WYOMING GAME AND FISH DEPARTMENT

FISH DIVISION

ADMINISTRATIVE REPORT

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INTRODUCTION

The Wyoming Game and Fish Commission and its administrative agency the Wyoming Game and Fish Department were formed in 1939. At inception, the agency's primary duties were limited to enforcement of fish and wildlife laws and the culture of fish for stocking throughout the state. Over time, other fish and wildlife functions were added to reflect resource management and changing public needs. In 1979, a full-time biologist was added to quantify instream flow needs for fisheries. A formal functional unit or crew for instream flow work was added in 1984. The unit consisted of 2 positions from 1984 to 1987; 3 positions from 1987 to 1995 and back to 2 positions from 1995 to present. In 2003, the unit was re-named "Water Management Unit" to recognize the diverse responsibilities encompassed under the two positions.

When first established, instream flow biologists devoted considerable effort toward identifying methodological approaches that were most appropriate for use in Wyoming (Annear and Conder 1984). Since passage of instream flow legislation in 1986, efforts focused on acquiring instream flow water rights for the state. In this role, the Department performed statutorily provided functions and duties associated with instream flow filings on behalf of the Game and Fish Commission (Commission). The Commission formalized this process in September 2005 with a policy defining the roles of the Department and Commission (Commission Policy No. VII N, Appendix 1).

A recommended approach for selecting candidate streams for instream flow water rights was initially provided by the Commission in 1986. The intent was to focus on the most popular stream fisheries, streams located on public lands, and streams with existing flow agreements under other authorities (such as special use permits). In 1994, a more formal plan was drafted to identify water management needs and priorities (Annear and Dey 1994). A similar document was authored in 2001 (Annear and Dey 2001). These documents provide, in part, an evaluation of the overall function of the instream flow program and reflect input from regional fishery management personnel.

Achievements

State statute (41-3-1001 to 41-3-1014) provides opportunities to protect or restore instream flows. Flow protection is possible by filing for current-day priority water rights in streams where adequate flow exists. The Department continues to pursue acquisition of such protective water rights, primarily on public lands. Most opportunities occur on federally administered lands such as those under the management authority of the U.S. Forest Service or Bureau of Land Management. Upon

requests from private landowners, the Department has filed protective instream flow water right applications for two separate Fish Creek segments on private land. As of February 2006, the Department, acting on behalf of the Commission, has submitted 97 instream flow water right applications for 96 stream segments (Appendix 2). Of these, the state engineer has approved 42 instream flow water right permits, and four have been adjudicated.

The law also establishes the opportunity to restore instream flows to streams where aquatic habitat has been degraded by removal of water. Opportunities to restore flows to streams are provided by provisions of the law that allow changing existing diversionary water rights to instream flow or by releasing storage water in reservoirs. To date, no private landowner has restored fisheries habitat on private land by changing a direct flow water right to instream flow. Likewise, the Department to date has not changed any of its direct flow water rights to instream flow, but we are currently evaluating all possible opportunities. The Commission has taken administrative action to use its ownership storage water in one situation (Fremont Lake, near Pinedale) for instream flow. Privately owned storage accounts have been determined ineligible for instream flow use by the State Engineer (January 9, 2002 letter from State Engineer Patrick Tyrrell to Wyoming Game and Fish Department Director John Baughman). As a consequence, no private entities have restored instream flows to any stream by releasing water from storage.

Vision and General Future Direction

There are over 25,000 miles of streams with fisheries in the state. Though there is only one set of laws governing water management in all of these streams, the biological and social needs, issues, and opportunities on each stream and stream segment are unique. As such there is not one single vision for all streams and stream segments.

Our vision is rooted in the Commission mission of "Conserving Wildlife - Serving People". We must first and foremost conserve wildlife and wildlife habitat consistent with our statutory obligations and legislative limits. We must serve the needs of a diverse citizenry by identifying their varied needs, understanding the values from which those needs are derived, and acting within legal limits and biological constraints to address those needs. We must be proactive; looking for those places where acquiring instream flow water rights and managing water for instream flow are necessary and appropriate tools to protect, restore, or improve state interests. We must maintain flexibility to develop suitable instream flow strategies on stream-by-stream, segment-by-segment, and site-by-site bases.

In general, we will direct the bulk of our energies to protecting fisheries and riverine habitats with current-day priority instream flow water rights on selected streams. The biological priorities identified in this report will serve as the primary basis for selecting candidate streams and stream segments. The hydrological, geomorphological, biological, water quality and connectivity issues for each segment will determine the type and scope of studies done on each segment. Wyoming statutes and the interpretation of those laws will govern the limit of instream flow filings. Public values will be considered via coordination with the Game and Fish Commission, consultation with potentially affected landowners, and the public hearing process. Acquiring and managing water rights for the state and commission will be an open process.

Purpose And Format

This is a goal-driven document that is supported by specific strategies and activities. In theory, annual work plans will follow largely from this framework. This document is not intended to constrain

our ability to adjust schedules or the selection of candidate streams during the covered period where changing conditions or factors dictate a different course of action.

The Water Management section performs two basic functions for the Department and Commission: securing current day priority instream flow water rights in the name of the State of Wyoming to protect existing fisheries; and broader water management duties including management of water rights on Commission properties and public education. Duties related to instream flow water rights typically include:

- Identifying candidate stream segments;
- Conducting field studies, analyzing field data, preparing recommendations and reports;
- Submitting water right application materials to the Wyoming Water Development Commission;
- Holding public informational meetings prior to public hearings;
- Presenting testimony on behalf of the Game and Fish Commission at public hearings held by the State Engineer;
- Monitoring hydrologic and ecological attributes in candidate streams to assist the Board of Control with the adjudication process; and,
- Providing information about instream flow matters to the public by giving presentations at public meetings and other means.

The section expanded its duties in 2003 to include functions that more broadly relate to water management and helping the general public understand the complexities of water management. This shift was necessitated by a perceived need to help the public function more effectively and achieve their individual and collective goals for the use of water. The section also became more directly involved in the management of Commission water rights at hatcheries, rearing stations and wildlife habitat management units. This function was developed at the direction of the Commission's water rights initiative in 2000 that involved establishment of a Department Water Rights Management team chaired by the Fish Division's Water Management Supervisor. Duties related to water management actions include:

- Provide assistance to Department personnel and the Commission on the management, acquisition, and disposal of commission-owned water rights at hatcheries and rearing stations;
- Provide assistance to Department personnel and the Commission on the management, acquisition, and disposal of commission-owned water rights on Wildlife Habitat Management Areas,
- Develop and disseminate information for department personnel and the public on water management and instream flow issues.

INSTREAM FLOW GOALS AND STRATEGIES

The following outline frames the goals and strategies considered vital for achieving the Instream Flow component of the Water Management vision. These goals and strategies will be specifically addressed with activities defined in annual work plans. Following the outline, a discussion offers additional description of each goal and strategy and presents a range of potential activities to achieve the goals.

Goal 1. Protect important fishery resources with instream flow water rights

Strategy 1. Identify important fishery resources.

Strategy 2. Regularly review and prioritize potential waters for instream flow water rights.

Strategy 3. Conduct studies to identify flow levels for instream flow water rights.

Strategy 4. File for instream flow water rights.

Strategy 5. Facilitate advancement of instream flow water applications to permit status.

a. Provide information to the general public, Wyoming Game and Fish Commission, State Engineer's Office, Board of Control, and other groups through public hearings, reports, etc.

b. Collect hydrology data where lack of data inhibits permitting decisions by the SEO and BOC.

c. Maintain a database to track the status of instream flow water right applications.

Strategy 6. Monitor instream flow water rights.

Goal 2. Apply the best available science for identifying instream flow water right flow levels while maximizing the number of instream flow water right applications.

Strategy 1. Maintain awareness of emerging scientific and technological approaches toward instream flow quantification.

Strategy 2. Investigate new approaches for application in Wyoming.

Strategy 3. Seek training to apply the best available science and technology.

Goal 3. Assist Regions in meeting Fisheries Management and Aquatic Habitat Goals

Strategy 1. Apply specialized tools, approaches, and knowledge to specific regional projects.

DISCUSSION OF INSTREAM FLOW GOALS AND STRATEGIES

Goal 1. Protect important fishery resources with instream flow water rights

The Wyoming Game and Fish Commission is accorded the responsibility for implementation of instream flow water rights by statutes 41-3-1001 to 41-3-1014. The Commission assigned responsibilities for implementation of instream flow water rights to the Department (Appendix 1). The instream flow biologist in the Water Management unit has the primary responsibility and obligation to pursue this goal. Through February 2006, the WGFD has submitted 97 instream flow water right applications, the state engineer has permitted 42, and the Board of Control has adjudicated 4. The filings protect about 450 stream miles from junior appropriators.

Strategy 1-1. Identify important fishery resources.

Interpretation of "important" fishery resources must necessarily change through time to reflect current understanding of aquatic environments and to reflect the direction of the Wyoming Game and Fish Department in meeting its mission to "Conserve Wildlife, Serve People". This strategy recognizes the value in periodically reevaluating the definition of "important" to ensure effort is being directed toward wildlife resources consistent with the instream flow law.

Following passage of the instream flow statute in 1986, the Wyoming Game and Fish Commission recognized important fishery resources under the instream flow law by directing the Department to focus on stream segments that:

1. Are among the most important fisheries to the public for recreational purposes (class 1, 2 and 3 streams under a now defunct classification scheme),
2. Are located on public lands or lands with guaranteed public access, or
3. Have existing flow agreements.

This direction remains unchanged, but has been expanded somewhat to include an additional set of "important" fisheries. Activities over the last 12 years have targeted streams inhabited by native cutthroat trout subspecies. We started with Bonneville cutthroat trout and by 1997 had filed for 41 miles of water rights on 17 streams. Effort continued with instream flow filings on Colorado River cutthroat trout waters and a total of 113 miles on 29 streams were filed by 2000. While most stream segments pursued were important recreational fisheries on public land, filings had the additional benefit of securing protection for species proposed for listing under the Endangered Species Act.

Our focus switched in 1998 to Yellowstone cutthroat trout streams. The Yellowstone cutthroat trout was petitioned for listing under the Endangered Species Act in 1998. In February 2001 the Fish and Wildlife Service (FWS) completed a 90-day petition review finding that listing was not warranted at th time. In January 2004, a suit was brought against the FWS alleging that this finding did not follow the tenets of the Endangered Species Act. In December 2004, the U.S. District Court of Colorado overturned the FWS' 90-day ruling on the basis that proper procedures were not filed and ordered the FWS to conduct a 12-month review. In February 2006, the FWS issued their determination from that 12-month review that listing under the Endangered Species Act is not warranted at this time. Instream flow water rights on Yellowstone cutthroat trout streams provide a legal protection mechanism that decreases the threat of habitat loss. Through February 2006, 13 instream flow water rights have been filed to protect over 45 miles of Yellowstone cutthroat trout streams.

For the planning period 2006 – 2010, Yellowstone cutthroat trout streams will continue to be recognized as the highest priority important fishery resource for protection with instream flow water rights. While other important fishery resources exist, notably traditional popular non-native sport fish and native prairie stream fish communities, this 5-year plan proposes a continued focus on Yellowstone cutthroat trout streams. Many significant populations throughout the historic range occupy waters that are candidates for protection with instream flow water rights. With future status of this species under the Endangered Species Act uncertain, continued State action in the form of instream flow water right filings is critical to the long-term persistence of the species.

Efforts to secure instream flow water rights over the next five years should remain focused on Yellowstone cutthroat trout streams unless other fisheries protection issues become priorities. The only issues that seem likely to divert attention from Yellowstone cutthroat trout are another potentially endangered fish or a change in water law that would allow a significant public fishery to become protected by an instream flow water right.

Activity 1-1:

No additional activity, beyond this 5-year plan, is required (until 2010). Completion of this 5-year plan, which explicitly identifies Yellowstone cutthroat trout streams as "important fishery resources" for the 2006 to 2010 planning period, constitutes achievement of Strategy 1-1.

Strategy 1-2. Regularly review and prioritize potential waters for instream flow water rights.

Regularly reviewing and prioritizing potential waters for instream flow water rights is important as new scientific information becomes available on species status (e.g. genetic makeup, population level and distribution, etc.) and habitat condition. With one full-time employee devoted to developing new instream flow water right applications, only two to four comprehensive instream flow studies can be conducted annually. Therefore it is crucial that potential instream flow segments are carefully prioritized to direct limited resources prudently.

