Northeastern Missouri River Basin

Cheyenne 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 watersheds each include one to four sub-regions (4-digit hydrologic unit code [HUC] watersheds). This approach allows the nesting of multiple spatial and temporal scales for planning and prioritizing conservation actions.

The Northeastern Missouri River basin includes four 6-digit HUCs, all direct tributaries to the Missouri River (Figure 5). These include the Little Missouri, Belle Fourche, Cheyenne, and Niobrara River watersheds (Figure 5). Thirteen 8-digit HUCs and 52 10-digit HUCs occur in this area. These watersheds span an area of about 12,000 square miles in northeastern Wyoming's Crook, Weston, Campbell, Converse, Niobrara, and Goshen counties. Land ownership is 81% private. Public land is held primarily by the State of Wyoming (6%), Bureau of Land Management (5%), and U.S. Forest Service (4%).

With over 80% of the land in this basin in private ownership and many of the public-owned parcels inaccessible, land ownership presents a big challenge to effectively manage the aquatic species in this basin.

There are approximately 44,000 miles of streams on the USGS National Hydrography Dataset in the Northeastern Missouri River basin. However many of these streams are ephemeral. A closer approximation (although still high) of actual aquatic habitat may be the 8,000 named stream miles from the NHD GIS layer. Major drainages include the Little Missouri River, Belle Fourche River, Cheyenne River and the Niobrara River.

