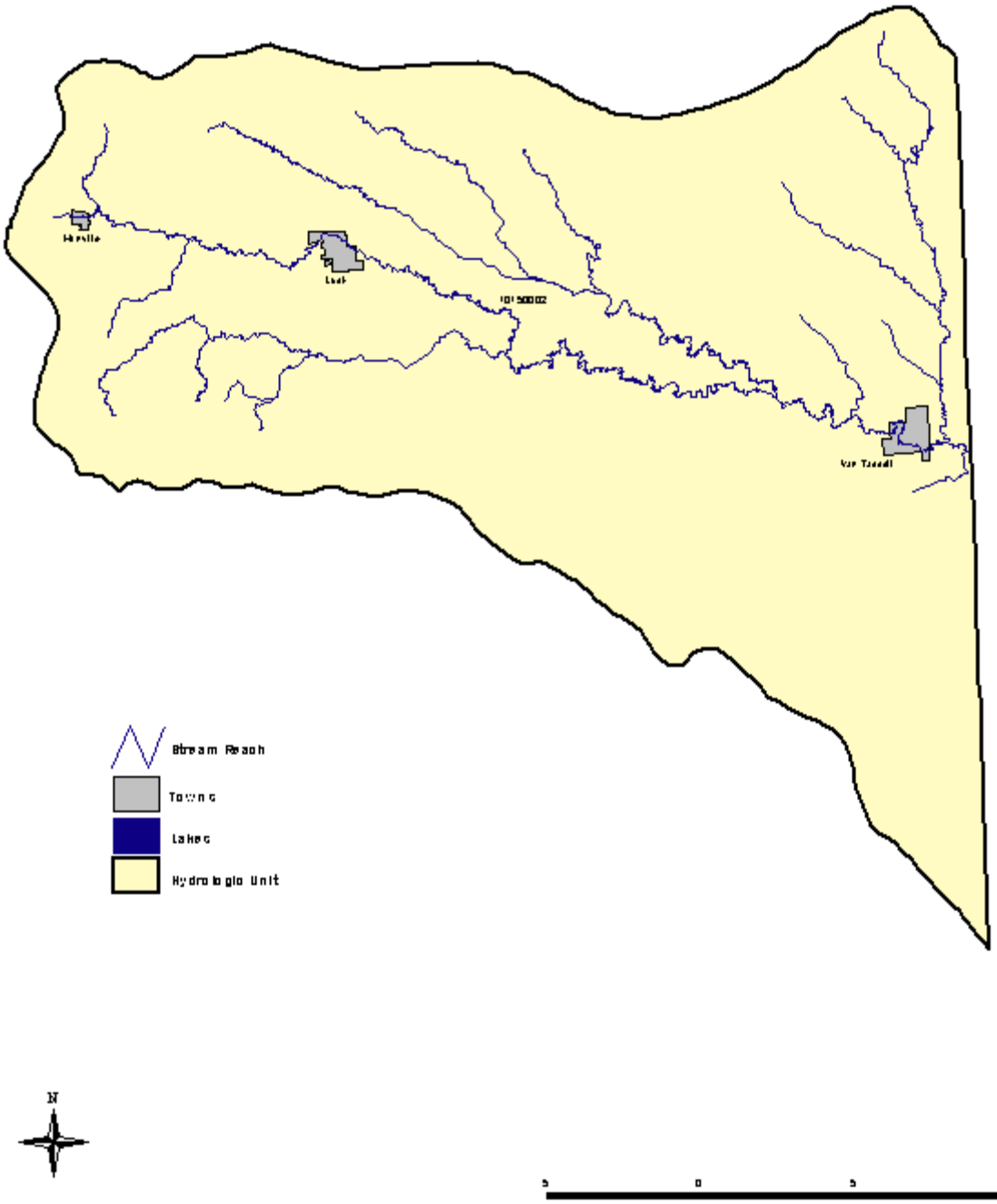
Ledford Slough, below the Baggs WWTP has been removed from the 303(d) List, due to expected approval the TMDLs for ammonia, fecal coliform and total residual chlorine (TRC) associated with routine renewal of the discharge permit.

Muddy Creek Watershed (HUC 14050004)
The Upper Muddy Creek drainage currently has a 319 watershed improvement project in place to address threats from physical degradation of the stream channels and riparian areas. Muddy Creek below Littlefield Creek and McKinney Creek below Eagle Creek are listed on Table C of the 303(d) List. However, this project has resulted in considerable improvement to stream stability, aquatic habitat and riparian areas. As a result of this project, Muddy Creek and

Littlefield Creek above their confluence, and McKinney Creek above Eagle Creek are now meeting their aquatic life uses. Because of the improved water quality, Colorado River Cutthroat Trout have been re-introduced into their former habitat in Littlefield Creek.

Another project was implemented on the reach of Muddy Creek, lying west of Highway 789, to address physical degradation of the stream channel, which threatens its aquatic life support. This reach of Muddy Creek is on Table C of the 303(d) List. Results of this project show an improving trend in riparian condition and bank stability above Red Wash. However, habitat degradation has been identified by a federal agency and a local conservation district 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.

Niobrara Basin



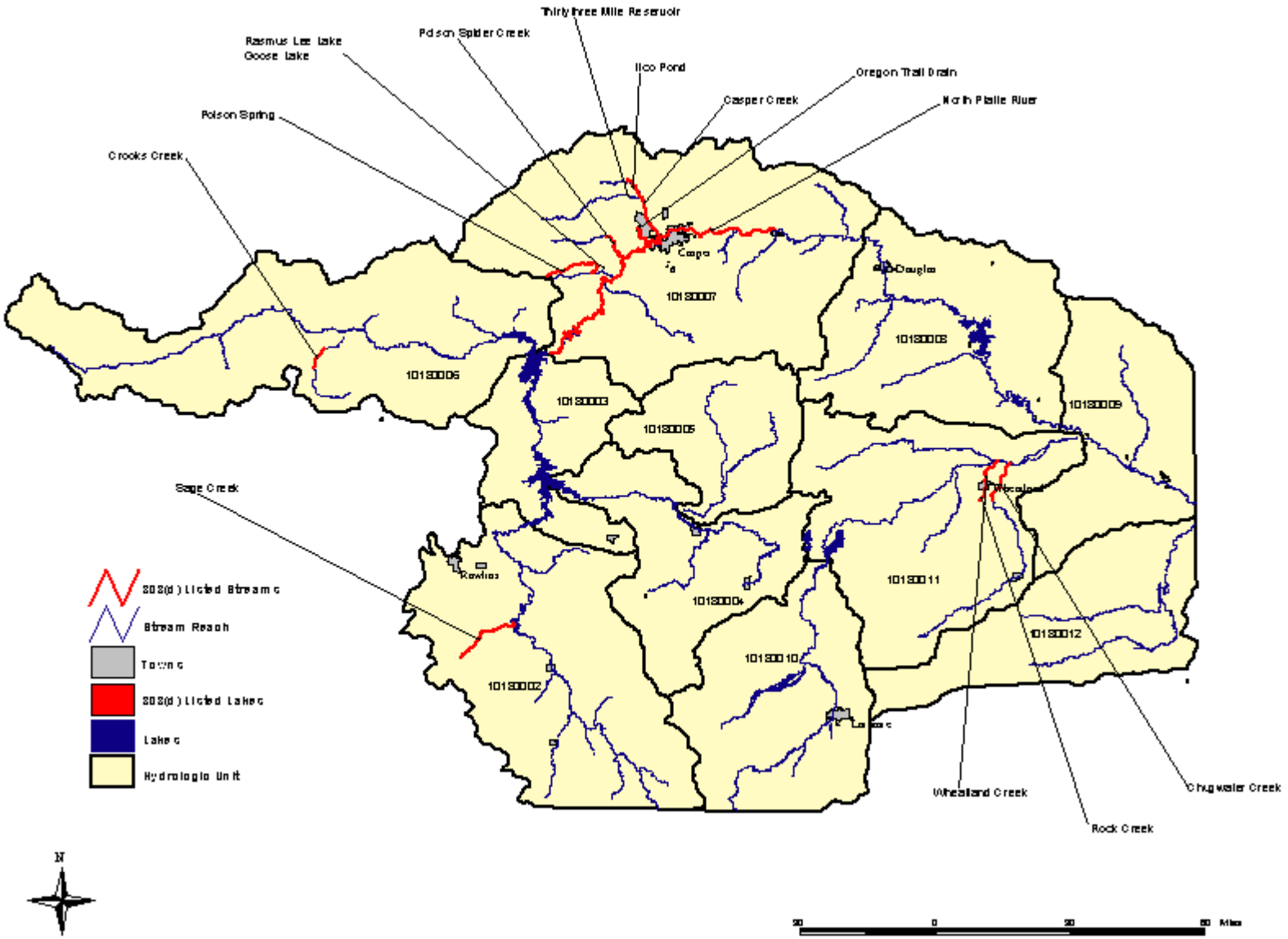
Niobrara River Basin

The Niobrara Headwaters Watershed is the only watershed 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 Watershed (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 down, stream flows surface and form an extremely slow moving, swamp-like stream, choked with bull rushes and cattails. Historical reports indicate that in the 1930's 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.

McMasters Reservoir is a shallow stock pond built on the Niobrara River. WGFD has been stocking it annually with trout, but all records indicate little, if any over winter survival of the trout. DEQ investigated the watershed and made the determination that McMasters Reservoir has naturally low levels of dissolved oxygen during ice and snow cover, due to its shallow depths and abundant vegetation. Therefore, winter fish kills appear to be a natural condition, and not due to any water quality problem.

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 an interstate compact governing water use on the Laramie River and a US Supreme Court decree governing North Platte River 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 Watershed (HUC 10180002)

The Upper North Platte Watershed 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 a lumber mill is located in Saratoga. Much of the forested area was historically harvested for railroad ties, and 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 watershed, 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 watershed. 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 erosion, resulted in increased erosion in several other places as the river adjusts 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 have been several reports that nutrient and sediment loads from Colorado may be increasing. Monitoring of the reach above Seminoe Reservoir has been scheduled for 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 Laramie River Watershed 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 State 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 as water quality concerns on Douglas Creek below Rob Roy Reservoir and above the wilderness boundary.

