Bear River Basin

Bear River

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Watershed Description

Six major watersheds were identified for conservation planning purposes under this State Wildlife Action Plan (SWAP) using hydrographic boundaries and fisheries assemblage and management considerations.

The Bear River basin corresponds with the Bear River hydrologic unit (HUC 1601). It includes two 6-digit HUCs: Upper Bear and Weber (Figure 1). Three 8-digit HUCs and twelve 10-digit HUCs occur partly or wholly within this area. These watersheds span about 1,500 square miles in southwestern Wyoming's Lincoln and Uinta counties. Land ownership is predominantly public, but substantial private land (38%) occurs. The public land is managed primarily by the Bureau of Land Management (40%) and U.S. Forest Service (12%).

The 7,500–sq mi Bear River basin includes portions of northeast Utah, southeast Idaho, and southwest Wyoming. In Wyoming, the basin is simply the Bear River and its tributaries. There are approximately 1,800 miles of streams on the USGS National Hydrography Dataset in the Bear River basin in Wyoming. Major drainages in the basin include the Bear River (originates in Utah), Smiths Fork and Thomas Fork.

Additional information about the basin's drainages, geography, geology, land forms, climate, dams, reservoirs and diversions, hydrology, habitat types, land use and classifications are detailed in the 2010 SWAP.

