

Water Management Unit Plan

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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 Wyoming Game and Fish Commission (Commission) has the authority to identify streams where instream flow needs are critically important as well as the responsibility of quantifying the flow regime needs for each of those streams. To date, Wyoming Game and Fish Department (WGFD) personnel have submitted 149 applications to obtain instream flow water rights. The majority of instream flow filings have been on important recreational streams, as well as streams harboring habitat for and populations of native Bear River, Colorado River, Snake River, and Yellowstone Cutthroat Trout. Recently, WGFD priorities have been on native Cutthroat Trout streams.

Since 1994, the WGFD has developed four plans to direct water management and instream flow protection efforts, and to share its views with other agencies and the public. This plan, the fifth in that series, draws on Commission and WGFD direction and identifies strategies and actions to achieve identified goals complementary to those in the WGFD's State Wildlife Action Plan and Statewide Habitat Plan (SHP). This plan does not pre-empt policies and guidelines in those guiding documents.

The vision of the Water Management Unit is, within statutory obligations and legislative limits, to protect, restore, and enhance stream flow regimes and water levels needed to conserve aquatic wildlife for the benefit of Wyoming's citizens. This vision guides the Water Management Unit's primary functions of 1) proactively engaging in various water management issues, 2) conducting instream flow studies to secure current-day priority instream flow water rights, and 3) assisting with stream restoration project development and monitoring. Strategies and actions to accomplish all three important functions are outlined in this plan. However, since late 2018 when the Water Management Supervisor retired, the unit has been staffed with one salaried position, an Instream Flow Biologist. A water management coordination position is needed to effectively accomplish the first priority; engaging in water management issues. This includes representing WGFD interests associated with complex water management issues and water development projects, establishing relationships and providing consistent, effective messaging about resource protection to water users, water management agencies, and non-governmental agencies.

This plan focuses on strategies and actions to secure instream flow water rights. A prioritization based on SHP habitat priority areas, native Cutthroat Trout population characteristics, and input from regional fisheries biologists identified 72 priority streams, with 19 of those considered the highest near-term priority and 53 pending additional information. Annual assessments will be performed to update the stream prioritization as new information is available

and restoration activities are completed. A key action, which requires continued funding of a three-year contract Instream Flow Project Biologist position, is to complete 11-14 instream flow studies on priority streams during FY25-27.

INTRODUCTION

Background

The Wyoming Game and Fish Commission (Commission) and its administrative agency, the Wyoming Game and Fish Department (WGFD), were formed in 1939. At inception, the WGFD's primary duties were enforcement of fish and wildlife laws and culture of fish for stocking throughout the state. Other functions were added over time to reflect changing public needs and resource management, including participating in management of Wyoming's water resources to benefit fish and wildlife.

In 1979, for the first time, a full-time fisheries biologist was employed to quantify instream flow needs for fisheries. A Fisheries Division functional unit for instream flow work was established in 1984. Initially, instream flow biologists devoted considerable effort to identifying methodological approaches that were most appropriate for use in Wyoming (Annear and Conder 1984, Conder and Annear 1987).

In 1986, the Wyoming legislature passed statutes (W.S. 41-3-1001 to 41-3-1014) designating instream flow as a beneficial use and establishing rigorous procedures for acquiring instream flow water rights, which only can be held by the State, not the Commission or WGFD. The instream flow law also gave the Commission responsibility to identify opportunities for instream flow water rights on Wyoming streams. The WGFD performs statutorily authorized functions and duties associated with instream flow filings on behalf of the Commission. The WGFD identifies specific stream segments with critical need for instream flows and quantifies the minimum amount of water necessary to provide adequate direct stream flows to maintain or improve existing fisheries, or provide adequate flows from reservoir storage to establish or maintain new fisheries. Flow protection is possible by filing for current-day priority water rights in streams where unappropriated flow exists in quantities needed to support fisheries.

Following passage of instream flow legislation, instream flow biologist's efforts focused on acquiring instream flow water rights. The initial focus of instream flow protection efforts was developed by the Commission in 1986. The 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). The Commission developed a policy in September 2005 to clarify the roles of the WGFD and Commission (Wyoming Game and Fish Commission Policy No. VII N, Appendix A).

In 1994, WGFD personnel drafted the first formal plan to guide identification and quantification of instream water right needs (Annear and Dey 1994). Similar plans were authored in 2001, 2006, and 2011 (Annear and Dey 2001; Annear and Dey 2006; Robertson and Annear 2011). This document is the fifth in that series and builds on earlier efforts to guide instream flow water right filings and water management activities.

The Water Management Unit has existed under various names and configurations since the early 1980s and is housed in the Aquatic Habitat Section of the WGFD's Fisheries Division. During the period 1984 to 2003, the unit consisted of as many as three salaried positions and two seasonal technicians. From 2003 through most of 2018, the Water Management Unit consisted of

a Water Management Supervisor, an Instream Flow Biologist, and one or two seasonal positions. From 2018, when the Water Management Supervisor retired, to 2023, the unit consisted of an Instream Flow Biologist and 0-1 seasonal positions. A 3-year contract Instream Flow Project Biologist position was added to the unit midway through 2023 to help conduct studies on priority candidate streams for instream flow segments.

Accomplishments

Most 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. However, opportunities have also been identified on state and Commission-owned lands. The instream flow statutes do not preclude filing for instream flow water rights on private lands, but such filings are only considered upon written requests from private landowners. The WGFD has completed studies and prepared instream flow water right applications for a limited number of relatively short stream segments crossing private land.

As of January 2025, the WGFD, acting on behalf of the Commission, has submitted five Board of Control Petitions and 144 instream flow water right applications to maintain or improve existing fisheries. One application was withdrawn, leaving 148 existing or applied for instream flow segments (http://wwdc.state.wy.us/instream_flows/instream_flows.html). The State Engineer has permitted 123 water rights and the Board of Control has adjudicated 70 of those. Twenty-five instream flow water rights are still in the application stage. In all, existing and applied for instream flow water rights will provide protection to base flows on over 600 stream miles.

The instream flow law also affords the opportunity to restore instream flows to streams where aquatic habitat could be improved by additional flow at identified times of year. Only the State of Wyoming may hold an instream flow right and 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.

Similarly, to date, the WGFD 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 it owns 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 VISION

There are over 25,000 miles of streams with fisheries in Wyoming (WGFD STREAMLAKE database). Though legal constraints on all of these waters are similar, there is

considerable variability in ecological, social, and practical needs, issues, and opportunities of each stream and stream segment. Within statutory obligations and legislative limits, and based on sound science, the Water Management Unit has the following vision:

Vision - “To protect, restore, and enhance stream flow regimes and water levels needed to conserve aquatic wildlife for the benefit of Wyoming’s citizens.”

This vision was developed to be consistent with the following mission statements:

“Conserving Wildlife - Serving People” – Game and Fish Commission

“Promote and maintain the availability of high quality habitat to sustain and enhance future wildlife populations” – Statewide Habitat Plan

“As stewards of Wyoming’s wildlife, we are committed to providing diverse, high quality angling opportunities for our customers and conserving all aquatic wildlife, reptiles, amphibians and their habitats for future generations” – Fisheries Division

“The aquatic habitat program works to protect, restore and enhance Wyoming’s water, watersheds, and waterways” – Aquatic Habitat Section

Currently, the Water Management Unit is not staffed adequately to achieve its vision or contribute fully to the above guiding missions. During the past five years, the Instream Flow Biologist, Aquatic Habitat Manager, Fish Division Chief, regional fisheries staff and Habitat Protection Program staff have worked piecemeal on water management issues. For example, representatives have worked together to identify impacts and develop comments associated with water development proposals such as the Alkali Reservoir project in the Bighorn Basin and the West Battle Creek Dam and Reservoir in the Little Snake River drainage. The Water Management Supervisor previously handled most commenting on water development. Likewise, other water management duties assigned previously to the Water Management Supervisor have not been performed or have been done nominally or been added to a growing list of regional personnel responsibilities.