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

Roads and dredging have been identified as water quality concerns on Smith North Creek and impacts from historic mining is a concern on Bear Creek. DEQ has monitored both these streams, but the data has not yet been fully assessed.

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, its 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) these drainages reportedly exhibit very good riparian and streambank condition, and 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 intends to correct those impacts.

Both Cedar Creek and the South Fork of Cedar Creek are in a monitoring program conducted by the Saratoga-Encampment-Rawlins Conservation District. They are also helping form a stakeholder group to address any water quality problems which may be found in the watershed.

Although streams in the Big Creek Drainage are fully supporting aquatic life uses on most of the forest, based on DEQ and Forest Service assessments, some concern exists over sediment loading from lower forest roads into the stream on private lands below the forest. This issue is reportedly scheduled to be addressed as needed in the near future.

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 reportedly 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 of 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.

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. However, some concerns about erosion due to poor riparian condition in portions of Centennial Creek have been identified by a federal agency. 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. 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, the

Saratoga-Encampment-Rawlins Conservation District, 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 improving 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. Although historically impacted by past grazing practices, existing information and data indicate no significant water quality problems. Additionally, new and developing AMPs are expected to result in even better watershed condition. Sugar Creek flows through Rawlins and enters the North Platte just upstream of Seminoe Reservoir. Some concerns with the physical condition of the watershed above Rawlins have been raised. 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 Watershed (HUC 10180003)
In the Pathfinder-Seminoe Watershed, North Platte River flow is regulated by Seminoe, Kortes and Pathfinder Reservoirs. The watershed include 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 watershed are ranching, 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 watershed or the Medicine Bow Watershed (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 rights, 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 watershed and is considered a reference stream for sand bottom streams in the Wyoming Basin Ecoregion.

Medicine Bow Watershed (HUC 10180004)
The headwaters of the Medicine Bow Watershed 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 watershed 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 watershed, 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 watershed and the final data interpretation is pending.

Little Medicine Bow Watershed (HUC 10180005)
The Little Medicine Bow Watershed drains the northwestern edge of the Laramie Mountains and the Shirley Basin. Land uses are primarily ranching 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 for several years, but the final data analysis has not yet been completed.

Sweetwater Watershed (HUC 10180006)
The Sweetwater watershed 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 watershed 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 watershed, 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 had 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.

Middle North Platte Watershed (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 US 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 standards 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. 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. However, additional mitigation will be required to provide water quality improvement in the creeks or the North Platte River. A water quality management plan is being developed for these waters, making them a low priority for TMDL development to give the project time to fix the selenium problems.

The North Platte River near Casper was on the 303(d) list for exceedences of the old standard for arsenic. Wyoming's new standard of 7 ug/L is much higher than the concentrations recorded in the river, so it has been removed from the 303(d) list for arsenic.

The North Platte River below the Glenrock WWTP has been removed from the 303(d) List, due to EPA approval of the TMDLs for ammonia, fecal coliform and TRC associated with routine renewal of the discharge permit.

Glendo Watershed (HUC 10180008)
The Laramie Mountains border the Glendo Watershed on the southwest. This watershed 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 ranching, irrigated agriculture, oil and gas development, and scattered gravel and limestone quarries.

Sunrise Mining District is located east of Hartville Canyon in a 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 standard. 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 Watershed (HUC 10180009)
In Wyoming, this watershed 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 Watershed (HUC10180010)
This watershed includes all the drainages above Wheatland Reservoir #2. Major drainages in the Upper Laramie Watershed 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 watershed.

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 Watershed (HUC10180011)
This watershed 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 standards in the winter and spring, indicating that aquatic life uses are not fully attained. Monitoring indicates Wheatland's waste water treatment plant is the source of ammonia and a TMDL has been approved by EPA. Although still partially impaired, Wheatland Creek has been delisted from the 303(d) list because of the approved TMDL. The City of Wheatland is currently operating a small scale experimental treatment of some of their waste water effluent using zeolite, a clay mineral, to immobilize the ammonia. If this treatment works, they may begin full scale treatment of the effluent, before it

enters Wheatland Creek in order to meet the TMDL and to meet and protect aquatic life uses in the creek.

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 added to the 303(d) List. The Platte County Natural Resource District is beginning the watershed planning process to identify and address sources of fecal contamination.

Assessments conducted by DEQ along the length of Chugwater Creek indicate the stream is meeting its designated uses as a class 2 water above Antelope Gap Road west of Wheatland, although nutrients are a concern. However, the character of the stream dramatically changes 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 efforts sponsored by the Wyoming Game and Fish Department to improve riparian condition to benefit wildlife are beginning 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. The lower portion of Chugwater Creek has been placed 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.

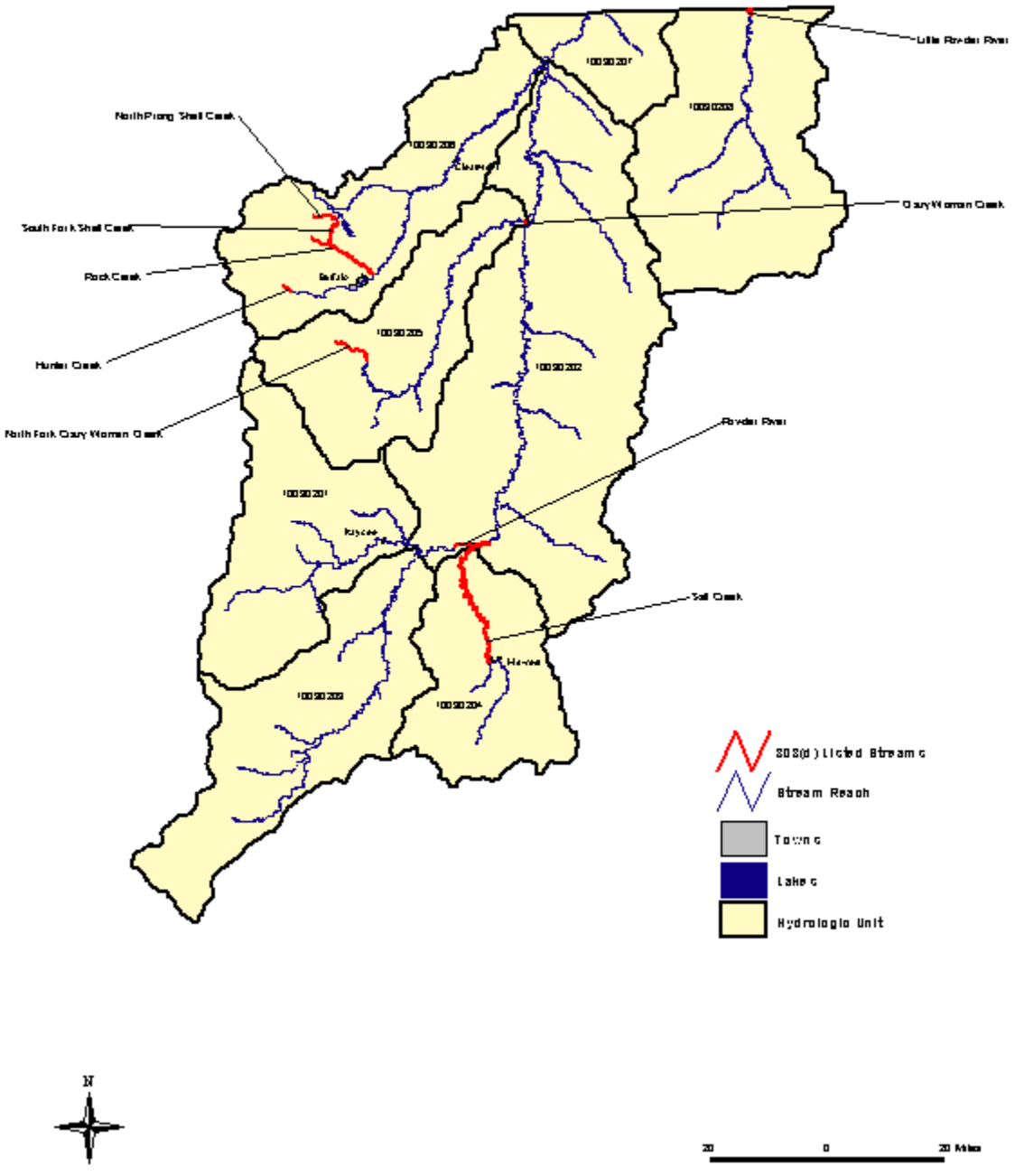
The Tunnel Reservoir on the Laramie River dams up water so it can be diverted through a tunnel into Bluegrass Creek to supply irrigation water in the Sybille Creek drainage. The reservoir is drained in the fall to prevent damage of the gates at the head of the tunnel. Because the reservoir was designed 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 Watershed (HUC 10180012)

Head waters of the Horse Creek Watershed are in the Laramie Mountains. Land uses are primarily grazing and irrigated hay production, with considerable dryland and irrigated cropping at lower elevations.

Watershed assessment 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 probably meeting its aquatic life uses, but elevated temperature is a concern in the lower watershed.

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 are 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, state and federal agencies have expressed concern that these aquatic communities may be affected.

Middle Fork Powder Watershed (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. Blue Creek, near Barnum, has also been assessed by DEQ and has been determined to be fully supporting its 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 1989 to create additional pool and riffle habitat. Bioassessments conducted by DEQ show that both Beartrap and Sawmill Creek are fully supporting their aquatic life uses.

The Middle Fork Powder River near Kaycee has been removed from the 303(d) List, due to approval of the Waste Load Allocations associated with renewal of the discharge permit for the Waste Water Treatment Plant.

Upper Powder River Watershed (HUC 10090202)
The Upper Powder Watershed 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 watershed 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, and coal bed methane, oil and gas production.

The Powder River below Salt Creek was listed on the 1998 303(d) List for exceedences of the chloride standard. 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 standard, so selenium was added as an impairment on Table A of the 303(d) List in 2000. Historic 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.