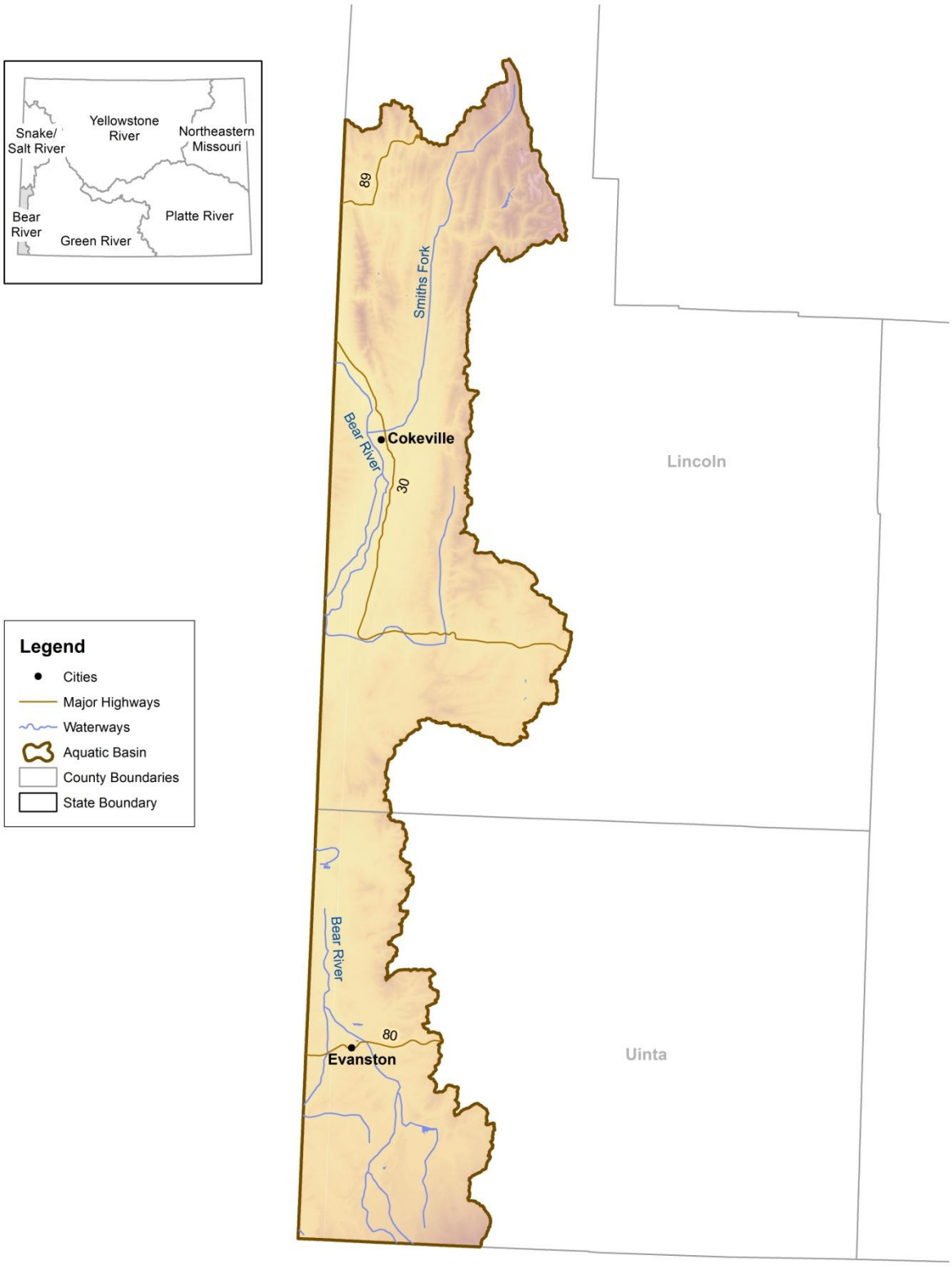

Figure 1. Bear River Basin.

Aquatic Wildlife

Fish

A detailed history of fish collections and surveys in this basin, which began in the mid 20th century is chronicled in the 2010 SWAP. These surveys and collections are the basis for describing the native fish community.

Twenty-two fish species, including two subspecies of cutthroat trout and twelve native species, are now found in the Bear River basin (Table 1). The nonnative fish community consists of nine game species, the most common of which are introduced salmonids.

There are three SGCN fish in the basin. The Bonneville Cutthroat Trout occupies much of the available coldwater habitat in the headwaters of the basin. The basin constitutes the core of the native range of Northern Leatherside Chub in Wyoming. The species has a notoriously patchy distribution. In the Bear River basin Northern Leatherside Chub are known from the Smiths Fork drainage near Cokeville, the Rock Creek drainage near Fossil Butte National Monument, and upper Bear River tributary streams south of Evanston (Schultz and Cavalli 2012). The Bluehead Sucker is also found in the basin but distribution and abundance is poorly understood.

No native species are known to have been extirpated from the Bear River basin, but introduced Brook, Brown, and Rainbow Trout are common. Introduced Snake River Cutthroat Trout, Largemouth Bass, Smallmouth Bass, Green Sunfish, and Yellow Perch are rare. Walleye and Smallmouth Bass were illegally introduced into Sulphur Creek Reservoir where they are successfully reproducing. Similarly, Yellow Perch were illegally introduced and have reproduced in Woodruff Reservoir. Green Sunfish are extremely rare in the basin. A single Green Sunfish was discovered in the UP Ice Pond in 2011. Largemouth Bass were previously stocked in a small number of waters in the basin, however there are no known populations remaining. Common Carp are abundant in the mainstem Bear River.

Table 1. Fishes present in the Bear River Basin. Species of Greatest Conservation Need (SGCN) are followed by an asterisk (*).

Native game	Native nongame	Nonnative game	Nonnative nongame
Bonneville Cutthroat Trout*	Bluehead Sucker*	Brook Trout	Common Carp
Mountain Whitefish	Longnose Dace	Brown Trout	
	Mottled Sculpin	Green Sunfish	
	Mountain Sucker	Largemouth Bass	
	Northern Leatherside Chub*	Rainbow Trout	
	Paiute Sculpin	Smallmouth Bass	
	Redside Shiner	Snake River Cutthroat Trout	
	Speckled Dace	Walleye	
	Utah Chub	Yellow Perch	
	Utah Sucker		

Aquatic Reptiles

No turtles are native to the Bear River Basin watershed, and none have been introduced.

Freshwater Mollusks and Crayfishes

Wyoming is still in the discovery phase in terms of its freshwater bivalve mollusks and gastropods. Although fingernail and pill clams and aquatic gastropods are often encountered

during invertebrate sampling, few published accounts of mollusk collections exist (Beetle 1989, Henderson 1924, Hoke 1979, Hovingh 2004). Many native mussels, clams, and gastropods are considered SGCN due to a lack of information regarding status.

Two bivalve mussel species have been documented in the Bear River Basin (Mathias 2014). In Wyoming, the range of the California Floater is restricted to the Bear River drainage. The more common and widespread Western Pearlshell is found in the Bear and Snake River drainages.

Most of what is known about species presence and distributions of gastropods in the basin are summarized in Beetle (1989). All gastropods in the basin are SGCN due to lack of adequate population and distribution information. Baseline survey data are needed for all gastropods in the Bear River watershed.

