Water Management Unit Plan and Stream Prioritization

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Abstract

The use of water for maintaining or restoring fisheries in streams has been recognized by statute as a beneficial use of water since passage of the state's instream flow law in 1986. Under that law the Game and Fish Commission has the authority to identify streams where instream flow needs are critically important as well as the responsibility of quantifying what the flow regime needs are for each stream. To date, department personnel have submitted applications to obtain water rights in the name of the state on 115 streams and stream segments. Since 1994, the department has developed five-year work plans to direct these efforts and share its views with other agencies and the public. This document is another in that series but is structured to guide department activities beyond the standard five-year time span. The priorities identified in this report will serve as the primary element for selecting candidate streams for instream flow water right protection.

The primary vision of this water management plan is to restore or maintain stream flow regimes and water levels for department-priority fish species in critically important streams and reservoirs using the best available science. The plan draws on department direction and is consistent with guidance contained in the State Wildlife Action Plan (SWAP, 2011) and Strategic Habitat Plan (SHP, 2009). Importantly, this water management plan does not pre-empt any of the policies or guidelines in those documents. The document identifies desired outcomes that are achieved by quantifiable outputs. Each output is supported by and dependent on specific activities and the availability of needed resources. This approach to strategic planning creates a mechanism to track accomplishments while identifying limitations or bottlenecks that may affect progress. The plan applies to the dual mission of the water management unit that involves 1) supporting department and commission objectives associated with water and water right management and 2) conducting instream flow studies to secure current-day priority instream flow water rights.

The unit is presently staffed by the minimum number of personnel to accomplish its dual mission. Financial and institutional support is reasonably adequate to perform the majority of duties. Though not a critical element, the report identifies potential for improving the unit's and department's function by adding the services of a full-time professional hydrologist. This position could be used to develop information needed in support of instream flow filings; water rights acquisition and management; and hydrologic availability, patterns, and management data for other department sections. As noted in the SHP (2009), "*While the timing, rate, form and*

quantity of water delivery to Wyoming's landscapes may change with changes in climate, habitat prescriptions and management alternatives must be adopted to ensure the water that is available sustains natural habitat processes." Credible hydrologic analyses focused on wildlife management needs are a critically important part of this challenge.

A significant portion of this report is dedicated to developing a prioritization system to rank streams throughout the state for consideration of instream flow studies. Drawing from a variety of sources, 1,469 streams or stream segments (8,847 miles) were placed in one of five broad groups and ranked on the basis of eight criteria. Groups consisted of 1) all streams where Bonneville cutthroat trout are native, 2) all streams where Colorado River cutthroat trout are native, 3) all streams where Yellowstone and Snake River cutthroat trout are native, 4) other streams where fish have been designated as species of greatest conservation need, and 5) streams with high recreational value (blue, red and yellow ribbon streams). A filtering process was applied to identify streams where instream flow filings are presently not feasible or practical.

Within each of the five groups, streams were ranked in categories of high, medium, low priority and unranked. Within each group, all streams of a particular rank are considered equal. There is no "top or bottom stream" and one group is no more important than the others.

To date, the majority of instream flow filings have been on important recreational streams, as well as streams harboring habitat for and populations of Colorado River and Bonneville cutthroat trout. More recently, department priorities have been on streams in the Yellowstone and Snake River cutthroat trout groups. Activities will likely continue to focus on these streams in the near future.

The rankings that result from this process are not a mandate to work on any particular stream or order of streams, but instead provide a guiding mechanism that allows flexibility to achieve specified department goals and objectives for fisheries management. Rankings in each category will change as more or better data become available. The list is not considered a final one and may be adapted over time as additional information becomes available.

Introduction

Background

The Wyoming Game and Fish Commission (commission) and its administrative agency the Wyoming Game and Fish Department (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 functions were added to reflect resource management and changing public needs, including managing water resources in the state for fish and wildlife. In 1979, a full-time biologist was added to quantify instream flow needs for fisheries. A formal functional unit for instream flow work was established in 1984 with the addition of a second position. 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" and reorganized to address the expanding responsibilities encompassed under the two positions.

When the unit was first established, instream flow biologists devoted considerable effort toward identifying methodological approaches that were most appropriate for use in Wyoming (Annear and Conder 1984, Conder and Annear 1987). Upon passage of instream flow legislation in 1986, efforts were 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 commission. The commission developed a policy in September 2005 to clarify the roles of the department and commission (Wyoming Game and Fish Commission Policy No. VII N, Appendix A).

The initial focus for conducting instream flow efforts was developed by the commission in 1986. Their emphasis at that time was on 1) the most popular trout stream fisheries, 2) streams located on public lands, and 3) streams with existing flow agreements under other authorities (such as special use permits). In 1994, the first formal plan was drafted by department personnel to identify instream flow needs and priorities (Annear and Dey 1994). Similar documents were authored in 2001 and 2006 (Annear and Dey 2001; Annear and Dey 2006). This report builds on those earlier efforts to further guide instream flow water right filings and water management activities in general.

Wyoming statute (W.S. 41-3-1001 to 41-3-1014) identifies instream flow as a beneficial use of water and requires the commission to identify opportunities to protect or restore instream flows. This designation is important because only those uses of water that are recognized as "beneficial" by either statute or the Board of Control may receive water rights and regulation under state law. Flow protection is possible by filing for current-day priority water rights in streams where unallocated flow exists in quantities needed to support fisheries. The majority of opportunities to secure state instream flow water rights are found in stream segments on federally administered lands such as those under the management authority of the U.S. Forest Service or Bureau of Land Management, but opportunities have also been identified on state and commission-owned lands. The law does not preclude filing for instream flow water rights on private lands however those filings are only considered upon written requests from private landowners. The department has completed studies and prepared instream flow water right applications for a limited number of relatively short stream segments crossing private land.

Accomplishments

As of October 2011, the department, acting on behalf of the commission, has submitted 115 instream flow water right applications. A current list of instream flow segments can be found at http://wwdc.state.wy.us/instream_flows/instream_flows.html. Of these, the state engineer has approved, or permitted 86 and the Board of Control has adjudicated 8. The total of all filings provide protection to base flows on over 450 stream miles with current-day priority water rights.

The law also affords the opportunity to restore instream flows to streams where aquatic habitat could be improved by additional flow at times of year. Only the State of Wyoming may own an instream flow right and they may obtain rights by gift or purchase from willing parties. W.S 41-3-1007 establishes that the Game and Fish Commission will act as the petitioner of any proposed change of use from an existing use to a new use of instream flow. To date, only one private landowner has requested such a change of use to restore fisheries habitat in streams passing through private land. Several reasons may explain this lack of action. Primary among these is that landowners must relinquish ownership of their privately owned water right to the state (not the commission) and many landowners do not wish to permanently convey ownership of existing water rights. Also a factor is that state law presently allows only the consumptively used portion of a water right to be changed for any use, including a change to instream flow. Because instream flow rights are non-consumptive, there is no opportunity to change a converted instream flow right back to its former consumptive use. This permanent nature of changes is an obstacle for some of the water right holders who have expressed tentative interest in changing the use of private irrigation rights to instream flow. Privately owned storage water rights have similarly been determined ineligible for instream flow use by the State Engineer.

Likewise, the department to date has not changed any of its consumptive (irrigation) water rights to instream flow. The commission has, however, taken formal action with the Board of Control to add the use of instream flow to a storage right they own in Fremont Lake, near Pinedale and allow the release of that water to Pine Creek on an as-needed basis. The commission has also formally changed the use of three senior water rights associated with fish culture stations around the state to instream flow. In each case, the commission asserted that the water right for fish culture was not needed at the time, but that the water right might be needed again in the future for fish culture. To protect the standing and priority date of those rights, the commission followed existing policies and procedures of the Board of Control to have the designated use of those rights changed to instream flow. Because both fish culture and instream flow uses are non-consumptive, a change of use from one to the other should be straight-forward and those instream flow right(s) should be eligible to return them to fish culture if and when the need to do so arises.

Guiding Principles and Vision

There are over 25,000 miles of streams with fisheries in the state (WGFD STREAMLK database). Though the legal constraints on all of these waters are similar, the ecological, social, and practical needs, issues, and opportunities on each stream and stream segment are often unique. As such there is not one universal vision for all streams aside from the over-arching

philosophy provided by the commission mission of "Conserving Wildlife - Serving People" within our statutory obligations and legislative limits.