South Fork Powder Watershed (HUC 10090203)
The South Fork Powder Watershed lies mostly in Natrona County, extending into the Waltman area. The few perennial reach miles in this watershed 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 watershed, 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 Watershed (HUC 10090204)
Midwest and Edgerton lie almost in the center of the Salt Creek Watershed. 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 too development of the oil fields in beginning in 1908. Most reaches in this semi-arid watershed 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 has been reclassified to class 2C, a non-game fishery. However, because of the high chloride concentrations in the creek, it exceeds the standards for protection of aquatic life. Salt Creek naturally carries a high load of salts, hence its name, but several reports indicate that the majority of the stream flow is due to effluent from oil treaters in the watershed. 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.

Salt Creek also remains on the 303(d) List of threatened waters due to an unusually high number of oil spills in the watershed, perhaps due to the age of the oil handling facilities. Although, those spills usually do not make it to live water, the risk of such a spill is considered substantial.

Crazy Woman Watershed (HUC 10090205)
Headwaters of the Crazy Woman Watershed are on the east side of the Big Horn Mountains. Land uses are primarily oil and gas development, recreation, ranching 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 application within the watershed.

Provisional USGS data collected in 2001 near the mouth of Crazy Woman Creek indicate it is exceeding the drinking water standard for manganese, and the creek has been added to Table A of the 303(d) List. Because these concentrations do not appear to represent a human health risk, Crazy Woman Creek has been given a low priority for TMDL development.

Clear Creek Watershed (HUC 10090206)
Clear Creek, Piney Creek and Rock Creek headwaters in the Clear Creek Watershed 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 have been identified as heavy grazing in small horse pastures. Impacts to the North and South Fork Shell Creek drainages are primarily due to irrigation diversions and conveyance. Lake DeSmet Conservation District recently received a 319 grant to better address these problems, and the streams are listed on Table C of the 303(d) List.

Two reaches of Clear Creek, below the Buffalo and Clearmont WWTPs, have been removed from the 303(d) List, due to expected approval of the TMDLs for ammonia, fecal coliform and TRC associated with routine renewal of the discharge permits.

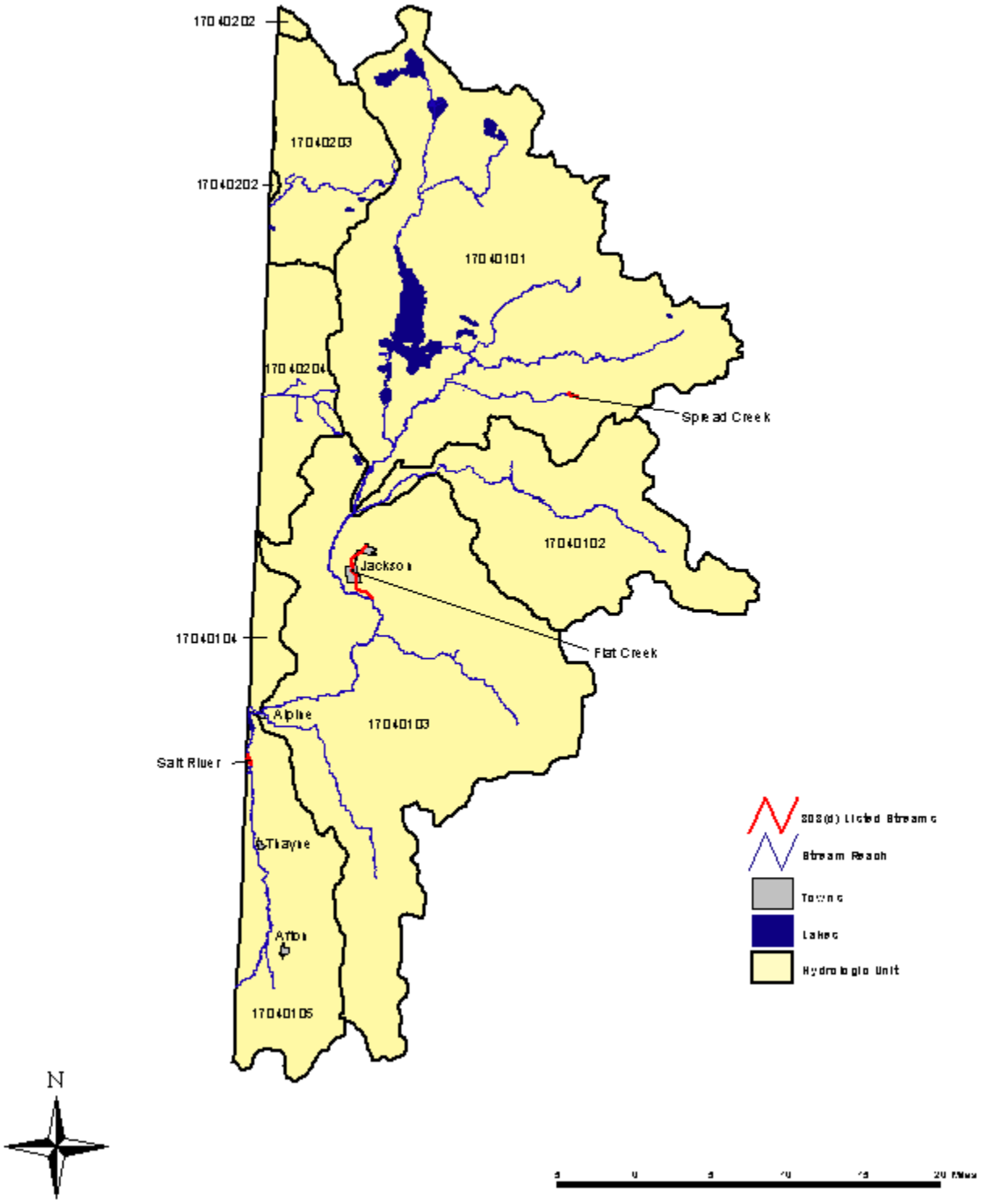
A short reach of Hunter Creek was impacted from excessive sediment which washed off an adjacent road and was listed as threatened on the 1998 303(d) List. Road modifications and changes in maintenance have been implemented to reduce this impact, and data indicates conditions are improving.

Middle Powder Watershed (HUC 10090207)
Middle Powder Watershed includes the lower portion of the Powder River in Wyoming before the Powder River flows into Montana. Land uses are primarily related to ranching and some oil and gas development. AML reclaimed six sites related to coal mining. Except for the Powder River main stem, reaches in this watershed are generally non-perennial.

Little Powder Watershed (HUC 10090208)
The Little Powder River originates near Gillette lies and flows north into Montana, east of the Powder River in Wyoming. Primary land uses in the Little Powder Watershed include coal mining, coal bed methane development and ranching. 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 standard, indicating the contact recreation use is threatened. The Little Powder River has been added to Table C of the 303(d) List.

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

Physical degradation of the Pacific Creek stream channel has been identified as a possible water quality concern after the creek made a major channel adjustment, the timing of which reportedly coincided with the placement of a new highway bridge across the channel. DEQ has scheduled monitoring for this drainage.

North Fork of Spread Creek currently has a watershed improvement project in place which has rehabilitated the stream channel and drastically improved the streams ability to support aquatic life. This stream is meeting its aquatic life uses, but is considered threatened until the riparian vegetation is better established, so it is listed on Table C of the 303(d) List.

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

Greys-Hoback Watershed (HUC 17040103)
Waters of the Greys-Hoback Watershed originate in the Bridger-Teton National Forest. Much of the southern part of this watershed 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 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.

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 naturally process has been accelerated by human activity.

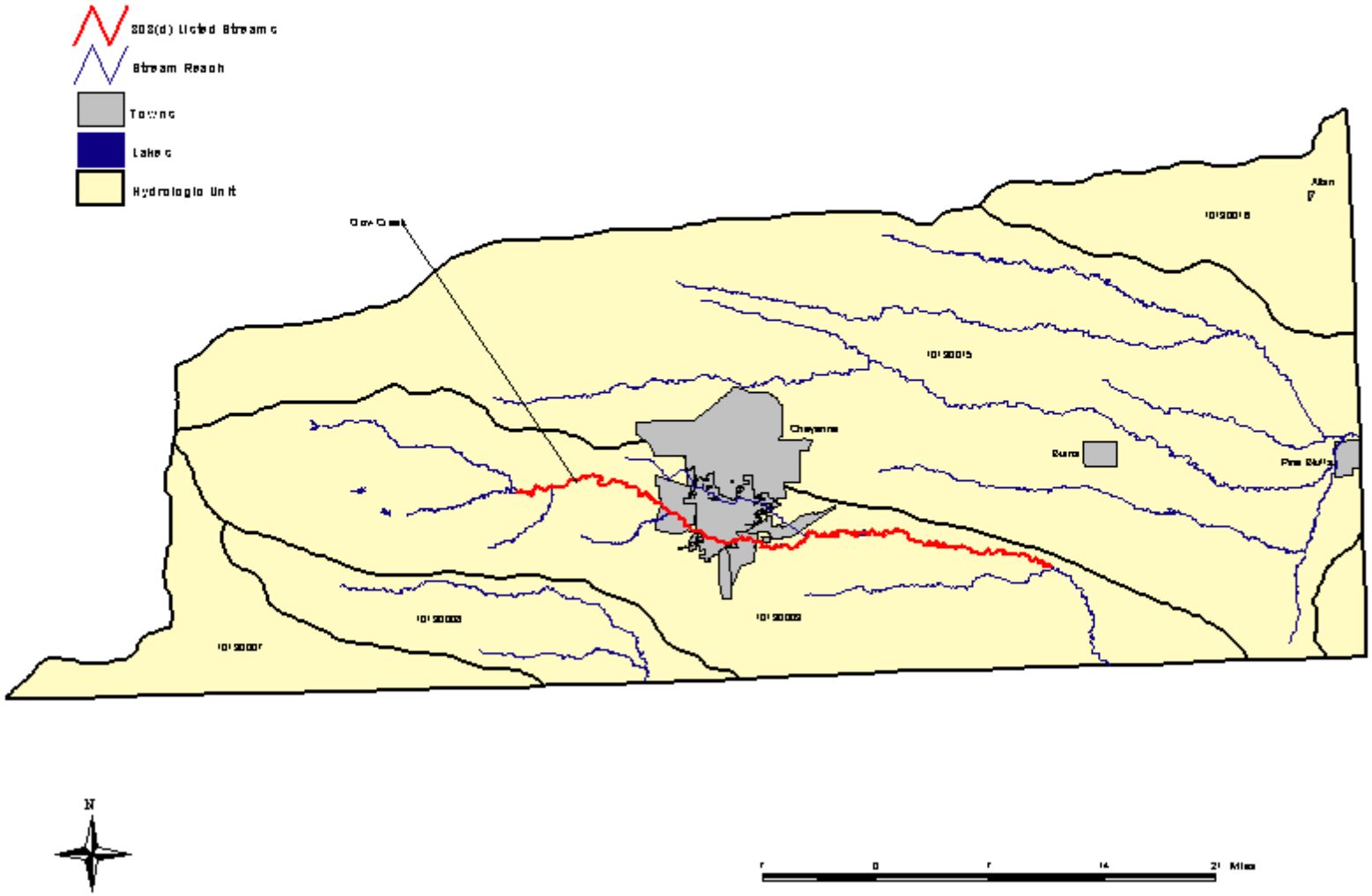
Palisades Watershed (HUC 17040104)
Waters of Palisades Watershed originate on the west side of the Teton Range in the Targhee National Forest. Land uses are primarily recreation and residential development.