Instream flow water rights will be pursued under a "protect the best first" approach. Priorities will be assigned by considering the following issues: genetic purity of target species, presence of hybridizing species, presence of competing species, stream miles directly protected, stream miles indirectly protected, habitat condition, and sampling efficiency. Streams targeted first will be those in which the target species has relatively higher genetic purity, hybridizing species are absent, and competitors are relatively few. Streams with longer potential instream flow segments will be selected before short streams. Cases where a short instream flow segment offers indirect protection to considerable upstream waters will rank higher than short segments having lower source stream miles. Streams with greater levels and diversity of habitat for all life stages of the target species will rank higher than streams with less habitat. Finally, a potential stream segment may rank moderately on the above considerations but still be selected for study in a particular year because it is nearby a higher ranked stream. Performing studies on several regional stream segments in a particular year is simply more cost effective because of decreases in travel time. Priorities for 2006-2010 studies among Yellowstone cutthroat trout waters are developed later in this report.

Per recent policy, the Wyoming Game and Fish Commission will review instream flow water right applications before they are submitted to the Water Development Commission.

Activity 1-2:

This 5-year plan describing the prioritization process and listing priority waters (see next section below) partially fulfills Strategy 2. Completion of annual work schedule plans refining annual priorities further fulfils this Strategy.

Strategy 1-3. Conduct studies to identify flow levels for instream flow water rights.

Detailed descriptions of instream flow study methods are provided in recent reports (e.g. Dey and Annear 2004). For each potential instream flow segment, data collection involves a minimum of three daylong visits to a study site. Usually more visits are necessary to observe and measure habitat under multiple flow conditions. In 2004, one site was visited on 8 separate occasions. Additional time is necessary to coordinate access, assemble basin level information and coordinate with other WGFD employees, other agencies and landowners. This intensive approach results in two to four studies per year under the current crew configuration.

Development of flow recommendations is linked to assessments of water availability. For example, application of the HQI model requires an estimate of average daily flow, critical period flow and peak flow. The Habitat Retention approach requires average daily flow and bankfull flow. Development of channel maintenance flow recommendations requires estimates of bankfull and the 25-year peak flow. Winter flow recommendations may require an estimate of natural winter flows such as the monthly 20% exceedance flow. Further, hydrology estimates provide a means to display flow recommendations relative to availability. For example, time series analyses can be developed to show the interaction between flow quantities and habitat conditions. Therefore, detailed hydrology information and estimates must be assembled for each instream flow segment. To minimize contention over the validity of flow estimates, hydrologic analyses should be contracted to qualified hydrologists.

Activity 1-3:

Conduct instream flow studies on up to four instream flow segments per year. Based on priorities outlined later in this document, 13 to 16 Yellowstone cutthroat trout stream segments will be studied over the 2006 to 2010 period. Hydrologic studies for each instream flow segment will be assigned under contract to a qualified hydrologist.

Strategy 1-4. File for instream flow water rights.

The next step following field studies is data analysis, report writing, preparation of instream flow water right application materials, notification of the Commission, and submittal of the application to the Water Development Commission. The map that accompanies the water right application is prepared by a certified engineer so advance planning is required to schedule this task with either the WGFD engineer or an outside contractor. Submittal of applications can generally be expected 9 to 15 months following instream flow studies.

Activity 1-4:

Annually complete data analysis, report writing, and application submittal for instream flow studies conducted under Goal 1, Strategy 3.

Strategy 1-5. Facilitate advancement of instream flow water right applications to permit status by providing information, collecting data and maintaining records.

Following issuance of a priority date for prospective instream flow water rights, additional activities are necessary to meet requirements of the instream flow law and to facilitate advancement of the instream flow water right to permit status. These activities are further delineated below:

Activity 1-5a:

Provide information on instream flow water rights at public hearings. Provide information to the WGF Commission, State Engineer, Board of Control, and other groups or individuals as requested or appropriate. For the 2006-2010 period, annual work schedules will identify potential public hearings though the scheduling of these meetings by the State Engineer is largely beyond our control.

Activity 1-5b:

A great deal of effort has been expended in collecting flow measurements at instream flow segments. Efforts range from visiting streams during specific seasons when spot measurements are lacking to operating seasonal gages for several consecutive years. Collecting continuous flow data (i.e. installing and operating gage stations) at all instream flow segments would quickly become a full time job and detract from the pursuit of additional instream flow filings. Even collecting spot measurements simply because information is lacking requires significant effort. Therefore, the collection of stream flow information should be targeted to those times and places where the State Engineer or Board of Control raises questions regarding flow availability.

Collect spot flow measurements in response to State Engineer or Board of Control information needs. For the 2006-2010 period, these are likely to be during the winter and spring periods for streams with existing priority dates.

Activity 1-5c:

An Access database has been developed to store records for each instream flow segment. Information such as segment length, priority date, location, etc. is maintained to facilitate rapid status and summary reports. The database provides an efficient means for responding to public information requests, for status updates, and for tracking progress.

Enter segment information into the instream flow database when applications are submitted. Update the database with priority date and status as information becomes available. Report information in response to requests and for any web page links that are developed.

Strategy 1-6. Monitor instream flow water right compliance.

As filings accumulate, it will become increasingly important to monitor compliance and track issues associated with the instream flow segments. With over 2000 instream flow water right filings, Colorado has one individual spending over 30% of their time responding to issues associated with existing filings (Jay Skinner, personal communication). With less than 100 filings in Wyoming, this has not yet become a significant issue though it will in the future.

Activity 1-6:

During the 2006-2010 period, review the status and issues associated with approved instream flow water segments to identify any that may bear closer monitoring. Examples would include

segments that contain a junior appropriator within or upstream of the segment. Schedule site visits to monitor compliance with the instream flow water right and document impacts to fish or habitat.

Goal 2. Apply the best available science for identifying instream flow water right flow levels while maximizing the number of instream flow water right applications.

Like all applied science, instream flow studies present a tradeoff on a scale of potential effort versus potential results. Effort and expense increases as a function of the level of understanding desired about flow level versus habitat relationships. Where the outcome may be contentious or the fishery resource particularly valuable, a broad range of river attributes may be studied over a period of years before instream flow recommendations are issued. Less initial effort may be justified in cases where further review and modification of instream flow recommendations is possible and where a competing goal is completing recommendations across a range of streams. Instream flow studies in Wyoming have been conducted on the data-intensive side of the scale, involving multiple site visits and thorough analysis of stream habitat issues. This approach constrains to a handful the number of filings possible annually. While not necessarily advocating a change from this model, it is important to periodically re-evaluate whether this approach continues to be appropriate, satisfies the public's desires and fulfills the resource protection opportunities under the instream flow legislation.

Strategy 2-1. Maintain awareness of emerging scientific and technological approaches toward instream flow quantification.

Instream flow studies combine of a broad array of inter-related scientific disciplines and technologies. To continue to efficiently collect the most useful information, it is important to remain networked with other scientists and managers in the field through attending scientific meetings, workshops, reading journals and books, etc.

Activity 2-1a:

Attend one to three scientific meetings per year. Scientific meetings are likely to include local and regional meetings of the American Fisheries Society, regional and national meetings of the Instream Flow Council, and specialized meetings like "Ecohydraulics" or other special sessions devoted to flow issues. Review journals and publish papers as appropriate.

Activity 2-1b:

During the 2006-2010 period, review present and potential methods to identify opportunities for increasing the rate of instream flow protections while ensuring adequate scientific underpinnings.

Strategy 2-2. Investigate new approaches for application in Wyoming.

The crew has a rich history of investigating techniques to improve the application of instream flow science in Wyoming. Studies have explored relative bias among various methods (Annear and Conder 1984), the ability of PHABSIM and HQI approaches to predict trout standing crop (Conder and Annear 1987), reducing fish losses from diversions (Bradshaw 1991), evaluation of habitat improvement structures using PHABSIM (Bradshaw 1992), videography techniques for quantifying habitat (Dey and Annear 1996), bioenergetic approaches for defining habitat suitability (Braaten et al. 1997 and Dey 1998), relationships between flow patterns and fish populations (Dey and Annear 2001), variability among bankfull width measurements (Dey 2001), relationships between icing patterns and habitat structures (Barrineau et al. 2004) and development of various habitat suitability curves. Studies

are currently underway to identify patterns among instream flow study results and channel geomorphic characteristics.

These studies provide valuable insights into flow-habitat patterns and demonstrate diligence in applying and advancing scientific approaches to instream flow assessment. Continuing such pertinent studies will maintain our place at the national forefront of instream flow science while maintaining our scientific credibility.

Activity 2-2:

For the 2006-2010 period, we anticipate the field component of the current ongoing study to identify patterns among instream flow study results and channel geomorphic characteristics will be completed. Data analysis and reporting will occur in 2006. Develop a study plan for a new project to begin in 2006. This project may be developed to overlap efforts on the Powder River addressed under Strategy 3-1.

Strategy 2-3. Seek training to apply the best available science and technology.

With rapidly changing technologies and advances in scientific understanding, continuous training is necessary. Potential training needs might include advanced surveying with total station and GPS, GIS, application of 2-D models, sediment monitoring, channel geomorphology measurements, photo imagery acquisition and analysis, and remote sensing.

Activity 2-3:

Identify and participate in training opportunities as they arise. Training is anticipated to consist of workshops or courses offered over periods up to one-week in duration. Up to two training sessions may be scheduled annually.

Goal 3. Assist Regions in meeting Fisheries Management and Aquatic Habitat Goals

With specialized knowledge, skills and abilities, our crew has traditionally offered assistance to regional fisheries management crews on issues related to water, habitat, and their influence on fish populations. Opportunities exist for further collaboration with regional aquatic habitat biologists in assessing, monitoring, and modeling impacts and benefits from habitat manipulations.

Strategy 3-1. Apply specialized tools, approaches, and knowledge to specific regional projects.

Recent examples include application of 2-dimensional habitat modeling to evaluate sill and gravel function on the Miracle Mile and monitoring relationships between flow and fish populations on Clear Creek following the Tie Hack project (Dey and Annear 2001).

Activity 3-1:

In 2006, collaborate with the Aquatic Assessment crew and Sheridan Regional Fisheries Management to investigate Powder River habitat availability under multiple flow conditions. Field effort is expected to include up to 20 man-days, including contract time. During the 2006-2010 period, Powder River habitat evaluation is expected to remain a priority.

WATER MANAGEMENT GOALS AND OBJECTIVES

The following outline frames the goals and objectives considered vital for achieving the Water Management component of the Water Management section's vision. These goals and objectives will be addressed with activities defined in annual work plans. Following the outline, a discussion offers additional description of each goal and objective and presents a range of potential activities to achieve the goals.

Goal 1. Facilitate management and maintain the standing of WGF Commission water rights.

Strategy 1. Document and evaluate the use and standing of water rights at Commission-owned fish culture stations and provide recommendations to Department personnel and the Commission.

Strategy 2. Assess issues associated with acquisition or disposal of water rights at Commission wildlife habitat management areas and provide recommendations to Department personnel and the Commission.

Goal 2. Increase public understanding of instream flow and water management issues.

Strategy 1. Develop and provide educational materials via department media.

a. Write articles that simplify complex aspects of instream flow and water law.

b. Write articles that profile streams with instream flow water rights.

c. Maintain the instream flow page of the Fish Division web page

d. Develop PowerPoint presentations and give presentations upon request to various public groups and individuals and department personnel.

Strategy 2. Provide information to assist department personnel and others with proposed legislative actions that could affect instream flow and water management opportunities.

Strategy 3. Assist state and federal agencies and other organizations with water management and instream flow issues.

Goal 3. Increase Department and Commission understanding of public awareness of and support for instream flow and water management issues.

Strategy 1. Conduct formal surveys that obtain opinions from a cross-section of Wyoming residents

DISCUSSION OF WATER MANAGEMENT GOALS AND OBJECTIVES

Goal 1: Facilitate the management of WGF Commission water rights.

Prior to 2002, sections within the department made many water right management decisions with only limited input from other sections. In 2002 the WGF commission authorized a water right initiative that led to the formation of an inter-sectional Water Rights Management Team. The

Team's primary responsibilities were to provide more direct oversight of actions involving the acquisition, disposal and use of commission water rights.

Strategy 1-1: Document and evaluate the use and standing of water rights at commission-owned fish culture stations and provide recommendations to Department personnel and the Commission.