The only crayfish species known to be native to the Bear River basin in Wyoming is the Pilose Crayfish. This was the only species found during a 1985-–1987 crayfish survey (Hubert 1988). Virile Crayfish a nonnative species, was also found in the Bear River drainage during the 2007-2009 survey and appeared to have to some degree displaced Pilose Crayfish (Hubert 2010).

Table 2. Species of Greatest Conservation Need present in the Bear River Basin

Fish
Bluehead Sucker
Bonneville Cutthroat Trout
Northern Leatherside Chub

Crustaceans
Pilose Crayfish

Mollusks
California Floater Mussel
Western Pearlshell Mussel

Identification of Conservation Areas

The 7,500 sq mi Bear River basin includes portions of northeast Utah, southeast Idaho, and southwest Wyoming. Approximately 20% of the basin lies in Wyoming. While a relatively small portion of the basin lies in Wyoming, the Wyoming portion has some of the best remaining native fish populations. Because of this a large portion of the basin is considered conservation area for aquatic SGCN (Figure 2).

Conservation areas include major Bear River tributaries Twin Creek, Smiths Fork, and Thomas Fork that are critical to the conservation of Northern Leatherside Chub, Bonneville Cutthroat Trout or both. The headwater tributaries of Mill, LaChapelle, and Sulphur creeks draining the north slope of the Uinta Mountains are critical for Northern Leatherside Chub. Additionally the Bear River and tributaries above Evanston harbor important Bonneville Cutthroat Trout populations.

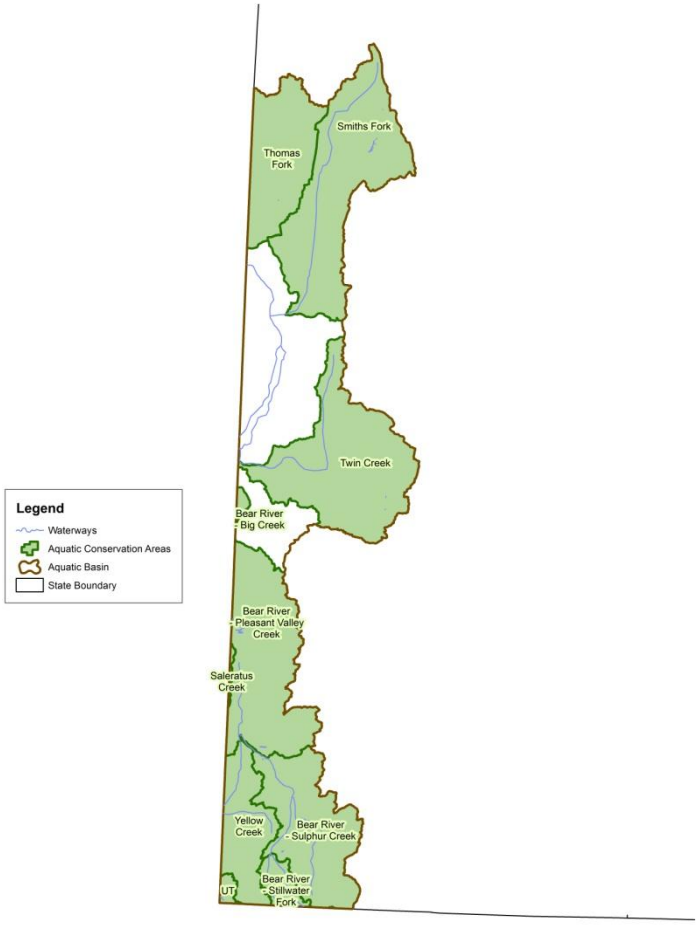

Figure 2. Aquatic Wildlife Conservation Areas in the Bear River Basin

Threats

Ungulate grazing and browsing – High

On a landscape scale, domestic livestock and big game grazing is the primary factor currently and historically influencing habitats in the Bear River basin. Stream habitat conditions are below potential because of eroded stream banks and high sediment levels contributed by degraded plant communities. Herbicide spraying in the 1960s and long-term heavy grazing have severely impacted the woody component of riparian communities (e.g. willow, cottonwood, and dogwood) communities. Subsequently, stream bank stability deteriorated and has negatively affected hydrological process and function. Proper stocking levels and grazing regimes can be effective habitat management tools and are compatible with stream channel, riparian, and upland area maintenance and improvement. However, improper grazing management can significantly reduce or eliminate vegetation and associated wildlife that depends on that forage, widen stream channels, vertically incise and entrench stream channels, cause soil erosion, increase water sediment loads, raise water temperature, encourage the spread of invasive plant species, destabilize and alter bank configuration, and lower surrounding water tables (Chaney et al. 1991, Nicholoff 2003). Overbrowsing by wildlife, particularly elk and moose, can also have similar negative effects on riparian shrubs. As with livestock grazing, impacts tend to be site specific, where herd numbers exceed forage availability, or where animals congregate to escape hunting and

other forms of predation, or as a result of other causes.