Another factor addressed by this plan is input received from a survey conducted by the Instream Flow Council (2009). That survey was a key element of the IFC's International Instream Flow Program Initiative project that was focused on providing information to help fish and wildlife agencies in the U.S. and Canada address present and future challenges associated with water management for fish and wildlife. The Association of Fish and Wildlife Agencies provided funding for that project through their multi-state conservation program. Results from the IFC project identified the primary strengths and challenges facing each state fish and wildlife agency in the U.S. The primary strengths specific to the department's instream flow-related activities include:

- *"Your agency has a formal instream flow or water management program and the importance of water for managing fish and wildlife is recognized in your agency's strategic plan.*
- *Your agency has adequate staff, training, budget, and a functional organizational structure for conducting instream flow activities.*
- *Your agency has adequate access to experts in hydrology, biology, geomorphology, water quality and connectivity for conducting instream flow studies.*
- *Your state's instream flow law and laws for managing water in lakes and reservoirs provides relatively good opportunity for managing fisheries.*
- *Your agency makes a relatively good effort to coordinate with the public and stakeholders on water related issues."*

The department's primary challenges for addressing instream flow and water management related activities, as identified in the survey, included:

- *"The interpretation of your state's instream flow law is more restrictive than opportunities the statute appears to provide. Policies limit habitat protection to only threshold or base flow levels.*
- *The effectiveness of your agency's information and education efforts for communicating instream flow needs and issues to the public is limited.*
- *In spite of your relatively good coordination with some individuals and stakeholders, the public is not very knowledgeable or <u>actively</u> supportive of instream flow issues or needs in your state."*

The primary vision of this water management plan is to restore or maintain needed stream flow regimes and water levels to maintain or restore functioning, connected aquatic habitats for department-priority fish species using the best available science. This will be accomplished by working under established legal authorities or in partnerships with other entities and individuals. Those opportunities may consist of legal or other enforceable mechanisms (such as water rights or management contracts and agreements) as well as voluntary water use practices that meet the management needs of individual water right holders while enhancing fishery and wildlife habitat or populations. Within this broad framework, the water management unit will identify and respect the values, needs, and biological limits associated with each situation. The water management unit will also be proactive and flexible enough to act on opportunities where

acquiring instream flow water rights or managing water for instream flow are necessary and in the public interest and where doing so in a timely manner is essential.

The primary resources that contribute to the water management unit's planned activities include the department's Strategic Habitat Plan (SHP; WGFD 2009) and State Wildlife Action Plan (SWAP 2010). The SHP references multiple goals, two of which are to 1) conserve and manage wildlife habitats that are crucial for maintaining terrestrial and aquatic wildlife populations for the present and future, and 2) enhance, improve, and manage priority wildlife habitats that have been degraded. The State Wildlife Action Plan is a comprehensive strategy to maintain the health and diversity of wildlife within the state, including reducing the need for future listings of species that are found in Wyoming under the federal Endangered Species Act. Wyoming's SWAP is a comprehensive document that identifies fish and wildlife management challenges on a statewide basis. It identifies priority management areas (conservation areas) by recognizing species of greatest conservation need (SGCN). The document also prescribes actions needed to help restore or maintain the abundance and diversity of fish and wildlife in the state. Streams and stream segments identified as priority conservation areas in this report (or within watersheds identified as priority conservation areas) serve as one source of information to prioritize activities for the water management unit.

The priorities identified in this report will serve as the primary element for selecting candidate streams for instream flow water right protection. The hydrologic, geomorphologic, biological, water quality and connectivity issues in each stream segment will determine the type and scope of studies conducted. Wyoming statutes and the interpretation of laws and policies will govern the number of instream flow filings and water right acquisitions. Public values will be considered via coordination with the commission, consultation with potentially affected landowners, public hearings, and general public input. Water rights are an important type of property right in Wyoming. As a consequence, acquiring and managing water rights for the state and commission will be dealt with in a manner consistent with other property rights acquisition efforts and activities conducted by the commission.

Format

The priorities contained in this document are derived using a logic model approach similar to the method described by Mattessich (2003). This approach relies on identifying outcomes (desired future conditions, or goals) that relate to the planning vision; outputs (or objectives) that are quantitative elements that measure progress toward desired outcomes; activities (or strategies) that consist of actions that produce outputs; and resources (or inputs) that include elements such as funding, training, knowledge, and institutional support needed to conduct activities.

The water management unit has two primary responsibilities. These consist of 1) engaging in broad water management duties that include activities such as helping manage water rights on commission properties, providing input in water acquisition or disposal decisions, assisting field personnel by providing water rights information, and providing information to help the public better understand and participate in water management decisions in general and 2) conducting instream flow studies and preparing water rights applications with the goal of securing current-day priority instream flow water rights in the name of the State of Wyoming. In

consideration of these two functions, this report identifies separate outcomes, outputs, activities, and resources relative to each focus area. The water management unit's annual work plan will be structured to incorporate a mix of activities and functions in support of these responsibilities.

WATER MANAGEMENT OUTCOMES, OUTPUTS, ACTIVITIES, AND RESOURCES

Outcome 1: Maintain the standing and value of commission water rights

Prior to 2002, many water rights management decisions were made with only limited input from more than one section in the department. In 2002 the commission authorized a water rights initiative that led to the formation of a water rights management team comprised of individuals from various sections within the department. The team's primary responsibilities are to provide oversight and recommendations to field personnel, the department's property rights team, and the commission on decisions and actions involving the acquisition, disposal, and use of commission water rights. The purpose of their input is to help protect the value of these important property rights as well as help put water that is already controlled by the commission and department to the best beneficial use for fish and wildlife and associated habitats. The water management section supervisor serves as the chairman of the water rights management team.

Output 1-1: Address issues associated with acquisition, management, or disposal of water rights and provide recommendations to department personnel and the commission.

The commission holds numerous water rights for fish culture, agricultural purposes associated with commission-owned wildlife habitat management units, instream flow from storage, and domestic uses. 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 while maintaining the standing and value of each right. In addition, the commission periodically has opportunities to acquire new water rights and will need to consider the consequences of such an acquisition. Similarly, there are consequences associated with a change of use action or disposal of an existing right that need to be fully considered prior to such an action.

Activity 1-1-1

The water management supervisor will schedule and chair meetings of the water rights management team upon request from regional teams or department staff. The supervisor will prepare written summaries of the findings, decisions, and actions of the team and follow up on appropriate matters associated with those summaries and recommendations as needed.

Activity 1-1-2

The water management supervisor will develop or maintain water right information on all wildlife habitat management units, culture stations, and other commission properties. As appropriate he will provide assistance and

recommendations to other department staff to assist with management of existing or newly acquired water rights on those commission properties.

Resources 1-1-1-1

No additional resources are needed at this time to address this activity other than staff time and normal office equipment.

Output 1-2: Increase public understanding of instream flow and water management issues

Over the past 20 years, the public's interest in the use of water and expectations for increasing the overall benefits from using Wyoming's water has increased. However, it is also apparent that the public has limited understanding of Wyoming water law, policies, and scientific principles of environmental flow 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 effectively express their needs and desires to natural resource managers, it is important they understand wildlife management principles, water laws and bureaucratic processes. Such informed input is essential to state agencies in order to better serve their citizenry.

Activity 1-2-1

A series of articles will be written under the "X-Stream Fishing" section of the *Wyoming Wildlife News* to increase public awareness of complexities associated with water law and instream flow science and cultivate a better awareness of and appreciation for instream flow water rights. To keep this information available to the public, all articles will be available from the department's website.

Resources 1-2-1-1

High quality photographic images are needed to publish along with text in these articles. No additional resources are needed at this time to address this activity other than staff time and normal office equipment.

Activity 1-2-2

In addition to posting X-Stream Fishing articles on the department web site, regular action is needed to update other aspects of the instream flow web page such as posting maps linked to instream flow reports and photos as well as other key reports, documents produced by the unit and links to other related web sites.

Resources 1-2-2-1

The primary resource needed to complete this activity is the ability to provide information about the water management unit and instream flow activities to a website manager who can place content on the internet. The department has developed a full-time website manager who will address this need.

Activity 1-2-3

To provide general information on a range of issues associated with riverine resource stewardship, one or more PowerPoint presentations will be developed or

maintained. Personnel will seek opportunities to present this information or respond to specific requests to various public groups, municipalities, individuals, and department personnel.