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

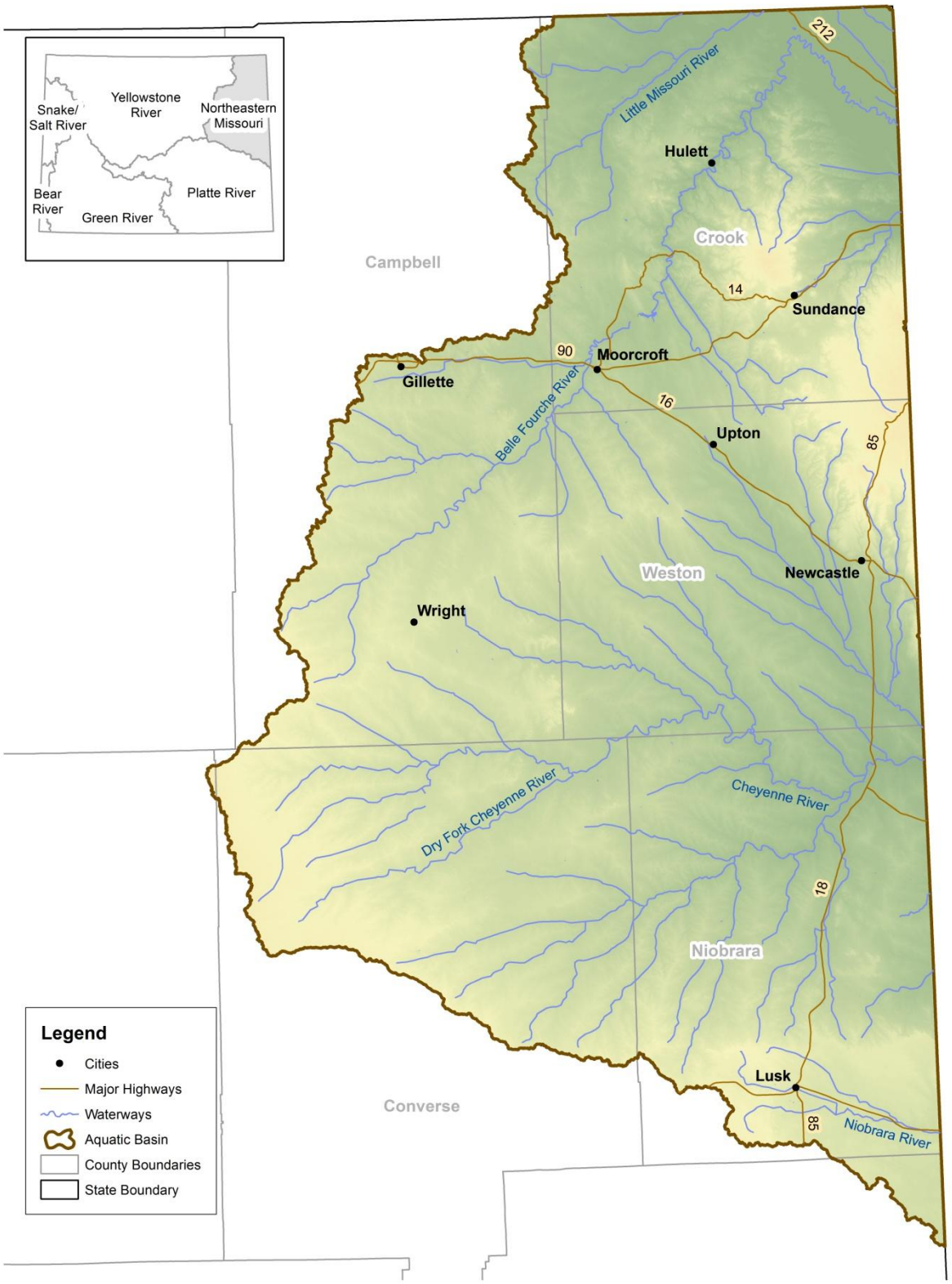

Figure 5. Northeastern Missouri River Basin.

Aquatic Wildlife

Fish

A detailed history of fish collections and surveys in this basin, which began in the mid 19th century is chronicled in the 2010 SWAP. These surveys and collections along with a detailed survey conducted in the 1990's (Patton et al. 1995, Patton 1997, Patton et al. 1998, Patton 2001) are the basis for describing the native fish community. The 2010 SWAP also includes a summary of fish introductions to the basin. Many introductions were conducted by the WGFD but others were illegal or inadvertent.

The Northeastern Missouri River basin is home to the most diverse fish community in the state. The known fish assemblage of the Northeastern Missouri River basin is shown in Table 5. The basin has three native game fish and 20 native nongame fish (Table 5). A total of 14 game fishes and nine nongame fishes have been introduced to the basin (Table 5). Nine nongame species native to the basin are currently considered SGCN.

Many of the fish SGCN in the basin (Brassy Minnow, Flathead Chub, Goldeye, Plains Minnow, and Western Silvery Minnow) belong to an assemblage associated with large turbid free flowing rivers. Others such as the Plains Topminnow and Finescale Dace are commonly associated with the small plains streams with large rainstorm induced flow fluctuations.

Table 5. Fishes present in the Northeastern Missouri River Basin. Species of Greatest Conservation Need (SGCN) are followed by an asterisk (*).

Native game	Native nongame	Nonnative game	Nonnative nongame
Black Bullhead	Brassy Minnow*	Black Crappie	Brook Stickleback
Channel Catfish	Creek Chub	Bluegill	Common Carp
Stonecat	Central Stoneroller	Brook Trout	Emerald Shiner
	Fathead Minnow	Brown Trout	Gizzard Shad
	Finescale Dace*	Freshwater Drum	Golden Shiner
	Flathead Chub*	Green Sunfish	Grass Carp
	Goldeye*	Largemouth Bass	Longnose Sucker
	Iowa Darter*	Northern Pike	Northern Plains Killifish
	Lake Chub	Rainbow Trout	Spottail Shiner
	Longnose Dace	Smallmouth Bass	
	Mountain Sucker	Snake River Cutthroat Trout	
	Pearl Dace*	Walleye	
	Plains Minnow*	White Crappie	
	Plains Topminnow*	Yellow Perch	
	Red Shiner		
	River Carpsucker		
	Sand Shiner		
	Shorthead Redhorse		
	Western Silvery Minnow*		
	White Sucker		

Aquatic Reptiles
Three turtles are found in the Northeastern Missouri River basin, all of which are native. The Western Painted and Western Spiny Softshell turtles are SCGN, but the Eastern Snapping turtle is not. The Western Spiny Softshell turtle is believed to have the widest distribution in the watershed of the three, however, few records exist for this species in the basin.

Freshwater Mollusks and Crayfishes
Wyoming is still in the discovery phase in terms of its freshwater bivalve mollusks and gastropods. Although aquatic mollusks are often encountered during invertebrate sampling, few published accounts exist (Beetle 1989, Henderson 1924, Hoke 1979, Hovingh 2004). The WGFD retains SGCN status for some native bivalve mollusks and many gastropods due to lacking information. However, the WGFD recently completed native mussel surveys statewide, including the Northeastern Missouri River Basin (Mathias 2016).

