

Progress Report

Green River Watershed Native Non-Game Fish Species Research: Phase II

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Submitted to:

Bureau of Reclamation

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INTRODUCTION

Flannelmouth sucker (*Catostomus latipinnis*), bluehead sucker (*Catostomus discobolus*), and roundtail chub (*Gila robusta*), hereafter target species, are native to the Colorado River basin and have undergone declines in both abundance and distribution throughout their ranges. Due to these declines, state and federal agencies have entered into a range-wide conservation agreement and strategy to ensure the persistence of these species in their native ranges (Utah Division of Wildlife Resources 2006)

Weitzel (2002) reports that these three species were historically abundant in the Green River watershed of southwestern Wyoming. However, populations have declined in Wyoming (Weitzel 2002) and throughout the Colorado River drainage (Bezzarides and Bestgen 2002). The Wyoming Natural Diversity Database assigns bluehead sucker (BHS) the global ranking of G4 suggesting this species is abundant and globally secure, although it may be quite rare in portions of its range and should therefore be an object of long-term concern (Keinath et al. 2003). Flannelmouth sucker (FMS) have been assigned the global ranking of G3/G4, which suggests its existence is uncertain. It is uncommon but appears to be locally secure. Roundtail chub (RTC) have been assigned the ranking of G3, which suggests its existence to be quite rare throughout its range or locally abundant and highly restricted. Additionally, the Wyoming Game and Fish Department classifies these three species as NSS1 species, meaning that they are rare and their habitat is declining or vulnerable.

Baxter and Simon (1970) and Wheeler (1997) represent the only drainage-wide fish surveys conducted in the Green River watershed of southwest Wyoming. The recent surveys conducted by Wheeler (1997) show that from 1965 to 1995 the three species declined in the Wyoming portion of the Green River drainage at three spatial scales (site, stream, and sub-drainage). In 1995, Wheeler documented BHS in the Hams Fork drainage, and RTC in the Hams Fork, Blacks Fork and Little Snake River drainages. In 1995, FMS were documented throughout the Green River drainage downstream of Fontenelle Reservoir and in the Little Snake River drainage (Wheeler 1997). In addition to these drainage-wide survey efforts, the Bitter Creek sub-drainage was surveyed in 1993 (Carter and Hubert 1995) and the Big Sandy River sub-drainage was surveyed in the 1960's and 1970's (Miller 1978).

Bluehead sucker and RTC were not documented in the 1993 Bitter Creek survey, but FMS were documented from a site near the Bitter Creek-Green River confluence (Carter and Hubert 1995).

Miller (1978) reported BHS and RTC at one site each during Big Sandy River surveys and BHS were also collected at one site on Little Sandy Creek. Flannelmouth sucker were documented throughout the Big Sandy River and Little Sandy Creek downstream of the National Forest Service boundary.

Bluehead sucker, FMS, and RTC face a number of threats to their continued survival in the Green River drainage of Wyoming. The most direct threats include habitat fragmentation caused by dams and water development projects, competition with and predation by introduced species, and hybridization with introduced species. Recent work in the Yampa River drainage in Colorado (Douglas and Douglas 2003) documents FMS and BHS hybridization with introduced white sucker (*Catostomus commersoni*). These findings raise the possibility that introgressive hybridization may be occurring among white sucker (WHS), FMS, and BHS.

Introgressive hybridization is defined as “the infiltration of genes of one species by the intermediacy of hybrids into another species, resulting in the genetic modification of the latter” (Hanson 1962). In this case, the introduced white sucker could act as a “bridge” allowing gene flow between FMS and BHS that is otherwise extremely rare. In addition, Baxter and Stone (1995) indicated that hybridization might occur between RTC and introduced Utah chub (*Gila atraria*) and leatherside chub (*Gila copei*). Because of these potential threats, additional information is needed to further assess the population status and guide future management decisions for these species.

This project consists of two distinct phases. Phase 1, completed in 2002, focused on compiling existing information on BHS, FMS, and RTC, assessing land ownership within the drainage, testing various gear and sampling strategies, documenting fish passage barriers, and collecting preliminary genetic samples from FMS, BHS, WHS, and their hybrids. Refer to Keith et al. (2003) for more information on Phase 1.

Phase II of the project involves non-game fish sampling in the Green River drainage in Wyoming. Efforts in 2006 mark the fourth and final year of Phase II surveys. In the first year of Phase II sampling (2003), efforts focused on the eastern portion of the Green River watershed downstream of Fontenelle Dam (Gill et al. 2004). A total of 60 reaches were sampled among seven sub-drainages. Twenty-three fish species were captured in the study area, of which seven are native to the Green River drainage: Flannelmouth sucker, BHS, Colorado River cutthroat trout (CRC), mottled sculpin (MSC), mountain sucker (MTS), mountain whitefish (MWF), and speckled dace (SPD).

Of the three target species, FMS, BHS, and their respective hybrids with WHS (FMS x WHS=FXW and BHS x WHS=BXW) were identified during the 2003 field season. Bluehead sucker were captured in nine of the 60 reaches sampled, and FMS were captured in 16 of the 60 reaches. Bluehead sucker hybrids (BXW) were captured in three of the 60 reaches, and FXW were captured in 11 of the 60 reaches. No RTC were captured during the 2003 field season. Refer to Gill et al. (2004) for more information on the 2003 field season.

The 2004 field season focused on the west side tributaries of the Green River downstream of Fontenelle Dam (Gill et al. 2005). A total of 100 reaches were sampled in six sub-drainages in 2004. Twenty-one fish species were captured, of which eight are native to the Green River watershed: BHS, FMS, RTC, CRC, MSC, MTS, MWF, and SPD. All three target species were captured in 2004; BHS were captured in two of the 100 reaches, FMS were captured in 34 reaches, and RTC were captured in 17 reaches. Bluehead sucker hybrids (BXW) were captured in five reaches and FXW in 21 reaches. More information on the 2004 field season can be found in Gill et al. (2005).

The 2005 field season focused on that portion of the Green River drainage upstream of Fontenelle Reservoir (Kern et al. 2006). A total of 76 reaches were sampled across 14 sub-drainages. Nineteen fish species were captured, of which seven are native to the Green River watershed: BHS, FMS, CRC, MSC, MTS, MWF, and SPD. No RTC were captured in 2005; BHS and FMS were the only target species collected.

In 2005, bluehead sucker were collected from one of 76 reaches and FMS were collected from nine of the 76 reaches. Hybridization between BHS and WHS was noted in two of the 76 reaches while hybridization between FMS and WHS was noted in seven of the 76 reaches. More information on the 2005 field season can be found in Kern et al. (2006). Hybridization between BHS and WHS was noted in two of the 76 reaches while hybridization between FMS and WHS was noted in seven of the 76 reaches. More information on the 2005 field season can be found in Kern et al. (2006).

This report summarizes the results of the fourth and final field season of Phase II, which was conducted in 2006. Efforts were concentrated in the Little Snake River and New Fork River drainages.

OBJECTIVES

The objectives outlined for completion during Phase II, 2006 were to:

1. Determine the distribution and abundance of BHS, FMS, and RTC.
2. Document the length frequency of BHS, FMS and RTC at each sampling location to determine the different life stages of each species.
3. Document the native and non-native species composition.
4. Attempt to determine the degree of hybridization that is occurring within FMS, BHS, and possibly RTC populations.

SITE DESCRIPTION

The Green River is the largest tributary to the Colorado River. Its headwaters originate in the Wind River mountain range of Wyoming. As it flows towards its confluence with the Colorado River in southeastern Utah, the Green River and its tributaries drain an area of approximately 45,000 mi² in Wyoming, Colorado, and Utah. This project focuses on that portion of the Green River in southwestern Wyoming, which drains an area of nearly 17,100 mi² and encompasses parts of Carbon, Fremont, Lincoln, Sublette, Sweetwater, and Uinta counties (Figure 1).

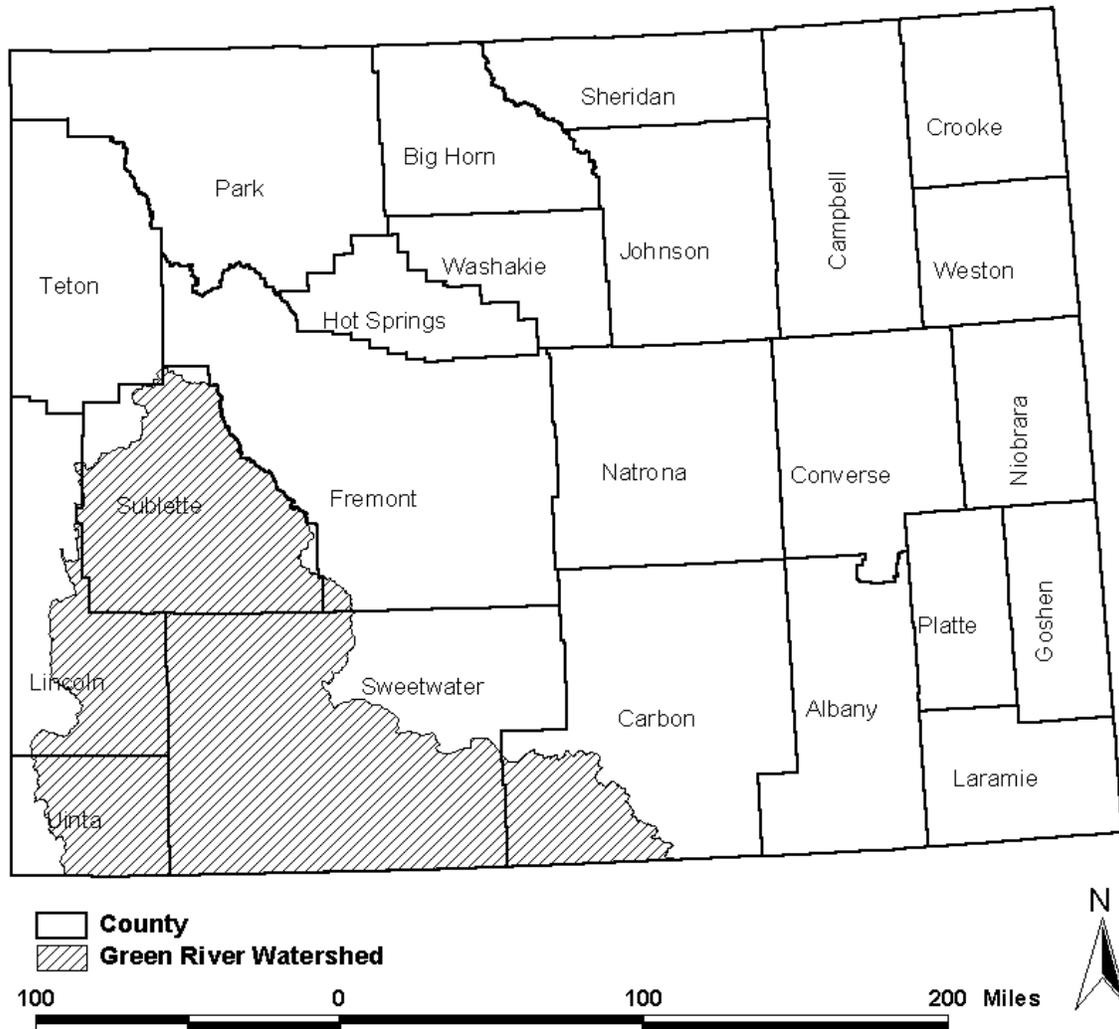


Figure 1. Study area for native non-game fish surveys; the Green River watershed of southwest Wyoming.

Land ownership within the watershed is 72% public and 28% private. The Bureau of Land Management (BLM) manages the majority (75%) of the public land, followed by the U.S. Forest Service (USFS, 15.8%), the State of Wyoming (5.5%), the Bureau of Reclamation (BOR, 2.9%), and the U.S. Fish and Wildlife Service (FWS, 0.8%).

Phase II efforts in 2006 focused on the Little Snake River and New Fork River sub-drainages (Figure 2). Sub-drainages targeted for sampling were based on Level 5 Hydrologic Unit Code (HUC) classification. For the purposes of this report, Level 5

HUCs will be hereafter referred to as “sub-drainages”. A complete list of sub-drainages within the 2005 target area can be found in Appendix D.

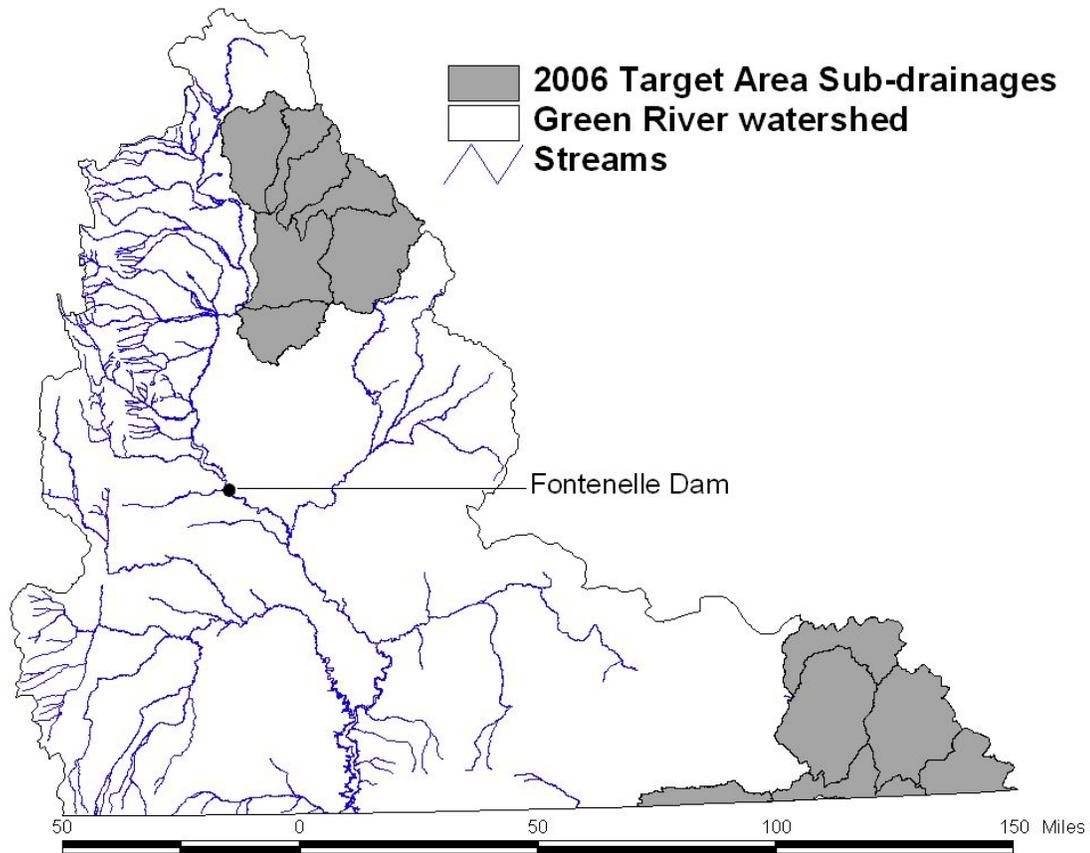


Figure 2. Proposed target area for Phase II sampling in summer 2006. Sub-drainages based on Level 5 HUC classifications.

METHODS

Sampling reaches were systematically selected throughout the study area and were spaced at approximately 5-mile intervals on most streams. Occasionally it was not possible to adhere to the 5-mile criterion due to lack of water or access problems. Sampling typically progressed upstream until trout and sculpin dominated the fish community. Unless otherwise noted, reaches were 656 ft long. Occasionally reaches were lengthened or shorted to end at habitat transitions or to accommodate local conditions (i.e., large beaver ponds, dense willow growth, or limited available water). Prior to sampling, block nets were placed at the upstream and downstream reach

boundaries to prevent fish from moving in or out of the area. At times, natural barriers (such as beaver dams) served as our upstream block nets.

Reaches were sampled with a variety of gears, including backpack, shore-based, barge (a cataraft barge equipped with three roaming electrodes) and raft electrofishing gear. Dipnets, bag seines, or a combination of electrofishing gear and a bag seine were also used. Conductivities in 2006 reaches necessitated the use of both shore based-electrofishing gear and backpack electrofishing units. Generally speaking, a 5000 watt generator and variable voltage pulsator integrated with shore-based or barge electrofishing equipment was used when water conductivity was above 1,000 $\mu\text{s}/\text{cm}$ or below 200 $\mu\text{s}/\text{cm}$. Some reaches sampled in 2006 in the New Fork River drainage had conductivities so low (below 50 $\mu\text{s}/\text{cm}$) that salt blocks were added to the stream until conductivities approached at least 100 $\mu\text{s}/\text{cm}$.

In most reaches, one or two backpack electrofishing units were used. A single unit was used in streams less than 15 ft wide, and two units were used in streams greater than 15 ft wide. Shore-based systems were used in reaches with high or low conductivities and barge electrofishing systems were used in places where stream size and depth made sampling with backpack electrofishing units or shore-based gear impossible. If electrofishing efficiency was poor due to high turbidity or extreme conductivity an additional electrofishing pass or seine haul was conducted over all or a portion of the reach. Residual pools were sampled with a combination of backpack electrofishing units, bag seines, and/or dipnets.

All fish collected were sorted by species and counted. Individual weights (g) and lengths (mm) were recorded for all target species, hybrids, and game fish. When a large number of WHS were collected, a sub-sample of 30 individuals representing the range of sizes was weighed and measured individually. A count and batch weight was recorded for all remaining WHS. Counts, length ranges, and batch weights were recorded for all non-target, non-game fish collected.

Tissue samples were collected from most BHS, FMS, RTC, and associated hybrids (Appendix B). These samples will be used to evaluate genetic purity and verify phenotypic identification. Samples consist of a thumbnail-sized piece of the right pelvic fin and are preserved in 95% ethanol. If a fish was too small to provide a sufficient fin

sample, the entire fish was sacrificed and preserved. In addition, a close-up digital photograph was taken of the entire fish. On suckers, an additional photograph was taken of the sub-terminal mouth.

Voucher specimens were collected from each stream sampled in 2006. Two specimens from each non-target species were collected. Specimens collected were generally capture or handling-related mortalities. If no mortalities were available, specimens were euthanized in a high dose of MS-222. Specimens were then preserved in 10% buffered formalin and labeled for temporary storage. Specimens will be sent to the Museum of Southwestern Biology, University of New Mexico, Albuquerque, for final curation. Genetic samples and photos from target species will be vouchered after genetic analyses are complete.

RESULTS

A total of 99 reaches across 14 sub-drainages were visited in 2006 (Figure 3). This includes four sub-drainages outside of the 2006 target area. Of these 99 reaches, 31 were not sampled due to a lack of water or insufficient flows to support fish. Fish community data was collected at 68 reaches in 2006 (Figure 3 and Appendix C). Reaches visited but not sampled were noted as such on the corresponding maps for individual sub-drainages (e.g. Figure 11).

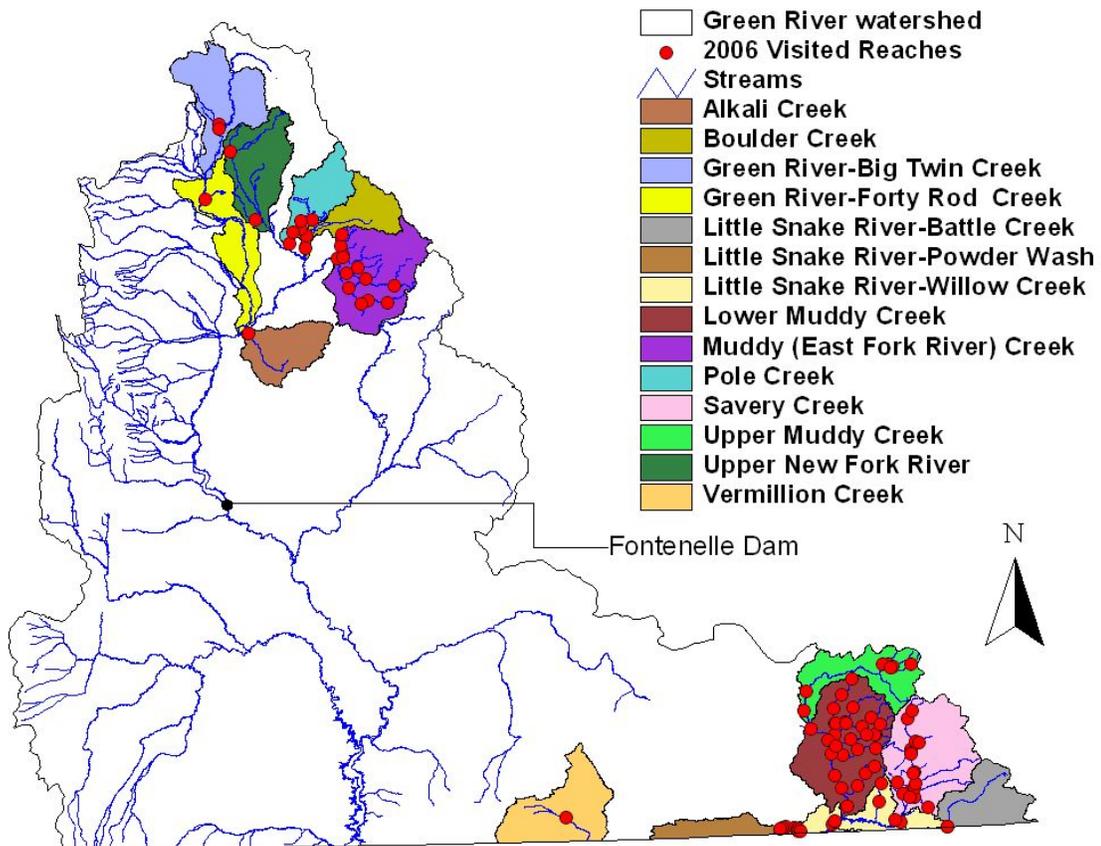


Figure 3. Location of sub-drainages and reaches visited in summer 2006.