Resources 1-2-3-1

No additional resources are needed at this time to address this activity other than staff time and normal office equipment.

Output 1-3: 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.

Activity 1-3-1

Formal surveys that obtain information about water issues from a cross-section of Wyoming residents are needed to help develop and refine messaging from the water management section. 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. One of the best ways to gather objective information is through structured surveys conducted by professional marketing firms. No specific activities associated with this issue are presently planned other than periodic presentations to the WGF Commission.

Resource 1-3-1-1

Primary resources needed for conducting this activity include department and commission authorization to collect the data as well as funding to pay for data collection and report generation. Neither of these resources is available at the present time.

Output 1-4: Maintain a summary of major water development and water management projects and provide insight to potential impacts to fish and wildlife resources.

The water management unit has been involved with many water-related projects throughout the state and provided input regarding the potential fish and wildlife consequences of such projects over its existence. Many of these projects have long-term consequences for fish and wildlife in terms of their mitigation and management. Some projects have been completed and many others have been studied but were not

built or implemented; however unsuccessful projects are often resubmitted by project sponsors. Because the issues associated with many of these "dormant" water projects often remain unchanged each time they are brought back for consideration, it is important to record some of their key features to aid future managers. To retain the information associated with these projects a summary database of "major water projects" was created.

Activity 1-4-1

Update information in the major water project database as appropriate on at least an annual basis.

Resources 1-4-1-1

No additional resources are needed at this time to address this activity other than staff time and normal office equipment.

INSTREAM FLOW OUTCOMES, OUTPUTS, ACTIVITIES, AND RESOURCES

Outcome 2: Protect important fishery resources with instream flow water rights or water management strategies.

The Wyoming Game and Fish Commission is accorded the responsibility for determining where instream flow water rights are needed in Wyoming to maintain or enhance fisheries and conducting studies to determine the quantity of flow needed by statutes 41-3-1001 to 41-3-1014. The commission assigned responsibilities for implementation of these efforts to the department (Appendix A). The instream flow biologist in the water management unit has the primary responsibility and obligation to pursue this goal.

Output 2: Identify important stream fisheries where instream flow water rights are needed and appropriate.

Interpretation of "important" fishery resources must necessarily change through time to reflect current understanding of aquatic environments and to reflect the direction of the department in meeting its mission to "Conserve Wildlife, Serve People". This plan provides an opportunity to periodically re-evaluate the definition of "important" and develop priorities that reflect current department philosophies, stream flow needs, and public desires. This plan prioritizes stream fisheries consistent with current department priorities, but the ranking will be reviewed and revised, as needed, in subsequent planning efforts.

In the first prioritization process for instream flow studies, the commission identified important fishery resources by directing the department to focus on stream segments that:

1. Supported the most important fisheries to the public for recreational purposes (class 1, 2, and 3 streams that are the equivalent of current-day blue, red and yellow ribbon streams),

2. Were located on public lands or lands with guaranteed public access, or
3. Already had some manner of existing formal flow agreements.

These initial criteria have since been expanded and reprioritized such that the focus more recently has been on streams inhabited by cutthroat trout subspecies that are native to Wyoming. Those efforts initially focused on Bonneville cutthroat trout and by 1997 had resulted in water rights applications filed for 41 miles of water rights on 17 streams with this species present. Once the priority waters with Bonneville cutthroat had been studied and instream flow filings submitted, the water management unit's focus shifted to evaluate the need for instream flow filings on Colorado River cutthroat trout waters. A total of 113 miles on 29 streams with this species had instream flow filings by 2000. The remaining two subspecies, Yellowstone and Snake River cutthroat trout (YSC and SRC) were the most recent focus of instream flow studies and water rights filings. Through April 2011, 25 instream flow water rights have been filed to protect over 96.0 miles of YSC and SRC streams.

Instream flow water rights filed on streams with YSC were cited as one of several reasons for denial of endangered or threatened designations for each of the cutthroat trout subspecies in the most recent findings by the U.S. Fish and Wildlife Service. Petitions for listing these and other native fishes in Wyoming are almost certain to be made in the future. As such, the protection of habitat for native fishes with instream flow rights remains a high priority.

At the present time, YSC and SRC streams will continue to be recognized as the highest priority fishery resource for protection with instream flow water rights. Many streams with significant populations of these species exist throughout their historic range and are candidates for protection with instream flow water rights. With the future status of this species under the Endangered Species Act uncertain, additional instream flow water right filings are critical to ensure the long-term persistence of the species and maintain department authority for their management.

Activity 2-1-1

Completion of this plan specifically defines "important, high priority fishery resources" and constitutes achievement of this Activity.

Resources 2-1-2-1

Resources needed to develop this prioritization list include a variety of elements. The department's SHP (2009) and SWAP (2010) are important guides for identifying important streams for habitat protection with instream flow water rights. In addition, input from department biologists, non-governmental organizations with knowledge of fishery resources in the state and other state agencies is essential. One valuable data source is input from Trout Unlimited, which has developed a stream ranking system for native fishes. Other state agencies such as the Water Development Commission that are engaged in statewide water basin planning also have important insights

that are included. No additional expenditure of funds or acquisition of other resources is needed at the present time to conduct these activities.

Output 2-2: Review and prioritize potential waters for instream flow water rights.

Regularly reviewing and prioritizing potential waters for instream flow water rights is essential to address new information on species status and habitat condition. Prioritization may also change in response to public input or changes in instream flow legislation or policy. With one full-time employee devoted to developing new instream flow water right applications, a very limited number of comprehensive studies can be conducted annually. Therefore it is crucial that potential instream flow segments are regularly prioritized to direct limited resources to where they are most needed.

Instream flow water rights will be prioritized under a "protect the best first" approach. Priorities will be assigned by developing a composite score or rank that includes the following issues: presence of SWAP Tier 1, 2 or 3 fish species, genetic purity of target species, streams identified as high priority by fish management personnel, segments identified as priorities of agencies or entities outside the department, segments where recent habitat or population restoration efforts have been conducted or are planned, and ribbon category (blue, red, or yellow only). Streams targeted first will be those that have relatively higher priority rank, though some streams with relatively lower rankings may also be included in a given year for a variety of reasons. For example, studies on several nearby stream segments in a particular year may be more cost effective by reducing travel expenses. Filing for stream networks is also a strategy that is consistent with the broader goal of managing stream systems even if there may not be direct connections between target stream segments in all cases.

Per established policy, the commission will have an opportunity to review instream flow water right applications before they are submitted to the Water Development Commission for filing with the State Engineer.

Activity 2-2-1

Complete annual work schedule plans that refine annual priorities.

Resources 2-2-1-1

The primary resources need to complete these activities include institutional support from within the department, information received from department field personnel, input from members of the public and other agencies, and time for water management personnel to conduct this work. No additional expenditure of funds or acquisition of other resources is needed at the present time to conduct these activities.

Output 2-3: Conduct studies to identify flow levels for instream flow water rights on two to six stream segments every year.

Detailed descriptions of instream flow study methodologies are provided in recent reports such as Robertson and Dey (2009). For each potential instream flow segment,

data collection involves a minimum of three, day-long visits to a study site. In some situations, more visits are necessary to observe and measure habitat under a range of flow conditions. Additional time is necessary to coordinate access, assemble basin-level information and coordinate with other department employees, other agencies, and landowners. This intensive approach typically allows two to six studies per year under the current crew configuration.

Development of instream 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 (Binns and Eiserman 1986). 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 percent 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. In consideration of these needs, detailed hydrologic information and estimates must be developed for each instream flow segment. In previous years hydrologic analyses have been developed by contracting with qualified hydrologists.

Activity 2-3-1

Conduct instream flow field studies on two to six instream flow segments per year.

Resources 2-3-1-1

Conducting field studies requires specific personnel, equipment, and funding. At least two people are needed for collecting field data (currently consisting of the instream flow program coordinator and a 7-month seasonal technician). This field crew requires specific equipment including, but not limited to, professional surveying and flow measuring equipment, data loggers, as well as transportation (4-wheel drive pick-up; ATVs), lodging (camp trailer), funding for travel and various other support items. An annual budget is needed to ensure these resources are available.

Resources 2-3-1-2

Data analysis hardware and software that are capable of efficiently running advanced computer programs associated with two-dimensional stream flow models. Computer capacity is also needed to run aging software for the Physical Habitat Simulation Model. The present model does not perform well with 64 bit Windows 7 based operating systems so at least one “older” computer with Windows XP is needed until PHABSIM software is updated. This update is being conducted jointly by the Instream Flow Council and the U.S. Geological Service.