The Water Management Unit is currently focusing wholly on completing instream flow water right filings and participating in limited coordination on water-related issues with the State Engineer’s Office and the Wyoming Water Development Office. This narrower focus is a departure from broader engagement as a program that was evaluated during 2006-2009 as part of the Instream Flow Council’s International Instream Flow Program Assessment (Annear et al. 2009). The assessment rated each state or provincial agency’s instream flow program effectiveness based on several aspects related to institutional capacity, legal capacity, and public involvement. The WGFD’s primary strengths included adequate staff, a well-functioning structure, and relatively good efforts to coordinate with the public and stakeholders. Today, however, those factors would be considered as primary instream flow-related challenges due WGFD’s decreased institutional capacity and corresponding reduction in public involvement efforts. Climate change related impacts will place additional demands on limited water resources and result in more complicated water management issues and development projects.

To best follow the guiding missions and achieve the unit’s vision, in addition to the Instream Flow Biologist addressing science and institutional aspects of instream flow protection,

the unit needs a salaried water management coordination position to establish relationships and provide consistent, strong messages about resource protection to water users, water management agencies, and non-governmental agencies. To accomplish the unit's first primary function of proactively engaging in water management issues, a skilled coordinator is needed to focus proactively on legal, institutional, and public involvement components of water management, involving protection, enhancement, and restoration of stream flows and water levels.

WATER MANAGEMENT UNIT GOALS, STRATEGIES, AND ACTIONS

Efforts toward meeting the Water Management Unit's vision will be guided through goals, strategies, and actions, and by working under established legal authorities or in partnerships with other entities and individuals. 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. The unit will strive to be proactive and flexible enough to act quickly on opportunities when it would be in the public interest to acquire instream flow water rights or to manage stream flows or water levels.

The primary documents that direct the Water Management Unit's planned actions are the WGFD's State Wildlife Action Plan (SWAP; WGFD 2017) and Statewide Habitat Plan (SHP; WGFD 2020). The SWAP is a comprehensive strategy to maintain the health and diversity of all wildlife species of concern within the state, including reducing the need for species found in Wyoming to be listed under the federal Endangered Species Act. The SHP can be considered a parallel, overlapping plan to implement habitat elements from the SWAP. The SHP goals are to: 1) Conserve and protect crucial aquatic and terrestrial wildlife habitats, 2) restore aquatic and terrestrial wildlife habitats, and 3) conserve, enhance, and protect fish and wildlife migrations. The Water Management Unit goals, strategies, and actions are patterned after those of the SHP.

The Water Management Unit has three primary functions:

- 1) Engaging in water management issues – duties include reviewing and commenting on water development projects; helping manage water rights on Commission properties; providing input on water acquisition or disposal decisions; assisting field personnel by providing water rights information; conducting or evaluating studies to quantify stream flows and water levels to improve water management for fish, wildlife, and recreation; and providing information to help the public better understand and participate in water management decisions.
- 2) Conducting instream flow studies to secure current-day priority instream flow water rights in the name of the State of Wyoming – duties include identifying segments in critical need of instream flows; planning, conducting, and reporting on instream flow studies; preparing water rights applications; reviewing hydrological feasibility studies; presenting instream flow recommendations at State Engineer's Office (SEO) public hearings; and monitoring stream flows to determine injury to instream flow water rights.

- 3) Assisting with stream restoration project development and monitoring – duties can include reviewing project concepts and designs and collecting pre- and post-project channel morphology data and drone aerial imagery.

The goals, strategies and actions of the following plan would effectively accomplish all three primary functions of the Water Management Unit. However, due to the current lack of a Water Management Coordinator, the plan has been structured to identify the strategies and actions that will be effectively accomplished by the Instream Flow Biologist, those that will be minimally addressed by the Instream Flow Biologist and Aquatic Habitat Program Manager, and those that would require the addition of a water management coordinator to accomplish.

The plan includes the following four goals:

Goal 1 – Conserve and protect crucial aquatic and terrestrial wildlife habitats (*SHP Goal 1*).

Goal 2 – Improve stream flow and water level protection understanding, within and outside of the WGFD (this goal is consistent with SHP Implementation Strategy I).

Goal 3 – Participate in efforts to restore aquatic wildlife habitats (this goal is consistent with SHP Goal 2).

Goal 4 – Ensure Water Management Unit staff is versed in up-to-date legal, institutional, public involvement, scientific, and technological approaches to stream flow and water level protection and management (this goal is consistent with SHP Implementation Strategy IV).

Multiple strategies and actions have been identified that will achieve each of the goals. The actions are identified as follows:

Boldface – Actions that will be effectively accomplished by the Instream Flow Biologist with AWEC and seasonal assistance; Goal 1, Strategy 1, Actions 1-5.

Normal font – Actions that will be minimally addressed by the Instream Flow biologist and Aquatic Habitat Program Manager. Full implementation would require the addition of a Water Management Coordinator.

Italicized font – Important additional actions that could be undertaken with the addition of a Water Management Coordinator.

Goal 1 – Conserve and protect crucial aquatic and terrestrial wildlife habitats (SHP Goal 1).

Strategy 1 – Protect important fishery resources with instream flow water rights (SHP Goal 1, Strategy IV).

The Instream Flow Biologist will continue pursuing instream flow filings to protect important fisheries. The candidate segments and priorities identified in this report will drive selection of segments for instream flow water rights. The hydrologic, geomorphic, biologic, water quality, and connectivity issues in each candidate stream segment will determine the type and scope of studies conducted. Public values will be considered through coordination

with the Commission, consultation with potentially affected landowners, public hearings, and general public input. The following seven specific actions will be performed:

Action 1.1.1 – Identify and prioritize potential candidate instream flow study segments on native Cutthroat Trout streams.

The first step of this action was accomplished in May 2024 with this plan’s stream prioritization component (see Appendix A), which identified 19 stream segments as highest priority potential candidates for instream flow water rights (see Action 1.1.2). Notably, this step also met SHP Strategy IV, Action (b); Use flow and temperature resiliencies and importance to multiple species to help prioritize stream segments for instream flow water rights studies.

The second step of this action is an annual assessment of the need to update the stream prioritization. Annual assessments will include communications with regional staff and review of new or updated datasets pertinent to prioritization. Any updates will be based on changes in land ownership, requests by private landowners, and new information on the population status of native Cutthroat Trout and other Species of Greatest Conservation Need (SGCN, identified in the SWAP), climate change predictions, and/or fish barrier work, habitat enhancements, and non-native fish removal.

Action 1.1.2 – Complete instream flow study reports and submit water right applications.

In FY25-26, perform data analysis, complete administrative reports, and submit water right applications, as appropriate, for eight instream flow studies conducted during 2018-2023 (Table 1). In FY26-27, complete instream flow studies, administrative reports, and instream flow water rights applications, as appropriate, on 11-14 priority candidate instream flow segments. The 19 highest priority segments (Tier A; Tables 2 and A1-A4) support native Cutthroat Trout populations critical to regional and statewide management of these SGCN. Based on annual assessments described in Action 1.1.1, some segments currently considered as highest priority will not be studied. Similarly, high priority streams (Tier B; Tables A1-A4) may be studied as the result of new information regarding fish population status, climate change predictions, and/or fish barrier work, habitat enhancements, and non-native fish removal. Completion of Action 1.1.2 depends on continued funding for the contract Instream Flow Project Biologist position.

Table 1. Instream flow water right activities summary, FY24-FY30. WGFD water identification numbers are noted in parentheses.

FY25-26	<p>Complete data analysis, administrative reports, and water right applications, if appropriate, for eight streams studied during 2018-2023:</p> <ul style="list-style-type: none"> Laramie River (LE8N1205AY) North Laramie River (LE8N1311AY) Maki Creek (PE8G4050SE) South Horse Creek (PE8G4250SE) North Horse Creek (PE8G4300SE) South Beaver Creek (PE8G4480SE) Rock Creek (PE8G5020SE; PE8G5080SE) Klondike Creek (PE8G5160SE)
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FY25-27	Complete instream flow studies, data analysis, administrative reports, and instream flow water rights applications, if appropriate, on 11-14 priority candidate instream flow segments.
FY28-30	Complete instream flow studies, data analysis, administrative reports, and instream flow water rights applications on 0-2 on priority candidate instream flow segments annually from Table 2.