Water development/altered flow regimes – High

Natural flow regimes in stream segments around the state have been altered by human activities including irrigation diversions and water developments for more reliable water supply, hydropower, fisheries and recreation, and flood control. These altered flow regimes are also a consequence of broad-scale changes in land use and management associated with agriculture, grazing, timber harvest, and housing development (see Wyoming Leading Wildlife Conservation Challenges – Disruption of Historic Disturbance Regimes). The majority of the Bear River basin is publically owned. Because it is such an arid region the limited amount of irrigated cropland can significantly affect aquatic wildlife. In addition, the direct effects of dewatering the irrigation diversions impede movement, and some fish are lost to entrainment into the irrigation ditches. Lateral and longitudinal hydrologic connectivity and physical access by fish populations to all habitats necessary to complete their life history is limited throughout the drainage. In-channel obstructions and dewatering have reduced some populations of native fishes.

Human infrastructure such as roads also alter flow with inappropriately sized and positioned culverts. This situation can compromise the integrity of some road crossings, stability of each stream themselves and create fish passage barriers and threaten road crossings.

Suburban development and small acreage ranchette subdivisions on some floodplain locations in the watershed are a contributing threat to stream and riparian health. The previously mentioned issues of livestock grazing, irrigation water use, roads, and road crossings are concentrated and often intensified on smaller acreages in subdivisions.

The need for additional water for human use will intensify in the immediate future, and that trend will be especially evident in the western U.S. This trend has multi-faceted consequences for fish and wildlife and the habitats upon which they depend. In Wyoming, trans-basin water diversions are not uncommon and are likely to be further proposed and pursued. Warmer conditions with more erratic precipitation— which some predict for Wyoming's future climate—may heighten the need for additional water storage for municipal and agricultural purposes. The likely trend will be water development projects closer to the delivery point and conveyance via pipelines instead of stream channels. Additional emphasis may be placed on lining irrigation ditches and other practices to more efficiently use water for consumptive purposes. The net effect of such water management practices in many situations will be to alter the timing, magnitude and duration of natural hydrographs as well as intra- and inter-annual variability in Wyoming's streams and associated riparian corridors (see Wyoming Leading Wildlife Conservation Challenges – Climate Change, and the Riparian habitat chapter). In other settings water conservation strategies may enhance stream flow in some segments of some streams.

One study of additional water storage has been conducted recently in this basin. The Sublette Creek Reservoir Mau / Covey Canal Rehabilitation Project proposes additional water development options in the Smiths Fork drainage (Wyoming Water Development Commission 2015). This project has completed Level 11 studies and is temporarily on hold pending consideration by the local project sponsor. It's future is questionable given its low Benefit/Cost ratio. Based on its most recent configuration the project could affect upstream migration of native fish and would likely reduce stream flow and trout habitat below the Covey/Mau irrigation diversion.

Drought and climate change – Moderate

Climate change may increase air and surface water temperatures, alter the magnitude and seasonality of precipitation and runoff, and shift the reproductive phenology and distribution of plants and animals (Seavy et al. 2009) (see Wyoming Leading Wildlife Conservation Challenges – Climate Change).

Changes in precipitation patterns under various climate change scenarios are predicted to produce peak flows earlier in the yearly cycle and to lower base flows (Barnett et al. 2004, Gray and Anderson 2009). Drought lowers water tables, leading to reduced plant growth and reproduction. Riparian vegetation declines lead to lower bank stability, higher siltation and altered stream habitat quality and quantity. Lower water levels increase water temperatures and reduce the living space available to fish and other aquatic wildlife. Changes to precipitation in native upland and riparian vegetation communities favor invasive plant species establishment such as cheatgrass, halogeton, reed grass, tamarisk, and Russian olive likely will deteriorate overall watershed stability and function. All these conditions can be detrimental to the health and reproductive success of all aquatic wildlife species.