Nineteen fish species were identified during the 2006 field season (see Appendix A for common, scientific, and abbreviated names for all fish species encountered in 2006). Of these, eight were native to the Green River watershed: BHS, FMS, CRC, MSC, MTS, MWF, RTC, and SPD.

All three of the target species (BHS, FMS, and RTC) were identified in 2006. Bluehead sucker were noted in four of 68 reaches (Figure 4). Flannelmouth sucker and roundtail chub were each noted in 10 of 68 reaches (Figures 5 and 6). Hybridization between BHS and WHS was noted in 12 of the 68 reaches (Figure 4), while hybridization between FMS and WHS was noted in 17 of the 68 reaches (Figure 5).

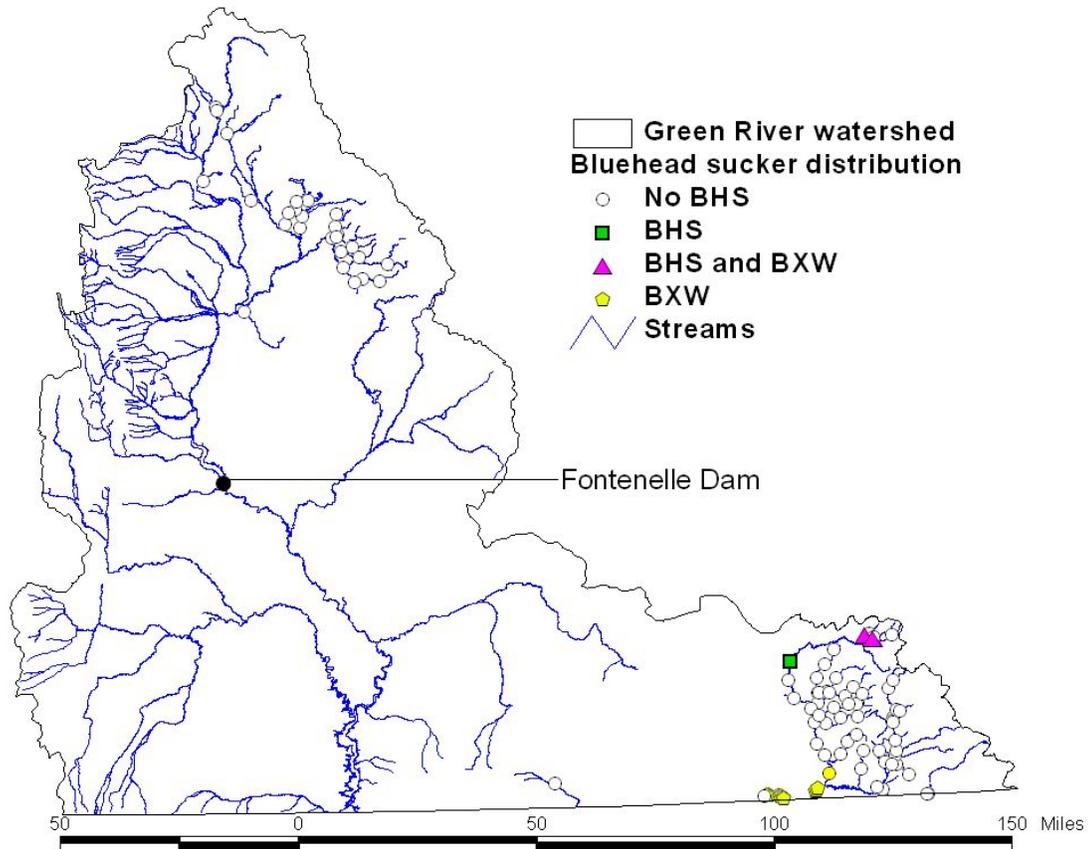


Figure 4. Locations of reaches where BHS and hybrids were identified during 2006 sampling.

Bluehead sucker were identified from four reaches in the Upper Muddy Creek sub-drainage (Figure 4). Additionally, a juvenile sucker presumed to be a BHS was collected from one reach in the Little Snake River-Powder Wash sub-drainage. This individual has been sent to the Larval Fish Lab at Colorado State University for identification. Putative BXW were identified from three reaches in the Little Snake River-Powder Wash sub-drainage, from six reaches in the Little Snake River-Willow

Creek sub-drainage, and from three reaches in the Upper Muddy Creek sub-drainage (Figure 4).

Flannemouth sucker were identified from three reaches in the Little Snake River-Powder Wash sub-drainage, from five reaches in the Little Snake River-Willow Creek sub-drainage, and from two reaches in the Upper Muddy Creek sub-drainages (Figure 5). Putative FXW were identified from three reaches in the Little Snake River-Powder Wash sub-drainage, from eight reaches in the Little Snake River-Willow Creek sub-drainage, and from three reaches in the Upper Muddy Creek sub-drainage (Figure 5).

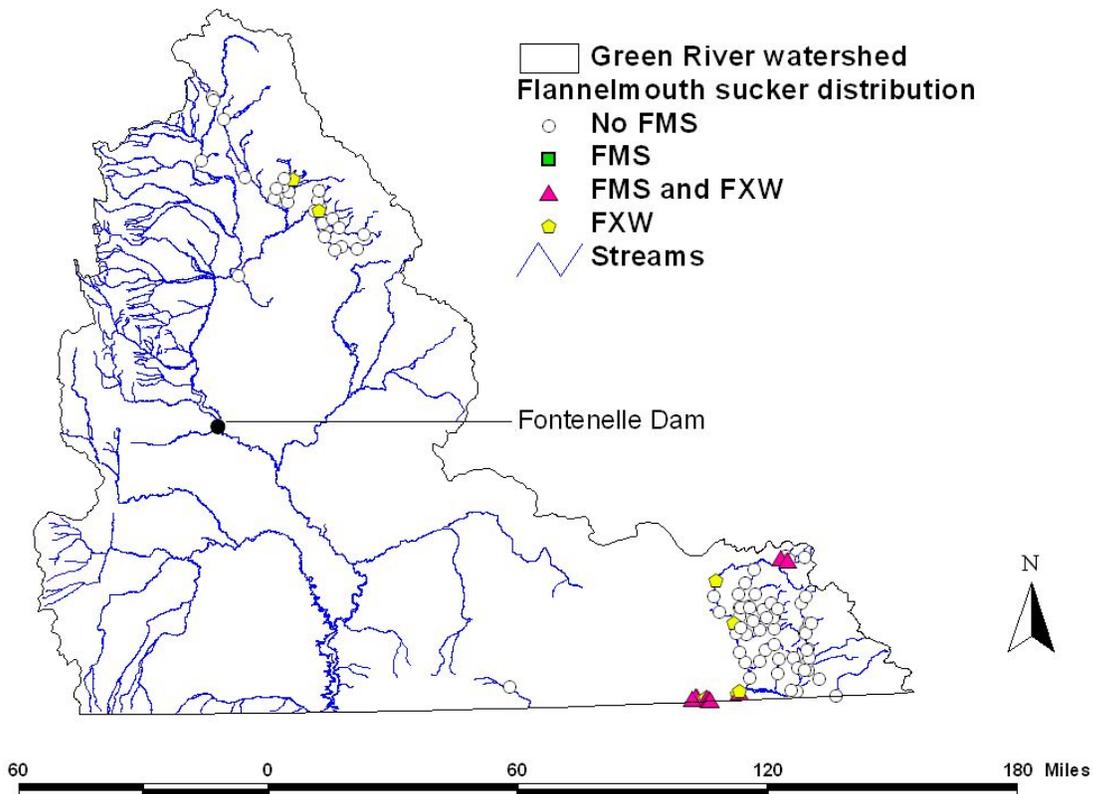


Figure 5. Locations of reaches where FMS and hybrids were identified during 2006 sampling.

Roundtail chub were identified from three reaches in the Little Snake River-Powder Wash sub-drainage, from four reaches in the Little Snake River-Willow Creek sub-drainage, from one reach in the Lower Muddy Creek sub-drainage, and from two reaches in the Upper Muddy Creek sub-drainage (Figure 6).

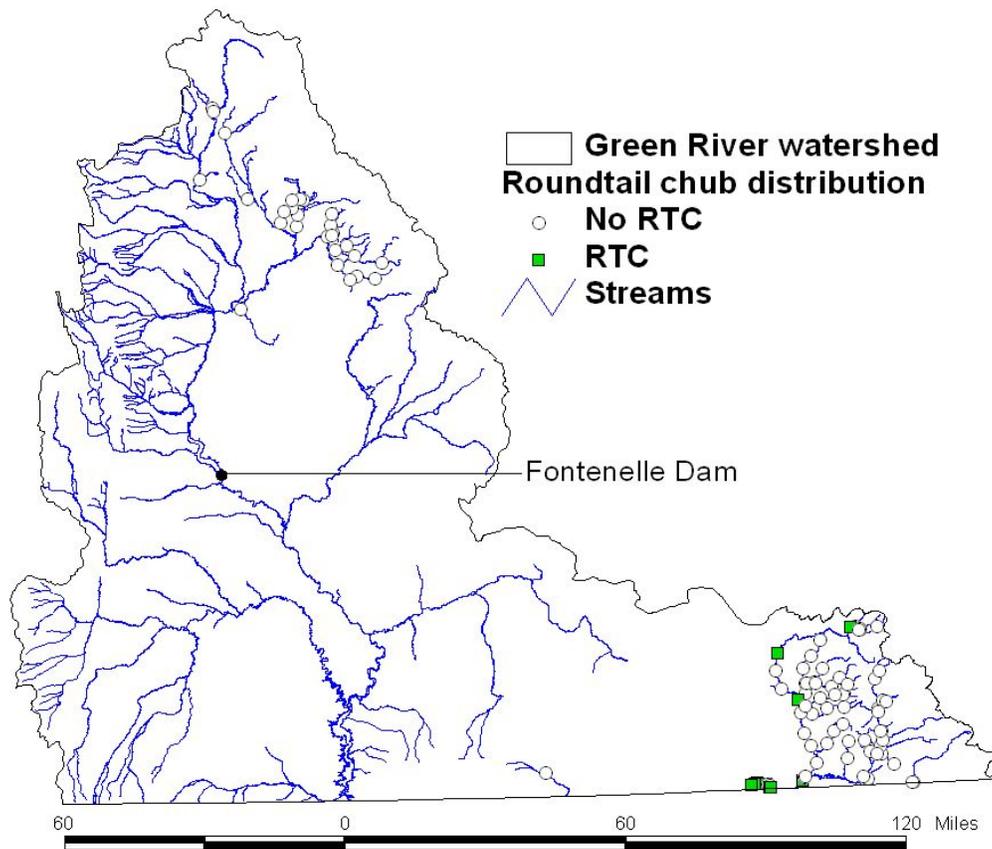


Figure 6. Locations of reaches where RTC were identified during 2006 sampling.

No adult BHS, FMS, BXW or RTC were identified upstream of Fontenelle Dam in 2006 (Figures 4 and 6, respectively). However, multiple juvenile native suckers were collected from Silver Creek in the Muddy (East Fork River) Creek sub-drainage (Figure 3), and inspection with a magnifying glass suggested that juvenile BHS and FMS were present in Silver Creek. Similarly, juvenile native suckers likely to be FMS were seined from a series of residual side channel pools on Pole Creek in the Pole Creek sub-drainage (Figure 3). These specimens have been sent to the Larval Fish Lab at Colorado State University for identification. Putative FXW were identified from one reach on Fall Creek in the Pole Creek sub-drainage and from one reach on Spring Creek in the Muddy (East Fork River) Creek sub-drainage (Figure 5).

Alkali Creek Sub-drainage

The 162 mi² Alkali Creek sub-drainage is in the central portion of the Green River watershed and is a tributary to the Green River east of Marbleton, WY (Figure 3). One reach on Alkali Creek was sampled in 2006 with personnel from the Pinedale BLM office (Figure 7 and Appendix C). Bureau of Land Management personnel discovered perennial water in a short segment of this otherwise ephemeral stream in the summer of 2005 and requested that we document the fish community. The mean wetted width of the reach was 8.9 ft and the maximum depth was 3.3 ft. Two fish species (FHM and WHS) were identified from the stream (Appendix E). Neither species is native to the stream. No target species or hybrids were identified from Alkali Creek in 2006.

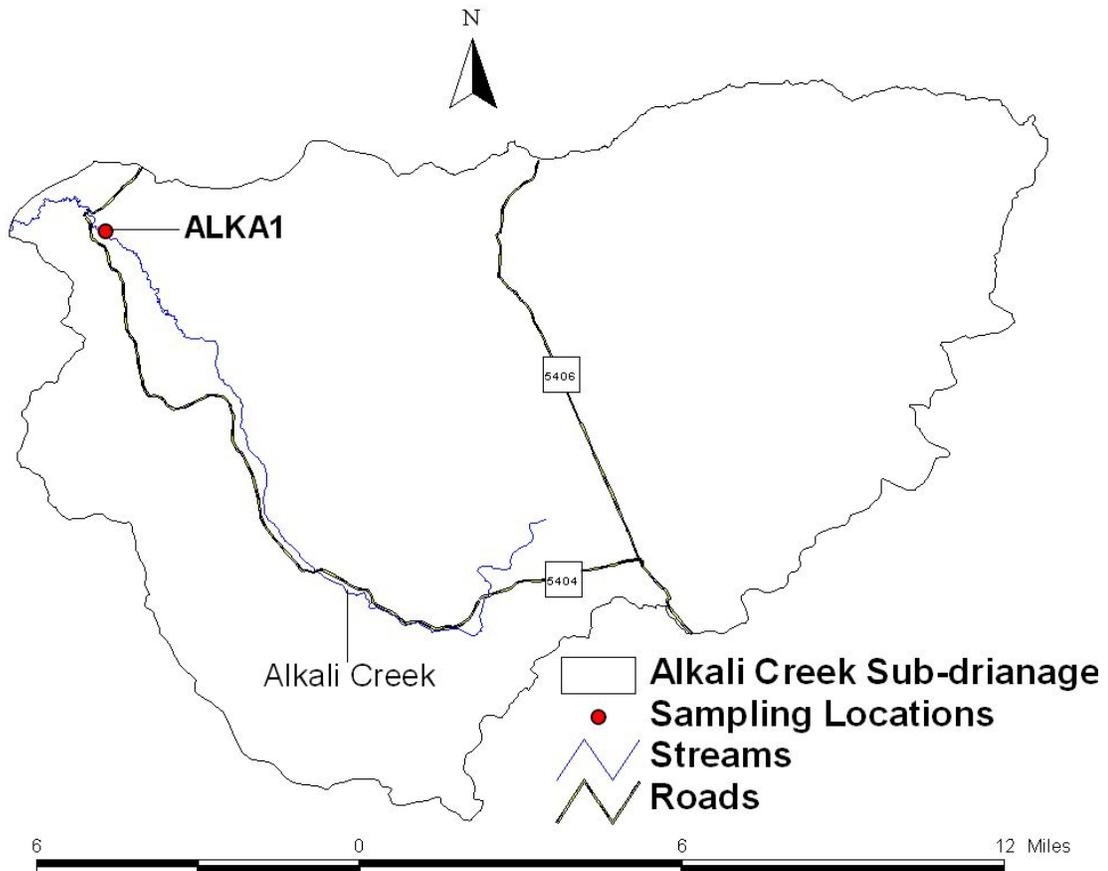


Figure7. Location of reach sampled in the Alkali Creek sub-drainage in 2006.

Boulder Creek Sub-drainage

The 137 mi² Boulder Creek sub-drainage is in the northeastern portion of the Green River drainage and is a tributary to the New Fork River (Figure 3). Two reaches

were sampled on Boulder Creek downstream of Boulder Lake in 2006 (Figure 8 and Appendix C). The mean wetted width of the two reaches was 60.9 ft and the maximum depth was 4.6 ft. Three of the eight fish species identified from Boulder Creek are native to the stream (MSC, MTS, and SPD; Appendix F). No target species or hybrids were identified from Boulder Creek in 2006.

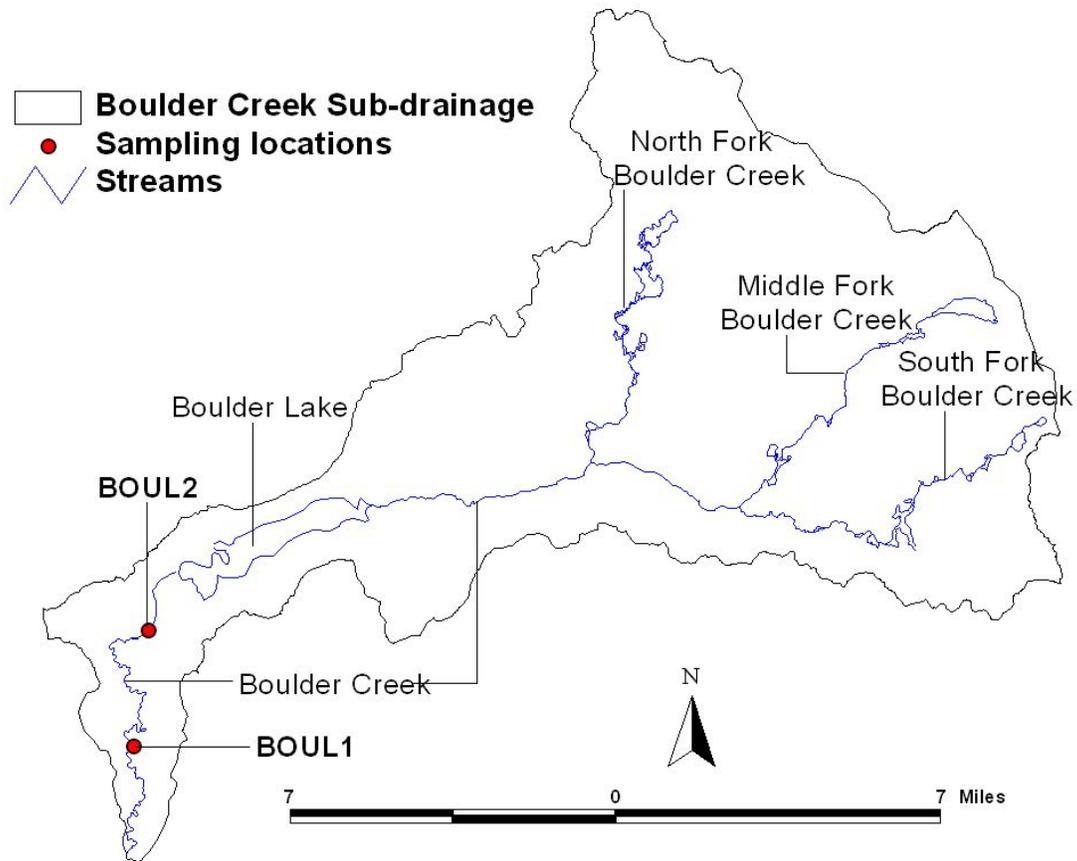


Figure 8. Locations of reaches sampled in the Boulder Creek sub-drainage in 2006.

Green River-Big Twin Creek Sub-drainage

The 259 mi² Green River-Big Twin Creek sub-drainage is in the northwestern portion of the Green River drainage (Figure 3). Two reaches were sampled within the sub-drainage in 2006 (Figure 9 and Appendix C). Of the eight fish species identified, four are native to the drainage (MSC, MTS, MWF, and SPD; Appendix G). No target species or hybrids were identified from the Green River-Big Twin Creek sub-drainage in 2006.