Three bivalve mussel species have been documented in the basin. Giant Floater have been documented in portions of the Little Missouri and Belle Fourche river drainages and White Heelsplitter and Giant Floater have been documented in the Belle Fourche drainage. Giant Floater remain SGCN with not enough information to provide a NSS rank. Both White Heelsplitter and Fatmucket are considered secure and not SGCN.

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.

Little information is available on the distribution of Wyoming crayfishes. The Calico Crayfish is the only species of crayfish known to occur in the Northeastern Missouri River basin (Hubert 2010). The Calico Crayfish is native to the basin and an SGCN.

Table 6. Species of Greatest Conservation Need present in the Northeastern Missouri River Basin.

Fish
Brassy Minnow
Central Stoneroller
Finescale Dace
Flathead Chub
Goldeye
Iowa Darter
Pearl Dace
Plains Minnow
Plains Topminnow
Western Silvery Minnow
Reptiles
Western Painted Turtle
Western Spiny Softshell
Crustaceans
Calico Crayfish
Mollusks
Giant Floater Mussel

Identification of Conservation Areas

To address needs of SGCN in the Northeastern Missouri River basin, conservation priority areas were identified (Figure 6). Results from Stewart et al. (2015) guided prioritization, building upon previous inventories and assessments (e.g., Patton 1997, McGree et al. 2011).

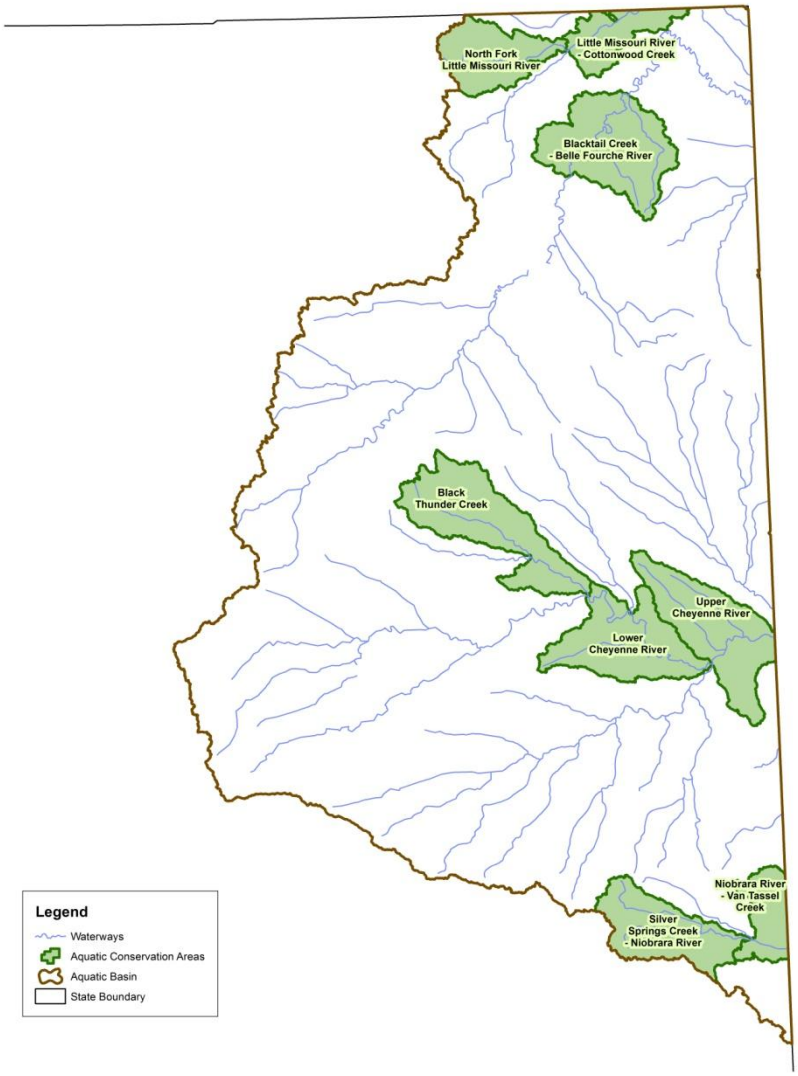

Figure 6. Aquatic Wildlife Conservation Areas in the Northeastern Missouri River Basin.