Activity 2-3-2

Hydrologic studies for each instream flow segment will be done either under contract with a professional hydrologist or by existing water management personnel.

Resources 2-3-2-1

Preparation of needed hydrologic information relies primarily on personnel with the training and skills needed to synthesize data based on established protocols and methods. If assistance is sought from outside the department, sufficient funding is needed to contract with professional hydrologists. If this work is done by existing department personnel, the primary resources needed include training, computer hardware and software, and adequate time in annual work schedules to conduct the analyses.

Output 2-4: Cooperate with and assist other 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 with instream flow or water management issues and challenges because of our specialized expertise in this field. Department personnel are also actively involved with various external organizations and activities related to water management that benefit fish and wildlife. It benefits the department, aquatic resources in general, and the public when the water management unit's expertise can be shared with other resource managers for the benefit of fish and wildlife.

Activity 2-4-1

Respond as appropriate to requests from other state agencies, federal agencies and non-governmental wildlife management organizations for assistance with water management applications. Specific activities may include, but not be limited to, responding 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.

Activity 2-4-2

Provide assistance upon request to the Wyoming Water Development Commission to conduct or supervise studies done by consultants (hired by WWDC) to evaluate potential aquatic impacts, benefits, and mitigation needs on proposed projects funded by the state legislature.

Resources 2-4-1-1

No additional resources are needed at this time to address this activity other than staff time and normal office equipment.

Activity 2-4-2

Maintain or establish membership on boards and organizations (such as the Wyoming Water Association and University of Wyoming Water Research Program) that are involved in water management issues.

Resources 2-4-1-1

No additional resources are needed at this time to address this activity other than staff time and normal office equipment.

Output 2-5: Apply the best available science for identifying instream flow needs.

Like all applied science, instream flow studies present a tradeoff on a scale of invested effort versus potential results. Effort and expense increases as a function of the detail desired about the relationship between flow regime and habitat. 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 regime recommendations are issued. A less rigorous study design may be justified in cases where there would be future opportunities to modify initial instream flow recommendations or where recommendations are developed on several streams simultaneously. Regardless, the majority of instream flow studies in Wyoming have involved relatively data-intensive efforts that consist of multiple site visits and thorough analysis of stream habitat data. This approach constrains to a handful the number of studies conducted and filings prepared annually. It is important to periodically evaluate the adequacy of this approach compared to other methods, how well it addresses legal constraints, whether it meets the public's information needs, and leads to fulfillment of the outcome for this component of the water management section.

Activity 2-5-1

Instream flow studies combine a broad array of inter-related scientific disciplines and technologies. To efficiently develop the most useful information for quantifying flow regime needs, it is important to network with other scientists and specialists by attending scientific meetings and workshops as well as reading journals and books. To address this output, unit members should attend at least one scientific meeting per year. Scientific meetings may include local and regional meetings of the American Fisheries Society, regional and national meetings of the Instream Flow Council, and other specialized meetings like "Eco-hydraulics" devoted to flow issues. Section members should also review journals and publish papers on a regular basis.

Resources 2-5-1-1

Funding is needed to support travel to approved scientific conferences, workshops and meetings. Funding is also needed to pay membership dues in professional organizations to maintain communication networks and opportunities.

Output 2-6: Prepare filings for two to six instream flow water rights annually.

The next steps following field studies and collection of hydrologic data are 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 department engineer or an outside contractor.

Activity 2-6-1

Annually complete data analysis, report writing, application submittal, and intra-departmental coordination for instream flow studies.

Resources 2-6-1-1

The primary resources needed to complete this output are computer hardware and software, office space, and well-trained personnel. No additional resources are needed at the present time.

Output 2-7: Facilitate advancement of instream flow water right applications to permit status by providing information, collecting data, and maintaining records.

Following submittal of instream flow water right applications to the state engineer's office and receipt of a priority date, additional activities are necessary to meet requirements of the instream flow law and facilitate advancement of the instream flow water right to permit status. These activities are further described below:

Activity 2-7-1

Provide information on instream flow water rights at department-sponsored information meetings and statutorily required public hearings. Provide information to the commission, state engineer, board of control, and other groups or individuals as requested or appropriate. These meetings are scheduled by the state engineer and the date and location are beyond department control.

Resources 2-7-1-1

Wyoming statute requires the commission to pay all expenses associated with filing instream flow water rights. These include department expenses and application fees as well as all expenses associated with the hearings incurred by the state engineer and board of control. These may include advertising for the hearing, meeting room expense, court recorder fees and travel expenses for the state engineer and staff. A specific line item of an appropriate amount is needed in the water management budget to pay all of these expenses.

Activity 2-7-2

A Microsoft 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 is used for responding to public information requests, status updates, and tracking progress of individual water rights through the permitting process.

Resources 2-7-2-1

Periodic assistance is needed from the Fish Division IT expert to manage these data. No additional resources are needed at the present time.

Output 2-7: Monitor instream flow water right compliance.

As the number of instream flow filings increases, it becomes more difficult to monitor flow patterns and track issues that may affect flow in those segments throughout the year. Currently, the water management unit relies on regional fisheries biologists and aquatic habitat biologists to observe stream segments with instream flow rights for instances of obvious non-compliance. However, the effectiveness of this approach is limited since these personnel are not always able to determine whether instream flow water rights are being affected by various activities. In addition, their already busy schedules generally limit their ability to provide monitoring data to the water management unit in a timely manner. The lack of active stream gages in nearly all instream flow segments limits the ability to conduct more detailed monitoring efforts.

Changes in dominant weather patterns associated with global climatic changes are expected to change precipitation patterns and water availability in most parts of the state. Monitoring flow patterns and modeling future hydrologic conditions will be an increasingly important information need for the water management unit as well as other fish and wildlife managers in the department whose efforts are related to watershed, riparian, and reservoir management as related to water availability. These analyses generally require the specialized skills of a professional hydrologist.

Activity 2-7-1

Provide annual summaries to field crews of instream flow segments in their management region. Request that fisheries managers and aquatic habitat biologists provide information as appropriate about potential impacts or threats to protected flow regimes in those segments.

Activity 2-7-2

Respond to all reports of potential impacts or benefits to existing instream flow segments to document the extent of those effects and take appropriate action.

Activity 2-7-3

Develop synthesized hydrographs for candidate instream flow segments on at least two streams per year. Install continuous recording stream gages at appropriate locations and collect data for at least one field season per site. Other activities will involve developing rating curves, downloading data, and generating hydrographs.

Resources 2-7-3-1

Continuous recording pressure transducers and basic staff gage equipment are needed to obtain annual flow data. Standard flow meters and associated equipment are also needed to measure stream flow levels.

Resources 2-7-3-2

The services of a professional, full-time hydrologist are needed to develop hydrologic models associated with all three activities. Work produced by this new position would benefit most divisions in the department by quantifying water use and needs on commission properties, improving hydrologic forecasting, and developing water management strategies to manage or mitigate potential impacts and benefits to fish and wildlife state-wide.

Output 2-8: Investigate new instream flow methods for application in Wyoming.

The water management unit has an established reputation for using state-of-the art techniques to quantify instream flow needs 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), aerial multi-spectral videography techniques for quantifying habitat (Dey and Annear 1996), bio-energetic 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 processes and trout habitat and bioenergetics (Annear et al. 2002), development of habitat suitability curves for native trout species (Dey, unpublished) and identification of relationships between instream flow results and channel geomorphic characteristics (Dey and Robertson, in process). Continuing such pertinent studies will maintain our place at the national forefront of instream flow science while maintaining the scientific credibility of the studies we conduct and flow regime recommendations we make.

Activity 2-8-1

For the planning period, we anticipate the field component of the current geomorphology study to identify patterns among instream flow study results and channel geomorphic characteristics will be completed. Crew members will investigate the feasibility of applying other methods such as Demonstration Flow Assessment, Bayesian Probability Analysis, Ecological Limits of Hydraulic Alteration (ELOHA), and other emerging tools.

Resources 2-8-1-1

No additional resources are needed to support this activity.

Output 2-9: Obtain training to apply appropriate flow models and technical tools

Continuous training is necessary to keep pace with rapidly changing technologies and advances in scientific understanding. Potential training needs 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 2-9-1

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

Resources 2-9-1-1

The primary resource needed to obtain training is a dedicated funding in the annual budget for registration as well as travel expenses. Classes can extend for one to two weeks annually plus travel. Travel is often out-of-state.