Salt River Watershed (HUC 17040105)
The Salt River Watershed 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 the 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. Currently, a 319 project is in place to provide education and implement best management practices for agricultural nutrient management.

Data collected by the USGS occasionally exceed the standard for fecal coliform bacteria indicating that the contact recreation use is threatened. The Salt river near Etna has been added to Table C of the 303(d) List. Further data will be collected to better define the reach affected by this threat to identify sources of contamination so they can be mitigated.

South Platte River Basin



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 watersheds (except the Lower Lodgepole Watershed) in the basin have their headwaters in the granitic Sherman mountains of the Laramie range. These watersheds 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. Because of the sandy soils and low stream flows in much of the basin, most irrigation uses groundwater via sprinklers.

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

Lone Tree Watershed (HUC 10190008)
Headwaters of the Lone Tree Watershed are in the Laramie Mountains, and the watershed drains to the east. Grazing is the primary land use, with limited irrigated and non-irrigated agriculture in the lower elevations. The Lonetree Creek drainage portion in Wyoming is included in the USGS South Platte River NAWQA Program. Data from this program show water quality typical of irrigated agriculture areas where agricultural return flow is the major stream influence.

Crow Creek Watershed (HUC 10190009)
The Crow Creek Watershed 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 Watershed to Crow Creek for a portion of Cheyenne's municipal water supply. Crystal, Granite and Middle Crow reservoirs all lie in this watershed. Primary land uses are grazing, residential development, irrigated hay production, and both irrigated and dryland cropping in the lower watershed.

The city of Cheyenne appears to have a major impact on the water quality of Crow Creek. Fecal coliform contamination is a constant problem in Crow Creek, from Dry Creek upstream through Warren Air Force Base, and exceedences of the standards for ammonia has 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 the past four years by DEQ and the Laramie County Conservation District, cadmium has been delisted as cause of impairment in the 2002 303(d) List. Although Wyoming does not have numeric standards for nitrates and phosphates for protection of aquatic life, high levels of these nutrients are another concern on Crow Creek. Currently, the Laramie County Conservation District is conducting monitoring and working to provide education about water quality in Crow Creek. Additionally, the greater Cheyenne metropolitan area will be developing plans to address stormwater over the next three to ten years.

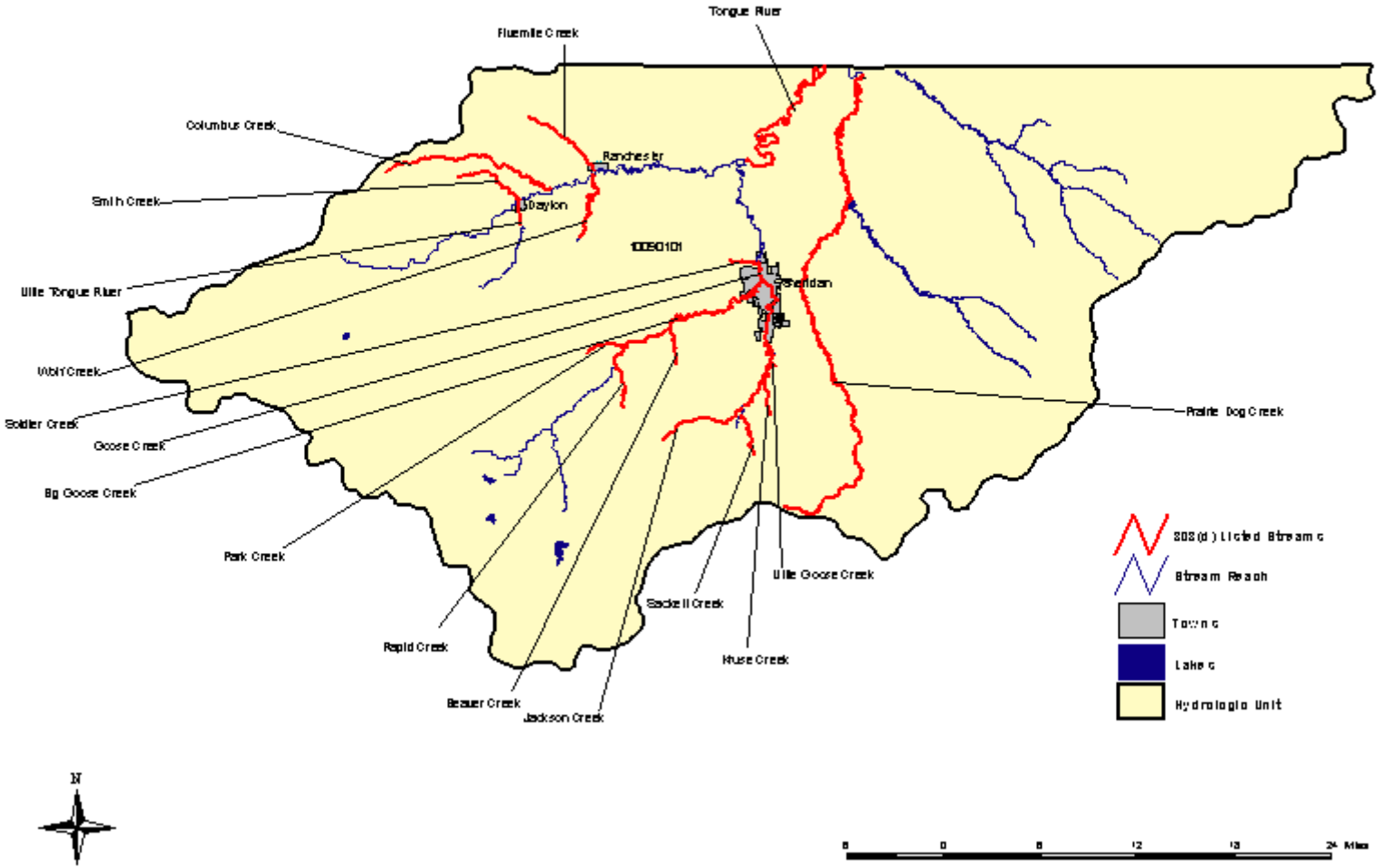
Sloans Lake in Cheyenne is frequented by a large number of ducks and geese, and also receives runoff from parks and streets. As a consequence, fecal coliform levels commonly exceed the standard for primary contact recreation for a short period nearly every year. Laramie County Environmental Health Officials routinely monitor those levels and close the lake to swimming when fecal coliform levels exceed standards.

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 reportedly supports a population of non-game fish.

Upper Lodgepole Watershed (HUC 10190015)
The Upper Lodgepole Watershed originates in the Laramie Range, north of the Crow Creek Watershed 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 watershed and irrigated and dryland crop production in the lower watershed. However, there has been considerable residential growth in the watershed in recent years, but effects of this growth on water quality are unknown.

Lower Lodgepole Watershed (HUC 10190016)
A small portion of the Lower Lodgepole Watershed is in eastern Laramie County, and it drains east into Nebraska. The watershed 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 watershed (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 watershed, primary land uses are irrigated agriculture, residential development, grazing and coal mining.

Tongue Watershed (HUC 10090101)
Big Goose and Little Goose Creeks were placed on the 1998 303(d) List due to exceedences of the standard 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. Sheridan County Conservation District (SCCD) has started a project to delineate stream reaches impaired by fecal contamination and begin locally led efforts to mitigate sources of impairment. Goose Creek below the Sheridan WWTP has also been added to Table B of the 303(d) List due to re-evaluation of the TMDLs for ammonia, fecal coliform and chlorine associated with routine renewal of the discharge permit.

Beaver Creek is classified as 3B, however it is reported to have perennial flow. DEQ has received a request that it be reclassified to 2AB.

The Tongue River below the Ranchester WWTP has been removed from the 303(d) List, due to approval of the TMDLs for fecal coliform and TRC associated with routine renewal of the discharge permit. However, a reach below the Dayton WWTP has been added to Table B due to re-evaluation of the TMDLs for ammonia, fecal coliform and chlorine associated with routine renewal of the discharge permit.

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 standard 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, has been added to the 303(d) list. SCCD has requested that the portion of the Tongue River below Interstate 90 be re-classified to a warm water fishery.