Water and water rights are essential components of fish culture stations. To maintain the value of culture stations as well as the water rights associated with those facilities it is essential to ensure all water needed and used on culture stations is properly permitted and used according to the water right certificate for each.

Activity 1-1:

The section will work document all existing water uses and compare those uses with water right information on file at the Cheyenne WGFD headquarters and in the State Engineers Office. Recommendations will be provided to address any inconsistencies or actions that need to be taken to maintain or establish the standing of water rights.

Strategy 1-2: Assess issues associated with acquisition or disposal of water rights at commission wildlife habitat management areas and provide recommendations to Department personnel and the Commission.

The commission holds numerous water rights, mostly for agricultural purposes, associated with Commission-owned wildlife habitat management units throughout the state. It is important that the Department use all existing water rights for maximum benefit of fish and wildlife within the limits allowed by each right.

Activity 1-2:

To insure that all existing water rights are used to maximize fish and wildlife benefits and that Fish Division interests are considered when water rights are disposed of or acquired or when opportunities are considered for modifying the use of existing water rights on Commission properties, the section will attend meetings of the Department's Water Rights Management Team.

Goal 2: Increase public understanding of instream flow and water management issues.

Over the past 20 years, public interest in the use of water and expectations for increasing the benefits of using water in Wyoming has increased. This is evidenced by numerous public contacts with the water management section as well as strong opinions voiced at instream flow hearings when they are held. However, it is also apparent that the public has limited understanding of Wyoming water law and scientific principles of fisheries management. This is consistent with recently documented national trends that show strong public support for wildlife but very limited knowledge about fish and game agencies and how wildlife management decisions are made (Responsive Management 2005). If the public is to articulate their needs and desires to wildlife and water resource managers, it is important they better understand wildlife management principles, water laws and bureaucratic processes. Such informed input is essential to state agencies in order to better serve their citizenry.

Strategy 2-1: Develop and provide educational materials via department media

The Department has a variety of print, video and electronic means for reaching citizens in Wyoming to share information pertaining to fish, wildlife and habitat in the state that can be effective means of providing information and stimulating feedback. The section receives numerous requests throughout the year to make presentations to various groups about the state's instream flow program.

Direct contacts are an effective way to respond directly to those who are most interested in water management issues and receive feedback.

Activity 2-1:

To increase public awareness of complexities associated with water law and instream flow science, articles will be written and published under the *"Clearing The Air On Water"* section of Wildlife News. To increase public awareness and appreciation for various instream flow segments a separate series of articles will be written under the *"X-Stream Fishing"* section of the News. To keep this information available to the public, all articles will be posted to the Fish Division's Instream Flow page on the Internet. In an effort to provide general information in a less structured manner, develop PowerPoint presentations and give presentations upon request to various public groups and individuals and department personnel.

Strategy 2-2: Provide information to assist department personnel and others with proposed legislative actions that could affect instream flow and water management opportunities.

Department administrative staff and field personnel are commonly asked about the effects of various activities or proposed legislation on instream flows and fish habitat. In many such situations, department personnel need more detailed information about water laws than they commonly possess.

Activity 2-2:

Respond to inquiries from department personnel and staff on an as-needed basis. Stay abreast of water law issues and facts by reading appropriate literature and maintaining contacts with water managers in other state agencies.

Strategy 2-3: Assist state and federal agencies and other organizations with water management and instream flow issues.

The Department commonly receives requests from other state agencies, federal agencies and organizations for assistance dealing with instream flow or water management issues and challenges because of our specialized expertise in this field. It benefits the Department and aquatic resources in general when the section's expertise can be shared with other resource managers and applied for the benefit of fish and wildlife.

Activity 2-3:

Respond as appropriate to requests to other state agencies, federal agencies and other organizations for legitimate requests for assistance with instream flow applications. Specific activities may include but not be limited to such things as providing written replies to inquiries, presenting guest lectures at conferences, and participating in instream flow related projects sponsored by professional organizations such as the Instream Flow Council and American Fisheries Society.

Goal 3. Increase Department and Commission understanding of public awareness of and support for instream flow and water management issues.

Public involvement is an integral part of advancing instream flow protection for aquatic resources in the state. The best example of this fact is illustrated by the successful initiative drive that led to establishment of the current instream flow law. To maximize the value and benefit of public involvement it is essential that the public be well informed. Much of the focus of this section is committed to helping provide important information to the public; however a key link in that activity is having a precise understanding of what the public knows and wants to know. When it comes to public

involvement, receiving meaningful public input is every bit as essential as providing focused public information and education materials.

Strategy 3-1: Conduct formal surveys that obtain opinions from a cross-section of Wyoming residents

Information can be obtained from the general public in a variety of manners including public meetings, voluntary surveys (comment boxes) or structured surveys. Each means of obtaining information has advantages and disadvantages, however it is essential to have the most objective information possible when shaping public information strategies and activities.

Activity 3-1

Seek Department and Commission support to conduct a formal, structured survey to identify existing knowledge of the public about instream flows and the importance of water for managing fisheries, to assess general support for existing Department actions, and to gauge public interest in broadening instream flow opportunities.

PRIORITIZATION OF YELLOWSTONE CUTTHROAT TROUT STREAMS FOR INSTREAM FLOW WATER RIGHTS

This section describes prioritization of waters for instream flow water right filings and is based on a Yellowstone cutthroat trout risk assessment published in March 2003 (May et al. 2003). The approach is hierarchal in that first basins are selected followed by stream segments within each basin. Priorities defined herein should be reconsidered annually as new information becomes available. The underlying goal is to protect the best, first.

Basin Selection

Level 4 hydrologic unit code (HUC) basins were assigned rank values to indicate the order in which instream flow studies will be conducted. Ranking the basins, rather than ranking all the streams, offers several advantages. A basin perspective is consistent with Fish Division development of habitat priorities and regional fisheries management plans. Effort can be applied systematically to distribute filings first where they are needed most. Also, work can be conducted efficiently within a basin, minimizing travel distances. Finally, by ultimately protecting multiple basins, demographic protection advantages accrue because the overall risk to populations is lowered over a broad geographic range.

Basins were ranked using information compiled during an inter-state Yellowstone cutthroat trout (YSC) risk assessment process that started in 2001 (May et al. 2003). That process provided a synthesis of relatively current information and a solid basis for selecting and prioritizing among basins harboring YSC (Appendix 3). The risk assessment includes data compiled by fisheries biologists from throughout the historic range. Distribution, genetic status, abundance, genetic risks and population risks were estimated. Products of the effort included a report (May et al. 2003) and an Access database formatted to allow GIS analysis and presentation of the data.

To compile and rank Wyoming information from the database, the following steps were taken:

- The latest database was downloaded from the Forest Service web site: (ftp://ftp2.fs.fed.us/incoming/r1/gallatin/isac/)
- The "yct_rts" shapefile was added to a new ArcMap 9.0 project and its table was linked to the fish presence, genetic sample and risk assessment tables.
- An event was run on the LLID field to highlight all stream segments containing YSC and the result was saved as a shape file (FishPres_joinedTables.shp).
- Wyoming streams were clipped (FishPres_joinedTables_WY.shp) resulting in 600 stream segments (3862 miles).
- Stream segments from Yellowstone National Park, Grand Teton National Park and the Wind River Indian Reservation were clipped out (FishPres_minusNPSIR.shp).
- Stream segments occurring on federally designated Wilderness Areas were clipped out using a 1:100,000 land management polygon shape file from the UW Spatial Data and Visualization web site (www.sdvc.uwyo.edu).

The above manipulations reduced the pool of potential stream segments to those containing YSC exclusive of National Parks, the Wind River Indian Reservation, and Wilderness Areas (Figure 1). The Indian Reservation is outside State of Wyoming jurisdiction while the National Parks and Wilderness areas were judged to provide reasonable flow protection by virtue of their founding mandates.

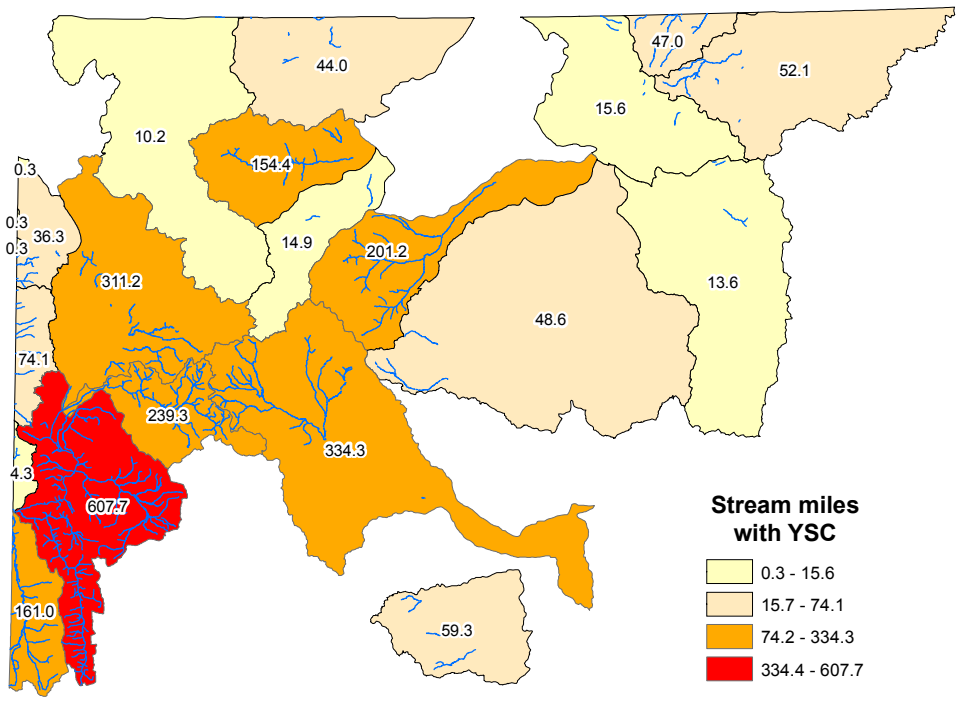

Figure 1. Miles of all Yellowstone cutthroat trout streams in each HUC 4 basin excluding Yellowstone National Park, Grand Teton National Park, the Wind River Indian Reservation, and Wilderness Areas.

With National Parks, Wilderness areas, and the Wind River Indian Reservation removed, 392 stream segments covering 2,429 miles remain (Figure 1). The Greys-Hoback basin contains the greatest stream miles containing YSC. One more filter was considered but not employed at this stage: reducing the stream segments further to those only on National Forest, State and Bureau of Land Management land. While instream flow segments are likely to occur primarily on public lands, the presence of YSC on private land in a basin is an important indicator of population status and may inspire work on nearby public lands or cooperative efforts with landowners. Consideration of stream miles on public land was used at a later ranking stage to rank streams for instream flow activity within basins.

Several alternative compilations of total stream miles within basins were compared to arrive at a recommended basin priority list. One approach originally considered but rejected was to sum stream miles falling into various designated "Conservation Populations." The database contains a conservation population field with values from A to E. Conservation population designations were assigned by individual regional fisheries biologists but May et al. (2003) offers little clarification as to what criteria were used and it is not clear exactly what each of the categories means. Also, subjective judgment differences by biologists in different regions could bias weightings of basins. Finally, the database includes many records for stream segments that were not designated conservation populations during the inter-state risk assessment because of mixed genetic heritage and management for other salmonid species (e.g. streams like the North Fork Shoshone River, Clarks Fork River, and Upper Wind River). Since information on population genetics and risk for all stream segments were assembled during the risk assessment process, these data were directly used to weight prospective instream flow segments rather than using the conservation population designation.

Four approaches for identifying priority watersheds were compared. All approaches identify higher priority watersheds as those with greater total stream miles occupied by YSC. The approaches differ in how genetics and population risk are used as weighting factors. The approaches are:

1. Stream miles containing populations with higher rated genetic characteristics (A, B, H, N – codes defined below)
2. Stream miles with "A" rated genetics only
3. Stream miles in which genetic rank and a population risk factor were used to weight stream miles
4. Stream miles with "A" rated genetics weighted by a population risk factor

The first two approaches are self-explanatory. The population risk factor used in approaches 3 and 4 was from page 11 in May et al. (2003) and was calculated as follows:

> Population Risk Factor = (0.7 * temporal variability rating) + (1.2 * population size rating) + (1.6 * population productivity rating) + (0.5 * isolation rating).