Output 2-10: Help fisheries management and aquatic habitat achieve their specified goals

With specialized knowledge, skills, and abilities, the water management unit has periodically helped regional fisheries management crews on issues related to water, habitat, and fish population issues. Opportunities exist for further collaboration with regional aquatic habitat biologists in assessing, monitoring, and modeling impacts and benefits from habitat manipulations. Recent examples include application of 2-dimensional habitat modeling to evaluate sill and gravel function on the North Platte River (Miracle Mile) and monitoring relationships between flow and fish populations on Clear Creek following the Tie Hack project.

Activity 2-10-1

Opportunities for cooperative assistance often arise during the annual work scheduling process for all crews. We will budget our time accordingly to help with high priority flow and water management needs as they develop.

Resources 2-10-1-1

No additional resources are needed at this time to address this activity other than staff time and normal office equipment.

PRIORITIZATION OF STREAMS FOR INSTREAM FLOW WATER RIGHTS

The process of prioritizing streams for instream flow water right consideration is driven in part by the fish species present per the State Wildlife Action Plan (SWAP, 2010), although a variety of other elements are also considered. The SWAP had its origins in element 1 of the federal congressional guidelines that specify that each state must develop a comprehensive report that provides "information on the distribution and abundance of species of wildlife, including low and declining populations as the state wildlife agency deems appropriate, that are indicative of the diversity and health of the state's wildlife." The species identified in the SWAP have been termed Species of Greatest Conservation Needs (SGCN), which broadly identifies species whose conservation status warrants increased management attention and funding as well as consideration in conservation, land use, and development planning in Wyoming.

The department developed a classification system to identify species of special concern. The Native Species Status (NSS) classification system has evolved and is based on a combination of population and habitat variables in a 16-cell matrix format to rank and display each species' status (Appendix B, Table 1). The population variables range over a continuum from populations that are declining with extirpation possible to populations that are widespread and expanding. After identifying population status, the primary limiting habitat factor is evaluated. The categories for these factors range from "severe and worsening" to "moderate and not likely to increase" (Appendix B, Table 2). The matrix cell established by the intersection of the selected row and column identifies the NSS rank for a species.

Species identified as NSS1, NSS2, NSS3, NSS4, and NSSU were considered SGCN during the development of the SWAP and includes 30 fish species (Appendix C). Following this initial designation, SGCN were further categorized in a process identified in the SWAP. These refining factors included considerations such as a) Wyoming's contribution to the species' overall conservation, b) regulatory or monetary impacts of the species' listing under the Endangered Species Act, c) urgency of conservation action, d) the ability to implement effective conservation actions, and e) the species' ecological or management role as a keystone, indicator, or umbrella species. Based on a composite score for each of these variables, species were assigned status of Tier I – highest priority, Tier II – moderate priority, and Tier III – lowest priority (Appendix C).

The ranking system for instream flow study streams in this plan is based on a composite score drawn from several factors, not just the presence of SGCN in a given stream. The system was designed to provide a defensible, flexible, and potentially enduring mechanism to focus instream flow and water management efforts toward species and streams where the greatest need exists today based on current department management goals and vision and public input. Though these views and values may change slightly in the future, the resulting template presented here is intended to be adaptable to future shifts in goals and policies.

Methods

Previous instream flow/water management plans focused on defined categories of streams where the emphasis was determined in consultation with administrators and other fisheries personnel. For example the most recent five-year plan (Annear and Dey 2006) focused strictly on prioritization of streams providing habitat for and populations of YSC. Previous plans had placed emphasis on other native cutthroat trout species as well as important recreational trout fisheries. While each plan led to instream flow water right filings on some of the most important streams in the state, many important streams with native cutthroat trout and important recreational fisheries still lack habitat protection with instream flow water rights. In addition, many streams containing SGCN other than trout have never been considered for instream flow studies.

Important themes that can be drawn from this history of instream flow filings are that state and department priorities change over time, department resources to address those needs are limited, and flexibility is needed to adapt to evolving issues and water management needs. Though the department has used a five-year planning window in the past for assessing priorities and identifying appropriate resource needs, there is also a need to address longer-term vision and be responsive to shorter-term needs that arise within the planning horizon. This plan addresses

these issues by presenting a comprehensive list of streams and stream segments that could benefit from instream flow filings based on current knowledge. This comprehensive list allows managers to better anticipate longer-term flow protection needs while also providing information to assess the relative importance of structuring annual work plans to address evolving issues and water management needs.

Ranking Process

The process of prioritizing streams for instream flow water right consideration necessarily begins by populating a master list. For this exercise we included all streams or stream segments that were specifically listed as priority conservation areas in the SWAP (WGFD 2010). In addition, the department's STREAMLK database was used to select all streams that were classified as blue, red, or yellow ribbon, as of February 2011 for inclusion in the master list. Streams with BRC, CRC and SRC were also identified in the STREAMLK database search (those streams not already identified in the SWAP). Finally, all streams that were identified as having a population of YSC (in Wyoming) by the multi-state recovery team were added to the list. In some cases, entire streams were represented, however many "streams" in this master list actually represent multiple discrete segments in a single stream. As such, all references to streams in this plan refer to the streams or stream segments as presented in the database.

Goal 1 of the Strategic Habitat Plan (2009) is "Conserve and manage wildlife habitats that are crucial for maintaining terrestrial and aquatic wildlife populations for the present and future." Under this goal (or outcome), one objective (or output) is to maintain existing habitat values within crucial habitat areas. Crucial habitat priority areas are based on significant biological or ecological values. These are areas that need to be protected or managed to maintain viable healthy populations of terrestrial and aquatic wildlife for the present and future.

An important strategy listed in the SHP for achieving this objective is protecting important fishery resources with instream flow water rights. In light of this guidance, this plan identifies all stream fisheries that are listed as crucial habitats and assigns them a value in the ranking model. Though this ranking attribute is based on other ranking attributes (like SGCN or native trout), including this attribute helps identify and affirm those streams within those other attribute rankings that are a special priority to the department (and public).

This master list did not include streams in geographic jurisdictions where state-led instream flow studies are inappropriate. These areas include streams within Yellowstone National Park, federal wilderness areas, and Native American reservations.

Development of Stream Groups

The master list was subdivided into five broad groupings based on historical and anticipated future instream flow focal areas. The groups consist of:

1. SGCN – Bonneville cutthroat trout (SGCN-BRC),
2. SGCN – Colorado River cutthroat trout (SGCN- CRC),
3. SGCN – Yellowstone and Snake River cutthroat trout (SGCN-YSC/SRC),
4. SGCN – other native fish species (SGCN-Other), and
5. All blue, red, and yellow ribbon streams (Ribbon streams).

Fish communities in some streams included species that could technically be placed in more than one group. For example a yellow ribbon recreational fishery with bluehead suckers and Colorado River cutthroat trout could be placed in three different groups. In those few instances, we placed the stream segment in only the group judged most critical or important.

A ranking system within each of these groups allows managers the flexibility of identifying long-term priorities without the need to answer the difficult question of whether a stream with a native non-game fish species is a higher priority than a stream with a particular native cutthroat, or whether one native cutthroat trout species is a higher priority than another native cutthroat species. It further allows managers the ability to evaluate the relative urgency of an unanticipated water management issue on an individual stream that may not be among those planned for instream flow studies. It is important to note that a stream's placement on the priority list does not constitute a mandate for its protection with an instream flow right. The system is intended to provide an objective assessment of the relative need to secure this kind of protection or pursue other water management strategies based on present information and the relatively few criteria included in this ranking system.

Ranking Streams Within Stream Groups

Within each group of streams, criteria were used to generate a score for individual streams. The same basic scoring system was used among groups, though slight modifications were incorporated within some groups to provide extra detail and differentiate streams. The first step in the ranking process was to add the score for each criterion listed below and generate a 'base score.' This base score was subsequently multiplied by a value of 1 or 0 for each of two filters (these indicate a positive or negative result for the filter) to obtain a final score. If the two filters both yielded a positive result, the stream retained its base score and was ranked accordingly. But where either filter yielded a negative result, individual streams were moved to a list of "unranked" streams meaning they were impractical for pursuing instream flow water rights at the present time. Streams on that list are not targeted for actions that would elevate them to the final list of ranked streams, but retaining them in the master list allows managers and the public to see why instream flow actions are directed toward some streams and not to others. Streams on this list may move onto the list of ranked streams in the future if additional information is obtained or land status changes.