Assessments conducted by SCCD indicate that the lower reach of the Little Tongue River from it mouth an undetermined distance above the town of Dayton is not meeting its contact recreation use due to exceedences of the standard for fecal coliform bacteria. This reach has been listed on Table A of the 303(d) List. Additionally, there are 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

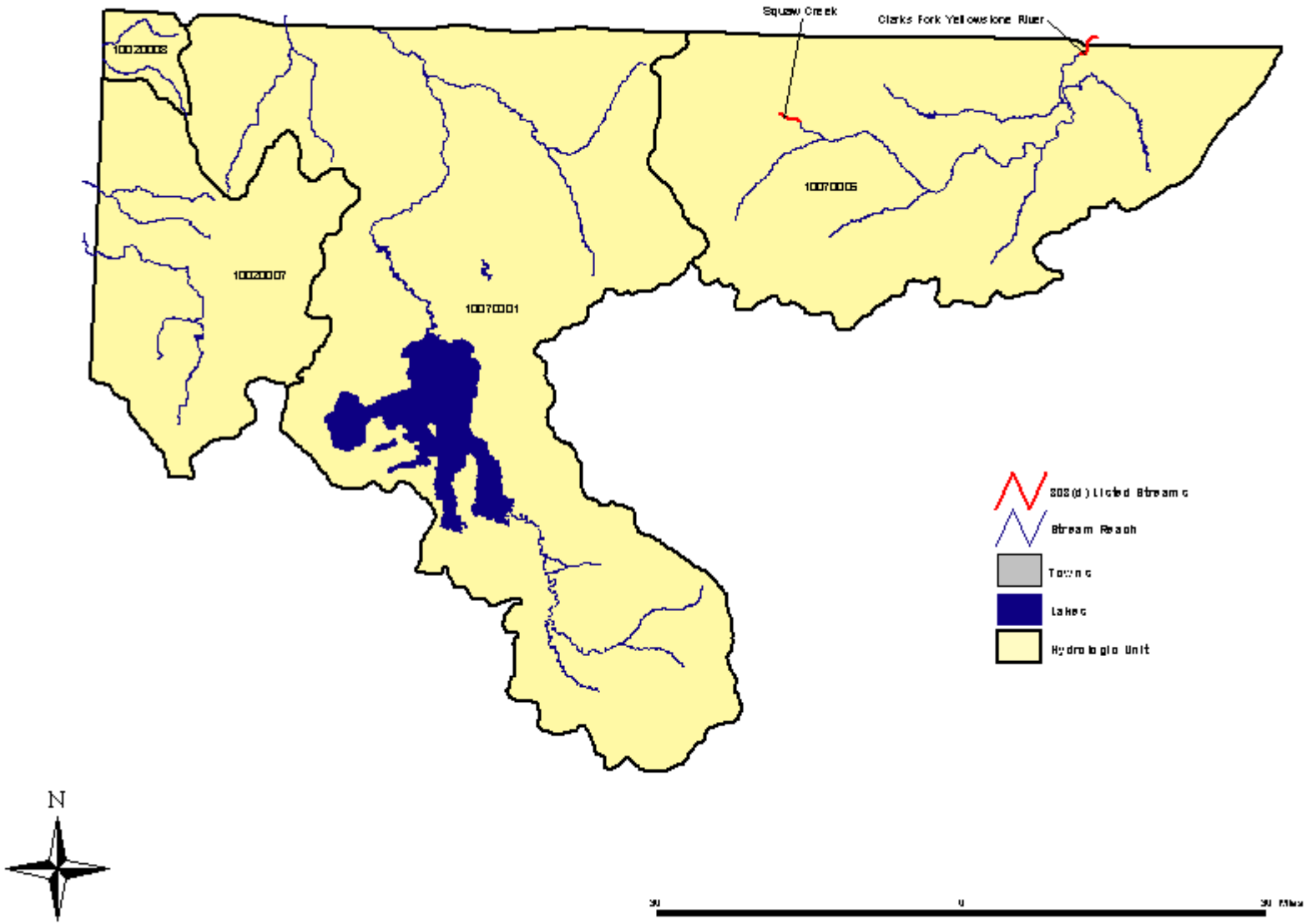
coliform data collected in Dayton by SCCD indicate that Smith Creek also does not meet is contact recreation use, therefore it has been listed on Table A of the 303(d) List.

SCCD also conducted assessments on Columbus Creek which indicate that its contact recreation use is impaired, 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 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, an SCCD monitoring site on Five Mile Creek has recorded fecal coliform counts whose geometric mean exceeds the standard, indicating it does not meet its recreational contact use. Five Mile Creek has been added to Table A of the 303(d) List).

Prairie Dog Creek, a tributary to the Tongue River, has been added to the 303(d) List due to exceedences of the water quality standard for manganese which indicates it is partially impaired for it drinking water use. Because these concentrations do not appear to represent a human health risk, Prairie Dog Creek has been given a low priority for TMDL development.

Yellowstone River Basin



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 Watershed (HUC 10070001)
In Wyoming, this watershed 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 watershed. Recreation is the primary land use in the watershed, and millions of people visit YNP each year, however most of the watershed 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 watershed 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 standards exceedences associated with the many geothermal features in this watershed 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. 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 reportedly been eradicated by long duration grazing and browsing by wildlife, and, as a consequence, considerable bank erosion is occurring along the river.

Soda Butte 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, Soda Butte Creek is on the Montana 303(d) list, but impacts in Wyoming have not yet been determined.

Clarks Fork Yellowstone Watershed (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 north east, then flows back into Montana where it confluences with the Yellowstone River. The Clarks Fork is Wyoming's only designated Wild and Scenic River. The upper two-thirds of the watershed in Wyoming is primarily Shoshone National Forest land, with small private in-holdings. Land uses in the upper watershed are primarily recreation, with some logging, grazing, irrigated hay production, and historic mining. Portions of the upper watershed were involved in the 1988 Yellowstone fires and subsequently salvage logged. Land uses in the lower watershed 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 standard 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.

Squaw Creek was first listed on Table C of the 1998 303(d) List due to water quality threats from an adjacent county road. A recent 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, so Squaw Creek has been delisted from the 303(d) List.

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

Designated Use Support Summary Tables

Miles are based on the National Hydrography Dataset (NHD). According to the NHD, Wyoming has 116,895 miles of perennial, intermittent and ephemeral rivers and streams.

Table 1. Individual Use Support Summary for Assessed Wyoming Streams and Rivers

Designated Use	Miles Assessed	Miles Fully Supporting	Miles Fully Supporting but Threatened	Miles Partially Supporting	Miles Not Supporting
Aquatic Life	3122.00	2479.79	352.36	237.47	52.38
Non-game Fish	105.01	10.38	32.17	55.55	6.91
Cold Water Fish	2923.57	2469.41	314.78	11.92	27.46
Warm Water Fish	41.55	0.00	0.00	41.55	0.00
Wildlife Watering	37.20	0.00	2.42	0.00	34.78
Contact Recreation	553.96	0.00	139.48	95.01	319.47
Drinking Water	15.59	0.00	0.00	15.59	0.00
Agriculture	34.78	0.00	0.00	0.00	34.78

Table 2. Summary of Fully Supporting, Threatened, and Impaired Waters in Wyoming

Degree of Designated Use Support	Total Miles Assessed	Percentage of Total Miles Assessed
Fully Supporting All Assessed Uses	2479.79	67.27
Fully Supporting All Assessed Uses but Threatened for At Least One Use	491.84	13.34
Impaired for One or More Uses	714.67	19.39
Total Assessed	3686.30	100.00

Table 3. Summary of Causes Impairing Wyoming's Assessed Streams and Rivers

Cause	Total Miles
Metals (Includes individual metals listed below)	141.06
Cadmium	12.82
Copper	17.45
Manganese	15.59
Selenium	129.93
Silver	12.82
Ammonia	21.42
pH	22.53
Siltation	47.51
Chlorides	53.76
Temperature	19.89
Physical/Habitat Degradation	7.70
Pathogens (Fecal Coliform)	412.05
Oil	5.49

Table 4. Summary of Sources Impairing Wyoming's Assessed Streams and Rivers

Source	Total Miles
Municipal Point Sources	6.91
Nonpoint Source	7.70
Agriculture - Irrigated Crop Production	101.10
Urban Runoff/ Storm Sewers	20.88
Resource Extraction - Petroleum Activities	34.10
Resource Extraction - Abandoned Mining	12.82
Resource Extraction - Inactive Mining	4.63
Natural Sources	79.28
Sources Unknown	399.04
Sources outside State Jurisdiction or Borders	6.50

Summary of 2002 303(d) Listings

The 2002 303(d) List is incorporated into four tables (Tables A, B, C & D). Twenty-four new segments have been added to Table A [303(d) waters with water quality impairments requiring a TMDL]. Four of these are for aquatic life use impairments, two for drinking water use impairments and eighteen for contact recreation use impairments. Twenty-six new segments have been added to Table B [303(d) Waters with Waste Load Allocation Discharge Permits Expiring] due to review of the TMDLs for ammonia, fecal coliform and chlorine. Sixteen new segments, all with contact recreation use threats, have been added to Table C [303(d) waterbodies with water quality threats]. Seventeen waterbody segments (found on Table D) are delisted from the 2000 303(d) list: all 13 waters from the 2000 Table B due to EPA approval (or expected approval) of Waste Load Allocations/TMDLs on permitted discharges; one due to a TMDL for a pollutant (ammonia); one due to current information indicating it meets the standard; one completion of a 319 project; and, one because of a standard change (arsenic).