Invasive species – Moderate
There are no listed aquatic invasive species (AIS) present in the basin. However, several introduced game fishes are problematic in the basin. Nonnative trout present a threat to Bonneville Cutthroat Trout through hybridization and competition. Other piscivorous nonnative fishes present a threat to native fishes in the basin. While nonnative game fish may need to be controlled for conservation and restoration of natives in some areas, these same fish support popular fisheries that provide important recreational and economic benefits (WGFD 2010).

Human Development and Infrastructure – Moderate
Inappropriately sized and positioned culverts on tributary stream road crossings impede fish passage and are incapable of passing higher stream discharges and sediment loads. Culverts too small for the discharge regime often nozzle high flow velocities and erode plunge pools on the downstream end of crossings, perching culverts at an elevation higher than the downstream stream bed elevation thereby creating passage barriers for some if not all fish species. Undersized culverts are unable to pass all sediment loads which are deposited and aggrade stream beds upstream of crossings to further exasperate problems. This situation can compromise the integrity of some road crossings and stability of each stream themselves. Unstable streams with active head cut incisions migrating upstream towards road crossings with culverts also create fish passage barriers and threaten road crossings.

Suburban development and small acreage ranchette subdivisions on some floodplain locations in the watershed are a contributing threat to stream and riparian health. The previously mentioned issues of livestock grazing, irrigation water use, roads, and road crossings are concentrated and often intensified on smaller acreages in subdivisions. More effort is exerted attempting to control migration of river channels and stream bank erosion in flood plain subdivisions to protect infrastructure and property. Rip-wrap and levees use to protect property often create more stream instability issues than what they solve.

Conservation Initiatives

Department plans and policies
The WGFD's Fish Division has developed basin management plans to guide management across the state. These plans provide background and history of aquatic wildlife management as well as management direction. These plans reference the SWAP and the Strategic Habitat Plan (SHP), attempting to incorporate management direction relevant to each basin.

Habitat management efforts are guided by the SHP that is regularly revised and approved by the Wyoming Game and Fish Commission. The SHP includes five goals: 1) Conserve and manage wildlife habitats that are crucial for maintaining terrestrial and aquatic wildlife populations for the present and future, 2) Enhance, improve, and manage priority wildlife habitats that have been degraded, 3) Increase wildlife-based recreation through habitat enhancements that maintain or increase

productivity of wildlife, 4) Increase public awareness of wildlife habitat issues and the critical connection between healthy habitat and abundant wildlife populations, and 5) Promote collaborative habitat management efforts with the general public, conservation partners, private landowners, and land management agencies. Efforts are focused in priority areas in each of the management regions and include crucial areas essential for conservation of important species and communities and enhancement areas, which represent places where work should be conducted to manage or improve wildlife habitat.

In addition to these guiding documents, the WGFD has a number of tools, policies and protocols to protect and enhance native aquatic wildlife. Additional details on environmental commenting, aquatic wildlife stocking and transplant, and disease prevention can be found in the 2010 SWAP.

Interagency plans and agreements

The states of Utah, Nevada, Wyoming, and Idaho, and the U.S. Forest Service, Bureau of Land Management, National Park Service, U.S. Fish and Wildlife Service, Confederated Tribes of the Goshute Reservation, and Utah Reclamation Mitigation and Conservation Commission are signatories to a range-wide conservation agreement and strategy for Bonneville Cutthroat Trout (Lentsch et al. 2000). As part of the agreement an interstate working group meets annually and produces periodic range-wide status assessments (May and Albeke 2005).

The states of Idaho, Nevada, Utah, and Wyoming, along with the U.S. Forest Service, Bureau of Land Management, Bureau of Reclamation, National Park Service, Fish and Wildlife Service, Trout Unlimited, and The Nature Conservancy, signed a Conservation Agreement to jointly conserve, protect, and restore Northern Leatherside Chub populations within their historic range (NLSC Conservation Team 2009). A range-wide conservation team meets annually to further conservation efforts. As part of the agreement the team is charged with producing status assessments for the species at five year intervals.