Weighted risk scores could range from 4 to 16 under this approach, with higher scores indicating the population is at greater risk. Ratings for each of the 4 constituents of the population risk score are explained in Table 4 of May et al. (2003) and were available in the risk assessment database. The population risk factor was calculated by adding a calculation field to the risk assessment table in ArcMap.

Stream miles were weighted under Approach 3 by reducing stream miles by 25% for streams containing "B", "H" or "N" rated genetics populations and dividing by the population risk score. This has the effect of weighting toward "A" genetics but still including the other higher genetic-rated streams. The 25% is arbitrary and other weights could be substituted. By using the population risk score in the denominator, lower risk populations exert relatively greater weight. Under approach 4, only the "A" genetic rated streams were selected and their mileages were divided by the population risk factor. None of the approaches attempt to segregate or rank stream segments based on spotting patterns.

Genetic classes were assigned by May et al. (2003) to populations as follows: A = Genetically unaltered (<1% introgression) – tested via electrophoresis or DNA; B = Introgressed 75% or less and 99% or more – tested via electrophoresis or DNA; C = Introgressed more than 75% - tested via electrophoresis or DNA; H = Potentially unaltered with no record of stocking or contaminating species present; J = Suspected hybrids with records of contaminating species being stocked or occurring in stream; N = Hybridized and pure populations co-exist in stream (use only if reproductive isolation is suspected and testing completed).

Basin Rankings

"Better" Genetics Approach (A, B, H, N):

The database contained 298 stream segments covering 1361 miles in which populations had genetics rated A, B, H or N (Figure 2). Six stream segments in this subset of the database were not recognized as conservation populations and did not have rankings on the various risk scores. Three of the streams in the Cody Region (Littlerock Ck., Laduala Ck., and Ishawooa Ck.) covered 14 miles. The other three stream segments occurred in the Sheridan Region (Lick Ck., Coney Ck. and upper Little Bighorn River) and covered 13 miles. The three Sheridan Region stream segments are supported only by stocking, do not appear capable of maintaining wild populations and have high densities of competing species (Bill Bradshaw, personal communication). Therefore, these three streams were excluded from further analysis. The three Cody Region

streams, while at relatively high risk from competing trout species, maintain populations (Steve Yekel, personal communication) and were left in the database. Relatively high risk ratings of "12" were assigned to these populations. After these adjustments, the data subset contained 295 stream segments covering 1348 miles.

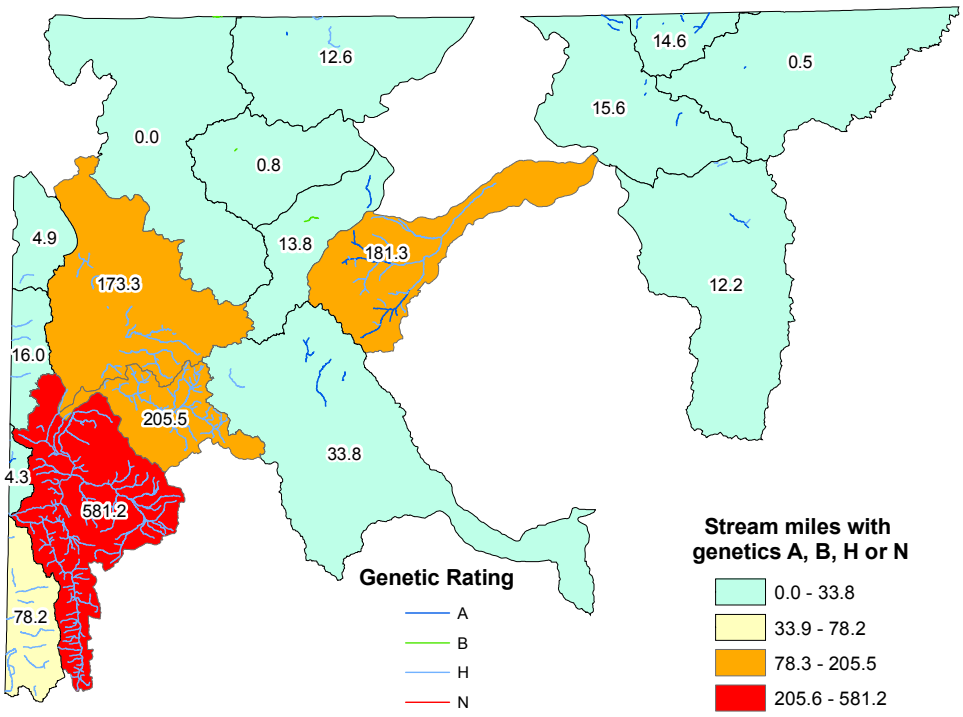

Figure 2. Stream miles containing YSC populations with genetic ratings of either A, B, H, or N. Total stream miles in these classes are summed for each basin. Stream segments on National Parks, Wilderness, or the Wind River Indian Reservation were not included.

The Greys-Hoback basin has the greatest stream mileage (581 miles) using this pooling method. A second tier of basins with between 173 and 206 miles is comprised of the Greybull, Gros Ventre and upper Snake basins (Figure 2). The Salt Basin would rank next with the Wind River basin topping the lowest tier of basins.

A-rated Genetics Approach:

There are 31 stream segments covering 131 miles rated with "A" genetics (Figure 3). The Greybull basin ranks highest followed by the upper Wind basin. Next under this approach are the Bighorn Lake and Little Bighorn basins.

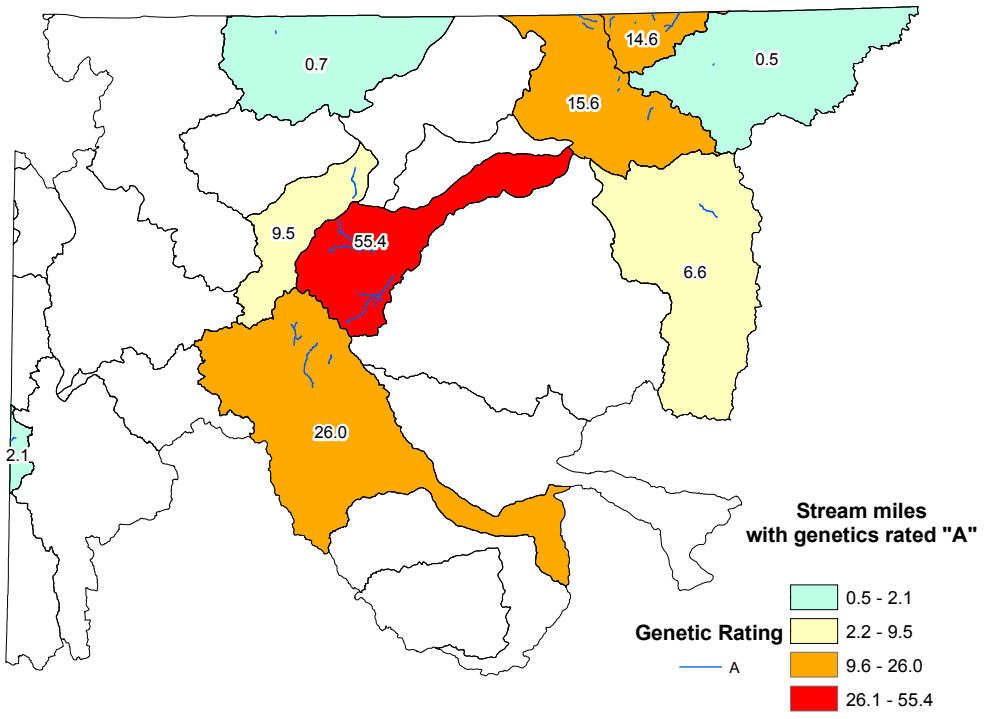

Figure 3. Stream miles with YSC populations with genetic rating A. Stream segments on National Parks, Wilderness, or the Wind River Indian Reservation were not included.

Weighting Genetics and Population Risk Approach:

Composite population risk scores for the 295 stream segments (genetics rated A, B, H, or N) ranged from 5.2 to 15.2 with a median value of 8. According to May et al (2003), most of these segments fall into moderate risk categories. Multiplying stream miles for each segment by 1 (A rated genetics) or 0.25 (B, H, or N rated populations) and then dividing by the population risk score yields the results presented in Figure 4. Like the un-weighted approach, the Greys-Hoback basin ranks highest due to the high number of stream miles. The weighting scheme reduced the differences among basins (Figure 4). The 0.25 genetic weight used for B, H, or N streams greatly reduced the weighted stream miles in the Greys-Hoback, Gros Ventre, and Upper Snake watersheds because the stream segments in these watersheds contain YSC populations rated "H". Selecting a lower arbitrary weight, like 0.1, would further reduce the rank of these watersheds and vice versa.

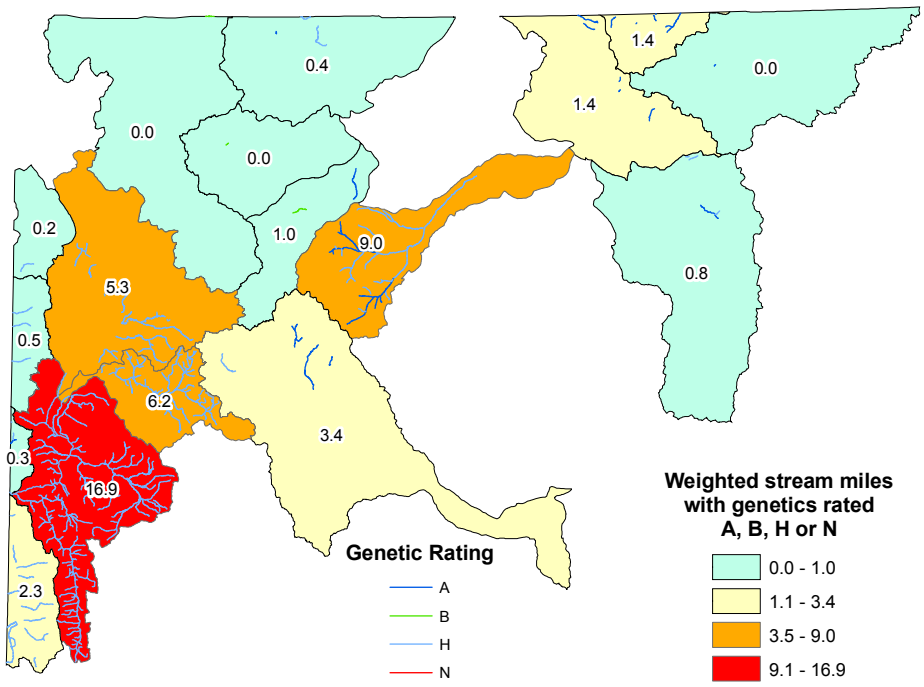

Figure 4. Weighted stream miles with YSC populations rated A, B, H, or N. Stream miles were multiplied by 1 (A rated genetics) or 0.25 (B, H, or N rated genetics) and divided by a population risk score. Stream segments on National Parks, Wilderness, or the Wind River Indian Reservation were not included.

A-Rated Streams Weighted by the Population Risk Factor Approach:

Figure 5 depicts the results of weighting the 31 stream segments with A-rated genetics by the population risk score. Following the highest ranking Greybull basin, the Upper Wind basin again ranks highest when the focus is on A-rated genetics. Next priorities under this approach would be Bighorn Lake and Little Bighorn basins (Figure 5).