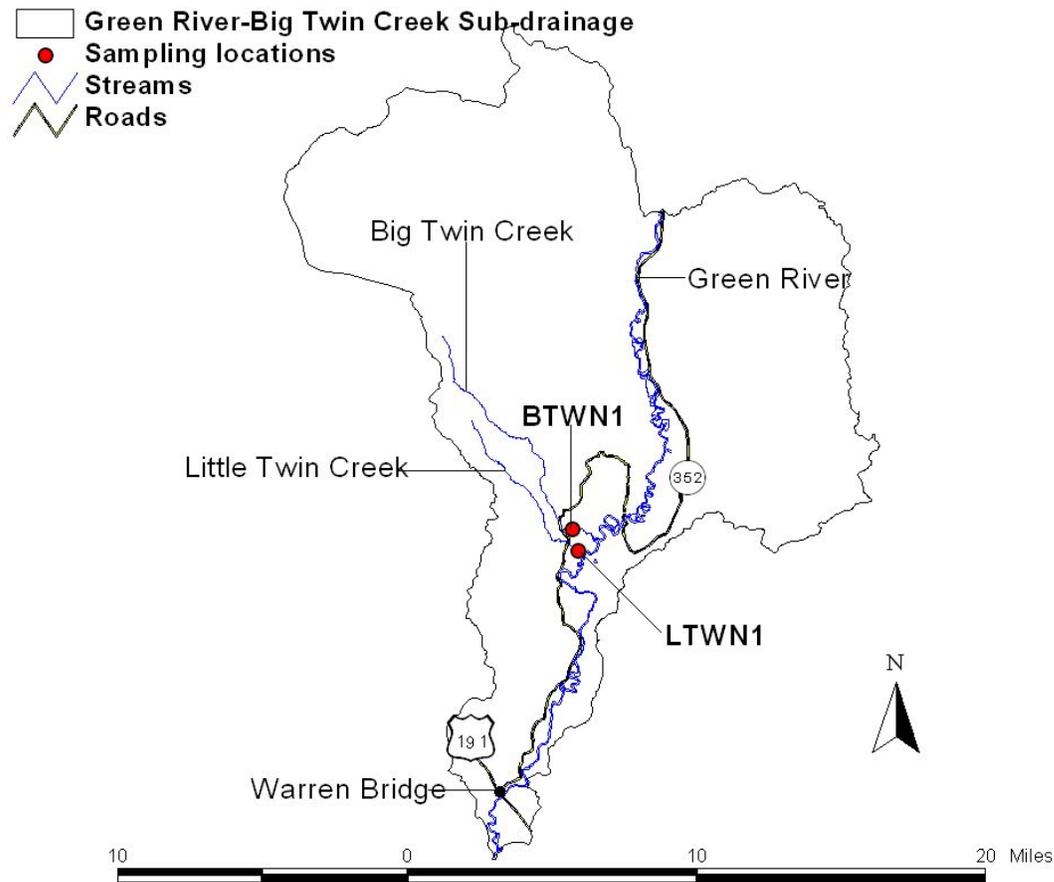


Figure 9. Location of reaches sampled in the Green River-Big Twin Creek sub-drainage in 2006.

Big Twin Creek

Big Twin Creek flows into the Green River north of Warren Bridge on U.S. Highway 191 (Figure 9). One reach was sampled on Big Twin Creek near the confluence with the Green River (Figure 9 and Appendix C).

The mean wetted width of the reach was 13.1 ft and the maximum depth was 3.6 ft. Four fish species were identified, of which two are native to the stream (MSC and MTS; Appendix G).

Little Twin Creek

Little Twin Creek flows into the Green River just south of Big Twin Creek (Figure 9). One reach was sampled on Little Twin Creek near the confluence with the

Green River (Figure 9 and Appendix C). Seven fish species were identified, of which three are native to the stream (MSC, MWF, and SPD; Appendix G).

Green River-Forty Rod Creek Sub-drainage

The 220-mi² Green River-Forty Rod Creek sub-drainage is in the northern portion of the Green River drainage (Figure 3). Forty Rod Creek flows into the Green River northwest of Daniel Junction, WY (Figure 10). One reach was sampled on Forty Rod Creek in 2006 (Figure 10 and Appendix C). The mean wetted width of the reach was 23.9 ft and the maximum depth was 3.3 ft. Six fish species were identified from Forty Rod Creek, of which three are native to the stream (MTS, MWF, and SPD; Appendix H). No target species or hybrids were identified from Forty Rod Creek in 2006.

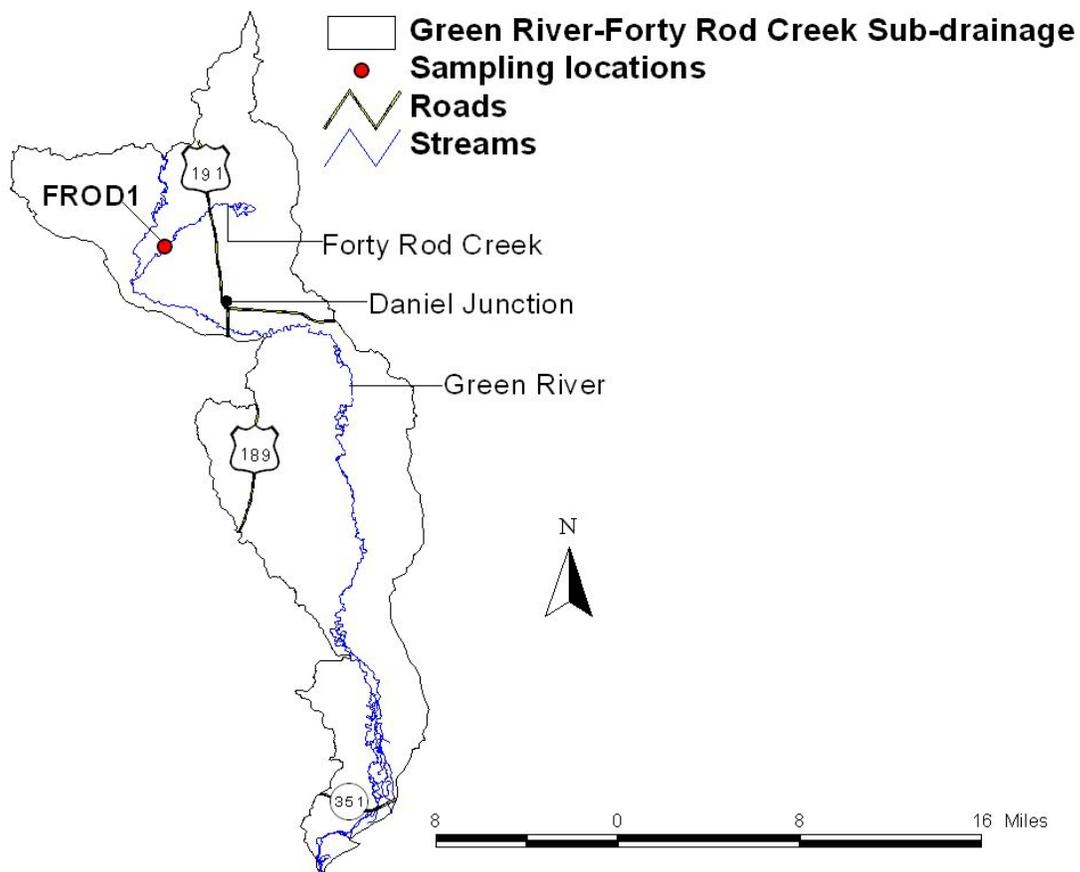


Figure 10. Location of reach sampled in the Green River-Forty Rod Creek sub-drainage in 2006.

Lower New Fork River Sub-drainage

The Lower New Fork River sub-drainage is located in the northern portion of the Green River drainage between the Pole Creek and Alkali Creek sub-drainages (Figure 3). Although this sub-drainage lies within the 2006 target area (Figure 2), no sampling took place in 2006 (Appendix D). It appears the only perennial water in this sub-drainage is the New Fork River, which is best sampled with raft electrofishing gear. Time and manpower constraints prevented sampling of the New Fork River in 2006.

Muddy (East Fork River) Creek Sub-drainage

The 332 mi² Muddy (East Fork River) Creek sub-drainage is in the northeastern portion of the Green River drainage (Figure 3). 13 potential sampling reaches across nine streams were visited in 2006. Of these 13 reaches, three were dry and not sampled, while 10 had water and were sampled (Figure 11 and Appendix I).

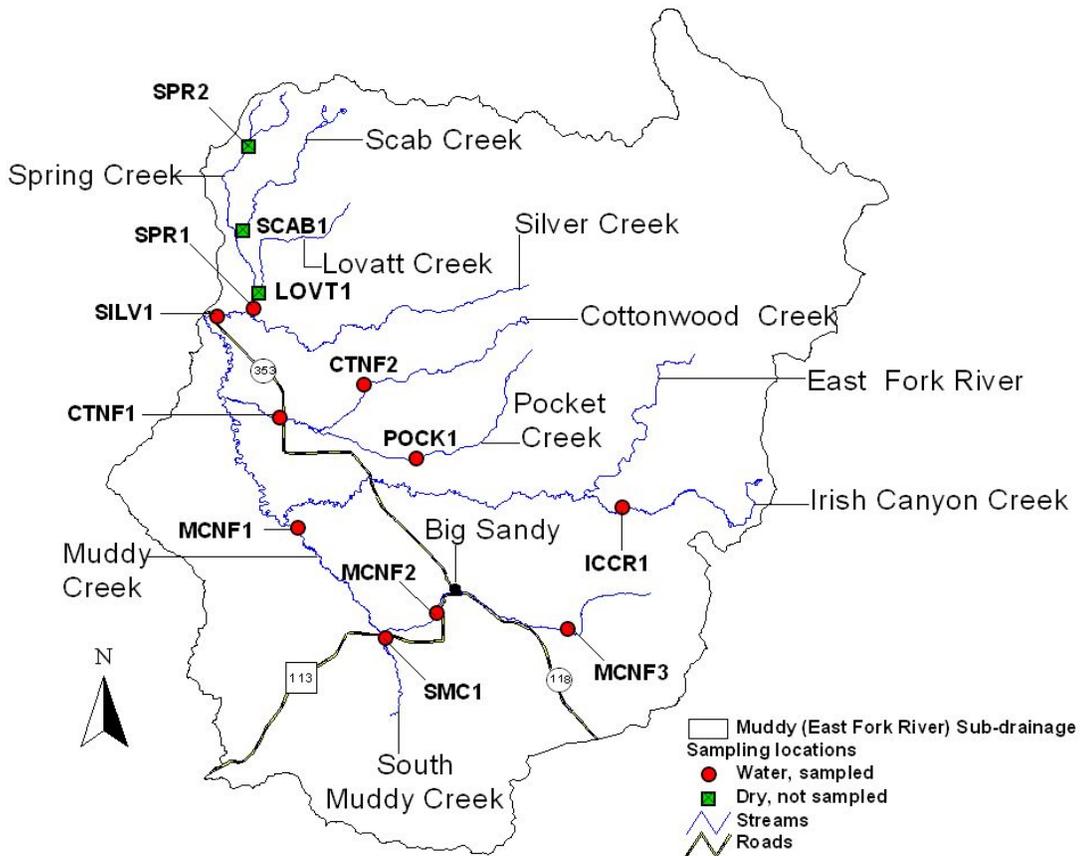


Figure 11. Locations of reaches visited in the Muddy (East Fork River) Creek sub-drainage in 2006.

Eight fish species were identified from this sub-drainage, of which four are native (MSC, MTS, MWF, and SPD; Appendix I). In addition, several juvenile suckers were collected from a reach on Silver Creek that close inspection with a magnifying glass suggested were BHS and FMS. These fish have been sent to the Larval Fish Lab at Colorado State University for identification. Hybridization between FMS and WHS was noted in one reach (Appendix I).

Cottonwood Creek

Cottonwood Creek flows into the East Fork River northwest of Big Sandy, WY (Figure 11). Two reaches were sampled on Cottonwood Creek in 2006 (Appendix C). The mean wetted width of the two reaches was 10.2 ft and the maximum depth was 2.3 ft. Five fish species were identified from Cottonwood Creek in 2006, of which two are native to the stream ((MTS and SPD; Appendix I). No target species or hybrids were identified from Cottonwood Creek in 2006 (Appendix I).

Irish Canyon Creek

Irish Canyon Creek flows into the East Fork River northeast of Big Sandy, WY (Figure 11). One reach was sampled on Irish Canyon Creek in 2006 (Appendix C). The mean wetted width of the reach was 16.8 ft and the maximum depth was 4.6 ft. One native fish species was identified from the stream (MTS; Appendix I).

Lovatt Creek

Lovatt Creek is a small tributary to Spring Creek in the northern portion of this sub-drainage (Figure 11). One potential sampling reach was visited on Lovatt Creek in 2006, but it was dry (Figure 11). No reaches were sampled on Lovatt Creek in 2006 (Appendix I).

Muddy Creek

Muddy Creek flows into the East Fork River northwest of Big Sandy, WY (Figure 11). Three reaches were sampled on Muddy Creek in 2006 (Appendix C). The mean

wetted width of the three reaches was 7.8 ft and the maximum depth was 2.6 ft. Five fish species were identified from Muddy Creek, of which three are native to the stream (MSC, MWF, and SPD; Appendix I). Neither target species nor hybrids were identified from Muddy Creek in 2006.

Pocket Creek

Pocket Creek is a small tributary to Cottonwood Creek north of Big Sandy, WY (Figure 11). One reach was sampled on Pocket Creek in 2006 (Appendix C).

The mean wetted width of the reach was 3.0 ft and the maximum depth was 1.0 ft. No fish were captured on Pocket Creek (Appendix I).

Scab Creek

Scab Creek is a tributary to Spring Creek upstream of Lovatt Creek (Figure 11). One potential sampling reach was visited on Scab Creek in 2006, but the reach was dry and was not sampled (Appendix I).

Silver Creek

Silver Creek flows into the East Fork River in the far northwestern portion of the Muddy Creek sub-drainage (Figure 11). One reach was sampled on Silver Creek in 2006 (Appendix C). The mean wetted width of the reach was 26.9 ft and the maximum depth was 3.6 ft. Six fish species were identified, of which three are native to the stream (MSC, MTS, and SPD; Appendix I). In addition, several juvenile suckers were collected from Silver Creek that may be BHS and FMS. These fish have been sent to the Larval Fish Lab at Colorado State University for identification.

South Muddy Creek

South Muddy Creek flows into Muddy Creek southwest of Big Sandy, WY (Figure 11). One reach was sampled on South Muddy Creek in 2006 (Appendix C). The mean wetted width of the reach was 3.0 ft and the maximum depth was 1.3 ft. No fish were captured on South Muddy Creek (Appendix I).

Spring Creek

Spring Creek flows into Silver Creek in the northwestern portion of the Muddy Creek sub-drainage (Figure 11). Two potential sampling reaches were visited on Spring Creek in 2006. One reach was dry, while the downstream reach had water and was sampled (Appendix C). The mean wetted width of the reach was 12.2 ft and the maximum depth was 3.0 ft. Seven fish species were identified from Spring Creek, of which three are native to the stream (MSC, MTS, and SPD; Appendix I).

Hybridization between WHS and FMS was noted in one individual measuring 9.9 in (Appendix I). A right pelvic fin clip was taken from the single FXW for genetic analyses (Appendix B).

Pine Creek Sub-drainage

The Pine Creek sub-drainage is located in the northern portion of the Green River drainage between the Pole Creek and Upper New Fork River sub-drainages (Figure 3). Sampling by WGFD personnel in Pine Creek downstream of Fremont Lake in 1996 and 2002 did not document any BHS, FMS, RTC, or sucker hybrids (Pete Cavalli, WGFD, personal communication), although Fremont Lake, which is located in this sub-drainage, does contain a small population of RTC. Fish species that were documented from Pine Creek in 1996 and 2002 include: BKT, BNT, RBT, RSS, and SPD (Pete Cavalli, WGFD personal communication). Due to these recent sampling efforts and time constraints, Pine Creek was not sampled in 2006.

Pole Creek Sub-drainage

The Pole Creek sub-drainage is 151-mi² in the northeastern portion of the Green River sub-drainage (Figure 3). Six reaches across three streams were visited in 2006 (Figure 12). Of these six reaches, one was dry and not sampled. Five reaches were sampled in the Pole Creek sub-drainage in 2006 (Appendix C). 10 fish species were identified, of which four are native to the sub-drainage (MSC, MTS, MWF, and SPD; Appendix J). Multiple juvenile suckers likely to be FMS were collected from a seining effort on Pole Creek. These fish have been sent to the Larval Fish Lab at Colorado State

University for identification. Hybridization between FMS and WHS was noted in one reach on Fall Creek (Appendix J).

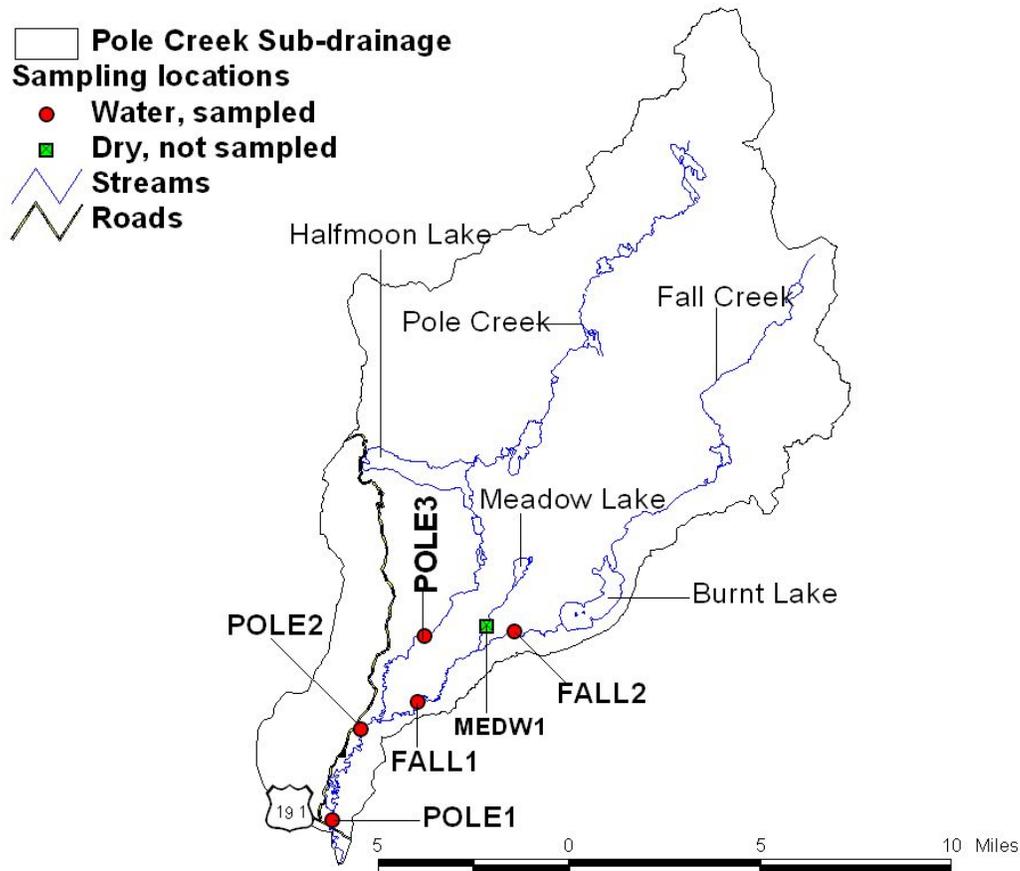


Figure 12. Location of reaches visited in the Pole Creek sub-drainage in 2006.

Fall Creek

Fall Creek flows into Pole Creek northeast of Highway 191 (Figure 12). Two reaches were sampled on Fall Creek downstream of Burnt Lake in 2006 (Appendix C). The mean wetted width of the two reaches was 25.2 ft and the maximum depth was 3.3 ft. Nine fish species were identified from Fall Creek, of which three are native to the stream (MSC, MWF, and SPD; Appendix J). No target species were collected, although hybridization between FMS and WHS was noted in one 7.2 in individual identified from reach FALL2 (Figure 12 and Appendix J). A right pelvic fin clip was taken from this single FXW for genetic analyses (Appendix B).

Meadow Creek

Meadow Creek flows into Fall Creek between Meadow Lake and Highway 191 (Figure 12). One potential sampling reach was visited on Meadow Creek, but the reach was dry and was not sampled (Appendix J).

Pole Creek

Pole Creek flows into the New Fork River just downstream of Highway 191 (Figure 12). Three reaches were sampled on Pole Creek downstream of Halfmoon Lake in 2006 (Appendix C). In addition, a bag seine was used to sample a series of residual side channel pools adjacent to reach POLE1. Nine fish species were identified from the electrofishing effort on Pole Creek, of which four are to the stream (MSC, MTS, MWF, and SPD; Appendix J). Five fish species were identified from the seining effort, of which two are native to the stream (MSC and SPD; Appendix J). Multiple juvenile fish likely to be FMS were also collected during the seining effort. These fish have been sent to the Larval Fish Lab at Colorado State University for identification.

Upper New Fork River Sub-drainage

The 231 mi² Upper New Fork River sub-drainage is in the northern portion of the Green River drainage (Figure 3). Two reaches were sampled in the Upper New Fork River sub-drainage in 2006 (Figure 13 and Appendix C). Six fish species were identified, of which three are native to the stream (MSC, MTS, and SPD, Appendix K). No target species or hybrids were identified from the Upper New Fork River sub-drainage in 2006 (Appendix K).

Duck Creek

Duck Creek flows into the New Fork River west of Pinedale, WY (Figure 13). One reach was sampled on Duck Creek in 2006 (Appendix C). Six fish species were identified, of which three are native to the stream (MSC, MTS, and SPD; Appendix K). No additional reaches were sampled on Duck Creek due to access problems. No target species or hybrids were identified from Duck Creek in 2006.