Table A: 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[1]
BF	10120201	BELLE FOURCHE RIVER	2ABWW	From Keyhole Reservoir upstream an undetermined distance above Rush Ck	Fecal Coliform	Undeterm.	DEQ	Contact Recreation	1996	L[1]
BF	10120201	DONKEY CREEK	3B	From confluence with Belle Fourche R upstream to Stonepile Ck	Fecal Coliform	Undeterm. Point	DEQ	Contact Recreation	2000	L[1]
BF	10120201	GILLETTE FISHING LAKE	2AB	Gillette Fishing Lake on Donkey Creek	Phosphate	Non-point	Intermountain CD	Warm Fish, Aquatic Life	1996	L[1]
BF	10120201	GILLETTE FISHING LAKE	2AB	Gillette Fishing Lake on Donkey Creek	Siltation	Non-point	Intermountain CD	Warm Fish, Aquatic Life	1996	L[1]
BR	16010101	BEAR RIVER	2AB	From Woodruff Narrows Reservoir up to Sulphur Creek	Sediment	Undeterm.	DEQ	Aquatic Life	2002	H
BH	10080003	MIDDLE FORK POPO AGIE RIVER	2AB	Undetermined distances upstream and downstream of City of Lander	Fecal Coliform	Undeterm.	DEQ	Contact Recreation	2002	L[1]
BH	10080007	BIGHORN RIVER	2AB	From Greybull R upstream to Nowood R	Fecal Coliform	Point Undeterm.	DEQ	Contact Recreation	2000	L[1]
BH	10080008	NOWOOD RIVER	2AB	From confluence with Bighorn R upstream an undetermined distance	Fecal Coliform	Undeterm. Point	DEQ	Contact Recreation	2002	L[1]
BH	10080009	GREYBULL RIVER	2AB	From confluence with Bighorn R upstream an undetermined distance	Fecal Coliform	Undeterm. Point	DEQ	Contact Recreation	2002	H
BH	10080010	BIGHORN RIVER	2AB	From Greybull R downstream undetermined distance	Fecal Coliform	Undeterm. Point	DEQ	Contact Recreation	2002	H
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[1]
BH	10080010	SHELL CREEK	2AB	From confluence with Bighorn R upstream an undetermined distance	Fecal Coliform	Undeterm.	DEQ	Contact Recreation	2002	L[1]
BH	10080014	BIG WASH	3B	From confluence with Sage Ck upstream to Sidon Canal	Fecal Coliform	Undeterm.	DEQ	Contact Recreation	2002	L[1]

[1]Low Priority is due to current or previous watershed project, or implementation of best management practices, which is expected to address water quality problem.

Basin	HUC	Name	Class	Location	Cause of Impairment	Sources	Data Sources	Uses Impaired	Date Listed	Priority
BH	10080014	BITTER CREEK	2AB	From Shoshone R up an undetermined distance above Powell	Fecal Coliform	Undeterm. Point	DEQ	Contact Recreation	2000	L[1]
BH	10080014	POLECAT CREEK	2AB	From confluence with Sage Ck upstream an undetermined distance	Fecal Coliform	Undeterm.	DEQ	Contact Recreation	2002	L[1]
BH	10080014	SAGE CREEK	2AB	From confluence with Shoshone R upstream an undetermined distance above Big Wash	Fecal Coliform	Undeterm. Point	DEQ	Contact Recreation	2002	L[1]
BH	10080014	SHOSHONE RIVER	2AB	From confluence with Bighorn Lake upstream an undetermined distance	Fecal Coliform	Undeterm. Point	DEQ	Contact Recreation	2002	L[1]
BH	10080014	WHISTLE CREEK	3B	From confluence with Shoshone R upstream an undetermined distance	Fecal Coliform	Undeterm.	DEQ	Contact Recreation	2002	L[1]
GR	14040105	BITTER CREEK	2C	From Green R up to Killpecker Ck	Fecal Coliform	Undeterm. Point	DEQ	Contact Recreation	2000	L[1]
GR	14040105	BITTER CREEK	2C	From Green R up to Killpecker Ck	Chloride	Undeterm.	DEQ	Non-game Fish, Aquatic Life	2002	L[1]
GR	14040105	KILLPECKER CREEK	3B	Near Rock Springs, tributary to Bitter Ck	Fecal Coliform	Undeterm. Point	DEQ	Contact Recreation	2000	L[1]
GR	14040107	BLACKS FK GREEN RIVER	2AB	From confluence w/ Ham's Fk upstream to an undetermined distance above Smiths Fork	Fecal Coliform	Undeterm. Point	DEQ, USGS 9222000	Contact Recreation	2000*	L[1]
GR	14040107	HAMS FORK GREEN RIVER	2AB	Impairment an undetermined distance above and below Diamondville	pH > 9.0	Undeterm.	USGS 9224050	Cold Fish, Aquatic Life	1996	L[1]
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[1]
GR	14040107	SMITHS FORK GREEN RIVER	2AB	From confluence with Blacks Fork an undetermined distance upstream	Fecal Coliform	Undeterm. Point	DEQ	Contact Recreation	2002	L[1]
LS	14050003	BATTLE CREEK WEST FORK	2AB	From Battle Cr upstream to Haggarty Ck	Copper	Point Natural	USGS 9253465, DEQ	Cold Fish, Aquatic Life	2000	L[1]
LS	14050003	HAGGARTY CREEK	2AB	From Ferris-Haggarty Mine downstream to W. Fk. Battle Ck	Silver	Point	USGS 9253455, DEQ	Cold Fish, Aquatic Life	1996	L[1]
LS	14050003	HAGGARTY CREEK	2AB	From Ferris-Haggarty Mine downstream to W. Fk. Battle Ck	Copper	Point Natural	USGS 9253455, DEQ	Cold Fish, Aquatic Life	1996	L[1]

[1]Low Priority is due to current or previous watershed project, or implementation of best management practices, which is expected to address water quality problem.

Basin	HUC	Name	Class	Location	Cause of Impairment	Sources	Data Sources	Uses Impaired	Date Listed	Priority
LS	14050003	HAGGARTY CREEK	2AB	From Ferris-Haggarty Mine downstream to W. Fk. Battle Ck	Cadmium	Point	USGS 9253455, DEQ	Cold Fish, Aquatic Life	1996	L[1]
NP	10180006	CROOKS CREEK	2AB	From SW NE S18 T28N R92W undetermined distance downstream	Oil Deposits	Undeterm.	DEQ	Cold Fish, Aquatic Life	1998	H
NP	10180007	CASPER CREEK	2AB	In Kendrick Reclamation Project below Casper Canal downstream to N Platte River	Selenium	Non-point Natural	USFWS, USGS	Cold fish, Aquatic Life, Wildlife	2000	L[1]
NP	10180007	GOOSE LAKE	3B	In Kendrick Reclamation Project	Selenium	Non-point Natural	USFWS, USGS	Aquatic Life, Wildlife	2000	L[1]
NP	10180007	ILLCO POND	3B	S13 T35N R81Win Kendrick Reclamation Project	Selenium	Non-point Natural	USFWS, USGS	Non-game Fish, Aquatic Life, Wildlife	2000	L[1]
NP	10180007	NORTH PLATTE RIVER	2AB	From Kendrick Reclamation Project downstream undetermined distance below Casper	Selenium	Non-point Natural Undeterm.	DEQ, USFWS, USGS 6645000	Cold fish, Aquatic Life, Wildlife	1998	L[1]
NP	10180007	OREGON TRAIL DRAIN	3B	From N Platte R upstream through Kendrick Reclamation Project	Selenium	Non-point Natural	USFWS, USGS	Aquatic Life, Wildlife	2000	L[1]
NP	10180007	POISON SPIDER CREEK	2AB,2C, 3B	From N Platte R upstream undetermined distance above Kendrick Reclamation Project	Selenium	Non-point Natural	USFWS, USGS	Aquatic Life, Fish, Wildlife	2000	L[1]
NP	10180007	POISON SPRING CREEK	3B	From N Platte R upstream through Kendrick Reclamation Project	Selenium	Non-point Natural	USFWS, USGS	Aquatic Life, Wildlife	2000	L[1]
NP	10180007	RASMUS LEE LAKE	3B	In Kendrick Reclamation Project	Selenium	Non-point Natural	USFWS, USGS	Aquatic Life, Wildlife	2000	L[1]
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[1]
NP	10180011	ROCK CREEK	2C	Above Town of Wheatland	Fecal Coliform	Undeterm.	DEQ	Contact Recreation	2002	L[1]
NP	10180011	WHEATLAND CREEK	2C	Impairment undetermined distance above and below Hwy 320	Fecal Coliform	Undeterm. Point	DEQ	Contact Recreation	2002	L[1]
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[1]
PR	10090202	POWDER RIVER	2ABWW	From Salt Ck to an undetermined distance downstream below Sussex	Chloride	Undeterm.	DEQ, USGS 6313500	Warm Fish, Aquatic Life	1998	L[1]
PR	10090204	SALT CREEK	2C	From Powder R to an undetermined distance upstream	Chloride	Undeterm.	USGS	Non-game Fish, Aquatic Life	2002	L[1]

Basin	HUC	Name	Class	Location	Cause of Impairment	Sources	Data Sources	Uses Impaired	Date Listed	Priority
PR	10090205	CRAZY WOMAN CREEK	2ABWW	From Powder R to an undetermined distance upstream	Manganese	Undeterm.	USGS 6316400	Drinking Water	2002	L[1]
SP	10190009	CROW CREEK	2AB, 2C	Impairment undetermined distance above and below Cheyenne	Ammonia	Undeterm.	USGS 6756060	Non-game Fish, Aquatic Life	1996	L[1]
SP	10190009	CROW CREEK	2AB, 2C	Impairment undetermined distance above and below Cheyenne	Fecal Coliform	Undeterm.	DEQ	Contact Recreation	1996	L[1]
TR	10090101	BEAVER CREEK	3B	From Big Goose Ck to an undetermined distance upstream	Fecal Coliform	Undeterm.	DEQ	Contact Recreation	2000	L[1]
TR	10090101	BIG GOOSE CREEK	2AB	From Sheridan to above Beckton	Fecal Coliform	Undeterm.	DEQ	Contact Recreation	1996	L[1]
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[1]
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[1]
TR	10090101	GOOSE CREEK	2AB	From confluence of Big and Little Goose Creeks an undetermined distance downstream	Fecal Coliform	Undeterm. Point	DEQ	Contact Recreation	2000	L[1]
TR	10090101	JACKSON CREEK	2AB	From Little Goose Ck to an undetermined distance upstream	Fecal Coliform	Undeterm.	DEQ	Contact Recreation	2000	L[1]
TR	10090101	KRUSE CREEK	2AB	From Little Goose Ck to an undetermined distance upstream	Fecal Coliform	Undeterm.	DEQ	Contact Recreation	2000	L[1]
TR	10090101	LITTLE GOOSE CREEK	2AB	From Sheridan upstream to above Big Horn	Fecal Coliform	Undeterm.	DEQ	Contact Recreation	1996	L[1]
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[1]
TR	10090101	PARK CREEK	2AB	From Big Goose Ck to an undetermined distance upstream	Fecal Coliform	Undeterm.	DEQ	Contact Recreation	2000	L[1]
TR	10090101	PRAIRIE DOG CREEK	2AB	From Tongue R to an undetermined distance upstream	Manganese	Undeterm.	USGS 06306250	Drinking Water	2002	L[1]

[1]Low Priority is due to current or previous watershed project, or implementation of best management practices, which is expected to address water quality problem.