Table 2. Nineteen highest priority streams (Tier A in Tables A1-A4) for studies to assess instream flow needs of Bear River Cutthroat Trout (BRC), Colorado River Cutthroat Trout (CRC), Snake River Cutthroat Trout (SRC), and Yellowstone Cutthroat Trout (YSC).

WaterID	Stream Name	Species and Population Qualifier*
CY8H1357PK	Ishawooa Creek	YSC Regional Importance
CY8H2125BN	Trapper Creek	YSC Core Conservation
CY8H2770PK	Willow Creek	YSC Core Conservation
CY8H3160BN	Mill Creek	YSC Core Conservation
JN8S2450LN	Deadman Creek	SRC Unique Life History
JN8S2460LN	North Fork Deadman Creek	SRC Unique Life History
JN8S2580LN	Cabin Creek	SRC Core Conservation
JN8S2710LN	Three Forks Creek	SRC Core Conservation
JN8S2720LN	South Three Forks Creek	SRC Core Conservation
JN8S2730LN	North Three Forks Creek	SRC Unique Life History
JN8S2790LN	Marten Creek	SRC Core Conservation
JN8S2800LN	Crow Creek	SRC Core Conservation
JN8S2880LN	Spring Creek	SRC Core Conservation
JN8S5510TN	Blackrock Creek	SRC Core Conservation
LR8W7020FT	Little Warm Spring Creek	YSC Regional Importance
PE8B1400LN	Smiths Fork	BRC Unique Life History
PE8B2390LN	Rock Creek	BRC Core Conservation
PE8G3282SE	North Fork Beaver Creek	CRC Core Conservation
PE8G3284SE	South Fork Beaver Creek	CRC Unique Life History

* See definitions in Appendix A.

Action 1.1.3 – Beginning in FY28, complete instream flow studies and administrative reports on 0-2 priority stream segments annually, and, if appropriate, submit water rights applications.

Streams selected for study will be based on stream prioritization (*see* Appendix A) and annual assessments described in Action 1.1.1. Funding for consultants or additional contract positions to conduct instream flow studies will be pursued if, based on updated priorities, three or more instream flow studies are planned for a given fiscal year.

Action 1.1.4 – Conduct hydrologic studies for each candidate instream flow segment by unit personnel or through contracting with professional hydrologists.

Detailed hydrologic information and estimates must be developed for each candidate instream flow segment. To make flow recommendations, estimates of natural hydrology, such as mean annual flow and monthly 20 percent exceedance flows, are required for use with habitat modeling methods and natural winter flow analysis. Further, hydrology estimates provide a means to determine if flow recommendations are reasonable compared to natural hydrology. This hydrology analysis is separate and distinct from hydrology studies conducted by the Wyoming Water Development Office (WWDO) as part of their legislatively required feasibility analysis.

Action 1.1.5 – Coordinate instream flow water right applications through procedural steps with the WWDO and SEO.

The Instream Flow Biologist will help select consultants for WWDO instream flow hydrologic feasibility studies, give presentations at scoping meetings, review and comment on study results, and process payments to WWDO for the studies. The Instream Flow Biologist also will process payments for advertising SEO instream flow application public hearings, and present instream flow study results and recommendations at those hearings.

Action 1.1.6 – Improve estimates of natural flows in ungauged streams.

WWDO hydrologic feasibility studies for instream flow recommendations are funded by WGFD and are subject to substantial uncertainty and variability in flow estimates. Results of past studies have, in some cases, prompted SEO to permit water rights at flow levels significantly less than recommended by WGFD. The Instream Flow Biologist will work through the University of Wyoming’s Water Research Program to pursue an unbiased study that recommends or develops a natural flow estimation approach for consideration by WWDO, SEO, and WGFD.

Action 1.1.7 – Conduct and/or pursue funding for literature reviews, GIS analysis, and research projects to:

- a. Evaluate how to more effectively use native cutthroat population status and genetic purity datasets (includes addressing errors and compatibility issues of datasets used in GIS analyses) in stream segment prioritization.
- b. Perform a stream segment prioritization for blue and red ribbon streams and for non-cutthroat trout fish SGCN species, particularly Bluehead Sucker, Green Sucker, Flannelmouth Sucker, and Roundtail Chub.
- c. Develop methods for assessing hydrology, water temperature, and biological conditions of segments to determine if additional instream flow segments are needed in mainstem reaches or tributaries upstream of existing instream flow segments.
- d. Update climate resistance/resiliency information for potential candidate segments and associated fish populations. This action is consistent with 1) SHP Goal 2, Strategy I, Action a) Develop an approach to identify vulnerabilities of landscapes, riverscapes, and species, then prioritize the areas for protection and restoration and

2) SHP Implementation Strategy V) Pursue new research and synthesis of available research to address key climate change vulnerability and adaptation information needs. This strategy will be pursued throughout the habitat sections and the Habitat Technical Advisory Group with cross over to wildlife and fisheries biologists.

- e. Monitor and/or estimate seasonal flow regimes and temperature in potential candidate instream flow segments and other streams containing important SGCN populations and lacking active USGS or other recording stations. This action is consistent with SHP Goal 2, Strategy I, Action b) Inventory water temperatures by watershed and prioritize management based on species-specific tolerances.

Action 1.1.8 – Perform course filtering to identify all IF segments potentially at risk of injury from junior users. Review and monitor selected instream flow segments for injury to instream flow water rights, and pursue compliance as needed when water is available and in priority.

This action is consistent with SHP Goal 1, Strategy IV, Action a) Identify instream flow segments for assessment to determine if water rights have been infringed upon by junior appropriators. The Instream Flow Biologist will review SEO records, land ownership, imagery, and local regional knowledge to identify instream flow segments that have a water right injury concern. The Instream Flow Biologist will monitor 0-2 segments annually. Funding for consultants or contract positions to conduct monitoring will be pursued if it is appropriate to monitor more than two segments annually.

Action 1.1.9 – Investigate new instream flow methods for application in Wyoming.

The water management unit once had a reputation for using state-of-the art techniques to quantify instream flow needs in Wyoming. In the 1980's through early 2000's, Unit staff conducted several studies to refine and improve assessment of instream flow needs. Few changes to WGFD instream flow methods have occurred in the past twenty years. Resuming pertinent studies will help return WGFD to the national forefront of instream flow science while maintaining the scientific credibility of studies we conduct and flow regime recommendations we make.

Strategy 1.2 – Protect important fishery and wildlife resources with water management.

Instream flow water rights are not the only water management tool for protecting fishery resources. Many fisheries are limited by reduced stream flows and water levels in water bodies that are not eligible or appropriate for water rights (See Table A5).

Action 1.2.1 – Coordinate with regional and statewide fisheries staff to identify needs and opportunities to protect or provide water for stream segments and reservoirs.

Action 1.2.2 – Assist regions in proactive coordination on water management opportunities (Table A5) such as Upper Colorado River Basin issues, Platte River Recovery Implementation Program, winter flow releases from Bureau of Reclamation reservoirs and other reservoirs, and summer releases from Laramie River Diversion Dam.

Action 1.2.3 – Conduct studies to recommend appropriate stream flow and water level regimes.

Action 1.2.4 – Given predictions related to water shortages/drought, use monitoring data to identify needs for and prioritize water management actions.

Action 1.2.5 – Work with partners and legislators to find and implement water management solutions like short or long-term leases or voluntary conversions of water rights to instream flow or other conservation water rights.

Action 1.2.6 – Pursue acquisition of water rights as water law and public acceptance allow for fishery and wildlife conservation.

Strategy 1.3 – Protect fisheries and associated habitat from water development and management activities that impact aquatic habitats (*SHP Goal 1, Strategy VI*).

Action 1.3.1 – Coordinate regularly with and attend meetings of the Water Development Commission to maintain awareness of potential water projects and provide effective WGFD technical comments to avoid or offset aquatic impacts.

Annually, the Instream Flow Biologist will develop and share a summary of the WWDO Recommendation Notebook for Level I, II, and III projects.

Action 1.3.2 – Coordinate regularly and attend meetings with the SEO and Board of Control to understand water issues and communicate on behalf of the WGFD.