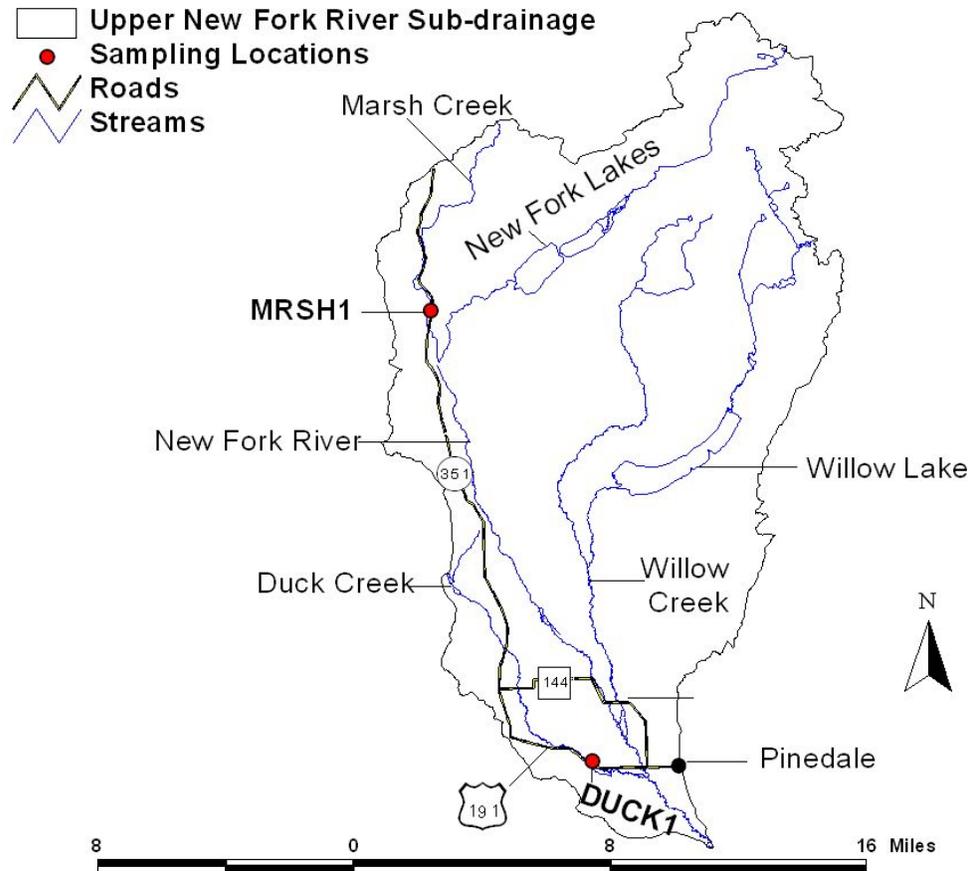


Figure 13. Location of reaches sampled in the Upper New Fork River sub-drainage in 2006.

Marsh Creek

Marsh Creek flows into the New Fork River west of the New Fork Lakes (Figure 13). One reach was sampled on Marsh Creek in 2006 (Appendix C), but no fish were captured (Appendix K). No additional reaches were sampled on March Creek due to access problems.

Little Snake River-Battle Creek Sub-drainage

The 170 mi² Little Snake River-Battle Creek sub-drainage is in the southeastern portion of the Green River drainage (Figure 3). Battle Creek flows into the Little Snake River just south of the Wyoming-Colorado state line (Figure 14). One reach was sampled on Battle Creek in 2006 just north of the state line (Figure 14 and Appendix C). The mean wetted width of the reach was 65 feet and the maximum depth was 2.3 feet.

Three fish species were identified from the stream. All three are native to the stream (MTS, MSC, and SPD; Appendix L). No target species or hybrids were collected from Battle Creek in 2006.

In addition to the electrofishing effort, a bag seine was used to sample a small man-made pond constructed on an old meander channel just west of the reach on Battle Creek (Figure 14 and Appendix L). The pond has no surface connection to Battle Creek. Four fish species were identified from the pond, none of which are native to the sub-drainage (CKC, FHM, RSS, WHS; Appendix L). Two more planned sampling reaches located on Battle Creek were not sampled in 2006 due to concerns of excessive trout mortality brought about by warm water temperatures and untimely thunderstorms which made the two-track roads leading to the creek hazardous to travel. Based on how quickly Battle Creek warmed up after spring flows in 2006, the best time to sample the remaining reaches is in the fall, if weather permits.

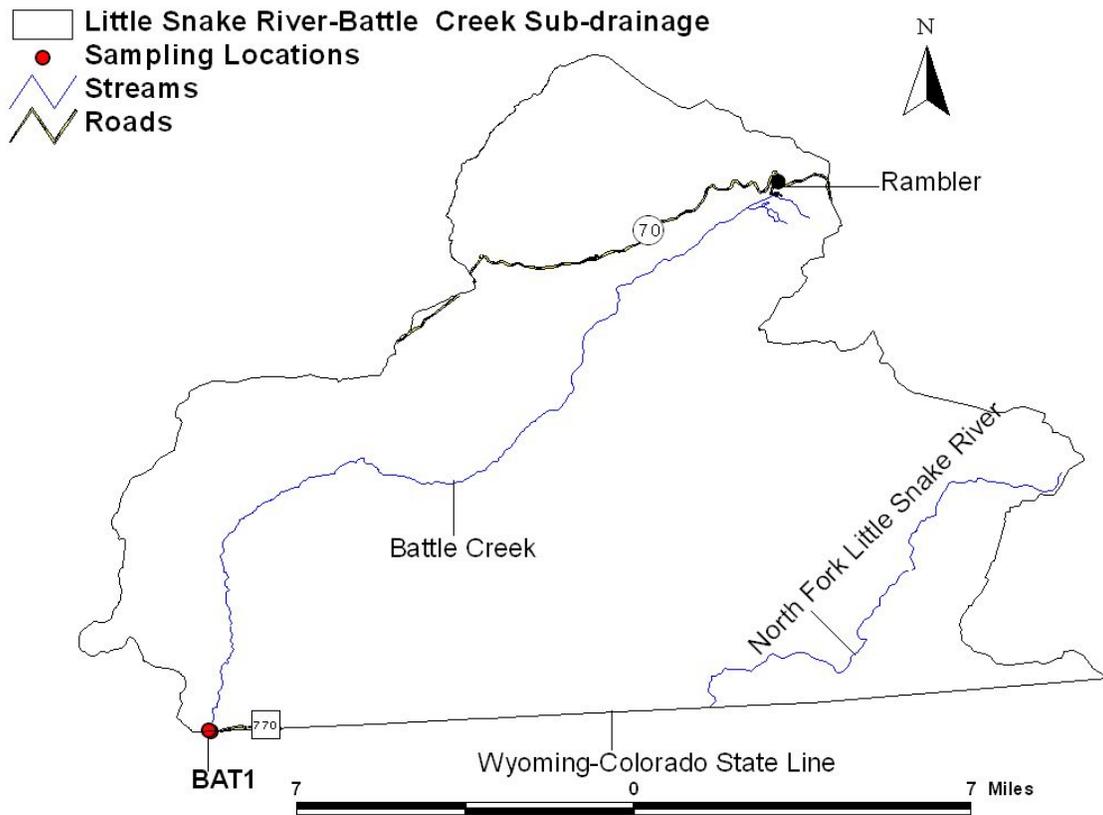


Figure 14. Location of reaches sampled in the Little Snake River-Battle Creek sub-drainage in 2006.

Little Snake River

11 reaches totaling 8.75 stream miles were sampled on the Little Snake River downstream of Baggs, WY in 2006 (Figures 19, 20, and 21 and Appendix C). Two of the three target species (FMS and RTC) were identified from the Little Snake River in 2006. Hybridization between WHS and two species of native suckers (BHS and FMS) was also noted. No BHS were identified, although BXW were identified from multiple reaches in low numbers (nine reaches totaling 17 fish). All BXW were greater than 10.0 in, except for one 6.9 in individual (Figure 15). Flannelmouth sucker were also collected from multiple reaches in low numbers (eight reaches totaling 17 fish). All FMS were greater than 15.0 in, with the exception of two individuals measuring 1.9 in and 3.0 in (Figure 16). Putative FXW were identified from all reaches and were more numerous than FMS (11 reaches totaling 64 fish). These hybrids were also identified from a broader range of length categories than were FMS (Figure 16).

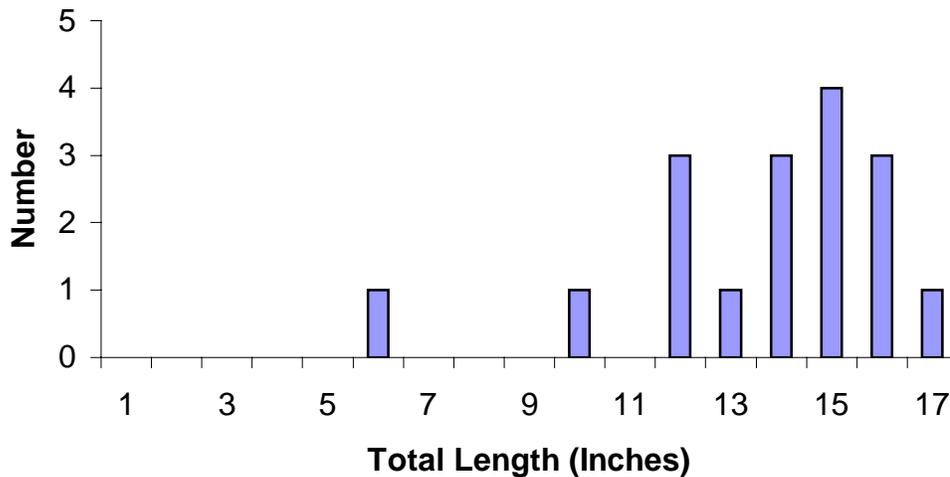


Figure 15. Length-frequency of BXW identified from the Little Snake River in 2006 (n=17).

Roundtail chub were identified from multiple reaches in low numbers (seven reaches totaling 23 fish) with 10 RTC collected from one reach. Although RTC were identified in low numbers, there was a good distribution across length categories (Figure 17). White sucker were identified from 11 reaches and were the third-most abundant fish

encountered while sampling the Little Snake River with 264 individuals collected. White sucker accounted for 73% of the total large-bodied sucker catch (Figure 18).

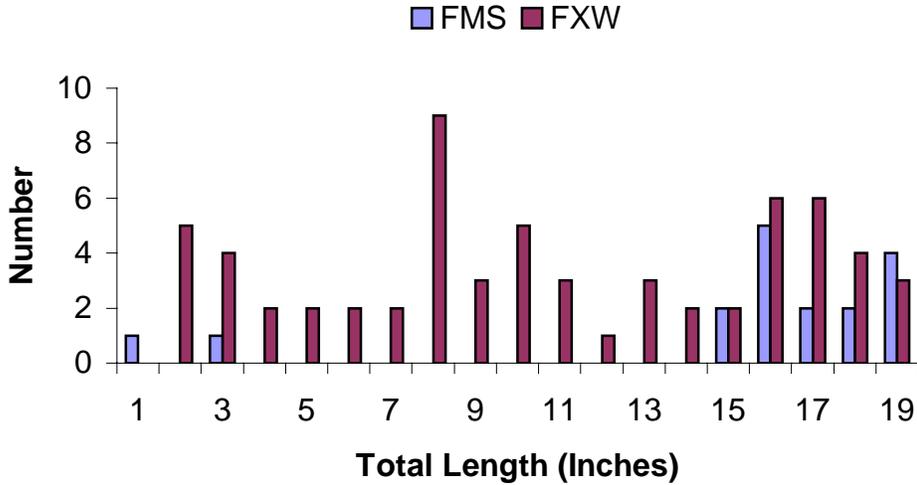


Figure 16. Length-frequency of FMS and FXW identified from the Little Snake River in 2006 (n=17 FMS and 64 FXW).

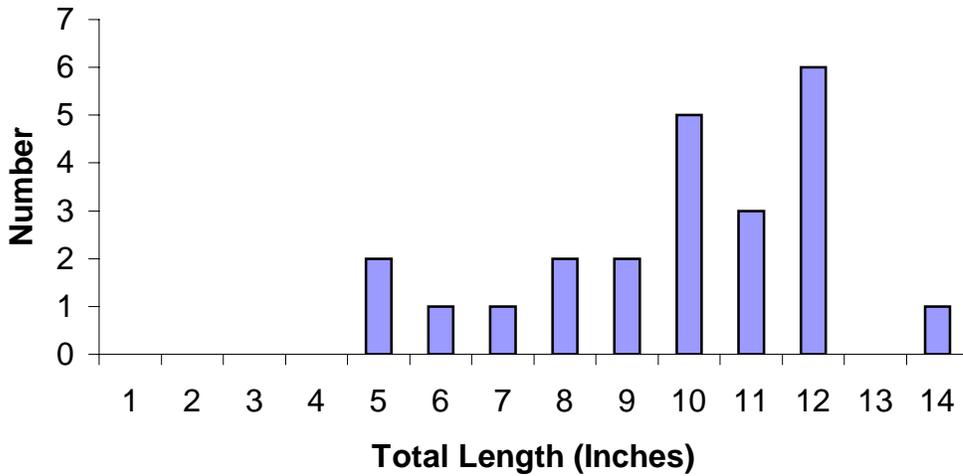


Figure 17. Length-frequency of RTC identified from the Little Snake River in 2006 (n=23).

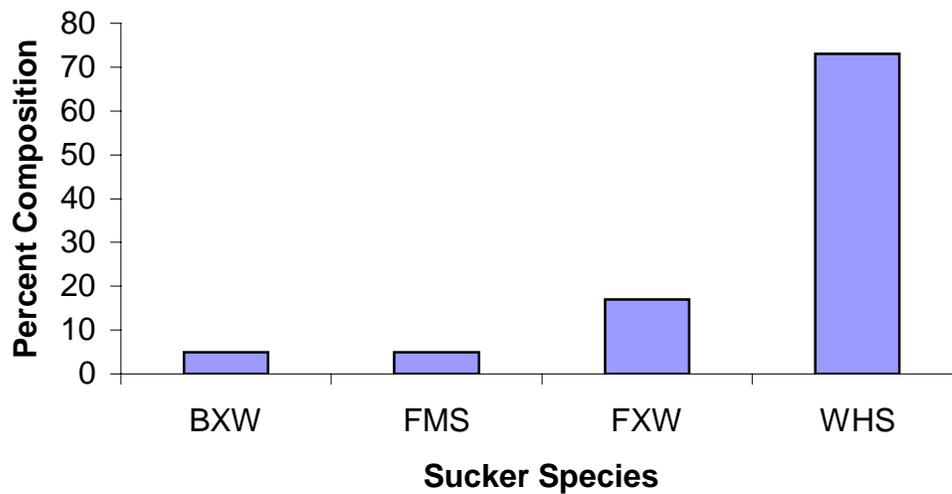


Figure 18. Relative abundance of BXW, FMS, FXW, and WHS identified from the Little Snake River in 2006 (n=362).

Identification of WHS and FXW was extremely difficult in some instances in the Little Snake River. Whether this was due to backcrossing of F1 hybrids and parental species or was simply a reflection of local conditions remains uncertain. Fin clips were taken from several of these questionable fish for genetic analyses.

Little Snake River-Powder Wash Sub-drainage

The 88 mi² Little Snake River-Powder Wash sub-drainage is in the southeastern portion of the Green River drainage (Figure 3). Three reaches totaling 3.25 stream miles were sampled in this sub-drainage of the Little Snake River in 2006 using a raft electrofishing unit (Figure 19 and Appendix C). A bag seine was also used to sample off-channel habitats not easily accessible to a raft. Although reach LSR12 began in the Little Snake River-Willow Creek sub-drainage, it will be included in the Little Snake River-Powder Wash sub-drainage for the purposes of this report (Figure 19). Eight fish species were identified from this sub-drainage, of which three are native to the sub-drainage (FMS, RTC, and SPD; Appendix M). Hybridization between introduced WHS and two species of native sucker (BHS and FMS) was also noted. Two of the three target species were identified from the Little Snake River-Powder Wash sub-drainage in 2006 (Appendix M), although a single juvenile sucker that is likely a BHS was collected from

reach LSR8 and has been sent to the Larval Fish Lab at Colorado State University for identification.

Little Snake River Reach LSR8

Reach LSR8 represents the most-downstream reach sampled on the Little Snake River in 2006 (Appendix C and Figure 19). Raft electrofishing gear was used to sample one stream mile of the Little Snake River. Seven fish species were identified from this reach, including three species native to the stream (FMS, RTC, and SPD; Appendix M). Two of the three target species were identified from this reach (FMS and RTC), although a single juvenile sucker that is likely a BHS has been sent to the Colorado State University Larval Fish Lab for identification. The three FMS ranged from 3.0-16.1 in and the three RTC ranged from 9.0-12.2 in (Appendix M). Hybridization between introduced WHS and two species of native sucker (BHS and FMS) was noted. The two BXW ranged from 12.4-14.1 in, while the eight FXW identified ranged from 6.0-16.2 in (Appendix M). Right pelvic fin clips were taken from each RTC and FMS for genetic analyses (Appendix B). In addition to the electrofishing effort, a bag seine was used to sample a backwater habitat (LSR8-S) located near the end of reach LSR8. Of the three fish species identified, one is native to the stream (SPD; Appendix M).

Little Snake River Reach LSR10

Reach LSR10 was located immediately upstream of reach LSR8 (Appendix C and Figure 19). Raft electrofishing gear was used to sample one stream mile of the Little Snake River. Five fish species were identified from this reach, including three native to the stream (FMS, RTC, and SPD; Appendix M). Two of the three target species were identified from this reach (FMS and RTC). The six FMS ranged from 16.3-18.4 in, while the three RTC ranged from 9.0-12.6 in (Appendix M). Hybridization between introduced WHS and two species of native sucker (BHS and FMS) was noted. The single BXW was 12.3 in, while the two FXW ranged from 8.4-11.6 in (Appendix M). Right pelvic fin clips were taken from each FMS and RTC for genetic analyses (Appendix B). In addition to the electrofishing effort, a bag seine was used to sample a side channel habitat

(LSR10-S) located near the end of reach LSR10. Of the three fish species identified, one is native to the stream (SPD; Appendix M).

Little Snake River Reach LSR12

Reach LSR12 was located immediately upstream of reach LSR10 (Appendix C and Figure 19). Raft electrofishing gear was used to sample 1.25 stream miles of the Little Snake River. Seven fish species were identified from this reach, including three native to the stream (FMS, RTC, and SPD; Appendix M). Two of the three target species were identified from this reach (FMS and RTC). The single FMS was 19.4 in, and the three RTC ranged from 5.7-6.8 in (Appendix M). Hybridization between introduced WHS and two species of native sucker (BHS and FMS) was noted. The single BXW was 15.8 in, while the seven FXW ranged from 2.9-13.5 in (Appendix M).

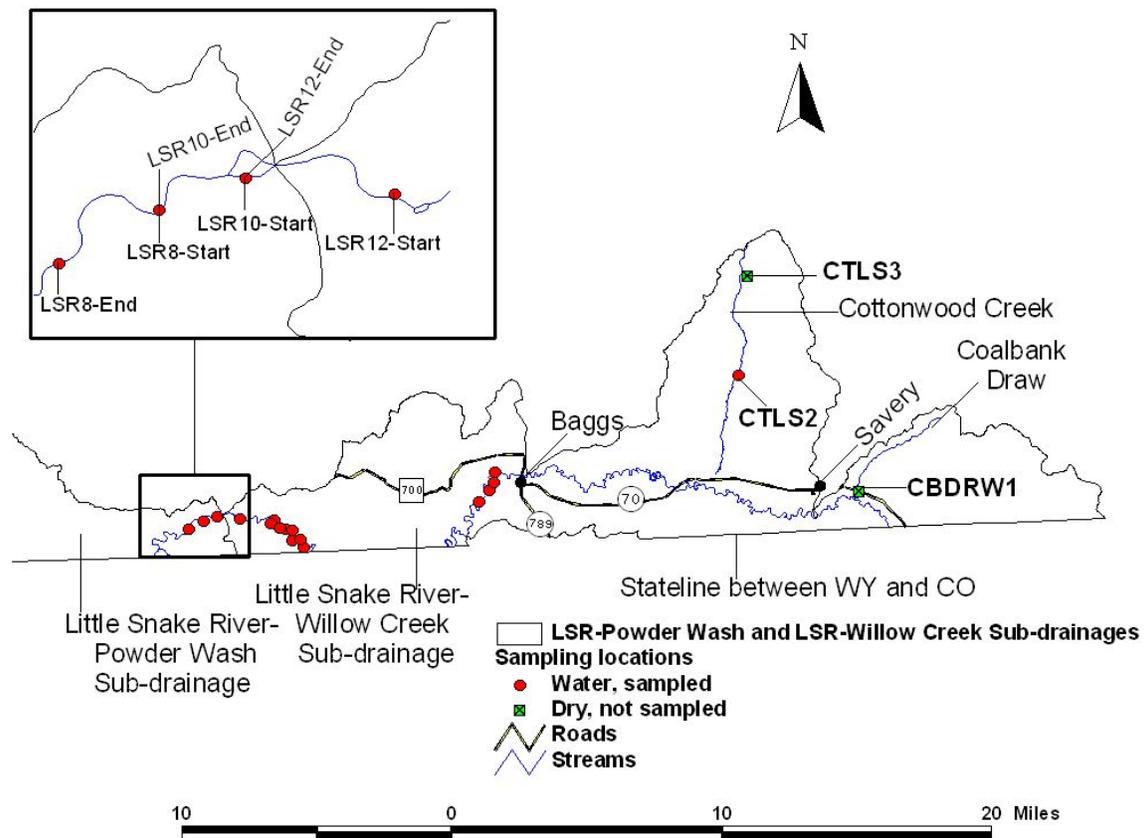


Figure 19. Location of reaches sampled in the Little Snake River-Powder Wash sub-drainage in 2006.