Basin	HUC	Name	Class	Location	Cause of Impairment	Sources	Data Sources	Uses Impaired	Date Listed	Priority
TR	10090101	RAPID CREEK	2AB	From Big Goose Ck to an undetermined distance upstream	Fecal Coliform	Undeterm.	DEQ	Contact Recreation	2000	L[2]
TR	10090101	SACKET CREEK	2AB	From Little Goose Ck to an undetermined distance upstream	Fecal Coliform	Undeterm.	DEQ	Contact Recreation	2000	L[1]
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[1]
TR	10090101	SOLDIER CREEK	2AB	From Goose Ck to an undetermined distance upstream	Fecal Coliform	Undeterm.	DEQ	Contact Recreation	2000	L[1]
TR	10090101	TONGUE RIVER	2AB	From Goose Ck downstream	Temperature	Undeterm.	DEQ, USGS 06306300	Cold Fish	2002	H
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[1]
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[1]
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[2]

[1]Low Priority is due to current or previous watershed project, or implementation of best management practices, which is expected to address water quality problem.

[2]Low Priority is due to current or previous watershed project, or implementation of best management practices, which is expected to address water quality problem.

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

Basin	HUC	Name	Class	Location	Permit Number	Expiration Date	WLA Threats	Threatened Uses
BF	10120201	BELLE FOURCHE RIVER	2ABWW	Undetermined distance below Hulett WWTP	WY0020214	November 30, 2002	Ammonia, Fecal Coliform, Chlorine	Warm Fish, Aquatic Life, Contact Recreation
BF	10120201	RUSH CREEK	3B	Undetermined distance below Moorcroft WWTP	WY0021741	January 31, 2003	Ammonia, Fecal Coliform, Chlorine	Aquatic Life, Contact Recreation
BH	10080001	WIND RIVER	2AB	Undetermined distance below Riverton WWTP	WY0020672	May 31, 2003	Ammonia, Fecal Coliform, Chlorine	Cold Fish, Aquatic Life, Contact Recreation
BH	10080003	POPO AGIE RIVER	2AB	Undetermined distance below Hudson WWTP	WY0020664	February 28, 2003	Ammonia, Fecal Coliform, Chlorine	Cold Fish, Aquatic Life, Contact Recreation
BH	10080007	BIGHORN RIVER	2AB	Undetermined distance below Worland WWTP	WY0020176	April 30, 2002	Ammonia, Fecal Coliform, Chlorine	Cold Fish, Aquatic Life, Contact Recreation
BH	10080007	BIGHORN RIVER	2AB	Undetermined distance below Thermopolis WWTP	WY0020192	January 31, 2004	Ammonia, Fecal Coliform, Chlorine	Cold Fish, Aquatic Life, Contact Recreation
BH	10080010	BIGHORN RIVER	2AB	Undetermined distance below Greybull WWTP	WY0020583	June 30, 2002	Ammonia, Fecal Coliform, Chlorine	Cold Fish, Aquatic Life, Contact Recreation
BH	10080014	BITTER CREEK	2AB	Undetermined distance below Powell WWTP	WY0020648	July 31, 2002	Ammonia, Fecal Coliform, Chlorine	Cold Fish, Aquatic Life, Contact Recreation
BH	10080014	SHOSHONE RIVER	2AB	Undetermined distance below Byron WWTP	WY0020281	January 31, 2003	Ammonia, Fecal Coliform, Chlorine	Cold Fish, Aquatic Life, Contact Recreation
BH	10080014	SHOSHONE RIVER	2AB	Undetermined distance below Cody WWTP	WY0020451	August 31, 2002	Ammonia, Fecal Coliform, Chlorine	Cold Fish, Aquatic Life, Contact Recreation
BR	16010101	BEAR RIVER	2AB	Undetermined distance below North Uinta County W&S District WWTP	WY0031712	November 30, 2002	Ammonia, Fecal Coliform, Chlorine	Cold Fish, Aquatic Life, Contact Recreation
GR	14040101	MUDDY CREEK	2AB	Undetermined distance below Marbleton WWTP	WY0021997	June 30, 2003	Ammonia, Fecal Coliform, Chlorine	Cold Fish, Aquatic Life, Contact Recreation
GR	14040107	BLACKS FORK GREEN RIVER	2AB	Undetermined distance below Granger WWTP	WY0022373	September 30, 2002	Ammonia, Fecal Coliform, Chlorine	Cold Fish, Aquatic Life, Contact Recreation
GR	14040107	HAMS FORK GREEN RIVER	2AB	Undetermined distance below Kemmerer-Diamondville WWTP	WY0020320	June 30, 2003	Ammonia, Fecal Coliform, Chlorine	Cold Fish, Aquatic Life, Contact Recreation
GR	14040107	SMITHS FORK GREEN RIVER	2AB	Undetermined distance below Mountain View WWTP	WY0022896	October 31, 2003	Ammonia, Fecal Coliform, Chlorine	Cold Fish, Aquatic Life, Contact Recreation
NP	10180004	MEDICINE BOW RIVER	2AB	Undetermined distance below Medicine Bow WWTP	WY0020257	October 31, 2003	Ammonia, Fecal Coliform, Chlorine	Cold Fish, Aquatic Life, Contact Recreation

Basin	HUC	Name	Class	Location	Permit Number	Expiration Date	WLA Threats	Threatened Uses
NP	10180007	NORTH PLATTE RIVER	2AB	Undetermined distance below Casper WWTP	WY0021920	October 31, 2003	Ammonia, Fecal Coliform, Chlorine	Cold Fish, Aquatic Life, Contact Recreation
NP	10180008	NORTH PLATTE RIVER	2AB	Undetermined distance below Guernsey WWTP	WY0021831	January 31, 2004	Ammonia, Fecal Coliform, Chlorine	Cold Fish, Aquatic Life, Contact Recreation
NP	10180008	NORTH PLATTE RIVER	2AB	Undetermined distance below Douglas WWTP	WY0020109	January 31, 2004	Ammonia, Fecal Coliform, Chlorine	Cold Fish, Aquatic Life, Contact Recreation
NP	10180009	NORTH PLATTE RIVER	2AB	Undetermined distance below Torrington WWTP	WY0020231	March 31, 2003	Ammonia, Fecal Coliform, Chlorine	Cold Fish, Aquatic Life, Contact Recreation
NP	10180009	RAWHIDE CREEK	2AB	Undetermined distance below Lingle WWTP	WY0021849	March 31, 2004	Ammonia, Fecal Coliform, Chlorine	Cold Fish, Aquatic Life, Contact Recreation
NP	10180011	CHUGWATER CREEK	2AB	Undetermined distance below Chugwater WWTP	WY0021431	January 31, 2003	Ammonia, Fecal Coliform, Chlorine	Cold Fish, Aquatic Life, Contact Recreation
SR	17040105	FLAT CREEK	2AB	Undetermined distance below Thayne WWTP	WY0025895	August 31, 2002	Ammonia, Fecal Coliform, Chlorine	Cold Fish, Aquatic Life, Contact Recreation
SR	17040105	SNAKE RIVER	2AB	Undetermined distance below Alpine WWTP	WY0035611	December 31, 2003	Ammonia, Fecal Coliform, Chlorine	Cold Fish, Aquatic Life, Contact Recreation
TR	10090101	GOOSE CREEK	2AB	Undetermined distance below Sheridan WWTP	WY0020010	June 30, 2003	Ammonia, Fecal Coliform, Chlorine	Cold Fish, Aquatic Life, Contact Recreation
TR	10090101	TONGUE RIVER	2AB	Undetermined distance below Dayton WWTP	WY0020435	March 31, 2003	Ammonia, Fecal Coliform, Chlorine	Cold Fish, Aquatic Life, Contact Recreation

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

Basin	HUC	Name	Class	Location	Cause of WQ Threat	Sources	Data sources	Threatened Uses	Date Listed	Prio r-ity
BF	10120201	STONEPILE CREEK	3B	Confluence with Donkey Creek upstream an undetermined distance	Fecal Coliform	Undeterm.	DEQ	Contact Recreation	2002	H
BH	10080005	OCEAN LAKE[1]	2ABWW	Ocean Lake	Habitat Degradation	Non-point	Lower Wind River NRD	Warm Fish, Aquatic Life	1996	L[2]
BH	10080005	POISON CREEK	2AB	From Boysen Reservoir upstream an undetermined distance	Fecal Coliform	Point Undeterm.	USGS 06255500	Contact Recreation	2002	H
BH	10080005	MUDDY CREEK	2AB	From Boysen Reservoir upstream an undetermined distance	Fecal Coliform	Point Undeterm.	USGS 06258000	Contact Recreation	2002	H
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	H
BH	10080007	FIFTEEN MILE CREEK	3B	Confluence with Bighorn River upstream an undetermined distance	Fecal Coliform	Undeterm.	USGS 440044107584301	Contact Recreation	2002	H
BH	10080007	NOWATER CREEK	3B	Confluence with Bighorn River upstream an undetermined distance	Fecal Coliform	Undeterm.	USGS 06267420	Contact Recreation	2002	H
BH	10080007	OWL CREEK	2AB	Confluence with Bighorn River upstream an undetermined distance	Fecal Coliform	Undeterm.	USGS 06264500 DEQ	Contact Recreation	2002	H
BH	10080007	SAGE CREEK	3B	Confluence with Bighorn River upstream an undetermined distance	Fecal Coliform	Undeterm.	USGS 440045107581401	Contact Recreation	2002	H
BH	10080007	SLICK CREEK	3B	Confluence with Bighorn River upstream an undetermined distance	Fecal Coliform	Undeterm.	USGS 062686600	Contact Recreation	2002	H
BH	10080008	PAINTROCK CREEK	2AB	Confluence with Nowood River upstream an undetermined distance	Fecal Coliform	Undeterm.	DEQ	Contact Recreation	2002	H
BH	10080010	BEAVER CREEK	2AB	Confluence with Shell Creek Upstream an undetermined distance	Fecal Coliform	Undeterm.	USGS 443229107503501	Contact Recreation	2002	H
BH	10080011	DRY CREEK	2ABWW	Confluence with Bighorn River upstream an undetermined distance	Fecal Coliform	Undeterm.	USGS 443055108252101, 06278000	Contact Recreation	2002	H

[1]Listing based on previous 319 Watershed Improvement Project but DEQ does not have "credible data" documenting that designated uses are attained.