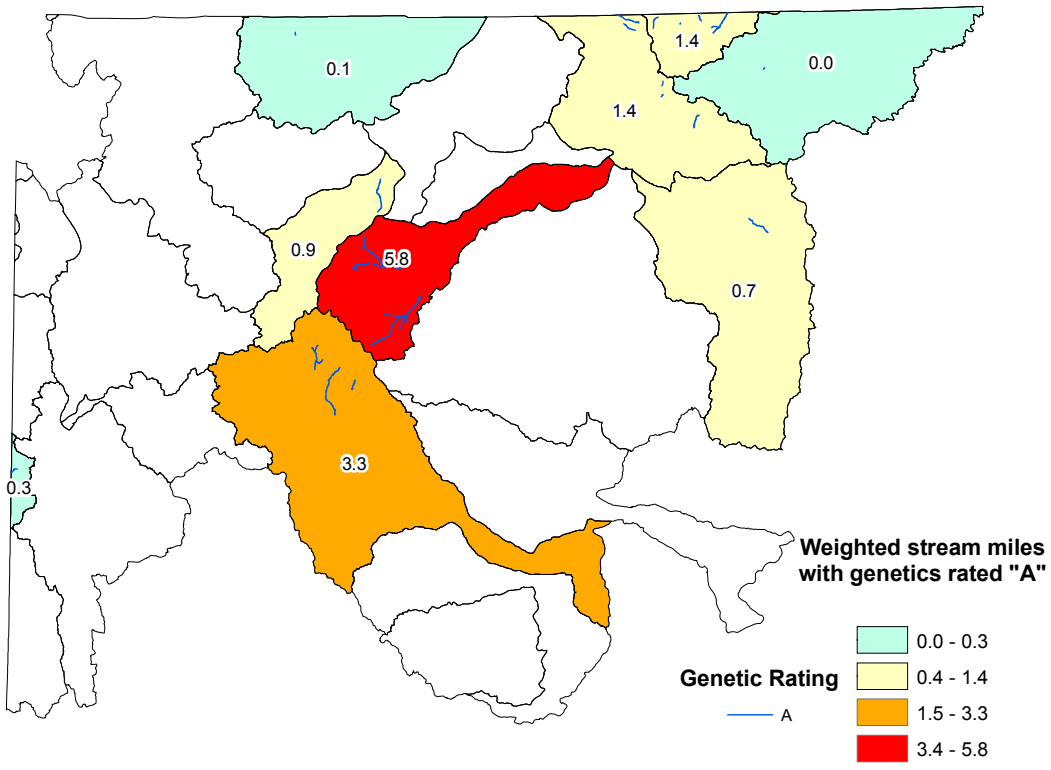

Figure 5. Stream miles with YSC populations with genetic rating A weighted by a population risk factor. Stream segments on National Parks, Wilderness, or the Wind River Indian Reservation were not included.

Assigning Priorities to basins for Instream Flow Studies

Under a protect-the-best-first approach, instream flow studies should be directed first toward basins with higher stream miles containing populations tested pure and at relatively low risk (from a population persistence perspective). Four alternative approaches were used to filter HUC level 4 basins; many more approaches are possible. A key consideration not reflected in these analyses is the fact that considerable new genetic testing is underway, especially for populations in the Greys-Hoback, Gros Ventre, and Upper Snake basins. Preliminary results suggest that many of the waters in these basins currently classified as "H" (potentially unaltered with no record of stocking or contaminating species present) may fall into the "A" genetic category (Rob Gipson, personal communication; Novak and Kershner 2005). With that strong possibility, all 4 approaches used would result in high rankings for these watersheds.

Given the likelihood of new genetic information updates to the database in the next year or two, priorities for years beyond the 2006-2010 period will require review during development of the next 5-year plan (2011 – 2015). Based on current information and the promise of high quality genetics in the Greys-Hoback (Novak and Kershner 2005), the upper Wind River and Greys-Hoback were identified as priority basins for instream flow studies during the period covered by this five-year plan. The upper Wind River was selected as the first priority because it has the greatest number of stream miles containing tested pure populations (26 miles; Approach 2) of the remaining basins (Table 1). The population risk factors are relatively low in this basin so it also ranks highest under Approach 4 (Table 1).

If miles of stream with A-rated genetics remained the primary prioritization criteria, the next priority basin would be Bighorn Lake. However, the high miles of water with "H" rated genetics in the Greys-Hoback basin and the fact that many of these are likely to be rated "A" makes the Grey's-Hoback basin a high priority.

Remaining proposed rankings in Table 1 should be re-visited in the next 5-year plan. The proposed rankings were developed to disperse instream flow filings geographically throughout YSC historic range rather than focus sequentially on neighboring basins as would occur by strictly following total weighted stream miles (e.g. Greys-Hoback then Snake headwaters then Gros Ventre). Instream flow protections in widely separated regions may provide legal protection against a broader array of threats as development pressures differ throughout the northwest corner of the state. It may be decided, as additional genetic information is incorporated into the database, that a preponderance of tested pure waters in basins like the Snake headwaters or Gros Ventre basins merits assigning higher priorities to these basins.

Table 1. Stream miles with YSC in Wyoming basins using different approaches for considering genetics and population risk. A proposed ranking scheme for instream flow studies is included.

4TH Order HUC Basin (s)	A, B, H, N	A only	Weighted Genetics and Risk	A segments weighted by Risk	Basin Rank	Proposed Instream Flow study status
Greybull	201	70.3	10.7	7.3	NA	Done 1998 - 2003
S. Fk. Shoshone	15	9.5	1.0	0.9		Done 2004
N. Fk. Shoshone	7	0	0.1	0		Done 2004
Upper Wind	74	66	8.4	8.2	1	2005 - 2006
Greys-Hoback	606	0	17.5	0	2	2007 – 2010
Bighorn Lake	16	15.6	1.4	1.4	3	Beyond 2010
Snake Headwaters	311	0	9.3	0	4	Beyond 2010
Little Bighorn	15	14.6	1.4	1.4	5	Beyond 2010
Gros Ventre	221	0	6.7	0	6	Beyond 2010
Nowood	12	6.6	0.8	0.7	7	Beyond 2010
Salt	78	0	2.3	0.3	8	Beyond 2010
Upper Tongue	0.5	0.5	0	0	--	Beyond 2010
Clarks Fork	17	5.0	0.9	0.5	--	Beyond 2010
Palisades	4.3	2.1	0.3	0	--	Beyond 2010
Teton	28	0	0.9	0	--	Beyond 2010
Henrys	4.9	0	0.2	0	--	Beyond 2010

Stream Rankings

Stream segments occurring outside of National Parks, the Wind River Indian Reservation and Wilderness areas are listed by basin in Appendix 4. Ranking and discussion of candidate instream flow streams within basins is provided below. The discussion is limited to streams in those basins where work has been completed or is planned for the 2006-2010 period.

Greybull Basin (1008009):

The Greybull basin can be considered "completed" relative to instream flow studies for the near future. Most potential segments on public land in the Greybull basin have been studied and instream flow water right applications filed. While some additional protections could be gained (Appendix 5), most of the remaining streams are either very small, on Wilderness, or derive secondary protection by virtue of instream flow segments downstream. See Appendix 5 for a list of streams or segments that were not studied.

South Fork Shoshone Basin (10080013):

Marquette Creek was studied in 2004. It was identified due to the genetic purity, isolation, and robustness of this population (Kruse 2000). Three remaining candidate streams in the South Fork Shoshone basin are entirely on Wilderness and thus already have some protection (Gentian Ck, East Fork Ck., and Younts Ck.). The Wyoming Game and Fish may restore pure YSC populations to upper regions of Ishawooa and Boulder Creeks but these populations would be nearly entirely on Wilderness. Currently the database lists Ishawooa Creek as containing genetically "B" rated populations. There is about 4.3 miles of Ishawooa Creek off Wilderness but about half of this is on private land.

North Fork Shoshone Basin (10080012):

Trout Creek was studied in 2004. Restoration stocking in recent years in Trout Creek headwaters has greatly expanded the distribution of pure YSC and highlighted the potential value of an instream flow segment. This stream was not listed in the risk assessment database because the risk assessment was conducted prior to the restoration stocking. The proposed instream flow segment would actually occur downstream of the headwaters and a movement barrier, in a portion of the stream with mixed cutthroat and rainbow. The instream flow segment will serve to indirectly protect the upstream population. Importantly, the segment would serve a dual role by also protecting an important spawning tributary to the North Fork Shoshone River and Buffalo Bill Reservoir Yellowstone cutthroat and rainbow trout fishery.

The only other North Fork Shoshone River basin stream identified with potentially high genetic purity is Grinnell Creek. This small stream in the headwaters has only about ½ mile that is not on Wilderness. This stream cannot efficiently be studied (it occurs nearly at Pahaska Teepee) and seems to offer a relatively small gain in protected YSC metapopulation relative to required effort.

Upper Wind River Basin (10080001):

The 26 miles of stream segments containing A-rated populations in this basin are distributed among 6 different streams (Appendix 4). First priorities among these are Bear Creek, Wiggins Fork and East Fork Wind River due to their high miles on public land. These 3 streams are candidates for investigations during the 2005 field season. These streams were studied in the early 1990's to understand relationships between trout habitat and diversion practices on the Wyoming Game and Fish Department's Spence/Moriarity Wildlife Habitat Management Area (Bradshaw and Annear 1992, Bradshaw and Annear 1993, Dey and Annear 1996). Results from the earlier investigations and new studies at higher elevations in 2005 (if necessary) will be used to develop recommendations for instream flow water rights.

In 2006, Caldwell and Frontier Creeks will be the highest priority prospects for instream flow studies in the Upper Wind River basin. West Fork Long Creek has a genetic rating of "H" and is an isolated population with competing species (composite population risk score of 10.4; Appendix 4). This stream may be considered for study in 2006 if time permits but it is not a priority at this time.

Greys - Hoback Basin (17040103):

There are 140 different stream segments in this basin that sum to 581 miles excluding Wilderness Areas (Table 2, Figure 6). Stream segment lengths range from 0.1 to 58 miles. The stream segments listed in Table 2 indicate maximum potential miles and have not been corrected for existence of private land, prior instream flow water rights (Greys River) or water management considerations. Instream flow segments will be pursued on a subset of the miles after reaches with unwilling private land owners are removed from consideration. For example, the Hoback River contains a long reach with private land and instream flow segments may be considered for above and below this area (Figure 6).

Table 2. Greys-Hoback Basin stream segments over 5 miles in length (Wilderness excluded).

NAME	Spotting Pattern	Length (miles)
Greys River	O	58.2
Hoback River	O	49.5
South Fork Snake River	O	46.6
Flat Creek	N	29.1
Little Greys River	O	19.8
Jack Creek	O	16.1
Willow Creek	O	15.4
Spring Creek	O	14.4
Cliff Creek	O	13.2
Dell Creek	O	11.8
Shoal Creek	O	11.6
Granite Creek	O	9.6
North Fork Fisherman Creek	N	9.5
Muddy Creek	O	8.7
Mosquito Creek	O	8.6
Sheep Creek	N	8.5
Fall Creek	O	8.4
Cache Creek	O	7.5
Fisherman Creek	N	7.4
Sheep Creek	N	7.2
South Fork Fisherman Creek	N	7
Corral Creek	O	6.7
Coburn Creek	O	6.2
Jenny Creek	O	5.3

The stream segments in Table 2 will occupy the remaining time for studies during the 2006-2010 period covered by this 5-year plan. In fact, it is unlikely all stream segments will be directly protected with instream flow water rights. Rather, many of the smaller order streams at upper elevations will be indirectly protected by virtue of instream flow water rights in larger, downstream streams. Other streams like the South Fork Snake River and Flat Creek may not be candidates for instream flow filings due to existing complicated water management conditions that adequately protect YSC fisheries.

To identify priorities within the Hoback-Greys Basin, these issues will be examined annually during development of annual work schedules. They cannot be developed in more detail now until the results from additional genetic testing of YSC populations becomes available. Instream flow segments targeted will be a subset of those listed in Table 2. Higher priorities will be assigned to larger, longer reaches with robust

populations on public land that will provide indirect protection to upstream waters. Stream segments containing YSC populations with higher quality genetics will be targeted.