Right pelvic fin clips were taken from the single FMS and from each RTC for genetic analyses (Appendix B). In addition to the electrofishing effort, a bag seine was used to sample a backwater habitat (LSR12-S) near the end of reach LSR12. Of the two fish species identified, one is native to the stream (SPD; Appendix M).

Little Snake River-Willow Creek Sub-drainage

The 143 mi² Little Snake River-Willow Creek sub-drainage is immediately upstream of the Little Snake River-Powder Wash sub-drainage in the southeastern portion of the Green River drainage (Figure 3). Eight reaches totaling 5.5 stream miles were sampled in this sub-drainage of the Little Snake River in 2006 using raft electrofishing gear (Figure 20 and Appendix C). A bag seine was also used to sample off-channel habitats not easily accessible to a raft. Additionally, one reach on Coalbank Draw and two reaches on Cottonwood Creek were also visited (Figure 20 and Appendix N). Twelve fish species were identified from this sub-drainage, of which four are native to the sub-drainage (FMS, MTS, RTC, and SPD; Appendix N). Two of the three target species (FMS and RTC) were identified from the Little Snake River-Willow Creek sub-drainage in 2006 (Appendix N). Hybridization between introduced WHS and two species of native sucker (BHS and FMS) was noted (Appendix N).

Coalbank Draw

One potential sampling reach on Coalbank Draw between Highway 70 and its confluence with the Little Snake River was visited in 2006 (Figure 20). The reach was dry and was not sampled. (Appendix N).

Cottonwood Creek

Cottonwood Creek is a small, ephemeral stream located between the towns of Baggs and Savery (Figure 20). Cottonwood Creek used to flow into the Little Snake River, but has been diverted into the First Mesa Ditch just north of Dixon, WY. Two potential sampling reaches were visited on Cottonwood Creek in 2006. The most upstream reach was dry, while the next downstream reach contained perennial water produced by a flowing well adjacent to the creek. The mean width of this reach was 6.9

ft and the maximum depth was 3.0 ft. Three fish species were identified, of which one is native to the stream (MTS; Appendix N). The most downstream potential reach was not sampled due to access problems.

Little Snake River Reach LSR18

Reach LSR18 begins approximately 3.0 stream miles upstream of the start of reach LSR12 (Figure 20 and Appendix C). A single raft electrofishing unit was used to sample 0.5 stream miles of the Little Snake River. Four fish species were identified from this reach, of which one is native to the stream (RTC; Appendix N). The single RTC measured 11.6 in (Appendix N). A single hybrid between WHS and FMS was identified in this reach and measured 17.2 in (Appendix N). A right pelvic fin clip was taken from the RTC for genetic analyses (Appendix B). No seining was conducted in this reach due to time constraints.

Little Snake River Reach LSR20

Reach LSR20 ends 0.5 stream miles upstream of the start of reach LSR18 (Figure 20 and Appendix C). A single raft electrofishing unit was used to sample 0.5 stream miles of the Little Snake River. Six fish species were identified from this reach, of which two are native to the stream (FMS and SPD; Appendix N). A single FMS was the only target species identified from this reach, and measured 16.9 in (Appendix N).

Hybridization between introduced WHS and two species of native sucker (BHS and FMS) was noted. The four BXW ranged from 10.6-15.7 in, while the two FXW ranged from 13.1-16.4 in (Appendix N). A right pelvic fin clip was taken from the single FMS for genetic analyses (Appendix B). In addition to the electrofishing effort, a bag seine was used to sample a backwater and a side channel (LSR20-S) located near the end of reach LSR20. None of the five fish species identified are native to the stream (Appendix N).

Little Snake River Reach LSR22

Reach LSR22 ends 0.5 stream miles upstream of the start of reach LSR20 (Figure 20 and Appendix C). A single raft electrofishing unit was used to sample 0.5 stream

miles of the Little Snake River. Four fish species were identified from this reach, of which one is native to the stream (FMS; Appendix N).

A single FMS measuring 19.6 in (Appendix N) was the only target species identified from this reach. Hybridization between introduced WHS and two species of native sucker (BHS and FMS) was noted. The two BXW ranged from 13.3-15.5 in, while the 5 FXW ranged from 16.2-19.1 in (Appendix N). A right pelvic fin clip was taken from the single FMS for genetic analyses (Appendix B). No seining was conducted in this reach due to a lack of suitable off-channel habitat.

Little Snake River Reach LSR23

Reach LSR23 was located immediately upstream of reach LSR22 (Figure 20 and Appendix C). A single raft electrofishing unit was used to sample 0.5 stream miles of the Little Snake River. Five fish species were identified, of which two are native to the stream (FMS and RTC; Appendix N). Two of the three target species (FMS and RTC) were collected from this reach, with the two FMS ranging from 19.5-19.7 in and the two RTC ranging from 12.1-15.0 in (Appendix N). Hybridization between FMS and WHS was noted, with the six FXW ranging from 16.9-18.8 in (Appendix N). Right pelvic fin clips were taken from each FMS and RTC for genetic analyses (Appendix B). In addition to the electrofishing effort, a bag seine was used to sample a residual pool (LSR23-S) separated from the main channel by a large sandbar. This pool was located near the end of reach LSR23. Neither of the two fish species identified is native to the stream (Appendix N).

Little Snake River Reach LSR24

Reach LSR24 was located immediately upstream of reach LSR23 (Figure 20 and Appendix N). A single raft electrofishing unit was used to sample 0.5 stream miles of the Little Snake River. Five fish species were identified from this reach, of which two are native to the stream (FMS and RTC; Appendix N). Two of the three target species were identified from this reach (FMS and RTC), with the two FMS ranging from 15.1-18.1 in and the 10 RTC ranging from 7.6-14.8 in (Appendix N). Hybridization between introduced WHS and two species of native sucker (BHS and FMS) was noted. The two

BXW ranged from 16.6-17.0 in, while the four FXW ranged from 12.7-19.1 in (Appendix N).

Right pelvic fin clips were taken from each FMS and each RTC for genetic analyses (Appendix B). In addition to the electrofishing effort, a bag seine was used to sample a backwater habitat (LSR24-S) located near the start of reach LSR24. Four fish species were identified, of which one is native (SPD) to the stream (Appendix N).

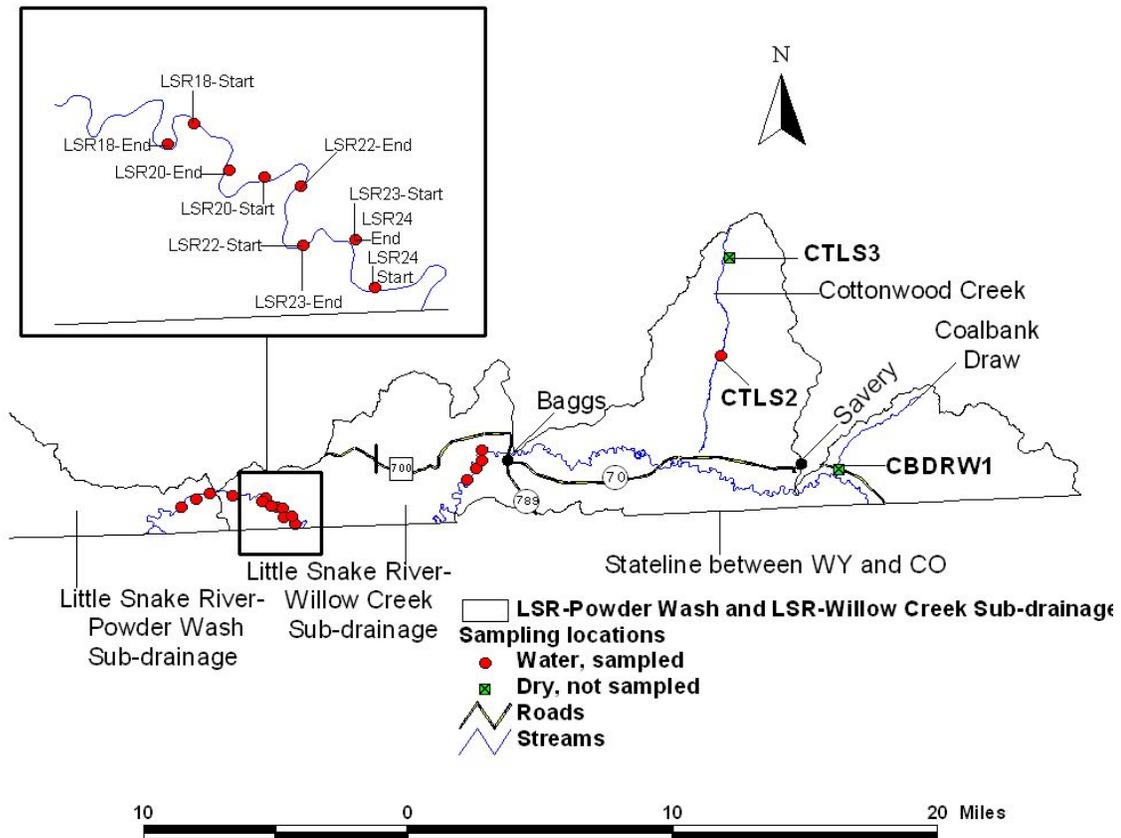


Figure 20. Location of reaches sampled in the Little Snake River-Willow Creek sub-drainage in 2006.

Little Snake River Reach LSR37

Reach LSR37 ends approximately 7.0 stream miles upstream of the Wyoming-Colorado state line, south of Baggs (Figure 21 and Appendix C). A single raft electrofishing unit was used to sample one stream mile of the Little Snake River. Eight fish species were identified from this reach, of which two are native to the stream (RTC

and SPD; Appendix N). One of the three target species was identified from this reach, with the single RTC measuring 12.7 in (Appendix N).

Hybridization between introduced WHS and two species of native sucker (BHS and FMS) was noted. The three BXW ranged from 15.5-16.9 in, while the 11 FXW ranged from 2.8-18.7 in (Appendix N). Right pelvic fin clips were taken from two BXW and the single RTC for genetic analyses (Appendix B). No seining was conducted in this reach due to time constraints.

Little Snake River Reach LSR39

Reach LSR39 was located immediately upstream of reach LSR37 (Figure 21 and Appendix C). A single raft electrofishing unit was used to sample one stream mile of the Little Snake River. Three fish species were identified, of which one is native to the stream (SPD; Appendix N). No target species were identified from the electrofishing effort, although a single juvenile FMS was identified from the seining effort described below. Hybridization between introduced WHS and two species of native sucker (BHS and FMS) was noted. A single BXW measured 6.9 in, while the 17 FXW ranged from 2.6-14.5 in (Appendix N). A right pelvic fin clip was taken from the single BXW for genetic analyses (Appendix B). In addition to the electrofishing effort, a bag seine was used to sample a deep, sandy run (LSR39-S1) and a residual pool (LSR39-S2). Both habitats were located near the end of LSR39. Of the four fish species identified from LSR39-S1, one is native to the stream; a single FMS measuring 1.9 in (Appendix N) and was sacrificed to provide tissue for genetic analyses (Appendix B). No fish were captured in LSR39-S2 (Appendix N).

Little Snake River Reach LSR41

Reach LSR41 was located immediately upstream of reach LSR39 (Figure 21 and Appendix C). A single raft electrofishing unit was used to sample one stream mile of the Little Snake River. Two fish species were identified, and neither is native to the stream (Appendix N). No target species were identified from this reach, although hybridization between introduced WHS and two species of native sucker (BHS and FMS) was noted. A single BXW measured 12.6 in, while a single FXW measured 18.3 in (Appendix N). A

right pelvic fin clip was taken from the single BXW and the single FXW for genetic analyses (Appendix B).

In addition to the electrofishing effort, a bag seine was used to sample a backwater habitat (LSR41-S) near the end of reach LSR41. Four fish species were identified, of which one is native to the stream (SPD; Appendix N).

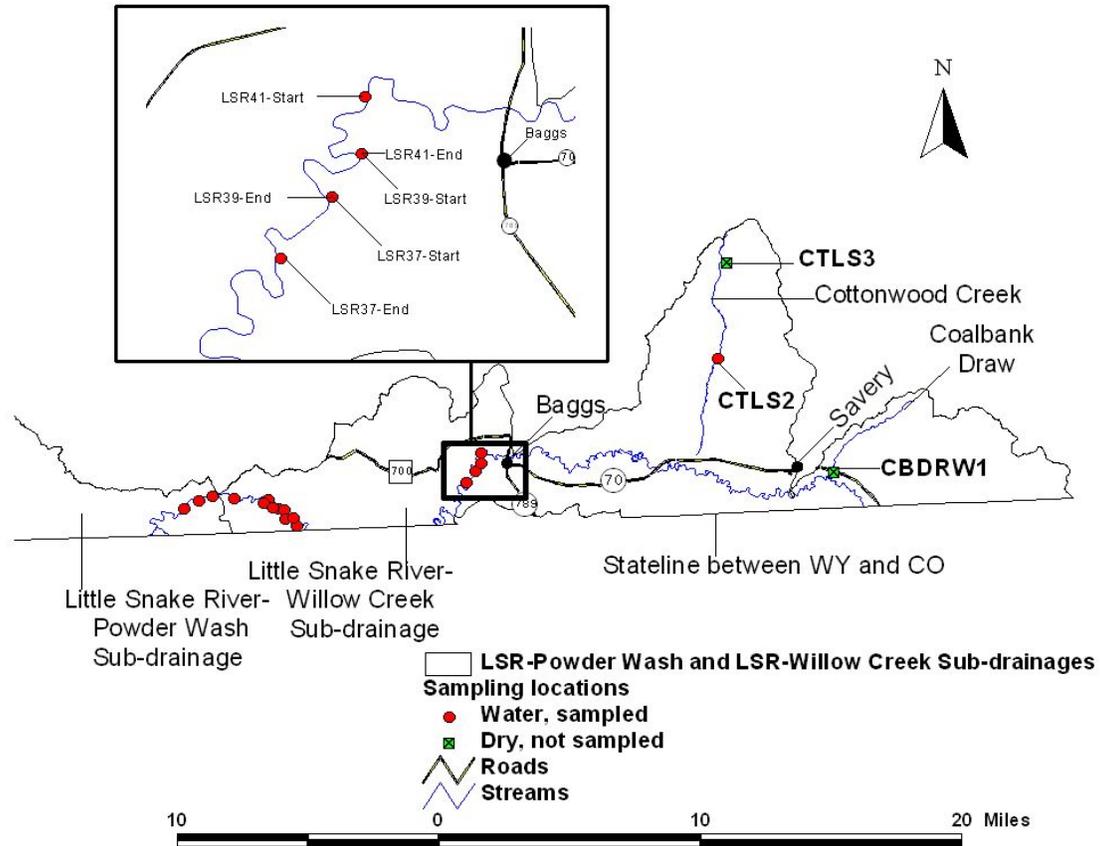


Figure 21. Location of reaches sampled in the Little Snake River-Willow Creek sub-drainage in 2006.

Lower Muddy Creek Sub-drainage

The 397 mi² Lower Muddy Creek sub-drainage is in the southeastern portion of the Green River drainage (Figure 3). Twenty-nine potential sampling reaches across nine streams were visited in 2006. Of these, 16 reaches were dry and four had extremely low flows and were unlikely to support fish (Figure 22). Nine reaches in this sub-drainage were sampled in 2006 (Figure 22 and Appendix C).

Seven fish species were identified from this sub-drainage, of which two are native to the sub-drainage (RTC and SPD; Appendix O). Roundtail chub were the only target species identified from this sub-drainage and were represented by two individuals identified from reach MCLS6 on Muddy Creek (Figure 22 and Appendix O). Hybridization between native FMS and introduced WHS was also noted at reach MCLS6 (Figure 22 and Appendix O). The FXW identified from reach MCLS6 did not resemble flannelmouth/white sucker hybrids collected elsewhere in the Green River drainage, but did not resemble pure WHS either. Scale patterns on these fish resembled the pattern typically found on WHS, but color and body shape were more typical of FXW. These fish were considered to be FXW (Appendix O). Right pelvic fin clips were taken from 15 of these fish for genetic analyses (Appendix B).

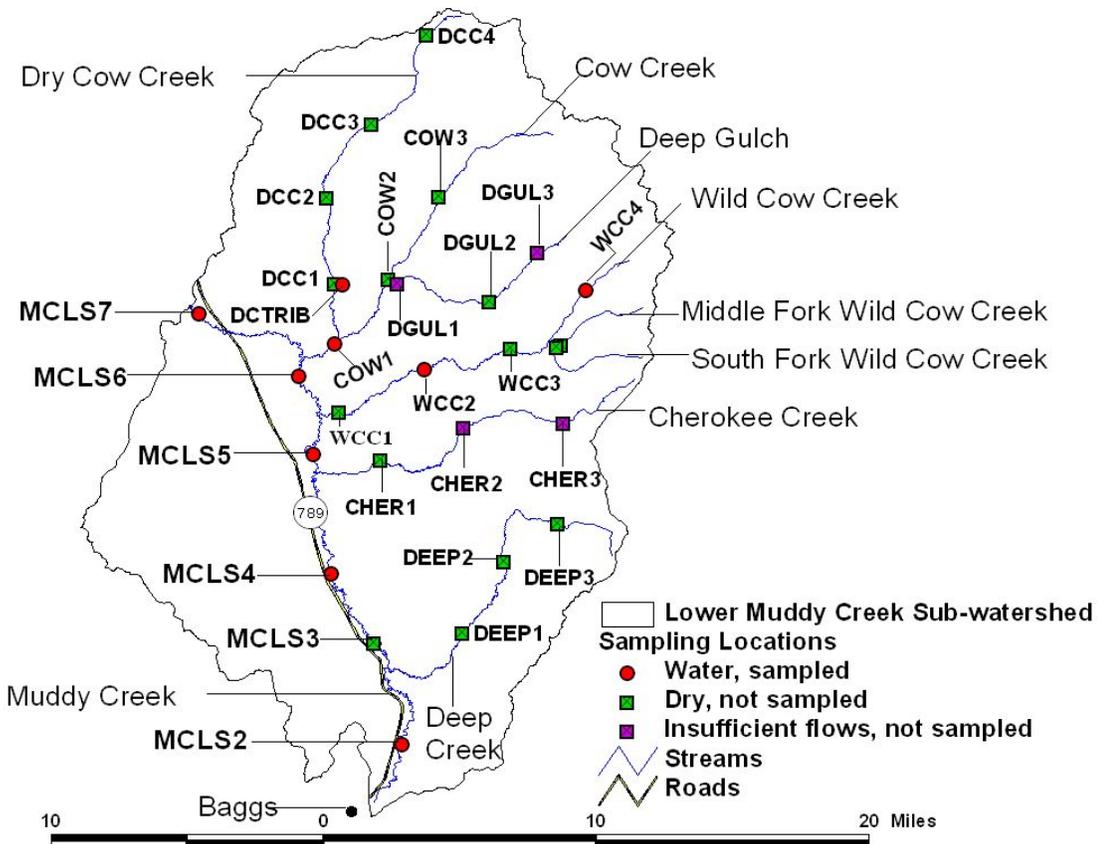


Figure 22. Location of reaches visited in the Lower Muddy Creek sub-drainage in 2006.

Cherokee Creek

Three potential sampling reaches were visited on Cherokee Creek in 2006 (Figure 22). Of these three reaches, one was dry and the other two had extremely low flows and were unlikely to support fish. No reaches were sampled on Cherokee Creek in 2006 (Appendix O).

Cow Creek

Three potential sampling reaches were visited on Cow Creek in 2006 (Figure 22). Of these three, two were dry and not sampled. One reach had water in the form of small residual pools and was sampled (Appendix C). Two dipnets were used to sample the reach. The mean wetted width of the reach was 3.5 ft and the maximum depth was 0.80 ft. No fish were captured (Appendix O).

Deep Creek

Three potential sampling reaches were visited on Deep Creek in 2006 (Figure 22). All three reaches were dry. No reaches were sampled on Deep Creek in 2006 (Appendix O).