Priority areas include drainages where native fish diversity is highest in the basin and includes streams where the density of rare species (e.g., Finescale Dace and Pearl Dace) are high. Priority areas include most of the lower Little Missouri River drainage including the North Fork, the lower Cheyenne River including Lance Creek, the lower Niobrara River including Van Tassel Creek and the Belle Fourche below Keyhole Reservoir and including Redwater Creek (Figure 6).

Priority drainages and habitats have not yet been defined for the conservation of aquatic reptiles, freshwater mollusks, or crayfishes.

Threats

Water development/altered flow regimes – Moderate

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, 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 Northeastern Missouri River basin is grasslands or sagebrush. There is some irrigated cropland and relatively few water storage reservoirs.

Groundwater use in prairie systems has been shown to negatively impact stream flow, increasing the extent and duration of dry or intermittent stream channels. Native prairie fishes evolved in a highly dynamic system and readily recolonize areas that periodically dry out. Key to the ability to recolonize is lateral and longitudinal hydrologic connectivity and physical access by fish populations to all habitats necessary to complete their life history. In-channel obstructions and increased drying have reduced some populations of native stream fishes.

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. Energy diversification, including hydropower development, may increase as the nation's energy demands rise. Warmer conditions with more erratic precipitation— which some predict for Wyoming's future climate—may heighten the need for additional water development (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 will likely be placed on lining irrigation ditches and other practices to more efficiently use water for consumptive purposes. The net effect of all such water management practices will be to alter the timing, magnitude, and duration of natural hydrographs and reduce intra- and inter-annual variability in Wyoming's streams and associated riparian corridors (see Wyoming Leading Wildlife Conservation Challenges – Climate Change).

While water development can threaten native species, some introduced species, including those in popular sport fisheries, have thrived in the face of water development. The simplification of natural systems by human development tends to favor species with generalized and broad habitat requirements.

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).

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 habitat available to fish and other aquatic wildlife. All these conditions can be detrimental to the health and reproductive success of all aquatic wildlife species.

Invasive species – Moderate
Aquatic invasive species (AIS) present in the basin include curly pondweed and brook stickleback. Additional descriptions and definitions of AIS can be found in the WGFD AIS management plan (WGFD 2010).

Curly pondweed was introduced into the United States in the mid 1800's and is now widespread. Curly pondweed reproduces by seed which can be easily transferred in mud or water. It is introduced into new areas through boating, fishing, and water hauling, and as an ornamental plant. New populations continue to be discovered in Wyoming. In the Northeastern Missouri River Basin, it is found in Keyhole Reservoir.

The Brook Stickleback has been introduced to many states outside of its native range. Brook Stickleback are spread as a result of bait introductions or accidental introductions with aquaculture species. Juvenile fish and fish eggs may be difficult to see and can be moved in standing water in boats and bait buckets. Brook Stickleback are found in Turner Reservoir and Beaver Creek in the Cheyenne River drainage, and in Montana Creek in the Belle Fourche River drainage.

In addition to species designated as AIS, several introduced game fishes are problematic in the basin including Northern Pike, Yellow Perch and Black Crappie. 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).

Other invasive species, such as zebra and quagga mussels and silver carp, are present in neighboring states and potentially very harmful to the aquatic wildlife in the basin. Through outreach and education, watercraft inspections, and monitoring, the harmful impacts of these and other invasive species may be prevented. Watercraft are inspected at key locations entering the basin at Beulah and at Keyhole Reservoir. Keyhole Reservoir is monitored annually to detect the presence of invasive species. These efforts to keep existing species in the basin from spreading to new waters, and other harmful species from entering the basin will continue. These efforts to keep existing species in the basin from spreading to new waters, and other harmful species from entering the basin will continue.

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 these tools, policies and protocols including environmental commenting, aquatic wildlife stocking and transplant, and disease prevention can be found in the 2010 SWAP.

Interagency plans and agreements
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 Great Plains Fish Habitat Partnership covers the Northeastern Missouri River Basin. The goal of the partnership is to work together to conserve (protect, restore, and enhance) aquatic resources of rivers and streams throughout the prairies of the central United States. Additional information on Fish Habitat Partnerships can be found in the 2010 SWAP.