The criteria used to generate a priority ranking score for streams included the following:

- **Strategic Habitat Plan (SHP)** – The SHP (2009) is an important management tool that was developed to help guide wildlife management activities. The report identifies two key habitat areas: crucial habitat areas (streams and watersheds) and enhancement areas. Crucial habitat areas are assigned the highest priority for maintaining or restoring habitats and species. Enhancement areas include areas where habitat restoration is needed. For this prioritization effort, a rating of "10" was applied to all streams within crucial habitat areas. A score of "5" was assigned to all streams within enhancement areas. Streams that are not identified as occurring within crucial or enhancement habitats received a rating of "0", which simply accords them no elevated priority status.
- **State Wildlife Action Plan (SWAP)** – Fisheries personnel identified high priority streams in the 2010 SWAP. For this prioritization effort, a rating of "10" was applied

to all SWAP high priority streams and watersheds. Streams that are not identified as a high priority or crucial or enhancement habitats received a rating of "0".

- **Ribbon Score** – This attribute was used both as a basis for establishing one of the five major categories as well as a ranking factor within each category. Ribbon color is a categorization system developed by the department to differentiate among streams based on the sole variable of trout population abundance (Annear et al. 1999, Table 1). It is an indirect indicator of the potential recreational value of a stream regardless of whether the stream is on public or private land. Scores for this criterion were assigned as follows: blue ribbon = "10", red ribbon = "5", and yellow ribbon = "1". Streams in other categories received a "0".

  Table 1. Criteria upon which Game and Fish Department ribbon colors are based.

Category	Pounds of Sport Fish per Mile
Blue Ribbon	≥600
Red Ribbon	≥300 and <600
Yellow Ribbon	>50 and <300

- **SGCN Score** – Because of the importance of SGCN species in department planning efforts, we including a scoring criterion that assigned a score of "5" if at least one Tier 1 SGCN species occurs in the stream, a score of "3" if at least one Tier 2 species occurs there, and a score of "1" if at least one Tier 3 SGCN species occurs there. The Tier yielding the highest score was used (e.g., if both Tier 1 and 2 species occurred in a stream, a score of "5" was assigned).
- **Genetics Score** – This attribute has most utility for SGCN-YSC/SRC SGCN-BRC, and SGCN-CRC streams due to the availability of the multi-state recovery team data (Yellowstone Cutthroat Interagency Coordination Group, 2010. and similar references for BRC and CRC) that has been collected and distributed for many waters containing these species. Where that report indicates that genetics of the trout population are essentially unaltered, a score of "10" was given. Where the genetic purity of trout in a stream was 1%-10% altered the stream received a score of "5". Streams where evidence of greater alteration than 10% were assigned a score of "1". In streams where genetics was unknown for the target species, a conservative approach was taken by assigning a score of "10". Until genetic degradation is proven it is inappropriate to minimize the potential rank of a stream that may contain genetically pure individuals of a species.

  Directly comparable data are not presently available for streams with SGCN-Other or Ribbon streams. Streams in the SGCN-Other group are challenging to score using this ranking criterion due to the general lack of available data. Fisheries management personnel provided input regarding locations of essentially pure populations of those species exist based on their observations and analyses. Those streams were rated "10". Where populations of SGCN are known to hybridize with non-native species with moderate frequency, a score of "5" was assigned. Streams where hybridization

is abundant were given a score of "1". In streams where the genetic composition of SGCN is presently unknown a score of "10 was given to ensure genetically important streams are not erroneously minimized.

In all of these cases, base scores and rankings for individual streams can be readily updated as information becomes available.

- **Recent Or Anticipated Focal Species Population/Habitat Restoration Work –** Department personnel regularly conduct habitat restoration or improvement work on streams around the state. Activities often involve restoring watersheds, connectivity, stream bank stability, or geomorphic processes. Flow regimes are often assumed to be adequate in restored reaches but adequate water availability in fact may or may not be secured. To provide meaningful assurance of permanent benefit from habitat or population restoration work, it is often important to formally protect existing or needed flows with instream flow water rights. As such, streams where department personnel have or will conduct habitat or other population restoration efforts are given a score of "10" in the ranking system to reflect the fact that virtually any investment of time or resources is an indication that the stream has value for fisheries or public use. All other streams received a score of "0".

  There are some situations where securing or acquiring water rights in conjunction with habitat or population restoration is legally or institutionally not allowed or feasible. The majority of those situations are on private land or where adequate supplies of unappropriated water are not likely available. Both of those issues are filters (described below) that are incorporated in the stream ranking system that eliminate a stream from active consideration of instream flow studies.

- **Trout Unlimited (TU) Conservation Success Index (CSI) Scores** – This plan addresses statewide water management needs for the general public so necessarily includes priorities of individuals and entities outside the department. One form of public input was taken from the CSI scores that TU has developed for native trout species in the western U.S. (see http://www.tu.org/science/conservation-success-index). The CSI score for each stream is the summation of individual scores for a) median range-wide condition, b) median population integrity, c) median habitat integrity and d) median future security. In TU's system, each attribute is further subdivided into 5 components that combine to yield scores ranging from 0-25. When all four of these attribute scores are summed, the maximum CSI score is 100. For this plan, we assigned scores of "5" to all streams with a CSI of 80 or more, "3" to all streams with a CSI of 60-79 and "0" to all streams listed by TU that received a lower CSI ranking or for which no CSI score was available. This ranking system is in keeping with the water management unit's commitment to "protect the best first".
- **Public or Other Agency Priority** –Another form of public input comes from periodic expressions of interest in various streams around the state that are directed to the water management unit. Some of those requests are formal, but most of this input is provided verbally at public meetings, hearings, and other professional settings.

  Other state agencies likewise have an interest in protecting or restoring instream flows in streams for various reasons. As part of the review process for developing

this plan, input was requested from the Wyoming Water Development Office, Wyoming Department of Environmental Quality, and Wyoming State Engineer's Office. Input was also sought from numerous non-governmental organizations and municipalities. Streams identified as needing protective or restorative instream flow regimes were combined with streams for which water management personnel have received expressed interest or importance. Similar to scoring priorities identified by department personnel, any stream for which a priority for instream flow protection was expressed by a member of the public or another agency or entity a score of "5" was given. Streams not receiving such requests received no score. At this writing no significant input has been received from other entities that have reviewed the plan.

Filters

The final stream ranking score was obtained by multiplying the base score by a value of 1 or 0 for each of two filters. The filters were used to remove streams from consideration (with a 0 multiplier value) when legal, institutional, or social factors make their consideration for instream flow water right filings impractical at the present time. This mechanism also identifies potential obstacles and management challenges to securing conditions of better flow on some streams as questions arise as to why they were or were not considered for instream flow water right filings. If and when these limiting elements are addressed, individual streams would no longer be filtered out (the multiplier value will be changed to a 1) and would be returned to full consideration. The list "unranked" streams is retained in the event that managers and others who are interested in pursuing flow protection or restoration in those streams may identify why the water management unit is not considering studies on those particular streams.

The filters include the following:

- **Instream Flow Filing Already Exists or is Planned** – On streams where an instream flow filing has already been submitted or is currently under study and an application is imminent, regardless of its status of permitting or adjudication, a score of "0" was assigned. This appropriately removes those streams from consideration. All other streams received a rating of "1".
- **Private Land** – If the stream runs through primarily private land, it typically has little value to the fishing public and would not be considered for an instream flow filing. Rather than attempt to define a minimum threshold distance for public access (such as a part that is on Forest Service or BLM land), streams that include at least one mile or more of private land along its length, a score of "0" was given. A more thorough review of individual streams may reveal that some that were filtered out with this method still have excellent public access and should be considered for instream flow filings. We will rely on managers or others to request that an individual stream or segment be considered with the understanding that an instream flow segment would only be evaluated through the section with public access and not extended onto privately owned portions unless the private landowner provided a written request for such action.

Final Ranking

Streams within each of the five stream groups for this plan were split into three broad priority levels: high, medium, and low priority, based on their final scores (Table 2). Because designated priority levels of high, medium, and low are only relative indicators, breaks were

identified by subjectively selecting natural break points between streams (e.g. where the final stream rank score changed markedly from one stream to another). Though streams within each of these priority levels exhibited a range of scores, all streams in each grouping were regarded to have the same relative rank, so there is no "highest" or "lowest" priority stream. This perspective is an important one considering that evolving information can easily move streams to different priority levels or generate different scores within a priority level.