Deep Gulch

Three potential sampling reaches were visited on Deep Gulch in 2006 (Figure 22). Of these three reaches, one was dry and the other two reaches had extremely low flows and were unlikely to support fish. No reaches were sampled on Deep Gulch in 2006 (Appendix O).

Dry Cow Creek

Four potential sampling reaches were visited on Dry Cow Creek in 2006 (Figure 22). All four reaches on Dry Cow Creek were dry. No reaches were sampled on Dry Cow Creek in 2006 (Appendix O).

A small (mean width < 1ft) unnamed and un-mapped stream between Cow and Dry Cow Creeks appears to originate from flowing wells a couple miles north of BLM Road 3308. This stream is ephemeral in nature, but provided enough flow to fill a pool

downstream of a culvert on BLM Road 3308. This pool was sampled (DCTRIB, Figure 22) with a bag seine. One non-native fish species was identified from this pool (CKC; Appendix O). By the end of the summer this pool was dry.

Muddy Creek

Six potential sampling reaches on Lower Muddy Creek were visited in 2006 (Figure 22). Of these six reaches, one was dry and five contained water and were sampled (Figure 22 and Appendix O). The mean wetted width of the five reaches was 8.3 ft and the maximum depth was 2.6 ft. Seven fish species were identified from Muddy Creek, of which two are native to the stream (RTC and SPD; Appendix O).

Two RTC ranging from 2.7 to 8.7 in and 117 FXW ranging from 2.9 to 15.0 in were collected from reach MCLS6 (Appendix O). Right pelvic fin clips were taken from each RTC and 15 FXW for genetic analyses (Appendix B). A planned sampling reach (MCLS1) just upstream of where Muddy Creek flows into the Little Snake River was not sampled due to access problems.

Wild Cow Creek

Four potential sampling reaches were visited on Wild Cow Creek in 2006 (Figure 22). Of these four reaches, two were dry and were not sampled. The other two reaches contained water in their entirety and were sampled (Figure 22 and Appendix C). The mean wetted width of the two reaches was 2.5 ft and the maximum depth was 1.6 ft. Five fish species were identified, of which one is native to the stream (SPD; Appendix O). No target species or hybrids were identified from Wild Cow Creek in 2006 (Appendix O).

Middle Fork Wild Cow Creek

One potential sampling reach was visited on Middle Fork Wild Cow Creek in 2006 (Figure 22 and Appendix O). The reach was dry and was not sampled.

South Fork Wild Cow Creek

One potential sampling reach was visited on South Fork Wild Cow Creek in 2006 (Figure 22 and Appendix O). The reach was dry and was not sampled.

Savery Creek Sub-drainage

The 351 mi² Savery Creek sub-drainage is in the southeastern portion of the Green River drainage (Figure 3). Nineteen potential sampling reaches across 10 streams were visited in 2006 (Figure 23). Of these 19 reaches, three were dry and one had extremely low flows. These four reaches were not sampled. Fifteen reaches were sampled in the Savery Creek sub-drainage in 2006 (Appendix C). Eleven fish species were identified, of which four are native to the sub-drainage (CRC, MSC, MTS, and SPD; Appendix P).

No reaches were sampled upstream of High Savery Dam because Wyoming Game and Fish Department personnel intensively surveyed this portion of the sub-drainage in 2002 prior to construction of High Savery Dam (Hahn 2002). The surveyed area included the North Fork Savery Creek, East Fork Savery Creek, and Dirtyman Fork Savery Creek drainages. Fish species encountered during these surveys include BKT, CKC, CRC, FHM, Iowa darter (*Etheostoma exile*), MSC, MTS, MWF, RBT, RSS, SPD, and WHS. These surveys did not identify any of the three species or hybrids.

In addition, surveys were conducted downstream of High Savery Dam in 2000, 2001, and 2002 to establish baseline pre-impoundment fish community information for Savery Creek (Dey and Annear 2003). Monitoring stations were established on Savery Creek immediately below High Savery Dam and near the confluence with Big Sandstone Creek. Fish species encountered during these surveys include BNT, CKC, CRC, FHM, FMS, FXW, LND, MSC, MTS, MWF, RBT, RSS, SPD, and WHS. Flannelmouth sucker were collected in low numbers, and fish appearing to be hybrids between FMS and WHS were reported as being common. However, neither target species nor hybrids were identified from this sub-drainage in 2006 (Appendix P).

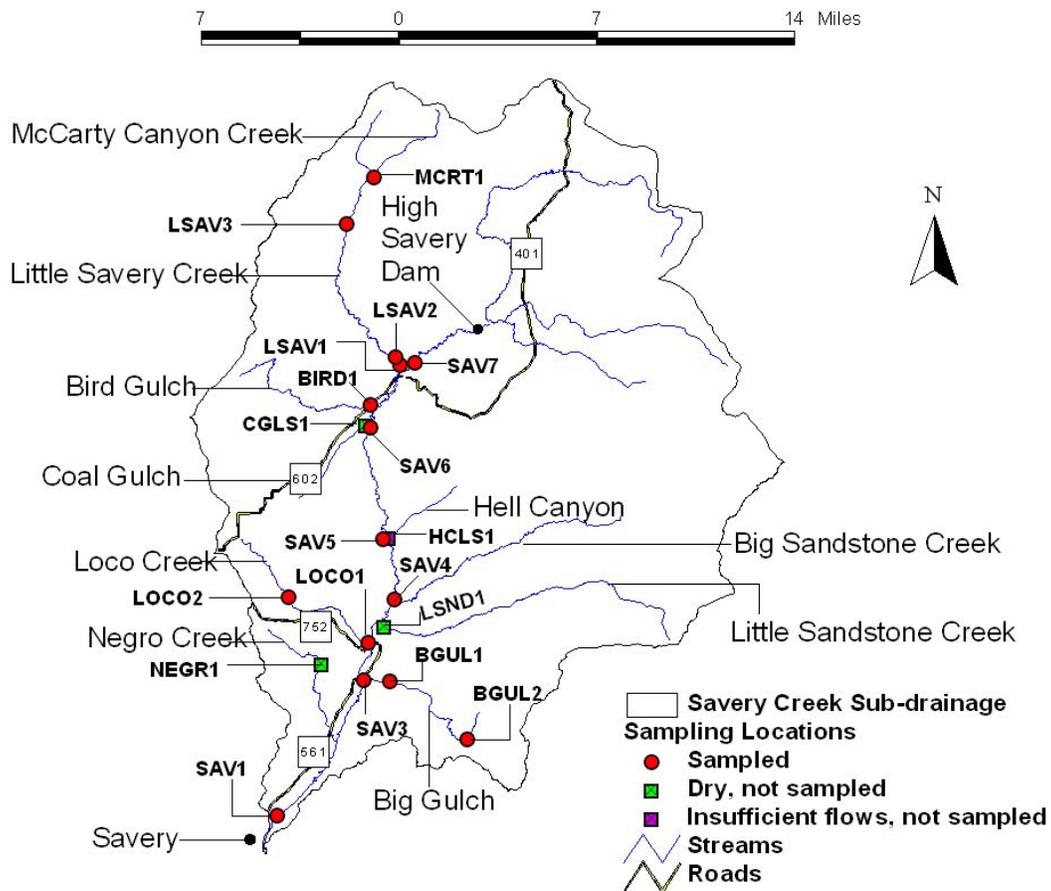


Figure 23. Location of reaches visited in the Savery Creek sub-drainage in 2006.

Big Gulch

Big Gulch is the most-downstream eastside tributary to Savery Creek (Figure 23). Two reaches were sampled on Big Gulch in 2006 (Appendix C). The mean wetted width of the two reaches was 6.2 ft and the maximum depth was 2.6 ft. Four fish species were identified from Big Gulch, of which three are native to the stream (MSC, MTS, and SPD; Appendix P).

Big Sandstone Creek

Big Sandstone Creek flows into Savery Creek in the mid-reaches of this sub-drainage (Figure 23). No reaches were planned on Big Sandstone Creek because Savery Creek was sampled near the confluence of Big Sandstone Creek and Savery Creek (reach SAV4) and the upstream areas of Big Sandstone Creek are extremely difficult to access.

Bird Gulch

Bird Gulch flows into Savery Creek just downstream of County Road 602 (Figure 23). One reach was sampled on Bird Gulch upstream of County Road 602 in 2006 (Appendix C). The mean wetted width of the reach was 4.3 ft and the maximum depth was 2.3 ft. No additional reaches were sampled on Bird Gulch due to access problems. Six fish species were identified, of which three are native to the stream (MSC, MTS, and SPD; Appendix P)

Coal Gulch

Coal Gulch flows into Savery Creek just south of Bird Gulch (Figure 23). One reach on Coal Gulch was visited in 2006, but the reach was dry and was not sampled (Appendix P).

Hell Canyon Creek

Hell Canyon Creek is a short tributary to Savery Creek located north of Big Sandstone Creek (Figure 23). Although Hell Canyon Creek supports a population of CRC in its upstream reaches, the reach near the confluence with Savery Creek had extremely low flows that are unlikely to support fish and was not sampled (Appendix P).

Little Sandstone Creek

Little Sandstone Creek flows into Savery Creek south of Hell Canyon Creek (Figure 23). One reach was visited on Little Sandstone Creek in 2006, but it was dry and was not sampled (Appendix P).

Little Savery Creek

Little Savery Creek flows into Savery Creek upstream of Bird Gulch (Figure 23). Three reaches were sampled on Little Savery Creek in 2006 (Appendix C). The mean wetted width of the three reaches was 9.3 ft and the maximum depth was 4.3 ft. A large irrigation diversion on private land serves as a barrier to fish movement; hence two of the reaches were placed near this diversion to document the fish community immediately upstream of (LSAV2) and downstream of (LSAV1) this diversion.

Ten fish species were identified from Little Savery Creek, of which four are native to the stream (CRC, MSC, MTS, and SPD; Appendix P). Mountain sucker was the only native species found downstream of the aforementioned diversion but not upstream of it (Appendix P).

Loco Creek

Loco Creek flows into Savery Creek just south of County Road 752 (Figure 23). Two reaches were sampled on Loco Creek in 2006 (Appendix C). The mean wetted width of the two reaches was 3.6 ft and the maximum depth was 2.0 ft. Six fish species were identified, of which three are native to the stream (MSC, MTS, and SPD; Appendix P).

McCarty Canyon Creek

McCarty Canyon Creek flows into Little Savery Creek in the northern portion of the Savery Creek sub-drainage (Figure 23). One reach was sampled on McCarty Canyon Creek in 2006 (Appendix C). The mean wetted width of the reach was 5.3 ft and the maximum depth was 1.6 ft. Three fish species were identified, of which two are native to the stream (CRC and MSC; Appendix P).

Negro Creek

Negro Creek flows into Savery Creek south of Loco Creek (Figure 23). One reach was visited in 2006, but was dry and was not sampled (Appendix P). A second potential sampling reach near County Road 561 was visited, but when the UTM coordinates were placed into GIS software this dry channel was revealed to not be Negro Creek. Negro Creek is located approximately 0.50 miles north of this location, but the stream channel was not readily apparent in 2006.

Savery Creek

Savery Creek flows into the Little Snake River southeast of Savery, WY (Figure 23). Six reaches were sampled on Savery Creek in 2006 (Appendix C). The mean wetted width of the six reaches was 30.1 ft and the maximum depth was 4.7 ft.

Nine fish species were identified, of which four are native to the stream (CRC, MSC, MTS, and SPD; Appendix P). A seventh reach (SAV2) was not sampled due to difficulty in getting vehicles to the reach.

Upper Muddy Creek Sub-drainage

The 210 mi² Upper Muddy Creek sub-drainage is in the southeastern portion of the Green River drainage (Figure 3). Eight potential sampling reaches across four streams were visited in 2006 (Figure 24). Of these eight potential sampling reaches, one was dry and was not sampled. Seven reaches were sampled in the Upper Muddy Creek sub-drainage in 2006 (Appendix C). Ten fish species were identified, of which five are native to the sub-drainage (BHS, FMS, MTS, RTC, and SPD; Appendix Q). All three target species were identified and hybridization between WHS and two species of native sucker (BHS and FMS) was noted.

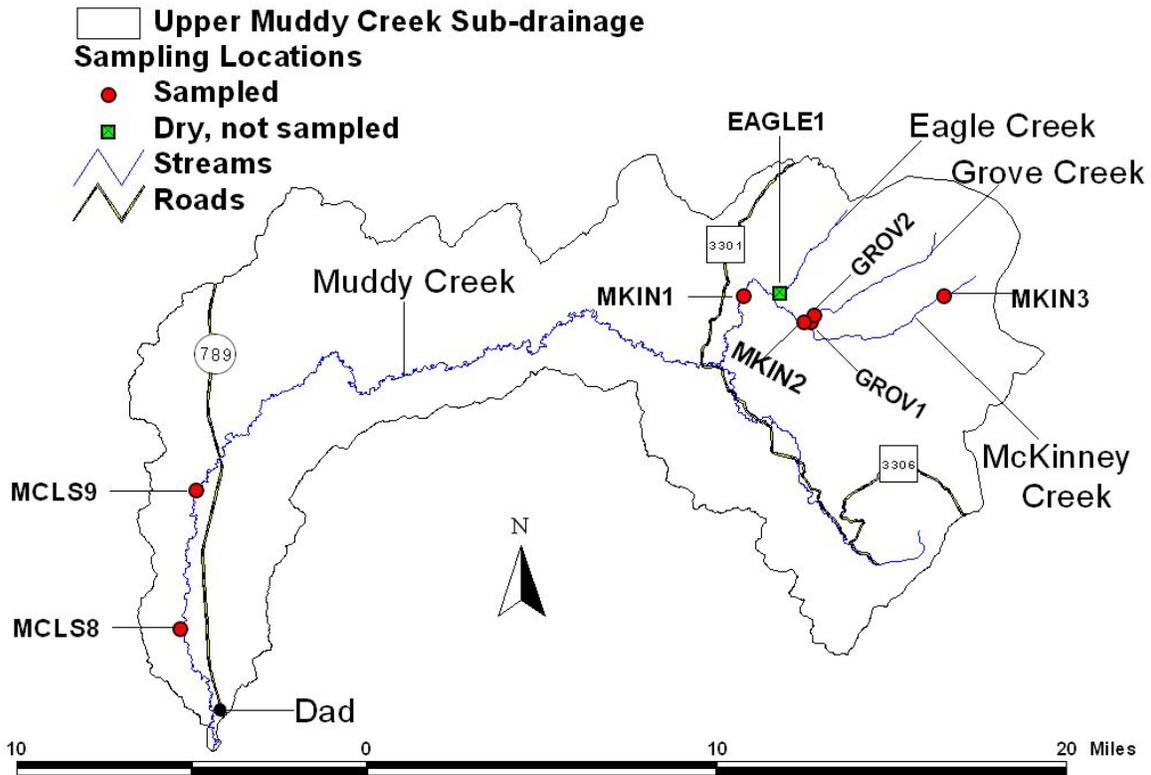


Figure 24. Location of reaches visited in the Upper Muddy Creek sub-drainage in 2006.

Bluehead sucker were identified from four reaches for a total of 32 fish. Fish less than 5.0 in dominated the BHS catch, although two larger individuals were identified from reach MKIN2 on McKinney Creek (Figure 25). Putative BXW were identified from multiple reaches in low numbers (three reaches totaling four fish) and were relatively spread out among length categories (Figure 25).

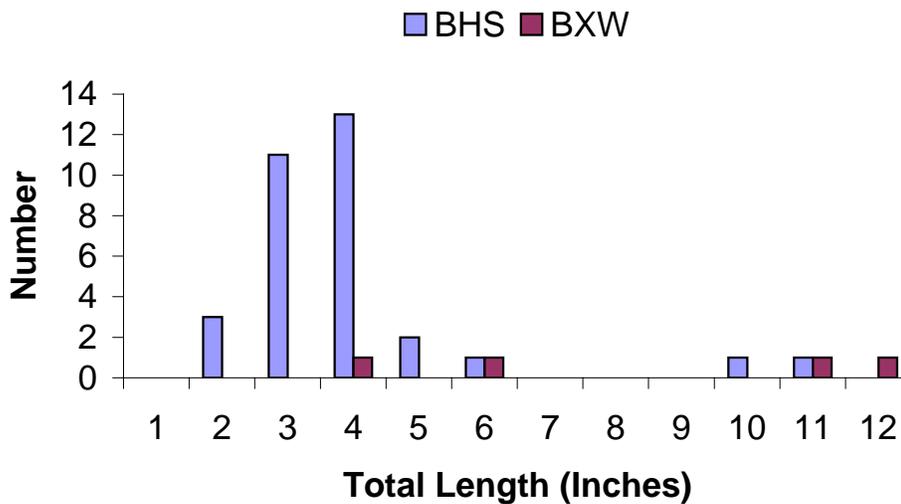


Figure 25. Length-Frequency of BHS and BXW identified from the Upper Muddy Creek sub-drainage in 2006 (n=32 BHS and 4 BXW).

Flannelmouth sucker were identified from two reaches for a total of two fish (Figure 26). Putative FXW were also identified from two reaches, but were more numerous than FMS (15 fish). As was the case for FMS, small and large fish dominated the catch for FXW, although FXW had representatives across more length categories than FMS (Figure 26).

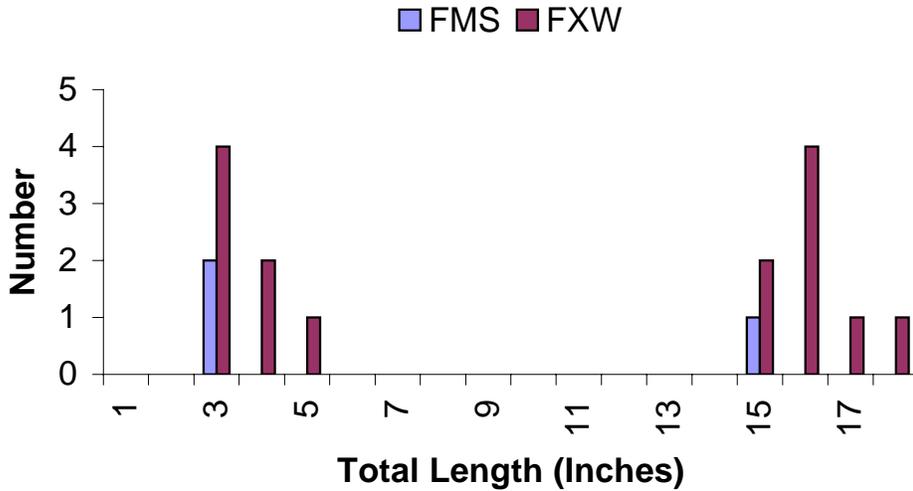


Figure 26. Length-Frequency of FMS and FXW identified from the Upper Muddy Creek sub-drainage in 2006 (n= 3 FMS and 15 FXW).

Roundtail chub were identified from two reaches for a total of 56 fish. Fish measuring less than 5.0 in dominated the RTC catch (Figure 27). As was the case in most reaches, WHS dominated the sucker catch for this sub-drainage, accounting for 53% of the sucker catch (Figure 28).

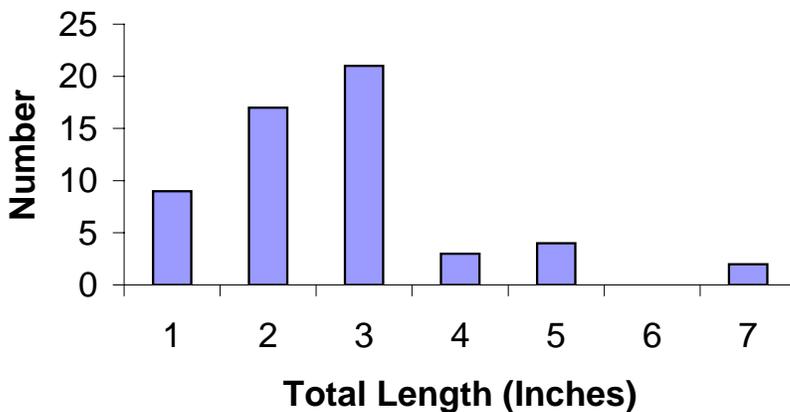


Figure 27. Length-Frequency of RTC identified from the Upper Muddy Creek sub-drainage in 2006 (n=56).

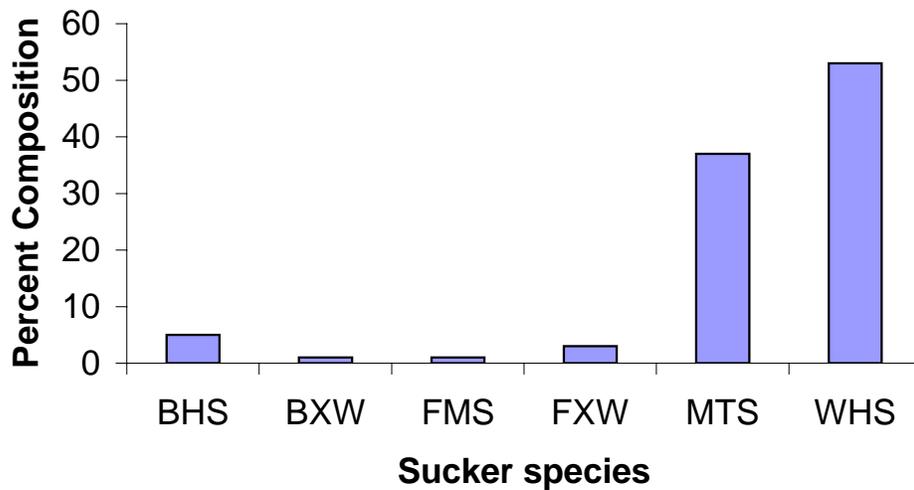


Figure 28. Relative abundance of sucker species and hybrids identified from the Upper Muddy Creek sub-drainage in 2006 (n=555).