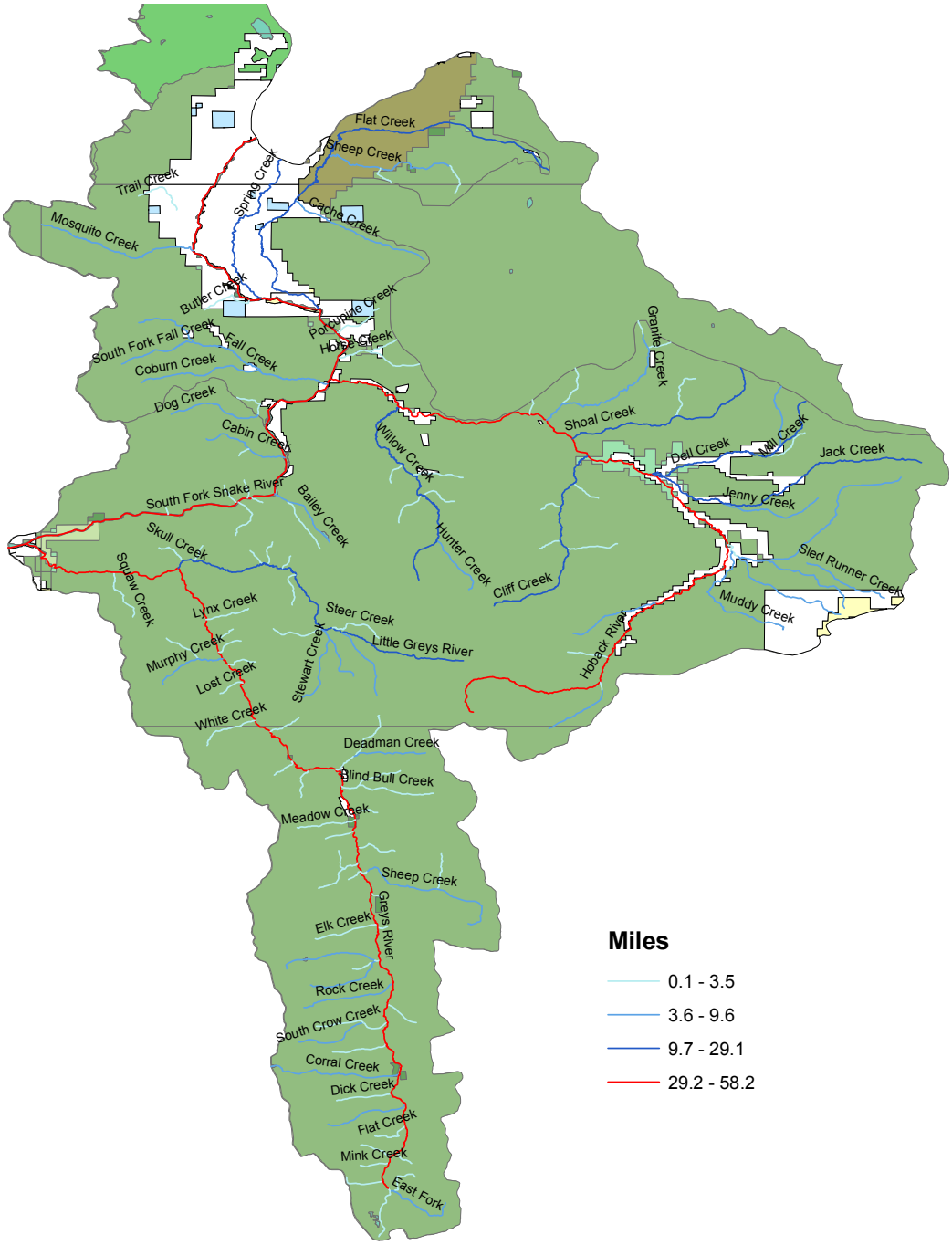

Figure 6. Greys-Hoback basin with stream segments segregated into 4 length categories.

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Appendix 1. Wyoming Game and Fish Commission Policy No. VII N

WYOMING GAME AND FISH COMMISSION	**Policy No. VII N**
Issue Date: September 8, 2005	Authority: Linda L. Fleming, President

INSTREAM FLOW ADMINISTRATION

The Wyoming Game and Fish Commission (Commission) is accorded responsibility for implementation of instream flow water rights under the following sections of Wyoming statutes:

1. 41-3-1003(a) – The game and fish commission shall construct any measuring device the state engineer considers necessary for the administration of an instream flow right.

2. 41-3-1003(b) – The state game and fish commission may report to the water development commission annually those specific segments of stream which the game and fish commission considers to have the most critical need for instream flows. The game and fish commission shall identify the points on the stream at which the need for instream flows begins and ends, the time of year when the flows are most critical and a detailed description of the minimum amount of water necessary to provide adequate instream flows.

3. 41-3-1003(c) – The water development commission shall file applications in the name of the state of Wyoming for permits to appropriate water for instream flows in those segments of stream recommended by the game and fish commission. The state engineer shall not grant any permits to appropriate or store water for instream flows prior to the completion of the study provided by W.S. 41-3-1004 or prior to the hearing required by W.S. 41-3-1006. Fees and costs of the commission associated with permit applications and adjudication of water rights shall be borne by the game and fish commission.

4. 41-3-1006(c) – Subsequent to submission of an application for an instream flow appropriation, the game and fish commission shall conduct relevant studies on the proposal.

5. 41-3-1006(e) – . . . At the public hearing, the game and fish commission shall present its studies and any other interested parties shall present views on the proposed instream flow appropriation.

6. 41-3-1007(a) – The state of Wyoming may acquire any existing water rights in streams of Wyoming by transfer or gift for the purpose of providing instream flows, provided that a change in use of the right acquired shall be in accordance with W.S. 41-3-104. . . . The game and fish commission shall act as a petitioner in a petition for change in use under this section.

7. 41-3-1008(a) – The game and fish commission shall report to the water development commission the need to regulate a stream to protect the priority of an instream flow right.

Appendix 1. Wyoming Game and Fish Commission Policy No. VII N

The Commission hereby assigns the above-mentioned responsibilities for implementation of instream flow water rights to the Game and Fish Department (Department). In carrying out these responsibilities, the Department is directed to notify the Commission member in whose jurisdiction a candidate water for filing occurs, as soon as possible where the proposed instream flow filing recommendation is located. If that Commission member has concern about the proposed recommendation, it will be brought to the full Commission in open session. The Department will advise all Commission members of each instream flow filing recommendation at least two weeks prior to filing and of any changes in the Instream Flow Program.

Appendix 2. Instream flow segments in priority order.

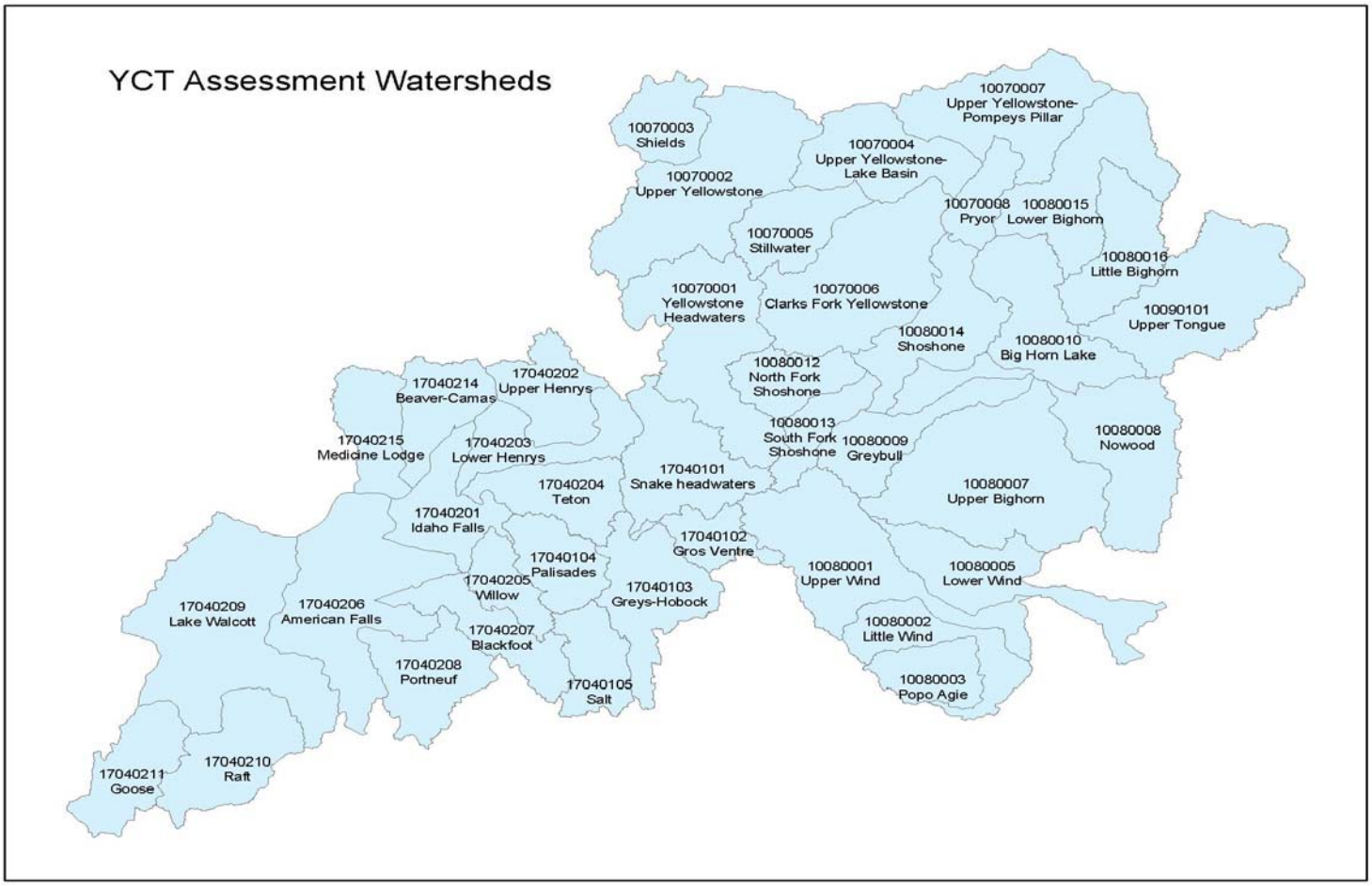
Stream	Region	Stream Miles	Priority Date	Issued Date
Wood River, Middle Fork	CY	4.9	1/14/2005	
Dick Creek	CY	2.2	1/14/2005	
Wood River (below M.Fk.Wood R.)	CY	1	1/14/2005	
Wood River (above M.Fk. Wood R.)	CY	3.8	1/14/2005	
Piney Creek	CY	2.3	2/10/2004	
N. Fk. Pickett Creek	CY	2.5	2/10/2004	
Greybull River	CY	4.3	2/10/2004	
Francs Fork	CY	5.2	7/8/2003	
Pickett Creek #2	CY	3.4	7/8/2003	
Timber Creek	CY	4.3	7/8/2003	
Pickett Creek #1	CY	4.7	7/8/2003	
Jack Creek	CY	2.5	7/8/2003	
Pine Creek Direct	PE	8.1	6/4/2002	12/10/2003
Pine Creek Secondary	PE	8.1	4/2/2002	12/10/2003
Dry Fork Little Bighorn River	SN	7.4	11/30/2000	
Wagonhound Creek	LE	8.5	9/22/2000	
Currant Creek	GR	9.1	6/8/2000	1/9/2005
Sage Creek	GR	3.6	12/6/1999	1/9/2005
Little Gilbert Creek	GR	1.7	12/6/1999	1/9/2005
Gilbert Creek	GR	4.4	12/6/1999	1/9/2005
Trout Creek	GR	3.8	12/6/1999	1/9/2005
Red Creek	GR	5.7	12/6/1999	1/9/2005
Lander Creek	GR	0.4	8/25/1997	12/1/2003
Packstring Creek	GR	1.3	8/25/1997	11/4/2002
Little White Creek	GR	2.5	8/25/1997	11/13/2002
North Fork Smiths Fork Creek	GR	2.4	8/25/1997	12/1/2003
Poker Hollow Creek	GR	1.6	8/25/1997	10/9/2002
Trespass Creek	GR	1	8/25/1997	
Big Sandstone Creek	GR	3	6/27/1996	
Roaring Fork Little Snake River	GR	3.2	6/27/1996	
Coantag Creek	GR	4.9	6/27/1996	1/2/2002
Water Canyon Creek	GR	1.2	6/27/1996	10/31/2002
Salt Creek	GR	4.5	6/27/1996	1/18/2002