Action 1.3.3 – Engage regularly with water users and managers through membership and activity in the Wyoming Water Association (WWA).

The Instream Flow Biologist will serve on the WWA Board and participate in its Recreation, Conservation and Environment Sector.

Action 1.3.4 – Serve on the Water Research Program Committee of the Office of Water Programs at the University of Wyoming.

Action 1.3.5 – Participate in the Instream Flow Council to track national issues and how they relate to Wyoming, respond effectively to water related legislative proposals, and remain scientifically and technologically up-to-date and relevant.

Action 1.3.6 – Coordinate and engage proactively and regularly with WWDO and BOR on existing and proposed water management and water development projects.

Action 1.3.7 – Pursue increased winter release levels from Glendo Dam.

Strategy 1.4 – Address issues associated with acquisition, management, or disposal of water rights and provide recommendations to WGFD personnel and the Commission.

Action 1.4.1 – As appropriate, provide assistance and recommendations to WGFD staff to assist with management of existing or newly acquired water rights on Commission properties. Participate as a member of the WGFD Water Rights team.

Strategy 1.5 – Cooperate with and assist other state and federal agencies and other organizations with water management and instream flow issues.

Action 1.5.1 – 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.

Action 1.5.2 – 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.

Action 1.5.3. Assist Habitat Protection Program, regional fisheries supervisors, and other WGFD staff in commenting on water development proposals.

Goal 2– Improve stream flow and water level protection understanding, within and outside of the WGFD (this goal is consistent with SHP Implementation Strategy I).

Strategy 2.1 – Communicate instream flow program efforts and accomplishments with WGFD staff.

Action 2.1.1 – Share this plan with Commission and WGFD staff.

Action 2.1.2 – Inform the Commission of instream flow study data collection, administrative reports, and applications.

Action 2.1.3 – Inform regional fisheries staff of specific plans for instream flow study data collection and solicit input on draft administrative reports.

Strategy 2.2 – Work with private landowners, other agencies, and conservation groups to communicate WGFD instream flow goals, efforts, and accomplishments.

Action 2.2.1 – Post this plan on the WGFD’s internet page. Share this plan with WWDO, SEO, U.S Forest Service (USFS), Bureau of Land Management (BLM), The Nature Conservancy, and Trout Unlimited.

Action 2.2.2 – Communicate with landowners adjacent to candidate instream flow segments prior to collecting data.

Action 2.2.3 – Write press releases regarding submission of instream flow applications and associated public hearings.

Action 2.2.4 – Co-author Wyoming Wildlife Magazine article following submittal of 150th instream flow application.

Action 2.2.5 – Revise instream flow brochure in FY26.

Action 2.2.6 – Promote awareness of and participation in the X-Stream Angler program through working with other WGFD staff to update logo, revise requirements and awards, produce news releases, articles, and web site postings to showcase streams with instream flow water rights.

Action 2.2.7 – Write articles for Wyoming Wildlife magazine and 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 and stream flow protection.

Action 2.2.8 – Present riverine resource stewardship information to various public groups, municipalities, and organizations.

Strategy 2.3 – Increase WGFD and Commission understanding of public awareness of and support for instream flow and water management issues.

Action 2.3.1 – Coordinate with WGFD leadership and staff to conduct public meeting and surveys to obtain information about Wyoming resident’s water issues and understanding to refine water management messaging.

Goal 3 – Participate in efforts to restore aquatic wildlife habitats (*this goal is consistent with SHP Goal 2*).

Strategy 3.1 – Communicate and collaborate effectively with other habitat managers.

Action 3.1.1 - Attend Aquatic Habitat Section meetings and joint meetings with Terrestrial Habitat Section

Strategy 3.2 – Assist Aquatic Habitat Biologists in developing designs for stream habitat projects.

Action 3.2.1 – Collect pre-project data, including channel morphology and drone aerial imagery, to inform design. Rely on Aquatic Habitat Biologists to oversee the majority of data compilation and imagery post-processing.

Action 3.2.2 – Consult on habitat project design plans.

Strategy 3.3 – Monitor effectiveness of stream habitat projects in reducing habitat issues and enhancing habitat.

Action 3.3.1 – Assist in development of monitoring plans.

Action 3.3.2 – Collect post-project channel morphology data and drone aerial imagery. Rely on Aquatic Habitat Biologists to oversee the majority of data compilation and imagery post-processing.

Goal 4 – Ensure Water Management Unit staff is versed in up-to-date legal, institutional, public involvement, scientific, and technological approaches to stream flow and water level protection and management (this goal is consistent with SHP Implementation Strategy IV).

Strategy 4.1 – Communicate and collaborate effectively with other habitat managers.

Action 4.1.1 - Attend conferences, symposia, webinars, and training courses.

Action 4.1.2 – Seek opportunities to share experiences and improve program effectiveness by working with water management researchers and other instream flow and water management practitioners.

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LITERATURE CITED

- Annear, T. C. and A. L. Conder. 1984. Relative bias of several fisheries instream flow methods. *North American Journal of Fisheries Management* 4:531-539.
- Annear, T. C. and P. D. Dey. 1994. Instream Flow Section Five Year Work Plan (1994 to 1998). Wyoming Game and Fish Department, Cheyenne, WY.
- Annear, T. C. and P. D. Dey. 2001. Instream Flow Program Five Year Work Plan; 2001 to 2005). Wyoming Game and Fish Department, Cheyenne, WY.
- Annear, T. C. and P. D. Dey. 2006. Water management unit five-year plan; 2006 to 2010. Project AW-SW-EP1-540. Wyoming Game and Fish Department, Cheyenne, WY.
- Annear, T., D. Lobb, C. Coomer, M. Woythal, C. Hendry, C. Estes, and K. Williams. 2009. International Instream Flow Program Initiative, A status report of state and provincial fish and wildlife agency instream flow activities and strategies for the future. Final report for Multi-State Conservation Grant Project WY M-7-T. Instream Flow Council, Cheyenne, Wyoming.
- Conder, A. L. and T. C. Annear. 1987. Test of weighted usable area estimates derived from a PHABSIM model for instream flow studies on trout streams. *North American Journal of Fisheries Management* 7:339-350.
- Robertson, M. S. and T. C. Annear. 2011. Water Management Unit Plan and Stream Prioritization. Wyoming Game and Fish Department, Cheyenne, WY.
- WGFD. 2017. State Wildlife Action Plan. Wyoming Game and Fish Department, Cheyenne, WY.

———. 2020. Statewide Habitat Plan. Wyoming Game and Fish Department, Cheyenne, WY.

APPENDIX A: PRIORITIZATION FOR INSTREAM FLOW WATER RIGHTS AND OTHER WATER MANAGEMENT

INTRODUCTION

Since 2011, instream flow studies and filings have been guided primarily by a Water Management Unit and Stream Prioritization Plan based on a comprehensive GIS analysis of stream segments (Robertson and Annear 2011). Prior to the 2011 plan, 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 2006 five-year plan (Annear and Dey 2006) focused strictly on prioritization of streams providing habitat for populations of Yellowstone Cutthroat Trout (YSC), a SGCN.

Previous plans placed emphasis on other native Cutthroat Trout species, which are also SGCN, as well as on 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 critical populations of native Cutthroat Trout and important recreational fisheries still lacked habitat protection with instream flow water rights. In addition, many stream segments containing Wyoming's SGCN other than cutthroat had not been considered for instream flow studies.

The 2011 prioritization used a scoring system to rank and categorize 1,469 stream segments into five groups: 1) all streams where Bear River Cutthroat Trout (BRC; also known as Bonneville Cutthroat Trout) are native, 2) all streams where Colorado River Cutthroat Trout (CRC) are native, 3) all streams where YSC and Snake River Cutthroat Trout (SRC) are native, 4) other streams (SGCN - Other) where fish have been designated SGCN, and 5) streams with high recreational value (blue and red ribbon streams). The ranked streams did not include stream segments in jurisdictions where state-led instream flow studies were inappropriate, such as segments within national parks, federal wilderness areas, and Native American reservations.