The highest potential score a stream could receive according to the scoring criteria is 65. Not all of the scoring criteria exerted the same degree of influence in differentiating among streams within a group, especially in cases where most or all of the streams in a group received the same score. Similarly, individual scoring criteria varied in influence among groups, but it is not essential that all groups of streams have the same or similar ranges of scores. As noted previously, it is philosophically inappropriate to create a system that differentiates between, for example, the relative rank (importance) of a stream with Bonneville cutthroat trout versus a stream with flannelmouth suckers versus a blue ribbon trout stream. The distinction in those instances is affected by drivers that are more value driven than statistically oriented. Department vision, public sentiment and legislative or institutional mandates are among the several external factors that cause fisheries managers to address value judgments. As noted, this prioritization effort is most useful for assessing the relative rank of streams within the five broad groups as a function of available and evolving information and should not be used to compare one group to another.

Table 2. Scores associated with high, medium and low priority ranks of streams in each of the five stream groupings used in this plan.

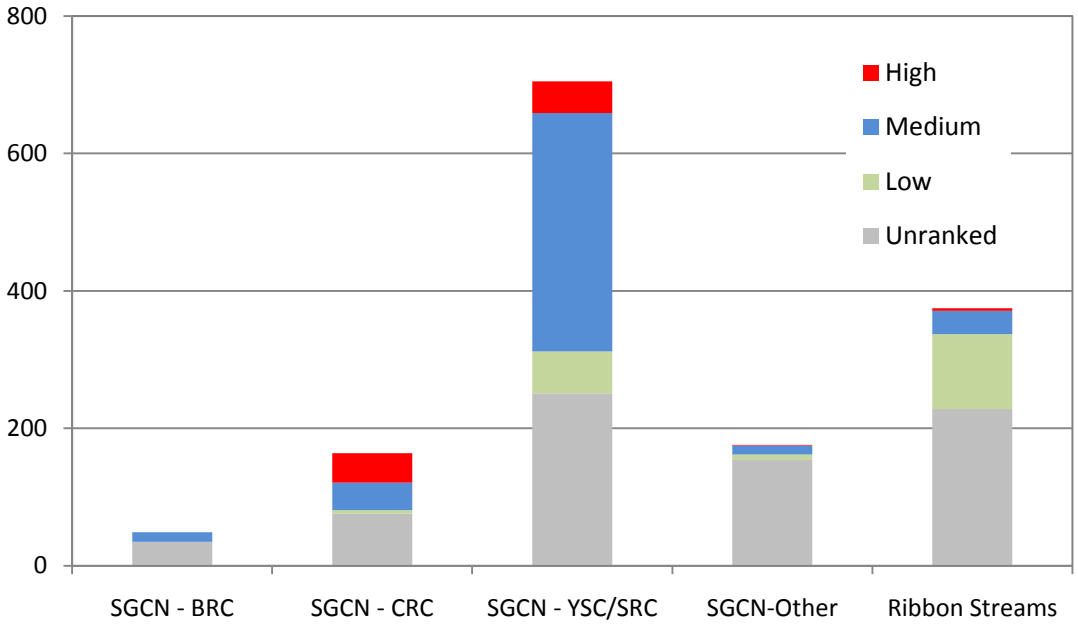
High	Medium	Low
>=40	**20 – 39**	**< 20**

Results

Stream Group, Scoring Criteria, Site Selection Filters, and Ranking Categories

A total of 1,469 streams and stream segments were grouped and assigned to a ranking category in this process. Of this total, the majority of streams were in the SGCN-YSC/SRC group and the fewest were in the SGCN-BRC group (Figure 1).

The number of streams in the high priority ranking category was relatively low in each group and was lowest in the SGCN-BRC group (Figure 2). The highest proportion occurred in the SGCN-CRC group where approximately 26% of the streams were high priority streams. The SGCN-YSC/SRC group had the greatest number and proportion of streams that ranked high and medium in this process. At the other end of the scale, the relatively high proportion of unranked streams in each category reflects the combined effect of the filters: streams on which instream flow water rights have already been filed or are planned and streams passing through private lands.



Priority	SGCN - BRC	SGCN - CRC	SGCN - YSC/SRC	SGCN-Other	Ribbon Streams
High	0	43	46	1	4
Medium	14	40	347	13	34
Low	0	5	61	8	109
Unranked	35	76	251	154	228
Total	**49**	**164**	**705**	**176**	**375**

Figure 1. Number of streams in each ranking category in each of the five stream groups.

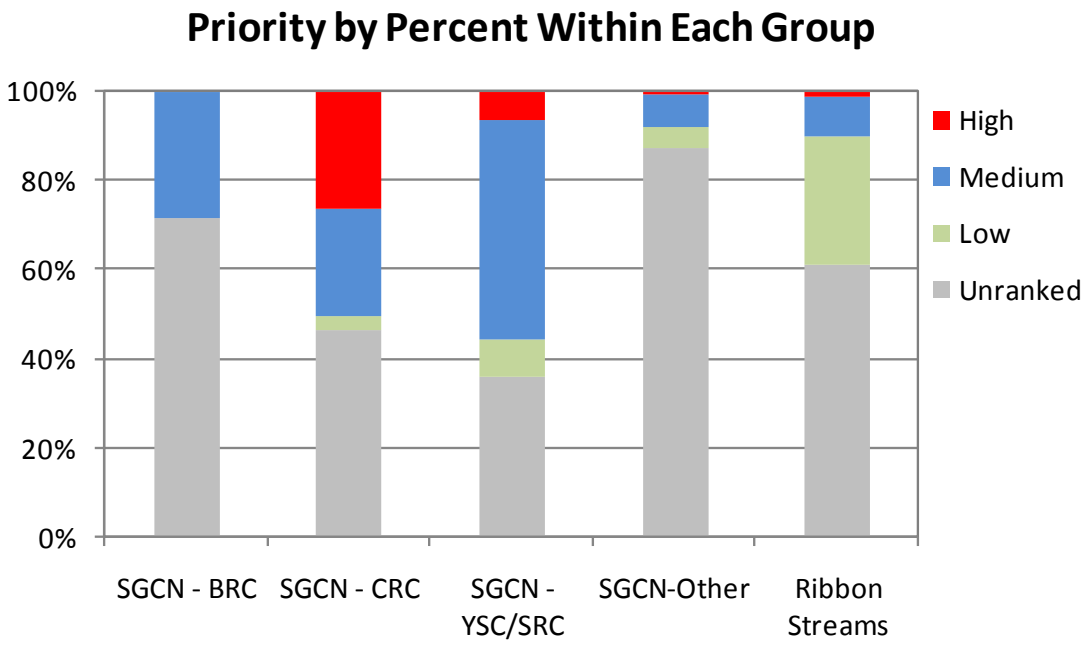


Figure 2. The percent of streams in each ranking category in each of the five stream groups.

Application - Annual Work Planning

For the first twenty or so years following passage of the state instream flow law, instream flow filings prepared by the department focused primarily on Ribbon streams, BRC and CRC streams. Under the five-year plan and period immediately preceding this one, efforts turned to preparing instream flow filings on YSC/SRC streams. Given the relatively large number of streams in this latter category, and the continued priority of the department to maintain and enhance populations of those species, the present focus for instream flow studies and filings will remain on this grouping. However, that emphasis will not preclude conducting studies on streams in other categories as legitimate needs are identified.

The stream rankings will be a primary driver for selecting streams for study for the water management unit during annual work planning. Other factors including, but not limited to, directives from fish division administration or the WGF Commission, requests from other agencies, or the need to address instream flow issues associated with private projects may also influence annual work planning and stream study selection. It is likely that the unit will conduct instream flow studies on two to six streams per year. Using the stream rankings and input for direction, the unit will select as many high priority streams as possible that are located in close proximity to each other. However as noted previously, studies may occasionally be conducted on lower priority streams that are located in close proximity to a higher priority stream (e.g., to increase efficiency by working in a relatively small geographic area or to address watershed connectivity of stream habitats).

Though the primary focus of instream flow studies will likely remain on YSC/SRC streams in the near future, this focus could change or opportunities to address instream flow regime needs in other streams may receive a high priority. Such direction could come from within the department or originate from external sources including requests to address potential aquatic impacts and benefits associated with projects funded by the Wyoming Water Development Commission and others. Annual information updates and flow protection requests from department personnel and staff may also affect the direction of instream flow filing activities.