Giraffe Creek	GR	2.4	6/27/1996	10/9/2002
Coal Creek	GR	4.2	6/27/1996	11/1/2002
Mill Creek	GR	3.1	6/27/1996	
North Fork Big Sandstone Creek	GR	0.7	6/27/1996	
Deep Creek	GR	3.5	12/19/1995	
Douglas Creek, Trib to Big Sandstone	GR	1	12/19/1995	
Dirtyman Creek	GR	0.9	12/19/1995	
Raymond Creek	GR	1.6	12/19/1995	9/15/2002
Smiths Fork	GR	5	12/19/1995	11/26/2002
Porcupine Creek	GR	1.3	12/19/1995	12/8/2002
Huff Creek	GR	3.3	6/20/1995	10/9/2002
Hobble Creek	GR	2.7	6/20/1995	10/3/2001
Coal Creek (Howland Cr.)	GR	0.8	6/20/1995	1/10/2002
Clear Creek #1	SN	4.9	10/6/1994	
Clear Creek #2	SN	4.2	10/6/1994	
Shell Creek #2	CY	6.1	10/8/1993	11/26/1999
Shell Creek #1	CY	10.5	10/8/1993	11/26/1999
Fish Creek (Wilson) #2	JN	1.5	10/8/1993	
Fish Creek (Wilson) #1	JN	0.6	10/8/1993	
Greys River	JN	10.1	10/8/1993	10/1/1998
Little Popo Agie River	LR	1.4	10/8/1993	1/17/2006
East Fork Smiths Fork	GR	4.6	1/21/1993	
Salt River	JN	2.6	1/5/1993	
Shoshone River	CY	15.1	12/31/1991	
Ted Creek	GR	0.3	6/21/1991	
W. Branch N.Fk. Little Snake	GR	7.4	6/21/1991	
Rabbit Creek	GR	1.2	6/21/1991	
Solomon Creek	GR	3.4	6/21/1991	
Rose Creek	GR	2.2	6/21/1991	
Green Timber Creek	GR	1.7	6/21/1991	
Harrison Creek	GR	1.8	6/21/1991	
Deadman Creek	GR	1.3	6/21/1991	
Third Creek	GR	0.7	6/21/1991	
North Fork Little Snake	GR	9.1	6/21/1991	
Beaver Creek	LE	1.9	6/21/1991	

Horse Creek	LE	0.1	6/21/1991	
Nugget Gulch	LE	0.1	6/21/1991	
Douglas Creek	LE	22.3	6/21/1991	
Camp Creek	LE	1.2	6/21/1991	
Lake Creek	LE	5.8	6/21/1991	
Deer Creek	CR	5	3/11/1991	
North Platte River	LE	16	3/11/1991	
Sweetwater River	LR	10.2	3/11/1991	
South Piney Creek	PE	7	3/11/1991	12/3/2003
North Piney Creek	PE	7.6	3/11/1991	2/10/2004
Middle Piney Creek	PE	3.6	3/11/1991	2/23/2004
Fish Creek	PE	4.2	3/11/1991	12/1/2003
Medicine Lodge Creek	CY	7.5	12/17/1990	
LaBarge Creek	PE	3.3	12/17/1990	12/3/2003
Big Laramie River	LE	3.9	12/14/1989	
Encampment River	LE	13.6	8/4/1989	
North Cottonwood Creek	PE	8.9	7/12/1989	
South Cottonwood Creek	PE	8.9	6/27/1989	
Wind River	LR	5.2	3/10/1989	6/22/1997
Little Bighorn River	SN	4.4	3/6/1989	9/19/1996
New Fork River	PE	1.5	2/9/1989	1/7/1992
Hams Fork River	GR	10.8	2/2/1989	
Green River	PE	9.8	1/10/1989	1/7/1992
Sand Creek	SN	2.5	12/7/1987	8/22/1991
Tensleep Creek	CY	7.9	7/2/1987	1/13/1991
Tongue River	SN	8.2	6/16/1987	3/11/1990
Middle Fork Powder River	SN	10	2/2/1987	11/25/1989
Clarks Fork	CY	5.8	11/18/1986	5/6/1988

* CR = Casper, CY = Cody, GR = Green River, JN= Jackson, LE = Laramie, LR = Lander, PE = Pinedale, SN = Sheridan

Appendix 3. Level 4 HUC basins throughout the historic range of Yellowstone cutthroat trout (from May et al. 2003).



Appendix 4. Wyoming risk assessment stream segments not located in National Parks, the Wind River Indian Reservation or Wilderness Areas. See May et al. (2003) or report text for field definitions.

Basin	Stream Segment	Genetic Rating	Conservation Designation	Spotting Pattern	Population Type	Length (miles)	Risk
Yellowstone Headwaters	Soda Butte Creek	B	E	M	Isolet	0	12
Clarks Fork Yellowstone	Muddy Creek	A	A	M	Isolet	0.7	9.2
	Littlerock Creek	H				8.6	12
	LADUALA CR	H				0.1	12
	Rock Creek	H	B	M	MetaPop	3.1	5.2
Upper Wind	Frontier Creek	A	E	M	MetaPop	1.3	8
	Caldwell Creek	A	E	M	MetaPop	2.2	8
	Wiggins Fork	A	E	M	MetaPop	6.9	8
	East Fork Wind River	A	E	M	MetaPop	2.3	8
	Bear Creek	A	E	M	MetaPop	13.4	8
	West Fork Long Creek	H	C	M	Isolet	7.8	10.4
Nowood	South Paint Rock Creek	A	A	M	Isolet	1.4	9.9
	South Paint Rock Creek	A	A	M	Isolet	5.2	9.6
	Dry Medicine Lodge Ck	H	C	M	Isolet	2.8	10.4
	Mill Creek	H	C	M	Isolet	1	9.7
	Soldier Creek	H	E	O	Isolet	1.7	6.8
Greybull	Middle Fork Wood R.	A	B	O	MetaPop	10.7	9.6
	Brown Creek	A	B	O	MetaPop	1.9	9.6
	Greybull River	A	B	O	MetaPop	14.1	9.6
	North Fork Pickett Creek	A	B	O	MetaPop	3.6	9.6
	Wood River	A	B	O	MetaPop	12.5	9.6
	Jack Creek	A	B	O	MetaPop	1.1	9.6
	South Fork Wood River	A	B	O	MetaPop	3.3	9.6
	Pickett Creek	A	B	O	MetaPop	8.2	9.6
	Francs Fork	H	B	O	MetaPop	10.8	9.6
	Rawhide Creek	H	C	M	Isolet	5.4	9.7
	Meeteetse Creek	H	B	O	MetaPop	22.5	9.6
	Deer Creek	H	B	O	MetaPop	3.1	9.6
	Dundee Creek	H	B	O	MetaPop	2.2	9.6
	Quaking Aspen Creek	H	B	O	MetaPop	3.2	9.6
	East Fork Francs Fork	H	B	O	MetaPop	1.6	9.6
	Kay Creek	H	B	O	MetaPop	3.7	9.6
	Horse Creek	H	B	O	MetaPop	2.6	9.6
	Dick Creek	H	B	O	MetaPop	1.8	9.6
	Rose Creek	H	B	O	MetaPop	2.8	9.6
	Willow Creek	H	B	O	MetaPop	2.1	9.6
	Wood River	H	B	O	MetaPop	10	9.6
	Timber Creek	H	B	O	MetaPop	6	9.6
	Greybull River	H	B	O	MetaPop	41	9.6
	Dick Creek	H	C	M	Isolet	4.2	10.8
	North Fork Dick Creek	H	C	M	Isolet	0.6	10.8
	Horse Creek	H	B	O	MetaPop	1.7	9.6
	Piney Creek	H	B	O	MetaPop	0.9	9.6
Big Horn Lake	Cedar Creek	A	A	M	Isolet	4	12
	Trout Creek	A	A	M	Isolet	6.2	10.4
	Deer Creek	A	A	M	Isolet	3.5	12
	South Beaver Creek	A	A	M	Isolet	0.7	12
	North Beaver Creek	A	A	M	Isolet	1.2	12

North Fork Shoshone	South Grinnell Creek	B	E	M	Isolet	0.8	12
South Fork Shoshone	Marquette Creek	A	A	O	Isolet	9.5	10.8
	Ishawooa Creek	B				4.3	12
Little Bighorn	West Pass Creek	A	A	M	Isolet	6.8	10.8
	Lodge Grass Creek	A	A	M	Isolet	3.4	8.8
	W Fk Little Bighorn R	A	A	M	Isolet	0.3	8.8
	Elk Creek	A	A	M	Isolet	0.3	12
	North Fk West Pass Ck	A	A	M	Isolet	2	10.8
	Elk Creek	A	A	M	Isolet	1.5	12
	Red Canyon Creek	A	A	M	Isolet	0.2	11.5
Upper Tongue	South Fork Little Tongue River	A	A	M	Isolet	0.5	12
Snake headwaters	South Fork Snake River	H	C	O	MetaPop	9	9.6
	Polecat Creek	H	C	O	MetaPop	3.5	9.6
	Grouse Creek	H	E	O	MetaPop	1	8
	Leidy Creek	H	E	O	MetaPop	3.8	8
	Sheffield Creek	H	C	O	MetaPop	2.2	9.6
	Middle Fork Ditch Creek	H	E	O	MetaPop	2.8	8
	Ditch Creek	H	E	O	MetaPop	6.3	8
	North Fork Ditch Creek	H	E	O	MetaPop	2.2	8
	Spread Creek	H	E	O	MetaPop	12.4	8
	Buffalo Fork	H	E	O	MetaPop	18.9	8
	Lava Creek	H	E	O	MetaPop	4.5	8
	Blackrock Creek	H	E	O	MetaPop	18.6	8
	Box Creek	H	E	O	MetaPop	1.4	8
	Pilgrim Creek	H	C	O	MetaPop	0.5	9.6
	South Fork Snake River	H	E	O	MetaPop	46.6	8
	North Fork Spread Creek	H	E	O	MetaPop	9.8	8
	South Fork Spread Creek	H	E	O	MetaPop	10.2	8
	Arizona Creek	H	C	O	MetaPop	5.7	9.6
	South Fork Snake River	H	E	O	MetaPop	7.2	8
	Pacific Creek	H	E	O	MetaPop	6.8	8
Gros Ventre	Lost Creek	H	E	O	MetaPop	1.5	8
	Cottonwood Creek	H	E	O	MetaPop	3.4	8
	Squaw Creek	H	E	O	MetaPop	3	8
	Spruce Creek	H	E	O	MetaPop	1.2	8
	Hackamore Creek	H	E	O	MetaPop	1.6	8
	Shorty Creek	H	E	O	MetaPop	0.5	8
	Big Cow Creek	H	E	O	MetaPop	0.9	8
	South Fork Fish Creek	H	E	O	MetaPop	15	8
	Papoose Creek	H	E	O	MetaPop	3.1	8
	Bacon Creek	H	E	O	MetaPop	11.5	8
	Sohare Creek	H	E	O	MetaPop	3	8
	Cottonwood Creek	H	E	O	MetaPop	15.1	8
	Fish Creek	H	E	O	MetaPop	4.5	8
	Dry Cottonwood Creek	H	C	N	Isolet	0.5	11.6
	Dry Cottonwood Creek	H	E	O	MetaPop	0.6	8
	Carmichael Fork	H	C	O	MetaPop	5.5	9.2
	Slate Creek	H	E	O	MetaPop	1.8	8
	Turpin Creek	H	C	N	Isolet	2.7	10.4
	Kinky Creek	H	E	O	MetaPop	0.3	8
	Big Cow Creek	H	C	N	Isolet	0.7	10.4
	Strawberry Creek	H	E	O	MetaPop	3.2	8