Although MTS represent 37% of the sucker catch, this percentage reflects a reach on Grove Creek (GROV2) where 191 MTS were identified (Figure 27 and Appendix Q). Excluding this reach, MTS were identified from three reaches for a total of 13 MTS (Appendix Q). No reaches were sampled on Muddy Creek upstream of Highway 789 (Figure 28) due to access problems and an ongoing chemical renovation of Muddy Creek upstream of the McKinney Creek confluence.

Eagle Creek

Eagle Creek is the most downstream tributary to McKinney Creek (Figure 24). One reach was visited on Eagle Creek in 2006, but was dry and was not sampled (Appendix Q).

Grove Creek

Grove Creek flows into McKinney Creek upstream of Eagle Creek (Figure 24). Two reaches were sampled on Grove Creek in 2006 (Appendix C). The mean wetted width of the two reaches was 7.7 ft and the maximum depth was 3.3 ft.

Six fish species were identified from Grove Creek, of which three are native to the stream (BHS, MTS, and SPD; Appendix Q). Bluehead sucker was the only target species identified, although hybridization between WHS and BHS was noted in one

reach. A single BHS measuring 4.6 in and a single BXW measuring 6.5 in were identified from reach GROV1 (Appendix Q).

Spot electrofishing after sampling GROV1 indicated that a large beaver dam upstream of GROV1 was acting as a barrier to fish movement, raising the possibility of an all-native fish community existing upstream of this dam. Reach GROV2 was located immediately upstream of this beaver dam, but the presence of WHS and BKT in this reach eliminated the possibility of an all-native fish community upstream of the beaver dam (Appendix Q). Right pelvic fin clips were taken from the single BHS and the single BXW for genetic analyses (Appendix B).

McKinney Creek

McKinney Creek flows into Muddy Creek in the upper portions of this sub-drainage (Figure 24). Three reaches were sampled on McKinney Creek in 2006 (Appendix C). The mean wetted width of the three reaches was 8.0 ft and the maximum depth was 3.0 ft. Eight fish species were identified, of which five are native to the stream (BHS, FMS, MTS, RTC, SPD; Appendix Q). All three-target species were identified, with BHS and FMS in two reaches (MKIN1 and MKIN2) and RTC in one reach (MKIN1). Hybridization between WHS and two species of native suckers (BHS and FMS) was noted in two reaches (MKIN1 and MKIN2). The 26 BHS ranged from 2.6-11.3 in, while the three BXW identified ranged from 6.5-12.2 in (Appendix Q). The two FMS identified ranged from 3.2-15.5 in, while the 15 FXW identified ranged from 3.3-18.0 in (Appendix Q). The seven RTC identified ranged from 3.8-7.9 in (Appendix Q). Three young-of-the-year native suckers in too poor of physical condition to be sent to the Larval Fish Laboratory at Colorado State University and too small to identify were sacrificed to provide tissue for identification and genetic analyses (Appendix B).

Muddy Creek

Two reaches were sampled on Muddy Creek downstream of the Highway 789 bridge crossing (Figure 24 and Appendix C). Seven fish species were identified, of which four are native (BHS, FMS, RTC, and SPD) to the stream (Appendix Q). Two

(BHS and RTC) of the three target species were identified from MCLS9, and hybridization was between WHS and FMS was also noted.

Five BHS ranged from 3.0-5.4 in, one FXW measured 3.5 in, and 49 RTC ranged from 1.2-5.5 in (Appendix Q). Right pelvic fin clips were taken from all BHS, the single FXW, and 47 RTC for genetic analyses (Appendix B).

Vermillion Creek Sub-drainage

The 260-mi² Vermillion Creek sub-drainage is in the south-central portion of the Green River drainage (Figure 29). One reach was sampled on North Fork Vermillion Creek in 2006 (Appendix C). A relatively large pool was sampled with a bag seine because the electrofishing gear was not working properly.

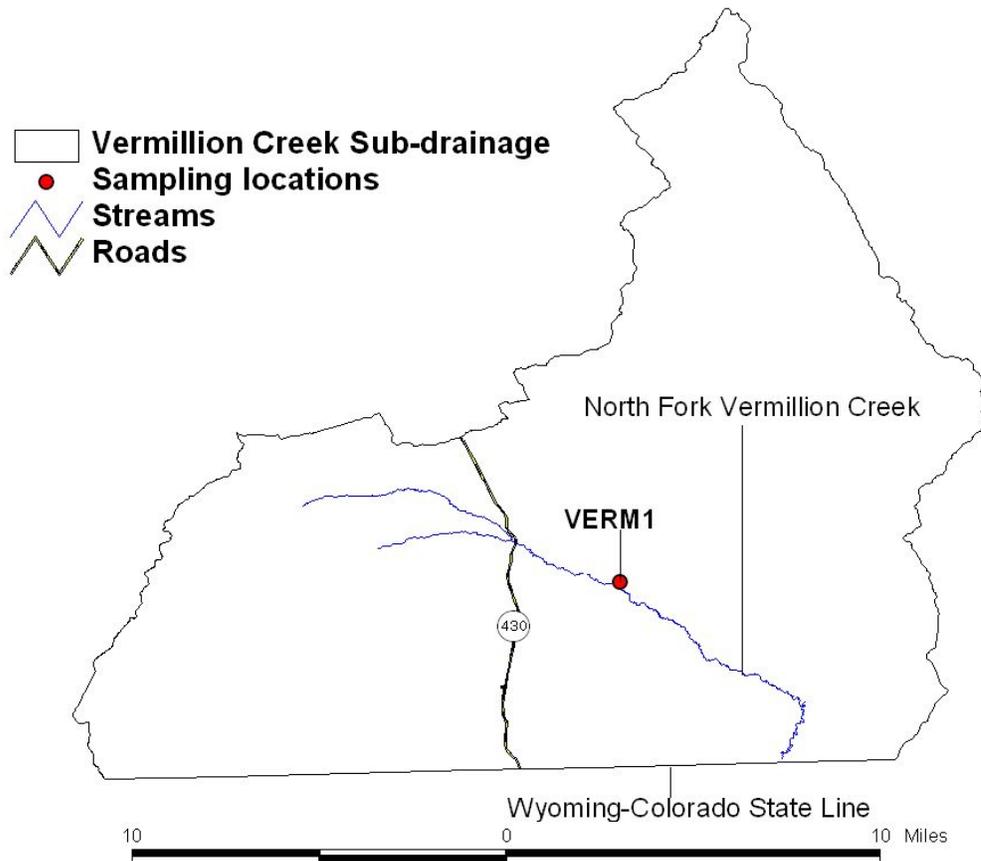


Figure 29. Location of sampled reach in the Vermillion Creek sub-drainage in 2006.

Two fish species were identified, and both are native to the stream (MTS and SPD; Appendix R). No target species or hybrids were identified from the Vermillion Creek sub-drainage in 2006, although RTC were documented in 1972 immediately downstream of a culvert that passes North Fork Vermillion Creek underneath State Highway 430 near the Colorado-Wyoming state line (WGFD file information). This culvert was inspected in 2002 during Phase I of this project and is considered a barrier to upstream fish movement due to the 8-foot vertical drop from the downstream end of the culvert to the stream below (Keith et al. 2003).

SUMMARY

In 2006, bluehead sucker were only found in four reaches in the Upper Muddy Creek sub-drainage of the Little Snake River drainage. No adult bluehead suckers were identified outside of this sub-drainage. However, suspected bluehead sucker juveniles were collected from the mainstem Little Snake River as well as from Silver Creek in the New Fork River drainage. These putative bluehead suckers have been sent to the Larval Fish Lab at Colorado State University for identification. Bluehead-white sucker hybrids were frequently identified in low numbers from the Little Snake River, and three reaches in the Upper Muddy Creek sub-drainage.

Flannemouth sucker were identified from 10 reaches across three sub-drainages of the Little Snake River drainage in 2006. No adult flannemouth suckers were identified outside of the Little Snake River drainage in 2006, although suspected flannemouth sucker juveniles were collected from Pole and Silver Creeks in the New Fork River drainage. These putative flannemouth suckers have been sent to the Larval Fish Lab at Colorado State University for identification. Flannemouth sucker-white sucker hybrids and white suckers were found in every reach flannemouth suckers were identified from in 2006 (indicating the potential for hybridization).

Roundtail chub were identified from 10 reaches across four sub-drainages in the Little Snake River drainage in 2006. Generally, roundtail chub were collected in low numbers from reaches where they were identified, although 49 roundtail chub were identified from one reach in Muddy Creek. No roundtail chub were identified outside the Little Snake River drainage in 2006.

The native and non-native fish species composition was documented for all stream reaches. Eight native and 11 non-native fish species were identified across the 68 reaches. Non-native fish species were more numerous than native species at most reaches. However, there were reaches where only native species were identified.

Vermillion Creek, Irish Canyon Creek, and Battle Creek contained only native fish. The fish community of Vermillion Creek consisted of MTS and SPD, although BKT are present in this stream at higher elevations (Robb Keith, personal communication).

The fish community of Irish Canyon Creek consisted of a single species (MTS), although CRC are also present in this stream (Hilda Sexauer, personal communication). The fish community of Battle Creek consisted of MSC, MTS, and SPD, although non-native trout occur in Battle Creek (Bill Wengert, personal communication) and a small pond adjacent to the reach on Battle Creek consisted entirely of non-native species. The single reach sampled on Battle Creek in 2006 consisted entirely of riffle habitat. Future sampling efforts on Battle Creek will reveal whether or not non-native species are present in lower velocity habitats that were not sampled in 2006.

SUMMARY 2002-2006

The 2006 field season marks the end of Phase II of the current project. To date, the project biologist and technicians have sampled 320 reaches in the Green River drainage to determine the distribution and abundance of bluehead sucker, flannelmouth sucker, and roundtail chub. In 2002, two of the three target species were identified (bluehead and flannelmouth sucker). Two of the three target species were identified in 2003 (bluehead and flannelmouth sucker). All three target species were identified in 2004. Two of the three target species were identified in 2005 (bluehead and flannelmouth sucker), although the bluehead sucker came from a stream reach where bluehead sucker were previously identified in 2003. In 2006, all three target species were identified.

Bluehead sucker have been identified in 5% of the reaches (16 of 320 reaches; Figure 30). In 2002, bluehead sucker were identified from the Green River below Fontenelle Dam, the Big Sandy River above Big Sandy Reservoir, and from Ringdahl

Reservoir southwest of Green River, WY. In 2003 and 2004, bluehead sucker were identified from the Big Sandy River, Little Sandy Creek, the Green River downstream of Fontenelle Dam, and the Blacks Fork River. The only identification of bluehead sucker in 2005 came from a previously sampled reach on Little Sandy Creek. In 2006, bluehead sucker were identified from Muddy Creek, Grove Creek, and McKinney Creek in the Little Snake River drainage. Bluehead sucker have not been identified upstream of Fontenelle Dam.

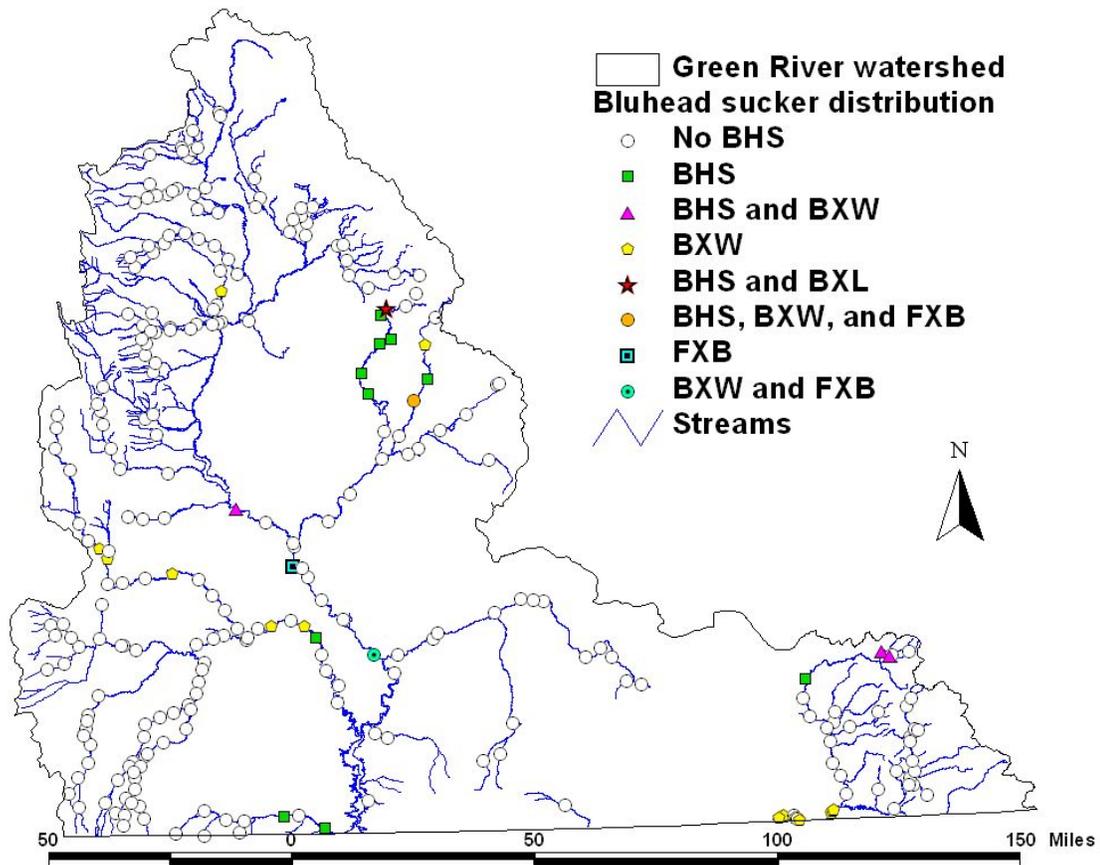


Figure 30. Locations of reaches where BHS or hybrids were identified in 2002, 2003, 2004, 2005, and 2006.

Flannemouth sucker have been identified in 25% of the reaches (80 of 320 reaches; Figure 31). The distribution of flannemouth sucker was more widespread than bluehead sucker. Flannemouth sucker have been identified from the Big Sandy River, Little Sandy Creek, Green River downstream of Fontenelle Dam, Bitter Creek, Blacks Fork River, Henrys Fork River, Smiths Fork River, Muddy Creek (tributary to Blacks

Fork River), Hams Fork River, Cottonwood Creek (tributary to the Green River north of Marbleton, WY), Muddy Creek (tributary to the Green River east of Marbleton, WY), Little Snake River downstream of Baggs, WY, and McKinney Creek (tributary to Muddy Creek) south of Rawlins, WY.

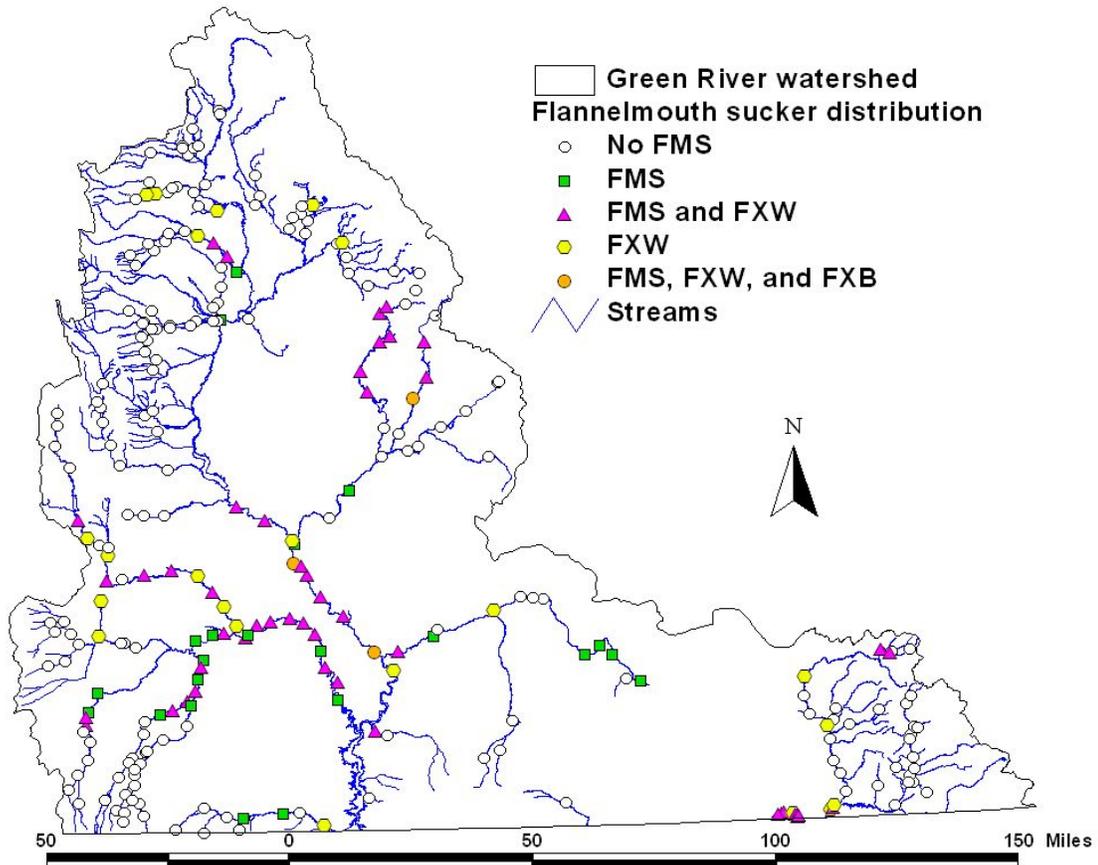


Figure 31. Locations of reaches where FMS or hybrids were identified in 2002, 2003, 2004, 2005, and 2006.

Perhaps the biggest threat to native bluehead and flannemouth suckers in the Green River drainage of Wyoming is the occurrence of and subsequent hybridization with nonnative white sucker. White sucker are widespread throughout the drainage and have been identified in 55% of the reaches (175 of 320 reaches; Figure 33). In addition, non-native longnose sucker (LNS) are present in Big Sandy River drainage above Big Sandy Reservoir, and genetic analyses have confirmed the presence of LNS-BHS hybrids in the Big Sandy River (Figure 34).

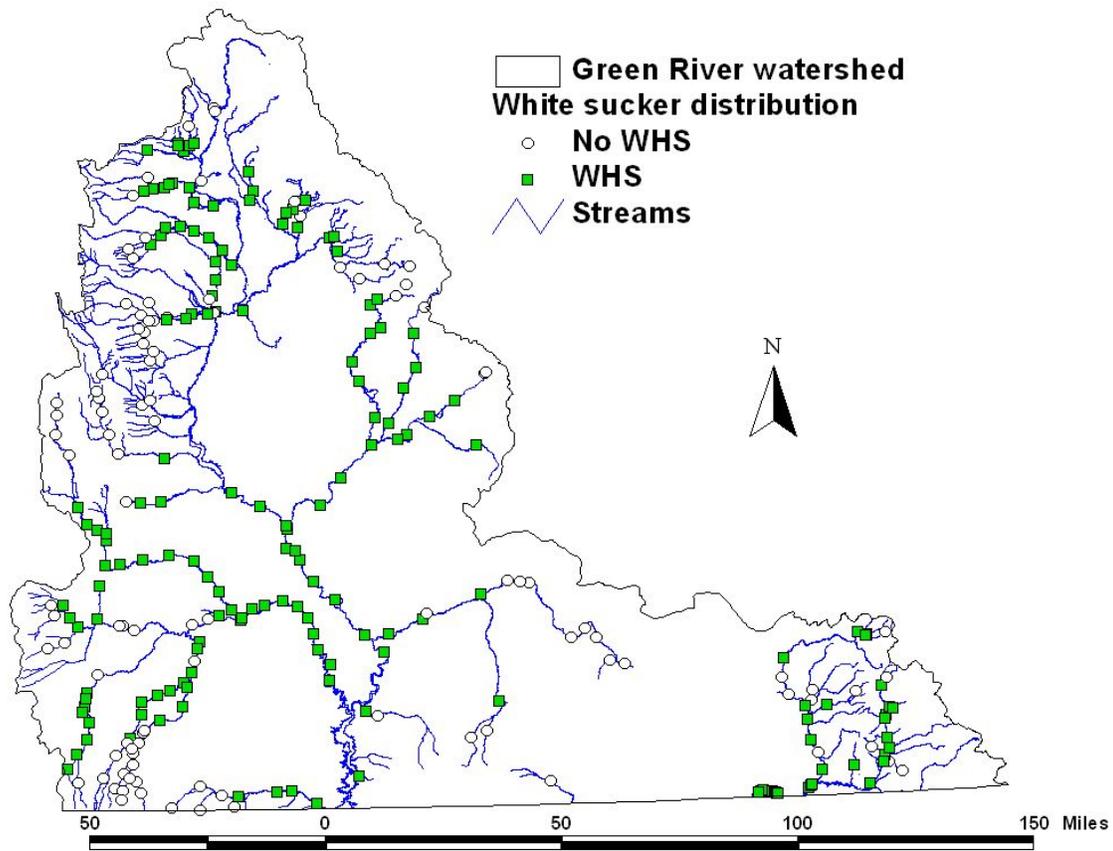


Figure 33. Locations of reaches where WHS were identified in 2002, 2003, 2004, and 2006.