[2]Low Priority is due to current or previous watershed project, or implementation of best management practices, which is expected to address water quality problem.

Basin	HUC	Name	Class	Location	Cause of WQ Threat	Sources	Data sources	Threatened Uses	Date Listed	Prior-ity
BH	10080014	FOSTER GULCH	2C	Confluence with Shoshone River upstream an undetermined distance	Fecal Coliform	Undeterm.	USGS 444932108254201	Contact Recreation	2002	H
BR	16010101	BRIDGER CREEK[1]	3B	Utah line upstream.	Habitat Degradation	Non-point	Bear Lake Regional Commission	Cold Fish, Aquatic Life	1998	L
CR	10120107	POISON CREEK	3B	S16-17 T46N R63W, Weston County	Oil Seeps	Point Undeterm.	DEQ, WOGCC	Wildlife, Aquatic Life	2000	L[2]
GR	14040101	REARDON DRAW[1]	3B	Lower 3 miles from confluence with Green River.	Habitat Degradation	Non-point	Sublette County CD	Aquatic Life	1998	L[2]
GR	14040107	EAST FK SMITHS FK[3]	2AB	From confluence with West Fork upstream to Utah Line.	Habitat Degradation	Non-point	Uinta County CD	Cold Fish, Aquatic Life	1998	L[2]
GR	14040107	WEST FK SMITHS FK[3]	2AB	From confluence with East Fork upstream to Utah Line.	Habitat Degradation	Non-point	Uinta County CD	Cold Fish, Aquatic Life	1998	L[2]
GR	14040107	WILLOW CREEK[3]	2AB	From confluence with Black's Fork upstream to Utah Line	Habitat Degradation	Non-point	Uinta County CD	Cold Fish, Aquatic Life	1998	L[2]
LS	14050003	LOCO CREEK W FK[3]	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[2]
LS	14050003	SAVERY CREEK[3]	2AB	Below Little Sandstone Creek to Little Snake River	Habitat Degradation	Non-point	Little Snake River CD	Cold Fish, Aquatic Life	1998	L[2]
LS	14050004	MCKINNEY CREEK[3]	2AB	Above Muddy Creek to Eagle Creek.	Habitat Degradation	Non-point	Little Snake River CD	Cold Fish, Aquatic Life	1996	L[2]
LS	14050004	MUDDY CREEK[3]	2C	West of State Hwy 789.	Habitat Degradation	Non-point	Little Snake River CD	Non-game Fish, Aquatic Life	1996	L[2]
LS	14050004	MUDDY CREEK[3]	2AB	Above Alamosa Gulch to Littlefield Creek.	Habitat Degradation	Non-point	Little Snake River CD	Cold Fish, Aquatic Life	1996	L[2]

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[3]Listing based on 319 Watershed Improvement Project to address identified water quality problems.

Basin	HUC	Name	Class	Location	Cause of WQ Threat	Sources	Data sources	Threatened Uses	Date Listed	Prior-ity
NP	10180002	SAGE CREEK[3]	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[2]
NP	10180011	CHUGWATER CREEK	2AB	Between Laramie River and Antelope Gap Road	Habitat Degradation	Undeterm.	DEQ	Cold Fish, Aquatic Life	2000	L[2]
PR	10090204	SALT CREEK	2C	Downstream of Oil Fields	Oil Spills	Undeterm.	DEQ	Non-game Fish, Aquatic Life	1996	L[2]
PR	10090205	CRAZY WOMAN CREEK NORTH FK[1]	2AB	Reaches within T49N R82W.	Habitat Degradation, Nutrients	Non-point	Crazy Woman Watershed improvement District	Cold Fish, Aquatic Life	1996	L[2]
PR	10090206	HUNTER CREEK	2AB	S10 T50N R84W-11 mi. W. of Buffalo	Heavy Siltation	Non-point	Big Horn NF, DEQ	Cold Fish, Aquatic Life	1998	L[2]
PR	10090206	ROCK CREEK[3]	2AB	Watershed below Forest Boundary, Tributary to Clear Creek.	Habitat Degradation	Non-point	Lake DeSmet CD	Cold Fish, Aquatic Life	2000	L[2]
PR	10090206	SHELL CREEK N FK[3]	3B	Above Shell Creek Reservoir	Habitat Degradation	Non-point	Lake DeSmet CD	Aquatic Life	2000	L[2]
PR	10090206	SHELL CREEK S FK[3]	3B	Above Shell Creek Reservoir	Habitat Degradation	Non-point	Lake DeSmet CD	Aquatic Life	2000	L[2]
PR	10090208	LITTLE POWDER RIVER	2AB	Wyoming/Montana state line upstream an undetermined distance	Fecal Coliform	Undeterm. Point	USGS 06324970	Contact Recreation	2002	H
SR	17040101	SPREAD CREEK NORTH FK[1]	2AB	1 mile reach in S13&14 T44N R111W.	Habitat Degradation	Non-point	Bridger-Teton NF	Cold Fish, Aquatic Life	1998	L[2]
SR	17040103	FLAT CREEK[3]	2AB	Between Snake River and Cache Creek	Habitat Degradation	Non-point	Teton County NRD	Cold Fish, Aquatic Life	2000	L[2]
SR	17040105	SALT RIVER	2AB	Undetermined distance upstream and downstream of Gaging Station (3.4mi. NW of Etna)	Fecal Coliform	Undeterm.	USGS 13027500	Contact Recreation	2002	H

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[3]Listing based on 319 Watershed Improvement Project to address identified water quality problems.

Basin	HUC	Name	Class	Location	Cause of WQ Threat	Sources	Data sources	Threatened Uses	Date Listed	Prior-ity
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[2]

Table D: Waterbodies Delisted from 2000 303(d) List

Basin	HUC	Name	Class	Former Impairment/Threats	Location	Listing Reason	Delisting Reason
BH	10080008	TENSLEEP CREEK	2AB	TRC, FECAL	Unknown distance below Tensleep WWTP	WY0020168 WLA Re-evaluation	EPA Approved WLA
BH	10080008	TENSLEEP CREEK WEST FORK	2AB	TRC, FECAL	Unknown distance below Deer Haven Lodge WWTP	WY0023400 WLA Re-evaluation	WLA Approval Expected
BH	10080014	SAGE CREEK	2AB	TRC, FECAL	Unknown distance below Frannie WWTP	WY0020052 WLA Re-evaluation	WLA Approval Expected
BH	10080014	SHOSHONE RIVER	2AB	TRC, FECAL	Unknown distance below Lovell WWTP	WY0020061 WLA Re-evaluation	EPA Approved WLA
GR	14040101	NORTH PINEY CREEK	2AB	NH3, FECAL, TRC	Unknown distance below Big Piney WWTP	WY0020133 WLA Re-evaluation	WLA Approval Expected
GR	14040102	PINE CREEK	2AB	NH3, FECAL, TRC	Unknown distance below Pinedale WWTP	WY0020656 WLA Re-evaluation	EPA Approved WLA
GR	14040107	HAMS FORK GREEN RIVER	2AB	NH3, FECAL, TRC	Unknown distance below Kemmerer-Diamondville Water Treatment Plant	WY0000116 WLA Re-evaluation	EPA Approved WLA
LS	14050003	LEDFORD SLOUGH	3	NH3, FECAL, TRC	Unknown distance below Baggs WWTP	WY0022888 WLA Re-evaluation	WLA Approval Expected
NP	10180007	NORTH PLATTE RIVER	2AB	NH3, FECAL, TRC	Unknown distance below Glenrock WWTP	WY0020630 WLA Re-evaluation	EPA Approved WLA
NP	10180007	NORTH PLATTE RIVER	2AB	ARSENIC	Undetermined distance above and below Casper	Standards exceedence	Well within new standard of 7 ug/l
NP	10180011	WHEATLAND CREEK	2C	AMMONIA	Impairment undetermined distance below Wheatland WWTP	Standards exceedence	EPA Approved TMDL (Wheatland WWTP sole source of Ammonia)
PR	10090201	MIDDLE FORK POWDER RIVER	2AB	TRC, FECAL	Unknown distance below Kaycee WWTP	WY0021733 WLA Re-evaluation	EPA Approved WLA
PR	10090206	CLEAR CREEK	2AB	NH3, FECAL, TRC	Unknown distance below Buffalo WWTP	WY0021024 WLA Re-evaluation	WLA Approval Expected
PR	10090206	CLEAR CREEK	2AB	NH3, FECAL, TRC	Unknown distance below Clearmont WWTP	WY0022063 WLA Re-evaluation	EPA Approved WLA
SP	10190009	CROW CREEK	2AB, 2C	CADMIUM	Undetermined distance above and below Cheyenne	Old USGS metals data	No detections of cadmium in four years of sampling
TR	10090101	TONGUE RIVER	2AB	TRC, FECAL	Unknown distance below Ranchester WWTP	WY0022161 WLA Re-evaluation	EPA Approved WLA
YR	10070006	SQUAW CREEK	2AB	HABITAT DEGRADATION	Reach in S28,29&33 T57N T106W, Park County .	Road encroachment on stream	Road relocated and stream rehabilitated

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