As a result of the 2011 prioritization, 94 stream segments were categorized as "High" priority, 448 segments were "Medium", 183 were "Low", and 744 were "Unranked". Within the High category, 46 segments supported YSC/SRC, 43 supported CRC, 4 were ribbon streams, and 1 supported other fish SGCN. Unranked stream segments had existing or planned instream flow filings, were primarily on private land, or had insufficient selection criteria information.

During 2011-2020, instream flow studies were done on 24 segments: 17 YSC segments (8 High, 3 Medium, 2 Low, and 4 Unranked), 5 CRC (1 High, 1 Medium, and 3 Unranked) segments, and 2 SGCN - Other (Hornyhead Chub) unranked segments. Streams representing a mix of rankings were studied because information and priorities changed over time. No studies were conducted during 2021-22.

A few important conclusions were drawn from this recent history of instream flow filings. The Wyoming Game and Fish Department (WGFD) did not have enough resources to study all the High ranked streams in a timely manner. Therefore, going forward, a smaller list of highest priority streams should be identified. Also, frequent reassessment of priorities is needed to adapt to evolving information.

GOAL AND APPROACH

The goal of the current prioritization was to identify 15-30 of the highest priority segments that could be considered for study over a 3-5 year period. The underpinnings of current stream prioritization are provided by Wyoming's State Wildlife Action Plan (SWAP; WGFD 2017) and the Statewide Habitat Plan (SHP; WGFD 2020) The SWAP is a comprehensive document that is periodically updated to identify fish and wildlife management challenges on a statewide basis. It identifies priority management areas (conservation areas) by SGCN to broadly identify species whose conservation status warrants increased management attention and funding as well as consideration in conservation, land use, and development planning in Wyoming. The SHP provides a roadmap defining how WGFD programs will work together to accomplish habitat protection and enhancement goals. The SHP identifies three types of priority areas (Crucial, Restoration, and Connectivity) for WGFD efforts.

The process of prioritizing stream segments for instream flow water right consideration in the current plan was driven strongly by SWAP SGCN Cutthroat Trout species population characteristics and SHP habitat priority areas. The prioritization for instream flow study consideration was also based on public land stream segments predicted to remain as coldwater refugia despite climate changes.

METHODS

The preliminary GIS prioritization analysis began with the same five groups and many of the same types of information used for the 2011 prioritization. However, some datasets used in 2011 were not updated and other datasets became available. Preliminary GIS analysis proved partly unsuccessful because of misleading, missing, and duplicate information associated with joining datasets having different stream reach lengths and stream paths, making it problematic to associate dataset attributes with WGFD WaterIDs. For examples, some dataset reaches were associated with two WaterIDs and some reaches had incorrect or no WaterIDs. In addition, there were discrepancies in stream names, land ownership, and other data.

For the final GIS prioritization, because of the above issues and the goal to identify 15-30 of the highest priority stream segments, the analysis was narrowed to using fewer stream groups and datasets. The prioritization focused on stream segments identified by multi-state species recovery teams as having native Cutthroat Trout populations (same as groups 1-3 used in 2011). Further, rather than using an arbitrary scoring system, the GIS analysis filtered out stream segments meeting the following selection criteria:

- 1) The stream segment supports a genetically "unaltered" (<1% altered; or suspected unaltered) core conservation native Cutthroat Trout population, or a native Cutthroat Trout population with probable or known unique life history, with no risk of hybridization.

Datasets used: BonnevilleCutthroatTrout.gdb
CRCT_WGFD_ConPops_20211105.gpkg
YctGeodatabase_2018_StreamNet.gdb
WY_stateborder.shp

- 2) The stream segment is on public lands (except wilderness areas, national parks, and Native American reservations) and in one or more SHP Aquatic Habitat Priority Areas (SHP 2020):

Datasets used: BLM_SurfaceOwnership_013122.gdb
S_USA.Wilderness.gdb
AquaticCrucialHabitatPriorities.gdb
AquaticRestorationHabitatPriorities.gdb
AquaticConnectivityHabitatPriorities.gdb

- 3) The stream segment is not within or closely upstream of an existing instream flow segment.

Dataset used: All_ISF_Filings_2020

- 4) The stream segment is predicted at greater than a 0.5 probability to remain a cold-water refugia for native Cutthroat Trout (if Brook Trout are not present) during 2030-2050 (Isaak et al 2017).

Dataset used: S_USA_ClimateShield+CT0BRK0_2040.gdb

Following the filtering process, input from regional and USFS fisheries biologists was used to determine three tiers of priority: highest, high, and low. Incorporating regional input was important because datasets contained some inaccurate and outdated information. As a result, some segments that met all criteria used in the GIS analysis were moved to lower tiers, some segments that did not meet all criteria were moved to the top tier, and some segments were added. In addition, because of dataset issues noted above, GIS layers and attribute tables were used in a laborious process to review each identified segment to ensure accuracy of WaterIDs, stream names, and other data joined to the multi-state recovery team datasets, and to revise tiers as needed. Other datasets used in tier development and accuracy were: Trout_Stream_Classifications_NAD, WGFD_3SpeciesPopsDataRequest_20211106.gpkg, and the WGFD STREAMLAKE database interactive map. Final tiers were determined in May 2024. Final tier descriptions are:

Tier A – Highest priority

A1 – Stream segments that met all selection criteria, and regional input and other information did not contradict highest priority ranking.

A2 – Segments that did not meet all selection criteria but were identified by regional staff as highest priority.

Tier B – High priority but pending additional information or action

B1 – Stream segments that met all selection criteria but additional information may be needed on climate change resilience, population status (presence, genetic purity, risk of hybridization), and/or barrier removal or construction.

B2 – Segments that did not meet all selection criteria but other SGCN are present and/or regional staff are planning, considering, or need more information on results of barrier removal or construction, removal or reduction of non-native trout, and/or stocking native Cutthroat Trout to restore or establish populations. Or, segments of regional high priority but concerns with water diversions, access, etc.

Tier C – Low priority

C1 – Segments that met all selection criteria but regional staff indicated otherwise, or other concerns were identified.

C2 – Segments that did not meet all selection criteria and were not important to regional fisheries management efforts, or other concerns were identified. Note that this tier grouping is not exhaustive. It only includes streams incorrectly identified in preliminary or final GIS analyses as meeting all selection criteria, or streams suggested by regional staff. In other words, this tier does not include all segments in the multi-state recovery team databases that did not meet the selection criteria and were not assigned to tiers A2 or B2.

Regional information was also gathered on other stream flow and water management issues. Regional fisheries personnel provided input on potential instream flow segments on streams with other fish SGCN and on blue and red ribbon streams. In addition, waterbodies in potential need of improved stream flow and water level management were identified by regional staff. Those potential instream flow segments and identified waterbodies were not prioritized but were compiled and placed in three categories based on the primary reason the waterbodies were identified.

RESULTS

Eighty-six stream segments (83 streams) were assigned to the three tiers for each native Cutthroat Trout species group (Tables A1-A4). Twenty-four stream segments met all selection criteria (8 Tier A1, 14 Tier B1, and 2 Tier C1). Twenty-three segments (22 streams) were assigned highest priority (Tier A), based on meeting all the selection criteria and/or being high priority for regional management. Within the 23 Tier A stream segments, two support BRC, six support CRC, ten support SRC, and five support YSC. Results of this prioritization were used to select three of the priority CRC streams (Klondike Creek, Rock Creek, and South Beaver Creek) for instream flow studies conducted in 2023, leaving two CRC streams and a total of 19 streams of current highest priority for future studies. Fifty-three stream segments were assigned to Tier B and ten segments were assigned to Tier C.

Seventy-eight other waterbodies were identified for potential water management (Table A5). Instream flow studies could be considered for 19 blue and red ribbon stream segments and on 27 segments with fish SGCN other than native Cutthroat Trout. Thirty-two waterbodies have strong potential for management of stream flows or water levels.