The states of Arizona, Colorado, Nevada, New Mexico, Utah and Wyoming and U.S. Fish and Wildlife Service, Bureau of Land Management, National Park Service, U.S. Bureau of Reclamation, Jicarilla Apache Nation, Southern Ute Indian Tribal Council, and U.S. Forest Service are signatories to a range-wide conservation agreement and strategy for Roundtail Chub, Bluehead Sucker and Flannelmouth Sucker (Three Species Conservation Team 2006). As part of the agreement an interstate working group meets annually to discuss conservation needs and produces regular status assessments.

The National Fish Habitat Action Plan (NFHAP) was developed by a coalition of fisheries professionals, state and federal agencies, tribes, foundations, conservation and angling groups, businesses and industries, all determined to reverse the declines of America's fish habitats. The WGFD is involved with three NFHAP partnerships, Great Plains Fish Habitat Partnership, the Western Native Trout Initiative, and the Desert Fishes Habitat Partnership. The last two partnerships cover the Bear River Basin. Additional information on Fish Habitat Partnerships can be found in the 2010 SWAP.

The USFWS recently established the Bear River Watershed Conservation Area. Under this program Land and Water Conservation Funds will be used to fund Conservation Easements in the Bear River watershed in Utah, Idaho, and Wyoming.

Ongoing and completed conservation actions

Numerous projects have been completed to benefit SGCN in the Bear River basin since the implementation of the 2010 SWAP (previous accomplishments are documented in the 2010 SWAP). Multiple sources of funding have been used to implement projects. Projects have been completed by Department personnel and through contracting and granting with research partners. Accomplishments are listed under

headings taken from the Recommended Conservation Actions in the 2010 SWAP. While accomplishments are not duplicated under more than one action they commonly address multiple actions. Although this list is not comprehensive of all actions, most of the significant initiatives are summarized below.

Secure and enhance populations and habitats in SGCN priority areas
WGFD biologists conducted a statewide survey of Mountain Whitefish (SGCN in 2010 SWAP) from 2009 to 2013. A primary achievement of the study was the development of a sampling approach for assessing populations (Edwards 2014). The study demonstrated most populations are robust leading to the determination that a non SGCN status rank (NSS5) is appropriate.

Monitor the status and distribution of native aquatic wildlife assemblages with emphasis on Bonneville Cutthroat Trout, Bluehead Sucker, and Northern Leatherside Chub
The WGFD conducted a study of the distribution and habitat use of Northern Leatherside Chub throughout their expected range in Wyoming (Schultz and Cavalli 2012).

The WGFD assisted Trout Unlimited with an Adopt-A-Trout project to study seasonal movement and habitat use of Bonneville Cutthroat Trout and Bluehead Suckers in the Bear River. The project identified spawning migration corridors, fish passage barriers and entrainment issues. Results from the project have project construction of a fish ladder to provide passage over an identified barrier. (WGFD 2012, 2013, 2014).

Assess the genetic purity of Bonneville Cutthroat Trout, Bluehead Sucker, and Northern Leatherside Chub populations Identify and reduce threats to native fish populations from nonnative species
The WGFD funded a study at the University of Wyoming to determine genetic purity and patterns of hybridization amongst Wyoming suckers (Mandeville et al. 2015). The study included Bluehead Suckers from the Bear River drainage.

The WGFD contracted genetic analyses of suspected Bonneville Cutthroat Trout from Lake Alice, and the Bear River. Both were determined to harbor only pure Bonneville Cutthroat Trout.

The WGFD contributed towards a project investigating genetic variation of Northern Leatherside Chub across their native range (Blakney et al. 2014). Results revealed contemporary isolation with evidence of historical connection amongst most populations.

Increase educational efforts about the ecological, economic, and social values of aquatic SGCN
The WGFD created, produced and disseminated a poster detailing the State's native fishes and stickers and magnets of some native nongame fishes, including Northern Leatherside Chub and Bluehead Sucker.

The WGFD assisted Trout Unlimited with an Adopt-A-Trout project to study seasonal movement and habitat use of Bonneville Cutthroat Trout and Bluehead Suckers in the Bear River drainage. A key component of the Adopt-A-Trout program is to bring real world science into the classroom (WGFD 2012, 2013, 2014).

Continue building voucher collections for all aquatic wildlife
WGFD completed freshwater mussel distribution surveys in the Bear River drainage (Mathias 2014). Live Western Pearlshell and California floater were documented in the drainage. All vouchers specimens are submitted to the Museum of Southwestern Biology, Albuquerque NM.