As noted previously in this report, the ranking of streams will be updated as needed when additional information is obtained. Department personnel are continually collecting new information about streams, management priorities are periodically changing, habitat restoration efforts are conducted or delayed as a function of funding availability (or lack thereof), and land ownership (access) changes over time as well. As a consequence, this process and list of streams is dynamic and will change over time. The template established here may persist; however, ranking criteria may also change in ways that rearrange the priority rank of streams.

For these reasons and others noted throughout the text of this plan, the present ranking serves primarily as a guide to help fisheries and water managers identify streams where presently available information and philosophies indicate that the value of instream flow studies can be maximized. This document does not serve as a mandate to pursue action on any individual waters. It will, however, serve as one of several inputs to help water management personnel develop annual work plans to protect public trust fishery resources throughout the state.

High Priority Watersheds (subject to annual review)

Based on criteria and guidance in this report and presently available information and emphasis known to department personnel, regions and priority streams where the water management unit will explore opportunities to conduct studies over the next five years have been identified (Table 3). However, instream flow studies will likely not be limited to these geographic areas in the coming years. Based on the increasing emphasis directed to non-game SGCN species, the unit will probably direct increasing attention to stream habitats containing those species, including conducting instream flow studies in some streams. Studies may also be conducted on other streams at the request of other state agencies or private individuals. In addition, a shift in priorities may occur if new genetics or population information such that department priorities change.

Table 3. Watersheds or regions where instream flow studies are tentatively planned for the next five-year period.

Field Season (Year)	Primary Watershed or Region	Primary Stream Group
2011	West slope Bighorn Mountains	SGCN–YSC/SRC
2012	West slope Bighorn Mountains	SGCN–YSC/SRC
2013	East slope Bighorn Mountains	SGCN–YSC/SRC
2014	Clarks Fork drainage	SGCN–YSC/SRC
2015	Clarks Fork drainage	SGCN–YSC/SRC

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APPENDX A

Wyoming Game and Fish Commission Instream Flow 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.

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 B

Table 1. Native Species Status Criteria

		Limiting Factors			
		a EXTREME Limiting factors are severe and continue to increase in severity	**b SEVERE** Limiting factors are severe and not increasing significantly	**c. MODERATE** Limiting factors are moderate and appear likely to increase in severity	**d. MINIMAL** Limiting factors are moderate and not likely to increase in severity
Population Status	**A. IMPERILED** Population size or distribution is restricted or declining and extirpation is possible	Aa **NSS1**	Ab **NSS2**	Ac NOT APPLICABLE	Ad NOT APPLICABLE
	B. VULNERABLE Population size or distribution is restricted or declining but extirpation is not imminent	Ba **NSS2**	Bb **NSS3**	Bc **NSS4**	Bd NOT APPLICABLE
	C. STABLE Population size and distribution is stable and the species is widely distributed	Ca NOT APPLICABLE	Cb **NSS4**	Cc **NSS5**	Cd **NSS6**
	D. EXPANDING Populations are expanding in number and/or distribution and the species is widely distributed	Da NOT APPLICABLE	Db NOT APPLICABLE	Dc **NSS6**	Dd **NSS7**

Native species status should be considered for species native to Wyoming within the historic range of the species. Select the most relevant limiting factor from Table 2 for the particular species. Species whose distribution and general abundance are unknown cannot be evaluated and should be listed as NSSU. Species designated as NSS1, NSS2, NSS3 or NSSU are the most likely to be considered SGCN in Wyoming. In addition, all federally listed species are SGCN, with their specific NSS designation determined by their population status and limiting factors.

Table 2. Limiting factors.

LIMITING FACTORS	**a EXTREME** Limiting factors are severe and continue to increase in severity	**b SEVERE** Limiting factors are severe and not increasing significantly	**c. MODERATE** Limiting factors are moderate and appear likely to increase in severity	**d. MINIMAL** Limiting factors are moderate and not likely to increase in severity
Habitat	***Deteriorating*** Significant ongoing and increasing loss of habitat or extremely limited habitat	***Restricted*** Significant loss of habitat	***Vulnerable*** Habitat is vulnerable but not currently restricted; increases in habitat loss likely	***Stable*** Habitat is secure and/or widespread
Human activity	***Highly sensitive*** Disturbance significantly and increasingly impacting populations	***Sensitive*** Disturbance significantly impacting populations	***Adaptive*** Disturbance currently results in moderate population reductions; additional losses likely	***Tolerant*** Species routinely occupies disturbed environments and habitats closely associated with humans
Genetics	***Deteriorating*** Species significantly declining in genetic purity or ongoing hybridizations	***Restricted*** Unaltered genetic base is severely restricted geographically or genetically	***Vulnerable*** Unaltered genetic base is currently stable but vulnerable to hybridization or loss of genetic diversity	***Stable*** Desired genetic base is secure and widespread.
Invasive species	***Deteriorating*** Invasive species causing significant and increasing population impacts and loss of habitat	***Restricted*** Invasive species causing significant population impacts or loss of habitat	***Vulnerable*** Invasive species impacts moderate but expected to increase in severity	***Stable*** No current or expected impacts from invasive species
Others Disease Contaminants Climate change				

Choose one factor that is most limiting to the species when making the NSS determination

APPENDIX C

List of native species and their Native Species Status (NSS) and Tier Ranking

Common Name	Scientific Name	2010 NSS Cell	Tier
Bluehead Sucker	*Catostomus discobolus*	NSS1 (Aa)	I
Colorado River Cutthroat Trout	*Oncorhynchus clarkii pleuriticus*	NSS2 (Ba)	I
Flannelmouth Sucker	*Catostomus latipinnis*	NSS1 (Aa)	I
Kendall Warm Springs Dace	*Rhinichthys osculus thermalis*	NSS1 (Aa)	I
Northern Leatherside Chub	*Gila copei*	NSSU (U)	I
Roundtail Chub	*Gila robusta*	NSS1 (Aa)	I
Sturgeon Chub	*Macrhybopsis gelida*	NSS1 (Aa)	I
Yellowstone Cutthroat Trout	*Oncorhynchus clarkii bouvieri*	NSS2 (Ba)	I
Bonneville Cutthroat Trout	*Oncorhynchus clarkii Utah*	NSS3 (Bb)	II
Burbot	*Lota lota*	NSS3 (Bb)	II
Finescale Dace	*Phacinus neogaeus*	NSS2 (Ab)	II
Goldeye	*Hiodon alosoides*	NSS3 (Bb)	II
Hornyhead Chub	*Nacomis biguttatus*	NSS2 (Ab)	II
Iowa Darter	*Etheostoma exile*	NSS3 (Bb)	II
Mountain Whitefish	*Prosopium williamsoni*	NSS4 (Bc)	II
Pearl Dace	*Margariscus margarita*	NSS2 (Ab)	II
Plains Minnow	*Hybognathus placitus*	NSS3 (Bb)	II
Plains Topminnow	*Fundulus sciadicus*	NSS3 (Bb)	II
Sauger	*Sander canadensis*	NSS3 (Bb)	II
Shovelnose Sturgeon	*Scaphirhynchus platorynchus*	NSS3 (Bb)	II
Snake River Cutthroat Trout	*Oncorhynchus clarkii*	NSS4 (Cb)	II

Common Name	Scientific Name	2010 NSS Cell	Tier
Suckermouth Minnow	*Phenacobius mirabilis*	NSS2 (Ab)	II
Western Silvery Minnow	*Hybognathus argyritis*	NSS2 (Ab)	II
Bigmouth Shiner	*Notropis dorsalis*	NSS4 (Cb)	III
Brassy Minnow	*Hybognathus hankinsoni*	NSS4 (Bc)	III
Central Stoneroller	*Campostoma anomalum*	NSS4 (Cb)	III
Common Shiner	*Luxilus cornutus*	NSS4 (Bc)	III
Flathead Chub	*Platygobio gracilis*	NSS4 (Bc)	III
Northern Plains Killifish	*Fundulus kansae*	NSS4 (Cb)	III
Orangethroat Darter	*Etheostoma spectabile*	NSSU (U)	III

Species of Greatest Conservation Need Wyoming Game and Fish Department Introduction Wyoming State Wildlife Action Plan – 2010; Page IV – i – 10.