	Park Creek	H	C	O	Isolet	4.2	10.4
	Devils Basin Creek	H	E	O	MetaPop	4.6	8
	Purdy Creek	H	E	O	MetaPop	4.2	8
	Little Devils Basin Ck	H	E	O	MetaPop	3.3	8
	Mountain Creek	H	E	O	MetaPop	1	8
	Goosewing Creek	H	E	O	MetaPop	0.6	8
	Haystack Fork	H	E	O	MetaPop	2	8
	Hereford Creek	H	E	O	MetaPop	2.1	8
	Red Creek	H	C	O	Isolet	3.1	10.4
	Dead Horse Creek	H	E	O	MetaPop	1	8
	Bullmoose Creek	H	E	O	MetaPop	3	8
	Leeds Creek	H	E	O	MetaPop	6.9	8
	Raspberry Creek	H	C	O	Isolet	1.4	10.4
	North Fork Fish Creek	H	E	O	MetaPop	17	8
	Raspberry Creek	H	C	N	Isolet	0.6	11.6
	Tepee Creek	H	E	O	MetaPop	0.3	8
	Slate Creek	H	C	O	MetaPop	1.4	9.2
	Alkali Creek	H	E	O	MetaPop	0.5	8
	Negrohead Fork	H	C	O	MetaPop	1.7	9.2
	Horsetail Creek	H	E	O	MetaPop	3.3	8
	Bear Paw Fork	H	C	O	MetaPop	2.1	9.2
	East Miner Creek	H	E	O	MetaPop	1.9	8
	Dallas Fork	H	C	O	MetaPop	5.8	9.2
	Cabin Creek	H	C	O	MetaPop	0.8	9.2
	Aspen Creek	H	C	O	MetaPop	0.8	9.2
	West Fork	H	E	O	MetaPop	0.8	8
	Crystal Creek	H	E	O	MetaPop	4.6	8
	Bentley Park Creek	H	E	O	MetaPop	2.5	8
	Breakneck Creek	H	C	N	Isolet	3	10.4
	Dallas Creek	H	E	O	MetaPop	2	8
	Hardscrabble Creek	H	E	O	MetaPop	2.4	8
	Gros Ventre River	H	E	O	MetaPop	37.2	8
Greys-Hoback	Dick Creek	H	E	O	MetaPop	2.6	8
	Spring Creek	H	E	O	MetaPop	4.3	8
	North Clear Creek	H	E	O	MetaPop	1.7	8
	Mink Creek	H	E	O	MetaPop	1.4	8
	Horse Creek	H	E	O	MetaPop	1	8
	Flat Creek	H	E	O	MetaPop	2	8
	Corral Creek	H	E	O	MetaPop	6.7	8
	North Corral Creek	H	E	O	MetaPop	2.7	8
	South Crow Creek	H	E	O	MetaPop	3.7	8
	North Crow Creek	H	E	O	MetaPop	2.3	8
	Marten Creek	H	C	N	Isolet	1.8	13.2
	Sheep Creek	H	C	N	Isolet	7.2	10.4
	Porcupine Creek	H	E	O	MetaPop	2.7	8
	Little Horse Creek	H	E	O	MetaPop	0.5	8
	Horse Creek	H	E	O	MetaPop	2.2	8
	Hunter Creek	H	E	O	MetaPop	3.8	8
	Little Horse Creek	H	E	O	MetaPop	2.2	8
	Crow Creek	H	E	O	MetaPop	1.5	8
	Mosquito Creek	H	E	O	MetaPop	8.6	8
	Rock Creek	H	E	O	MetaPop	4.8	8
	North Three Forks Creek	H	C	N	Isolet	4.8	13.2

	Middle Three Forks Ck	H	E	O	MetaPop	1.1	8
	Pritchard Creek	H	E	O	MetaPop	2	8
	South Three Forks Creek	H	E	O	MetaPop	4	8
	Dog Creek	H	E	O	MetaPop	4.8	8
	North Twin Creek	H	C	N	Isolet	0.4	13.2
	Lookout Creek	H	E	O	MetaPop	1.1	8
	North Twin Creek	H	E	O	MetaPop	0.2	8
	Elk Creek	H	E	O	MetaPop	3.2	8
	Buck Creek	H	E	O	MetaPop	0.7	8
	Shepard Creek	H	E	O	MetaPop	1.9	8
	Trail Creek	H	E	O	MetaPop	3	8
	Shale Creek	H	C	N	MetaPop	2	12
	Poison Creek	H	E	O	MetaPop	2.1	8
	North Three Forks Creek	H	E	O	MetaPop	0.3	8
	Cabin Creek	H	C	N	Isolet	4.6	13.2
	Squaw Creek	H	E	O	MetaPop	0.4	8
	South Fk Little Greys R	H	E	O	MetaPop	4	8
	Stewart Creek	H	E	O	MetaPop	4.4	8
	West Bailey Creek	H	E	O	MetaPop	3.4	8
	Blind Trail Creek	H	E	O	MetaPop	4.6	8
	Steer Creek	H	E	O	MetaPop	3.1	8
	Lynx Creek	H	E	O	MetaPop	2.2	8
	Hot Foot Creek	H	E	O	MetaPop	1.2	8
	Deer Creek	H	E	O	MetaPop	1.4	8
	Murphy Creek	H	E	O	MetaPop	3.8	8
	Middle Creek	H	E	O	MetaPop	2.7	8
	Fisherman Creek	H	E	O	MetaPop	1.1	8
	McCain Creek	H	E	O	MetaPop	2.2	8
	Mumford Creek	H	E	O	MetaPop	2.2	8
	White Creek	H	C	N	Isolet	1.4	13.2
	Sled Runner Creek	H	C	N	Isolet	4.6	13.2
	Jamb Creek	H	E	O	MetaPop	1.9	8
	South Fork Hoback R.	H	E	O	MetaPop	0.5	8
	North Fk Fisherman Ck	H	C	N	MetaPop	9.5	12
	Squaw Creek	H	C	N	Isolet	3	13.2
	Little Greys River	H	E	O	MetaPop	19.8	8
	Skull Creek	H	E	O	MetaPop	0.3	8
	Greys River	H	E	O	MetaPop	58.2	8
	Greys River	H	C	N	MetaPop	3.5	12
	North Fork Murphy Ck	H	E	O	MetaPop	2.1	8
	Little Elk Creek	H	E	O	MetaPop	1.7	8
	Black Canyon Creek	H	E	O	MetaPop	2.1	8
	Cabin Creek	H	E	O	MetaPop	0.4	8
	Cabin Creek	H	C	N	Isolet	0.4	12
	Lower Cabin Creek	H	C	N	Isolet	1.3	12
	Upper Cabin Creek	H	C	N	Isolet	2	12
	Bear Creek	H	E	O	MetaPop	0.3	8
	Bear Creek	H	C	N	Isolet	0.5	13.2
	Sheep Creek	H	E	O	MetaPop	0.4	8
	Sheep Creek	H	C	N	Isolet	8.5	12
	North Fork Sheep Creek	H	C	N	Isolet	2.4	12
	Pearson Creek	H	E	O	MetaPop	1.4	8
	Deadman Creek	H	E	O	MetaPop	1.3	8

	White Creek	H	E	O	MetaPop	1.7	8
	Deadman Creek	H	C	N	Isolet	3.6	13.2
	North Fork Deadman Ck	H	C	N	Isolet	3.1	13.2
	Blind Bull Creek	H	E	O	MetaPop	2.2	8
	Blind Bull Creek	H	C	N	Isolet	2.5	13.2
	Little Blind Bull Creek	H	E	O	MetaPop	0.1	8
	Little Blind Bull Creek	H	C	N	Isolet	2.2	11.6
	Trail Creek	H	E	O	MetaPop	1.3	8
	South Cabin Creek	H	C	N	Isolet	0.7	13.2
	Meadow Creek	H	E	O	MetaPop	3	8
	Deadhorse Creek	H	E	O	MetaPop	1.4	8
	Whiskey Creek	H	E	O	MetaPop	0.9	8
	Henderson Creek	H	E	O	MetaPop	1.9	8
	East Fork	H	C	N	MetaPop	4.1	12
	Flat Creek	H	C	N	MetaPop	29.1	9.6
	Sheep Creek	H	C	N	Isolet	2	11.6
	South Twin Creek	H	C	N	Isolet	1.3	11.6
	Pine Creek	H	E	O	MetaPop	2.8	8
	Spring Creek	H	E	O	MetaPop	14.4	8
	Butler Creek	H	E	O	MetaPop	2.9	8
	Bull Creek	H	E	O	MetaPop	1	8
	Fisherman Creek	H	C	N	MetaPop	7.4	12
	Granite Creek	H	E	O	MetaPop	9.6	8
	Skull Creek	H	C	N	Isolet	1.4	13.2
	South Fk Fisherman Ck	H	C	N	MetaPop	7	12
	Lost Creek	H	E	O	MetaPop	1.4	8
	Granite Creek	H	C	N	MetaPop	0.9	12
	Wolf Creek	H	E	O	MetaPop	0.4	8
	Fall Creek	H	E	O	MetaPop	8.4	8
	Cache Creek	H	E	O	MetaPop	7.5	8
	Coburn Creek	H	E	O	MetaPop	6.2	8
	North Fork Fall Creek	H	E	O	MetaPop	3.8	8
	South Fork Fall Creek	H	E	O	MetaPop	4	8
	Hoback River	H	E	O	MetaPop	49.5	8
	Willow Creek	H	E	O	MetaPop	15.4	8
	Lick Creek	H	E	O	MetaPop	1.5	8
	West Table Creek	H	E	O	MetaPop	1.3	8
	Adams Creek	H	E	O	MetaPop	2.5	8
	Little Granite Creek	H	E	O	MetaPop	2.7	8
	Bailey Creek	H	E	O	MetaPop	4.3	8
	Swift Creek	H	E	O	MetaPop	1.1	8
	Trail Creek	H	E	O	MetaPop	0.2	8
	Muddy Creek	H	E	O	MetaPop	8.7	8
	Trail Creek	H	C	N	Isolet	0.9	13.2
	Cow Camp Creek	H	E	O	MetaPop	0.2	8
	Cow Camp Creek	H	C	N	Isolet	0.9	13.2
	South Fork Hoback R.	H	C	N	Isolet	3.7	13.2
	Fire Box Creek	H	E	O	MetaPop	1.6	8
	Shoal Creek	H	E	O	MetaPop	11.6	8
	Kilgore Creek	H	E	O	MetaPop	4.7	8
	Lake Gulch Creek	H	E	O	MetaPop	0.6	8
	West Shoal Creek	H	E	O	MetaPop	3.2	8
	Cliff Creek	H	E	O	MetaPop	13.2	8

	Dell Creek	H	E	O	MetaPop	11.8	8
	Jenny Creek	H	E	O	MetaPop	5.3	8
	East Table Creek	H	E	O	MetaPop	1.2	8
	Jack Creek	H	E	O	MetaPop	16.1	8
	Little Cliff Creek	H	E	O	MetaPop	1.6	8
	Mill Creek	H	E	O	MetaPop	2.5	8
	Sandy Marshall Creek	H	C	N	Isolet	2.1	13.2
	Sandy Marshall Creek	H	E	O	MetaPop	0.4	8
	Clause Creek	H	E	O	MetaPop	1.2	8
	Gibbs Creek	H	C	N	Isolet	0.9	13.2
	Gibbs Creek	H	E	O	MetaPop	0.3	8
	West Dell Creek	H	E	O	MetaPop	4.2	8
	Fawn Creek	N	E	O	MetaPop	1.5	8
Palisades	Big Elk Creek	A	E	O	MetaPop	2.1	8
	Siddoway Creek	H	E	O	MetaPop	1.9	8
	Corral Canyon	H	E	O	MetaPop	0.3	9.6
Salt	Swift Creek	H	E	O	MetaPop	3.8	8
	Willow Creek	H	E	O	MetaPop	4.7	8
	Flat Creek	H	E	O	MetaPop	5.2	8
	Crow Creek	H	E	O	MetaPop	4.1	8
	First Creek	H	E	O	MetaPop	2.7	8
	Spring Creek	H	E	O	MetaPop	16	8
	Second Creek	H	E	O	MetaPop	1.5	8
	Dry Creek	H	E	O	MetaPop	1.4	8
	Stump Creek	H	E	O	MetaPop	5.1	8
	Strawberry Creek	H	C	O	Isolet	4.6	12
	Swift Creek	H	C	O	Isolet	6.5	13.2
	Dry Creek	H	E	O	MetaPop	6	8
	Cottonwood Creek	H	E	O	MetaPop	8.7	8
	Wagner Creek	H	E	O	MetaPop	0.7	8
	Fish Creek	H	E	O	MetaPop	2.8	8
	Strawberry Creek	H	E	O	MetaPop	4.4	8
Lower Henrys	Jackass Creek	H	E	M	MetaPop	4.9	8
Teton	Darby Creek	H	E	M	MetaPop	4.9	8
	South Fork Badger Ck	H	E	M	MetaPop	5.9	8
	South Leigh Creek	H	E	M	MetaPop	5.2	8

Appendix 5. Greybull Basin streams without instream flow segments.

Stream	Comments
Dundee Ck.	Remote but not Wilderness, protected by Middle Fk Wood segment
Quaking Aspen Ck.	Private land and tiny stream.
Deer Ck.	Potential segment but BKT and private land near mouth
Brown Ck.	Private land near mouth. Potential 2.5-mile segment. Very small stream.
Chimney Ck	On Wilderness
Meeteetse Ck.	1.8 mile potential segment on National Forest from FS boundary down to confluence w/N. Fk. Meeteetse Ck.
Rawhide Ck.	A couple 1-2 mile potential segments on BLM and State land
Horse Creek	Headwaters of Wood River. Remote but not Wilderness. Some protection gained from IF segment downstream.
Willow Ck.	Tiny rivulet east of Jack Ck. 2-4 miles on State and NF
Kay Ck.	Remote and secondary protection via Francs Fork segment ds.
Rose Ck.	Potential short segment on State land but BKT presence
Upper Greybull R. tributaries	Numerous tributaries on Washakie Wilderness.