DISCUSSION

The priorities identified in this report will aid in selecting candidate streams for instream flow water right protection and for guiding efforts on other water management issues and stream restoration projects. The priority tiers are information for guiding selection of stream segments for instream flow studies, not a mandate to work or not work on any particular stream segment. Both Tier A and Tier B streams have strong potential for future instream flow studies. Tier A identifies the streams segments that have the highest current priority for instream flow study consideration. Tier B identifies high priority stream segments possibly needing more action or new information before an instream flow study is conducted. The lengthy prioritization process, which began in 2021, confirmed that highest priority is a “moving target” because pertinent information is updated frequently with new sampling results and new analyses.

The prioritization is intended to focus instream flow efforts toward species and stream segments where the greatest near-term needs exist based on available information and current WGFD management goals and policies. The prioritization process described above is intended to be adaptable to use new information and follow new SWAP and SHP goals and habitat priorities. The segments in each tier will change as more and better data become available. As such, annual review of guidance documents, database updates, new sampling and research on Cutthroat Trout populations and genetics, and input from regional staff should be done to reassess the priority tiers.

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LITERATURE CITED

Isaak, D., M. Young, D. Nagel, D. Horan, M. Groce, and S. Parkes. 2017. Climate Shield bull trout and cutthroat trout population occurrence scenarios for the western U.S. Rocky Mountain Research Station, U.S. Forest Service Data Archive, Fort Collins, CO. DOI.

WGFD. 2017. State Wildlife Action Plan. Wyoming Game and Fish Department, Cheyenne, WY.

———. 2020. Statewide Habitat Plan. Wyoming Game and Fish Department, Cheyenne, WY

Table A1. Stream prioritization tiers for Bear River Cutthroat Trout (BRC) populations in 5 Wyoming stream segments. Tier descriptions are in the Methods section. Bold WaterID indicates segment that met all selection criteria.

Tier	WaterID	Stream Name	SHP Aquatic Priority	Population Qualifier	Genetic Status	Hybridization Risk	Climate Shield*	Note
A1	PE8B2390LN	Rock Creek	Crucial; Restoration; Connectivity	Core	Unaltered	No Risk	na	Very important BRC stream; Access through private land
A2	PE8B1400LN	Smiths Fork	Crucial; Restoration; Connectivity	Unique	Not Tested - Unaltered	Hybridizing species are sympatric	na	On state land down to Coal Creek; Important habitat for BRC
B1	None							
B2	PE8B2330LN	Twin Creek	Crucial; Restoration; Connectivity	Core	Not Tested - Hybridized	No Risk**	na	BHS shown as present; Water diversion concerns
	PE8B2331LN	South Fork Twin Creek	Crucial; Connectivity	Core	Not Tested - Hybridized	No Risk**	na	Water storage and diversions on tributaries
	PE8B2410LN	Watercress Canyon	Crucial; Restoration	Core	Not Tested - Hybridized	No Risk**	na	Tributary of Rock Creek; so it seems Genetic_Status should be "Not Tested - Unaltered";
C1	None							
C2	None							

*Probability of BRC occurrence during 2030-2059 within cold-water habitat based on prevalence of BKT at 0% of sites within a habitat (Isaak et al. 2017).

** Genetic Status and Hybridization Risk are contradictory

Table A2. Stream prioritization tiers for Colorado River Cutthroat Trout (CRC) populations in 23 Wyoming stream segments. Tier descriptions are in the Methods section. Bold WaterID indicates segment that met all selection criteria.

Tier	WaterID	Stream Name	SHP Aquatic Priority	Population Qualifier	Genetic Status	Hybridization Risk	Climate Shield*	Note
A1	PE8G3282SE	North Fork Beaver Creek	Crucial; Connectivity	Core	Unaltered	No Risk	0.90	Regional high priority
	PE8G5160SE	Klondike Creek	Crucial; Connectivity	Core	Not Tested - Unaltered	No Risk	na	Pure CRC and should be protected; <i>IF study in 2023</i>
A2	PE8G3284SE	South Fork Beaver Creek	Crucial; Connectivity	Core	Unaltered	Hybridizing species < 10 km	0.94	Has potential for streamside CRC spawning
	PE8G4480SE	South Beaver Creek	Crucial; Restoration	Unique	Not Tested - Unaltered	Hybridizing species < 10 km	0.89	Regional priority; <i>IF study in 2023</i>
	PE8G5020SE	Rock Creek Section 1	Crucial; Connectivity	Core	Not Tested - Hybridized	Hybridizing species < 10 km	na	CRC restoration potential; <i>IF study in 2023</i>
	PE8G5080SE	Rock Creek Section 2	Crucial; Connectivity	Core	Unaltered	Hybridizing species < 10 km	0.91	Would be part of Rock Creek Section 1 IF segment
B1	GR8I2687CN	Green Creek	Crucial; Restoration; Connectivity	Core	Unaltered	No Risk	0.93	Haggarty Creek tributary
	GR8I2689CN	Alisha Creek	Crucial; Restoration; Connectivity	Core	Unaltered	No Risk	0.93	Haggarty Creek tributary
	PE8G3180LN	Nameless Creek	Crucial; Connectivity	Core	Unaltered	No Risk	na	Fish migration barrier no longer present; Upstream of IF segment
B2	GR8G2760LN	South Fork Fontenelle Creek	Crucial; Connectivity	Mixed Genetics	90% - 99%	Hybridizing species < 10 km	0.92	Need regional priority and updated genetic status
	LE8N5847CN	Elk Creek	Crucial	na	na	na	0.73	CRC population may be used for translocation to Wyoming Range streams; Immediately upstream of IF segment
	LE8N5850CN	Stud Creek	Crucial	na	na	na	0.94	CRC population may be used for translocation to Wyoming Range streams; regional high priority but just upstream of IF segment
	LE8N7106CN	Blackhall Two Creek	na	na	na	na	0.90	CRC population may be used for translocation to Wyoming Range streams

Table A2 continued.

B2 cont.	LE8N7425AY; LE8N7425CN	Cascade Creek	na	na	na	na	0.99	CRC population may be used for translocation to Wyoming Range streams
	LE8N7426AY	Big Falls Creek	na	na	na	na	0.99	CRC population may be used for translocation to Wyoming Range streams
	PE8G3283SE	Middle Fork Beaver Creek	Crucial; Connectivity	Unique	Not Tested - Unaltered	Hybridizing species < 10 km	0.77	No overlap with Climate Shield
	PE8G4170SE	Bare Creek	Crucial; Connectivity	Core	Unaltered	No Risk	na	Regional high priority but flows into IF segment
	PE8G4171SE	West Fork Bare Creek	Crucial; Connectivity	Core	90% - 99%	No Risk	na	Upstream of IF segment; Climate resilience probability of nearby streams is high
	PE8G4310SE	Lead Creek	Crucial	Unique	90% - 99%	Hybridizing species < 10 km	0.90	Regional high priority but access may be difficult
	PE8G4920SE	Gypsum Creek	Crucial; Connectivity	Other	Not Tested - Unaltered	Hybridizing species < 10 km	0.92	No longer supports CRC; Has potential for CRC restoration;
	PE8G4923SE	Park Creek	Crucial; Connectivity	Other	Not Tested - Unaltered	Hybridizing species < 10 km	0.90	No longer supports CRC; Has potential for CRC restoration;
C1	GR8I2685CN	Haggarty Creek	Crucial; Restoration; Connectivity	Core	Unaltered	No Risk	0.93	Mining pollution degrades water quality
C2	PE8G4490SE	Chall Creek	Crucial; Restoration	Unique	Not Tested - Unaltered	Hybridizing species < 10 km	na	Low flow and low CRC numbers

*Probability of CRC occurrence during 2030-2059 within cold-water habitat based on prevalence of BKT at 0% of sites within a habitat (Isaak et al. 2017).

Table A3. Stream prioritization tiers for Snake River Cutthroat Trout (SRC) populations in 28 Wyoming stream segments. Tier descriptions are in the Methods section. Bold WaterID indicates segment that met all selection criteria.