Ongoing and completed conservation actions

Numerous projects have been completed to benefit SGCN in the Northeastern Missouri 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

The WGFD conducted a project to inventory and assess amphibian and reptile populations and habitats in northeastern Wyoming (Snoberger and Walker 2016). Amongst other findings, Western Painted Turtle and Eastern Snapping Turtles were both documented but Western Spiny Softshell was not detected.

Protect native fish populations in the Niobrara drainage

WGFD biologists inventoried and assessed fish populations and habitats in northeastern Wyoming's prairie streams (Moan et al. 2010, McGree et al. 2011). Amongst other findings, numerous refinements were made to range distributions.

WGFD biologists carried out a project in 2014-2015 to determine the impacts of barriers and intermittency on native fish assemblages in the Niobrara River (Compton and Hogberg *In preparation*). Amongst other findings, non-native Northern Pike were documented in the lower Niobrara River in Wyoming for the first time.

Describe the distribution and intactness of aquatic habitats

No reported projects.

Protect relatively intact riparian systems and restore those in proximity to SGCN priority areas

The WGFD transplanted beaver to the Blacktail and Redwater Creek drainages. The objectives were to raise streamside water tables and moderate late season stream flows (WGFD 2011, 2012, 2015, 2016).

The WGFD implemented rehabilitation treatments in cooperation with the Black Hills National Forest to stabilize channel degradation at a three acre remnant beaver dam wetland complex that supports FSD in the headwaters on Middle Redwater Creek (WGFD 2016).

Explore water management approaches that enhance fish habitat

A project in Newcastle was completed that created a 1.6 acre publically accessible pond and enhanced downstream wetlands by using water from an unused water well.

Increase educational efforts about the ecological, economic, and social values of aquatic SGCN

The WGFD created, produced and disseminated a poster detailing the states native fishes.

Continue building voucher collections for all aquatic wildlife

WGFD biologists collected numerous fish voucher specimens since the last SWAP (2010). All fish voucher specimens are submitted to the Museum of Southwestern Biology, Albuquerque NM. All native mussel and crayfish voucher

specimens are submitted to the University of Colorado Museum of Natural History.

Complete the comprehensive survey for freshwater mussels
The WGFD conducted a SWG-funded project to assess the distribution and abundance of native mussels in northeast Wyoming. Inventory surveys were conducted in the Powder, Tongue, Belle Fourche and Cheyenne (Mathias 2016). Live White Heelsplitter, Fatmucket and Giant Floater were documented in the Tongue and Belle Fourche rivers (Mathias 2016).

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

Increase connectivity where appropriate
The above mentioned project on Middle Redwater Creek helped reconnect a Finescale Dace population.

Remove nonnative species from the North Fork Little Missouri River
No reported projects.

Recommended Conservation Actions

Secure, enhance, or establish SGCN populations
Determine suitable locations and transplant Finescale Dace to increase distribution.

Inventory, assess, or examine life history requirements of SGCN
Investigate the distribution, impacts on SGCN and options for control of non-native Northern Pike in the lower Niobrara River. Conduct baseline gastropods surveys in the basin and identify needed actions to maintain or restore populations.

Survey to fill gaps in knowledge about native mussel distribution with a particular focus on Giant Floater.

Investigate the distribution and population structure of aquatic reptiles, especially Western Spiny Softshell.

Provide passage and reduce entrainment at barriers impacting SGCN
Enter information on physical measurements and locations of natural and manmade barriers in WGFD Fish Passage database.

Improve aquatic habitat for SGCN
Explore opportunities to increase suitable riparian habitats for beaver, and transplant beaver to suitable habitats.

Conduct habitat improvement projects to secure currently occupied Finescale Dace habitat in the Belle Fourche (e.g. Redwater Creek) drainage.

Employ water management strategies that improve habitat for SGCN
No actions identified.

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 fish sampling program at multiple sites in the Little Missouri, Belle

Fourche, Cheyenne and Niobrara river drainages (McGree et al. 2010, Moan et al. 2010).

Monitor upstream distributions of introduced Northern Pike in the Niobrara River.

Monitor the existing population of Finescale Dace in the Redwater Creek drainage.

Monitor water quantity and temperature in areas containing important native SGCN populations.

Monitor the establishment and spread of invasive species.

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