Complete the comprehensive survey for freshwater mussels
WGFD completed freshwater mussel distribution surveys in the Bear River drainage (Mathias 2014).

Continue aquatic habitat work in the basin
WGFD completed water temperature monitoring for Muddy, Little Muddy, Mill, Coal, Raymond and Huff creeks (2013 – 2014).

WGFD completed livestock exclosure maintenance in several streams.

WGFD hired a consultant to complete habitat and water quality data collection for the Smiths Fork and Sublette Creek.

The WGFD and USFWS removed three fish migration barriers to connect portions of Yellow Creek to benefit Bonneville Cutthroat Trout and Northern Leatherside Chub.

Twenty-four of the 30 known water diversion structures in the Central Bear River watershed (including Smiths Fork) were assessed for fish passage.

Fish passage was improved at the old city of Evanston water diversion structure to benefit Bonneville Cutthroat Trout and other native species.

TU and WGFD completed numerous projects on Rock Creek to improve fish passage for Bonneville Cutthroat Trout and other native species.

TU and WGFD installed a new diversion and fish screen on Twin Creek to improve passage and reduce entrainment of Bonneville Cutthroat Trout and other native species.

Explore water management approaches that enhance fish habitat
No reported projects.

Follow up on recommendations from the graduate research project on gastropods
No reported projects.

Recommended Conservation Actions

Secure, enhance, or establish SGCN populations
No actions identified.

Inventory, assess, or examine life history requirements of SGCN
Survey to determine distribution and status of Bluehead Sucker and Leatherside Chub in the mainstem Bear River. If feasible, conduct movement studies to determine seasonal migration patterns of Bluehead Sucker in the drainage.

Survey to fill gaps in knowledge about native mussel distribution as described in Mathias (2014).

Conduct baseline gastropods surveys in the basin and identify needed actions to maintain or restore populations.

Provide passage and reduce entrainment at barriers impacting SGCN
Reconnect sections of Yellow Creek to improve habitat for Northern Leatherside Chub and Bonneville Cutthroat Trout.

Assess diversions and other manmade structures to determine passability by fish and other aquatic organisms in the Bear River basin.

Work with partners to address fish passage barriers in the Bear River drainage upstream of Woodruff Reservoir.

Incorporate fish passage in designs and plans for new irrigation infrastructure.

Improve aquatic habitat for SGCN
Work with landowners, TU, USFWS, and other partners on Giraffe Creek to enhance habitats through passive restoration, secure conservation easement(s) and public access, and develop a long-term restoration and management plan.

Work with the USFS to replace culvert on USFS road 10382, and reduce sediment from salt mine and impacts from sheep trailing on Salt Creek.

Repairs existing habitat structures on Salt Creek.

Work with BLM and WY Department of Agriculture to develop willow recovery projects in the basin.

Conduct stream habitat improvements to enhance habitat for Bonneville Cutthroat Trout and other native species in Giraffe and Coal Creeks.

Complete Salt Flats stream restoration work on the Thomas Fork River to improve habitat for Bonneville Cutthroat Trout and other native species.

Work with partners to enhance habitat in Yellow Creek. Focus on addressing limiting habitat conditions for Northern Leatherside Chubs through increasing summer and fall low flows and improving riparian function.

Work with partners to enhance habitat in Mill Creek. Focus on opportunities to consolidate irrigation diversions, improve infrastructure to reduce conveyance loss, and improve irrigation efficiency to maintain flow during June and July.

Work with partners to enhance habitat in the Bear River drainage upstream of Woodruff Reservoir. Focus on opportunities to consolidate irrigation diversions and improve infrastructure to reduce conveyance loss and maintain more flow in channel.

Increase educational efforts about the ecological, economic, and social values of aquatic SGCN
No actions identified.

Continue building voucher collections for aquatic wildlife
Continue to fill voids in voucher inventory for fish per WGFD protocol (Zafft and Bear 2009).

Build gastropod voucher collection and find permanent repository.

Monitoring

Establish standardized monitoring protocols and locations for SGCN
Establish a standardized sampling program at multiple sites in the Bear River drainage to monitor presence of Northern Leatherside Chub.

Determine if there are any useful locations for monitoring Bluehead Sucker in the mainstem Bear River.

Periodically conduct population estimates at standard locations for Bonneville Cutthroat Trout.

Monitor seasonal flow regimes and temperature in areas containing important native SGCN populations and lacking active USGS or other recording stations.

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