Tier	WaterID	Stream Name	SHP Aquatic Priority	Population Qualifier	Genetic Status	Hybridization Risk	Climate Shield*	Note
A1	JN8S2450LN	Deadman Creek	Crucial; Restoration	Unique	Unaltered (< 1%)	No Risk	0.80	SRC adults and YOY sampled by USFS in 2022
	JN8S2460LN	North Fork Deadman Creek	Crucial; Restoration	Unique	Unaltered (< 1%)	No Risk	na	Climate resilience likely similar to Deadman Creek
	JN8S2730LN	North Three Forks Creek	Crucial; Restoration	Unique	Unaltered (< 1%)	No Risk	0.92	High numbers of SRC adults, juveniles, and YOY in 2022
A2	JN8S2580LN	Cabin Creek	Crucial; Restoration	Core	Unaltered (< 1%)	Hybridizing species > 10 km	na	Excellent SRC spawning habitat; Potential culvert replacement
	JN8S2710LN	Three Forks Creek	Crucial; Restoration	Core	Unaltered (< 1%)	Hybridizing species > 10 km	na	Recommended based on 2024 reconnaissance
	JN8S2720LN	South Three Forks Creek	Crucial; Restoration	Core	Unaltered (< 1%)	Hybridizing species > 10 km	0.93	Recommended based on USFS 2022 sampling
	JN8S2790LN	Marten Creek	Crucial; Restoration	Core	Unaltered (< 1%)	Hybridizing species > 10 km	0.62	Recommended based on USFS 2022 sampling
	JN8S2800LN	Crow Creek	Crucial; Restoration	Core	Unaltered (< 1%)	Hybridizing species > 10 km	0.92	Recommended based on USFS 2022 sampling
	JN8S2880LN	Spring Creek	Crucial; Restoration; Connectivity	Core	Unaltered (< 1%)	Hybridizing species > 10 km	0.84	Recommended based on USFS 2022 sampling
	JN8S5510TN	Blackrock Creek	Crucial; Connectivity	Core	Suspected Unaltered	Hybridizing species > 10 km	0.97	Seems to be important for SRC and BHS spawning
B1	JN8S4490TN	Slate Creek	Crucial; Connectivity	Core	Suspected Unaltered	No Risk	0.78	BKT apparently common; no sampling records
	JN8S4510TN	Bear Paw Fork	Crucial; Connectivity	Core	Suspected Unaltered	No Risk	na	BKT apparently common; no sampling records
	JN8S4520TN	Dallas Fork	Crucial; Connectivity	Core	Suspected Unaltered	No Risk	0.88	BKT apparently common; no sampling records
	JN8S4530TN	Negrohead Fork	Crucial; Connectivity	Core	Suspected Unaltered	No Risk	0.75	BKT apparently common; no sampling records
	JN8S4555TN	Carmichael Fork	Crucial; Connectivity	Core	Suspected Unaltered	No Risk	0.87	BKT apparently common; no sampling records
	JN8S4557TN	Cabin Creek	Crucial; Connectivity	Core	Suspected Unaltered	No Risk	0.78	BKT apparently common; no sampling records
	JN8S4559TN	Aspen Creek	Crucial; Connectivity	Core	Suspected Unaltered	No Risk	0.87	BKT apparently common; no sampling records

Table A3 continued.

B2	JN8S2001LN	Greys River	Crucial; Restoration; Connectivity	Core	Unaltered (< 1%)	Hybridizing species > 10 km	0.91	Bridge replacement near headwaters improved passage; Need more sampling
	JN8S2950LN	East Fork Greys River	Crucial; Restoration; Connectivity	Core	Unaltered (< 1%)	Hybridizing species > 10 km	0.86	Bridge replacement improved passage; Need more sampling.
	JN8S4050TN	Flat Creek (lower reach)	Crucial; Restoration	Core	Unaltered (< 1%)	Hybridizing species > 10 km	na	Important trophy SRC fishery and spawning stream; Many diversions
	JN8S4050TN	Flat Creek (upper reach)	Restoration	Other	Unaltered (< 1%)	No Risk	na	Important trophy SRC fishery and spawning stream; Several diversions
	JN8S4320TN	Gros Ventre River	Crucial; Connectivity	Unique	Co-existence	Hybridizing species > 10 km	na	Core area for BHS and LSC; Many diversions
	JN8S4321TN	Gros Ventre River	Connectivity	Unique	Unaltered (< 1%)	Hybridizing species > 10 km	0.97	Several diversions
	JN8S4710TN	Cottonwood Creek	Crucial; Connectivity	Unique	Unaltered (< 1%)	Hybridizing species > 10 km	0.98	Shown as occupied by BHS
	JN8S4915TN	Squaw Creek	Crucial	Unique	Unaltered (< 1%)	Hybridizing species > 10 km	0.97	LSC detected by eDNA
	JN9S4910TN	Red Creek	Crucial	Unique	Unaltered (< 1%)	Hybridizing species > 10 km	0.92	BHS detected by eDNA
C1	NONE							
C2	JN8S5075TN	South Fork Ditch Creek	Crucial; Connectivity	Other	Unaltered (< 1%)	Hybridizing species > 10 km	na	Not a regional priority
	JN8S5795TN	Pacific Creek	Restoration	Core	Unaltered (< 1%)	No Risk	0.90	Stream is unnaturally wide and drainage is highly altered due to the heavy trailing. Climate Shield reach is far upstream on Wilderness; Only 0.7 miles in Restoration Priority Area

*Probability of SRC occurrence during 2030-2059 within cold-water habitat based on prevalence of BKT at 0% of sites within a habitat (Isaak et al. 2017).

Table A4. Stream prioritization tiers for Yellowstone Cutthroat Trout (YSC) populations in 30 Wyoming streams. Tier descriptions are in the Methods section. Bold WaterID indicates segment that met all selection criteria.

Tier	WaterID	Stream Name	SHP Aquatic Priority	Population Qualifier	Genetic Status	Hybridization Risk	Climate Shield*	Note
A1	CY8H2770PK	Willow Creek	Crucial; Connectivity	Core	Suspected Unaltered	No Risk	0.61	Good potential candidate
	CY8H3160BN	Mill Creek	Crucial; Connectivity	Core	Unaltered (< 1%)	No Risk	0.99	YSC in 0.7 mile segment
A2	CY8H1357PK	Ishawooa Creek	Crucial; Connectivity	Other	>10% and <=25%	Hybridizing species < 10 km	0.99	YSC population slightly introgressed with RBT
	CY8H2125BN	Trapper Creek	Crucial	Core	Unaltered (< 1%)	Hybridizing species < 10 km	0.99	YSC population present
	LR8W7020FT	Little Warm Spring Creek	Restoration	na	na	na	0.91	YSC population with no risk of hybridization above barrier
B1	Tributary of CY8H2425PK	Four Bear Creek	Crucial	Core	Suspected Unaltered	No Risk	na	Nearby streams show low Climate Shield probabilities;
	CY8H2490PK	Quaking Aspen Creek	Crucial; Connectivity	Core	Suspected Unaltered	No Risk	0.66	Sampling needed to determine YSC utilization
	CY8H2500PK	Brown Creek	Crucial; Connectivity	Core	Unaltered (< 1%)	No Risk	0.83	Sampling needed to determine YSC utilization
	CY8H2588PK	Deer Creek	Crucial; Connectivity	Core	Suspected Unaltered	No Risk	0.99	Regional high priority but upstream of IF segment
	CY8H2725PK	Rose Creek	Crucial; Connectivity	Core	Suspected Unaltered	No Risk	0.77	YSC population downstream of Climate Shield
	SN8E4070SN	Elkhorn Creek	Crucial; Restoration; Connectivity	Core	Unaltered (< 1%)	No Risk	0.87	Considering a non-native fish barrier.
B2	CY8H2470PK	North Fork Dick Creek	Crucial; Connectivity	na	na	na	0.94	YSC observed in 2021; Potential culvert project
	CY8H3510BN CY8H3510JN	East Tensleep Creek	Restoration; Connectivity	na	na	na	na	Restoration planned to expand population
	CY8H3550JN	Baby Wagon Creek	Restoration; Connectivity	na	na	na	na	Will be part of East Tensleep restoration
	CY8H3560JN	Virginia Creek	Restoration; Connectivity	na	na	na	0.90	Will be part of East Tensleep restoration
	CY8H3691WE	North Fork South Fork Otter Creek	Crucial	na	Suspected Unaltered	na	na	Need population and climate resiliency information
	LR8W5532FT	Sawmill Creek	na	na	na	na	0.97	YSC range expansion or restoration likely

Table A4 continued.

B2 cont.	LR8W5539FT	Burnt Gulch Creek	na	na	na	na	0.97	Part of Sawmill Creek YSC range expansion
	LR8W5645FT	Sand Creek	na	na	na	na	0.98	Possible but difficult YSC range expansion
	LR8W5650FT	Dickinson Creek	na	na	na	na	0.98	Would be part of Sand Creek YSC range expansion
	LR8W5655FT	Ranger Creek	na	na	na	na	0.98	Would be part of Sand Creek YSC range expansion
	LR8W5664FT	Bears Ears Creek	na	na	na	na	0.98	Would be part of Sand Creek YSC range expansion
	SN8E4020SN	Red Gulch Creek	Crucial; Restoration; Connectivity	Core	Unaltered (< 1%)	Hybridizing species < 10 km	na	Climate Shield likely similar to Elkhorn Creek
	SN8T2300SN	Columbus Creek	Crucial; Restoration; Connectivity	na	na	na	0.90	Potential for establishing YSC genetic refugia; Assessing barrier feasibility
C1	CY8H2405PK	Rawhide Creek	Crucial; Connectivity	Core	Suspected Unaltered	No Risk	0.98	Water diversions; Climate Shield 1 mile upstream of YSC
C2	CY8H1025BN	Deer Creek	Crucial; Connectivity	Core	Unaltered (< 1%)	No Risk	0.37	Climate shield less than 0.5
	CY8H2367PK	Horse Creek	Crucial	Core	Suspected Unaltered	Hybridizing species > 10 km	na	Very poor habitat
	CY8H4460HS	Cottonwood Creek	Crucial	Core	Suspected Hybridized	Hybridizing species < 10 km	0.79	Difficult access; short reach of Climate Shield
	CY8H4880HS	South Fork Owl Creek	Crucial; Restoration	Core	Unaltered (< 1%)	Hybridizing species are sympatric	0.91	Along Wind River Reservation; small overlap with Climate Shield
	CY8H4930HS	Rock Creek	Crucial; Restoration	Core	Unaltered (< 1%)	Hybridizing species are sympatric	0.83	Along Wind River Reservation; no overlap with Climate Shield

*Probability of YSC occurrence during 2030-2059 within cold-water habitat based on prevalence of BKT at 0% of sites within a habitat (Isaak et al. 2017).

Table A5. Waterbodies and management areas identified for possible water management actions, including possible instream flow segments associated with blue and red ribbon streams and fish SGCN other than Cutthroat Trout.

WaterID	Stream, Lake, or Area Name	Primary Category
CR8N1005PE	North Platte River Coli-Guer	Water Management
CR8N1008PE	North Platte River Guer-Glen Glendo	Water Management
CR8N3060CE	La Prele Creek (downstream of reservoir)	Water Management
CY8H1092PK	Lower Shoshone River	Water Management
CY8H1095PK	Shoshone River, BB TO CORBETT	Water Management
CY8H1490PK	North Fork Shoshone River	Blue and Red Ribbon
CY8H3410WE	Canyon Creek	Blue and Red Ribbon
GR8I2280CN	Savery Creek below High Savery Reservoir	Water Management
GR8I2660CN	West Fork Battle Creek	Water Management
JN8S1001TN	Snake River	Water Management
JN8S4760TN	Bacon Creek	Other Fish SGCN
JN8S4920TN	Papoose Creek	Other Fish SGCN
LE (No WaterID)	Forbes Wildlife Habitat Management Area	Water Management
LE (No WaterID)	Wick Wildlife Habitat Management Area	Water Management
LE4N0575GN	Bump Sullivan Wildlife Habitat Management Area	Water Management
LE8N1022CN	North Platte River, Sage-Sara	Blue and Red Ribbon
LE8N1024CN	North Platte River, Sara-Colo	Blue and Red Ribbon
LE8N1200GN	Lower Laramie River below Grayrocks	Water Management
LE8N1204PE	Lower Laramie River	Water Management
LE8N1205AY	Laramie River ds of Tunnel Diversion Dam	Water Management
LE8N1215AY	Laramie River 4 Monolith-Colo	Blue and Red Ribbon
LE8N1225PE	Chugwater Creek	Other Fish SGCN
LE8N1230PE	Antelope Creek	Other Fish SGCN
LE8N1245PE	Richeau Creek	Other Fish SGCN
LE8N1310PE	North Laramie River	Other Fish SGCN
LE8N1310PE	North Laramie passage projects	Water Management
LE8N1311AY	North Laramie River	Other Fish SGCN
LE8N1311AY	North Laramie River instream flow study in 2018	Water Management
LE8N1328AY	Brandel Creek	Blue and Red Ribbon
LE8N1360AY	Bear Creek	Blue and Red Ribbon
LE8N1455PE	Dry Laramie River	Blue and Red Ribbon
LE8N1515AY	North Sybille Creek	Blue and Red Ribbon
LE8N1565AY	Duck Creek	Blue and Red Ribbon
LE8N5460CN	Little Medicine Bow River	Other Fish SGCN
LE8N5521AY	Sheep Creek	Other Fish SGCN
LE8N6333CN	Hot Slough Creek	Other Fish SGCN
LE8N6620CN	Encampment River SEC 1	Blue and Red Ribbon
LE8N7110CN	Brush Creek	Water Management

Table A5 continued.

LE8N7370CN	French Creek	Water Management
LE8N7430CN	Big Creek	Water Management
LE8O8080LE	Lodgepole Creek Sec 1	Other Fish SGCN
LE8O8160LE	Muddy Creek	Other Fish SGCN
LE8O8161LE	North Fork Muddy Creek	Other Fish SGCN
LR4W0032FT	Pilot Butte - BOR	Water Management
LR4W0196FT	Luckey Pond	Water Management
LR4W0748FT	Pete's Pond	Water Management
LR8N4350FT	Sweetwater River	Other Fish SGCN
LR8W5005FT	Wind River	Other Fish SGCN
LR8W5005FT	Wind River Sec 1	Water Management
LR8W5361FT	Popo Agie River Sec 2	Blue and Red Ribbon
LR8W5505FT	Middle Fork Popo Agie	Water Management
LR8W5620FT	North Fork Popo Agie River Sec 1	Blue and Red Ribbon
LR8W6680FT	Torrey Creek	Other Fish SGCN
LR8W6740FT	Jakey's Fork Sec 1	Water Management
LR9W5268FT	Poison Creek	Other Fish SGCN
LR9W5319FT	Beaver Creek	Other Fish SGCN
PE2G0893SE	New Fork Lake	Water Management
PE8B1020LN	Bear River Sec 1 (ID Line)	Other Fish SGCN
PE8B1460LN	Pine Creek	Blue and Red Ribbon
PE8B1520LN	Muddy Creek	Other Fish SGCN
PE8G1020SE	Green River(Blw NF River)	Blue and Red Ribbon
PE8G1030SE	Green River (Abv NF River)	Blue and Red Ribbon
PE8G3451SE	New Fork (East Fork-Pine)	Blue and Red Ribbon
PE8G3460SE	East Fork River	Blue and Red Ribbon
PE8G3870SE	Pine Creek	Water Management
PE8G4010SE	Cottonwood Creek	Blue and Red Ribbon
SN4F0209CK	Cook Lake	Water Management
SN4P0227JN	Lake De Smet	Water Management
SN8P4208JN	Powder River	Other Fish SGCN
SN8P4250SN	Clear Creek	Other Fish SGCN
SN8P4255SN	Clear Creek	Other Fish SGCN
SN8P4263JN	Clear Creek	Water Management
SN8P5020JN	Crazy Woman Creek	Other Fish SGCN
SN8P6480JN	Middle Fork Powder River	Other Fish SGCN
SN8T1100SN	Tongue River	Other Fish SGCN
SN8T1150SN	Big Goose Creek	Water Management
SN8T1520SN	Little Goose Creek	Water Management
SN9F2540CK	Cow Creek	Other Fish SGCN