The only known population of bluehead sucker in Wyoming that was not sympatric with white sucker occurred in Ringdahl Reservoir in the Henrys Fork sub-drainage southwest of Green River, WY. Ringdahl Reservoir was fully drained in the summer of 2006 and all fish are assumed to have perished. Fish Division personnel from the Green River Regional Office of the Wyoming Game and Fish Department utilized trap nets to capture approximately 1,400 bluehead suckers before the reservoir was drained. These fish were transplanted into four different reservoirs where white sucker are not present with the hopes of establishing at least one naturally-reproducing population. A small reservoir in Rock Springs, WY received 200 bluehead suckers that died shortly after the introduction due to unexpected water quality issues. Future monitoring will reveal how the other three transplanted populations are faring. The only known population of flannelmouth sucker in Wyoming that is not sympatric with white sucker occurs in the upper portion of the Bitter Creek sub-drainage upstream of Point of

Rocks, WY. Due to the threat of introgression with white sucker, these populations of bluehead sucker and flannelmouth sucker should be protected and expanded where possible. The feasibility of removing white sucker from key stream reaches should also be explored.

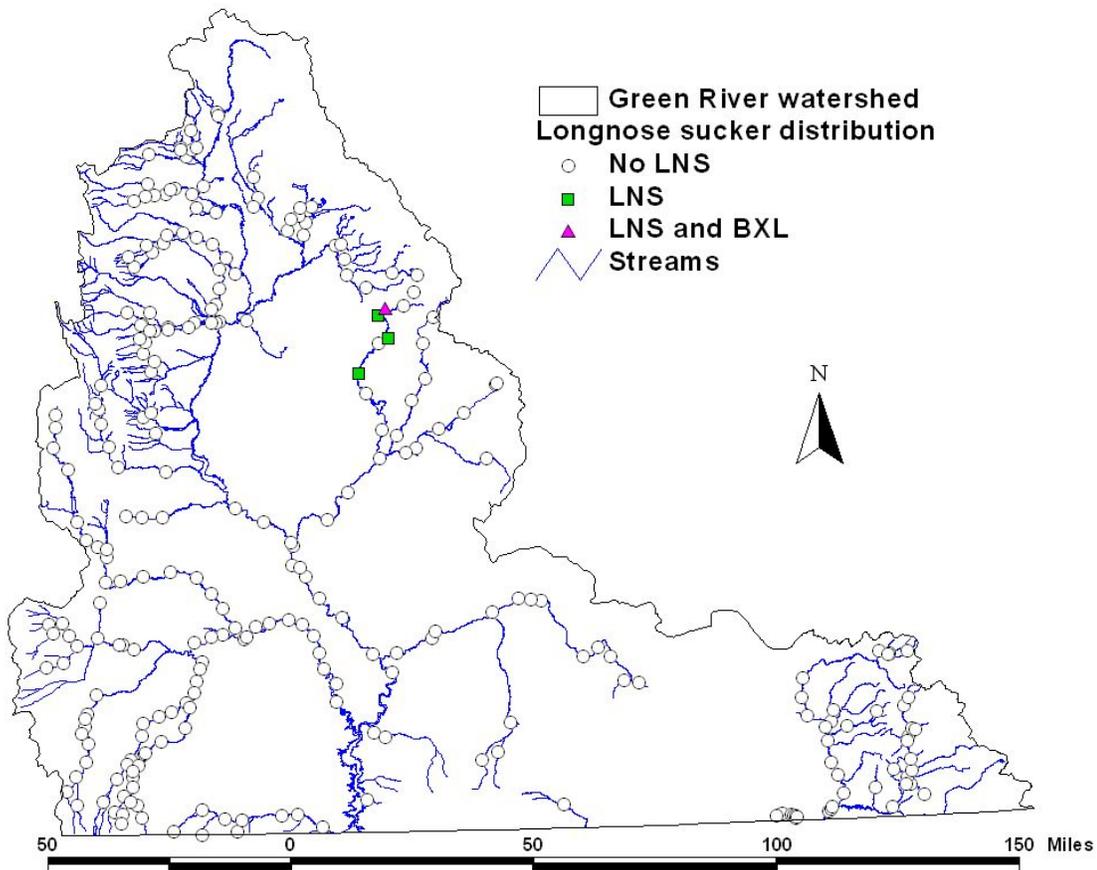


Figure 34. Locations of reaches where LNS were identified in 2002, 2003, 2004, and 2006.

Roundtail chub have been identified in 8% of the reaches (27 of 320 reaches; Figure 32). They have been identified from the Blacks Fork River sub-drainage, including the Blacks Fork River, Hams Fork River, and Muddy Creek, as well as from the Little Snake River sub-drainage, including the Little Snake River, Muddy Creek, and McKinney Creek.

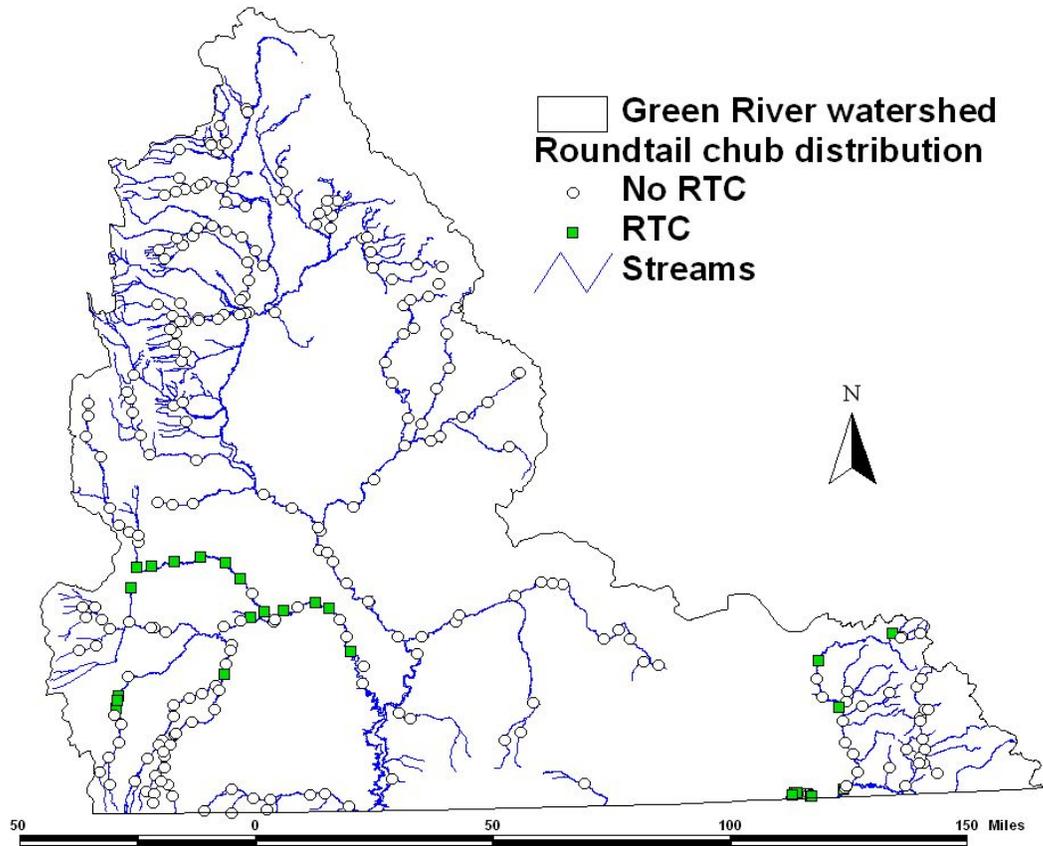


Figure 32. Locations of reaches where RTC were identified in 2002, 2003, 2004, 2005, and 2006.

Roundtail chub are also established in a number of lakes within the New Fork River drainage near Pinedale, WY (Pete Cavalli, Wyoming Game and Fish Department file information). Streams flowing out of six lakes that support varying numbers of roundtail chub in the New Fork River drainage were surveyed in 2005 and 2006. No roundtail chub were identified from these streams.

REFERENCES

- Baxter, G. T. and J. R. Simon. 1970. Fishes of Wyoming. Wyoming Game and Fish Department, Cheyenne, WY.
- Baxter, G. T. and M. D. Stone. 1995. Fishes of Wyoming. Wyoming Game and Fish Department, Cheyenne, WY.
- Bezzlerides, N., and K. Bestgen. 2002. Status review of roundtail chub *Gila robusta*, flannelmouth sucker *Catostomus latipinnis* and bluehead sucker *Catostomus discobolus* in the Colorado River Basin. Larval Fish Laboratory, Colorado State University, Contribution 118. 139 pp.
- Carter, B. and W. A. Hubert. 1995. Factors influencing fish assemblages of a high-elevation desert stream system in Wyoming. *Great Basin Naturalist* 55:169-173.
- Douglas, M. R. and M. E. Douglas. 2003. Yampa River hybrid sucker genetic assessment. Final report to the Colorado Division of Wildlife, CDOW contract number 740-2001 Exhibit B. 49 pp.
- Dey, P. and T. Annear. 2003. Savery Creek fishery and habitat monitoring: baseline conditions prior to completion and operation of High Savery Dam and Reservoir. Wyoming Game and Department Administrative Report. Project number AW-GR-3SC-511. Cheyenne, WY. 18pp.
- Gill, C., R. Keith, and K. Gelwicks. 2004. Green River watershed native non-game fish species research: phase II. Progress report submitted to the Bureau of Reclamation, agreement number 02-FC-40-6870. 52 pp.
- Gill, C., R. Keith, and K. Gelwicks. 2005. Green River watershed native non-game fish species research: phase II. Progress report submitted to the Bureau of Reclamation, agreement number 01-FC-40-6870. 69 pp.

- Hanson, H.C. 1962. A dictionary of ecology. Philosophical Library, Inc. New York, NY.
- Hahn, M. 2002. Progress of Fisheries Work in 2002 on the High Savery Project. Wyoming Game and Department Administrative Report. Cheyenne, WY. 10pp.
- Keinath, D., B. Heidel and G.P. Beauvais. 2003. Wyoming plant and animal species of concern. Prepared by Wyoming Natural Diversity Database, Laramie, WY. Unpublished Report.
- Keith, R., C.Gill, and K. Gelwicks. 2003. Green River watershed native non-game fish species research: Phase I. Progress report submitted to the Bureau of Reclamation, agreement number 02-FC-40-6870. 50pp.
- Kern, A. R. Keith, and K. Gelwicks. 2006. Green River watershed native non-game fish species research: phase II. Progress report submitted to the Bureau of Reclamation, agreement number 02-FC-40-6870. 86 pp.
- Miller, D. 1978. Comprehensive survey of the Big Sandy River. Wyoming Game and Department Administrative Report, Project No. 4077-01-6402. Cheyenne, WY.
- Utah Division of Wildlife Resources. 2006. Range-wide conservation agreement and strategy for roundtail chub *Gila robusta*, bluehead sucker *Catostomus discobolus*, and flannelmouth sucker *Catostomus latipinnis*. Publication Number 06-18, Salt Lake City, Utah. 59 pp.
- Weitzel, D. L. 2002. Conservation and status assessment for the bluehead sucker (*Catostomus discobolus*), flannelmouth sucker (*Catostomus latipinnis*), roundtail chub (*Gila robusta*), and leatherside chub (*Gila copei*): sensitive fishes west of the Continental Divide, Wyoming. Wyoming Game and Fish Department Administrative Report, Cheyenne, WY.

Wheeler, C. A. 1997. Current distributions and distributional changes of fishes in Wyoming west of the continental divide. M.S. Thesis. Department of Zoology and Physiology, University of Wyoming, Laramie, WY. 113 pp.

Appendices

Appendix A.— Species codes and common and scientific names of fish species collected in the Green River drainage during the summer 2006 field season.

Species code	Common name	Scientific name
<u>Native Species</u>		
BHS	bluehead sucker	<i>Catostomus discobolus</i>
CRC	Colorado River cutthroat trout	<i>Oncorhynchus clarki pleuriticus</i>
FMS	flannelmouth sucker	<i>Catostomus latipinnis</i>
MSC	mottled sculpin	<i>Cottus bairdi</i>
MTS	mountain sucker	<i>Catostomus platyrhynchus</i>
MWF	mountain whitefish	<i>Prosopium williamsoni</i>
RTC	roundtail chub	<i>Gila robusta</i>
SPD	speckled dace	<i>Rhinichthys osculus</i>
<u>Introduced Species</u>		
BKT	brook trout	<i>Salvelinus fontinalis</i>
BNT	brown trout	<i>Salmo trutta</i>
CCF	channel catfish	<i>Ictalurus punctatus</i>
CKC	creek chub	<i>Semotilus atromaculatus</i>
CRP	common carp	<i>Cyprinus carpio</i>
FHM	fathead minnow	<i>Pimephales promelas</i>
RBT	rainbow trout	<i>Oncorhynchus mykiss</i>
RSS	redside shiner	<i>Richardsonius balteatus</i>
SDS	sand shiner	<i>Notropis stramineus</i>
SRC	Snake River cutthroat trout	<i>Onchorhynchus clarki ssp</i>
WHS	white sucker	<i>Catostomus commersoni</i>
<u>Hybrids</u>		
BXW	bluehead x white sucker	
FXW	flannelmouth x white sucker	
<u>Other</u>		
NFP	no fish present (collected) in reach	

Appendix B.— Number of tissue samples collected in 2006 for genetic analysis.

Species	Stream	# Collected	Site ID	Location Description	UTM
FXW	Fall Creek	1	FALL2	Near Game and Fish haystacks downstream of Burnt Lake	12T 0606848E 4746467N
BHS	Grove Creek	1	GROV1	Upstream of large beaver dam complex on McKinney Creek	13T 0297210E 4595076N
BXW	Grove Creek	1	GROV1	Upstream of large beaver dam complex on McKinney Creek	13T 0297210E 4595076N
RTC	Little Snake River	3	LSR8	LSR8 on the Little Snake River	13T 0256623E 4544407N
FMS	Little Snake River	3	LSR8	LSR8 on the Little Snake River	13T 0256623E 4544407N
RTC	Little Snake River	3	LSR10	LSR10 on the Little Snake River	13T 0257574E 4544837N
FMS	Little Snake River	6	LSR10	LSR10 on the Little Snake River	13T 0257574E 4544837N
RTC	Little Snake River	3	LSR12	LSR12 on the Little Snake River	13T 0258386E 4545074N
FMS	Little Snake River	1	LSR12	LSR12 on the Little Snake River	13T 0258386E 4545074N
RTC	Little Snake River	1	LSR18	LSR18 on the Little Snake River	13T 0261510E 4544413N
FMS	Little Snake River	1	LSR20	LSR20 on the Little Snake River	13T 0262080E 4544112N
FMS	Little Snake River	1	LSR22	LSR22 on the Little Snake River	13T 0262768E 4543913N
RTC	Little Snake River	2	LSR23	LSR23 on the Little Snake River	13T 0262746E 4543338N
FMS	Little Snake River	2	LSR23	LSR23 on the Little Snake River	13T 0262746E 4543338N
RTC	Little Snake River	10	LSR24	LSR24 on the Little Snake River	13T 0263257E 4543354N
FMS	Little Snake River	2	LSR24	LSR24 on the Little Snake River	13T 0263257E 4543354N
RTC	Little Snake River	1	LSR37	LSR37 on the Little Snake River	13T 0274020E 4544846N
BXW	Little Snake River	2	LSR37	LSR37 on the Little Snake River	13T 0274020E 4544846N
BXW	Little Snake River	1	LSR39	LSR39 on the Little Snake River	13T 0274635E 4545483N
FMS	Little Snake River	1	LSR39-S1	LSR39-S1 on the Little Snake River	13T 0274635E 4545483N
FXW	Little Snake River	15	LSR41	LSR41 on the Little Snake River	13T 0275000E 4545943N
BXW	Little Snake River	1	LSR41	LSR41 on the Little Snake River	13T 0275000E 4545943N
Unknown	McKinney Creek	3	MKIN1	~1.5 miles upstream of confluence with Muddy Creek	13T 0294213E 4596482N
BHS	McKinney Creek	23	MKIN1	~1.5 miles upstream of confluence with Muddy Creek	13T 0294213E 4596482N
BXW	McKinney Creek	1	MKIN1	~1.5 miles upstream of confluence with Muddy Creek	13T 0294213E 4596482N
FMS	McKinney Creek	1	MKIN1	~1.5 miles upstream of confluence with Muddy Creek	13T 0294213E 4596482N
FXW	McKinney Creek	4	MKIN1	~1.5 miles upstream of confluence with Muddy Creek	13T 0294213E 4596482N

Appendix B continued.— Number of tissue samples collected in 2006 for genetic analysis.

Species	Stream	# Collected	Site ID	Location Description	UTM
RTC	McKinney Creek	7	MKIN1	~1.5 miles upstream of confluence with Muddy Creek	13T 0294213E 4596482N
BHS	McKinney Creek	3	MKIN2	Downstream of large beaver dam complex ~0.25 miles	13T 0296848E 4595060N
BXW	McKinney Creek	2	MKIN2	Downstream of large beaver dam complex ~0.25 miles	13T 0296848E 4595060N
FMS	McKinney Creek	1	MKIN2	Downstream of large beaver dam complex ~0.25 miles	13T 0296848E 4595060N
FXW	McKinney Creek	11	MKIN2	Downstream of large beaver dam complex ~0.25 miles	13T 0296848E 4595060N
RTC	Muddy Creek	2	MCLS6	Between Cow and Wild Cow Creeks	13T 0274589E 4572690N
FXW	Muddy Creek	11	MCLS6	Between Cow and Wild Cow Creeks	13T 0274589E 4572690N
BHS	Muddy Creek	5	MCLS9	BLM land ~1.5 miles downstream of first Hwy 789 crossing on Muddy Creek	13T 0268481E 4589275N
FMS	Muddy Creek	1	MCLS9	BLM land ~1.5 miles downstream of first Hwy 789 crossing on Muddy Creek	13T 0268481E 4589275N
RTC	Muddy Creek	47	MCLS9	BLM land ~1.5 miles downstream of first Hwy 789 crossing on Muddy Creek	13T 0268481E 4589275N
FXW	Spring Creek	1	SPR1	~0.50 mile upstream of confluence with Silver Creek	12T 0616713E 4734123N

Appendix C. Location description of sampled reaches across the 14 Level 5 HUCs sampled in 2005.

Site ID	Elevation (ft)	Legal Location	Location Description	Ownership
<u>Alkali Creek Level 5 HUC</u>				
ALKA1	6822	R110W, T30N, S33, SW 1/4	BLM land south of Ross Ridge	BLM
<u>Boulder Creek Level 5 HUC</u>				
BOUL1	7008	R108W, T33N, S35, SE 1/4	Doc Johnson's property behind shed	Private
BOUL2	7217	R108W, T33N, S23, NW 1/4	At Stokes Crossing	BLM
<u>Green River-Big Twin Creek Level 5 HUC</u>				
BTWN1	7621	R110W, T37N, S29, NE 1/4	~1.0 miles upstream of confluence with Green River	Private
LTWN1	7635	R110W, T37N, S28, SW 1/4	~0.50 miles upstream of confluence with Green River	Private
<u>Green River-Forty Rod Creek Level 5 HUC</u>				
FROD1	7395	R111W, T 34N, S8, SE 1/4	Upstream of county road crossing on Daniel Hatchery property	State
<u>Muddy (East Fork River) Creek Level 5 HUC</u>				
CTNF1	7145	R107W, t32N, S26, SE /4	Downstream of Hwy 353 crossing	Private
CTNF2	7399	R106W, T32N, S29, NW 1/4	~ 2.0 miles southwest of Chimney Butte	Private
ICCR1	8394	R105W, T31N, S9, SE 1/4	~ 1.0 mile upstream of confluence with East Fork River	USFS
MCNF1	7101	R107W, T31N, S13, NW 1/4	~ 0.75 mile upstream of confluence with East Fork River	Private
MCNF2	7198	R106W, T31N, S27, SW 1/4	In big meadow downstream of Big Sandy, WY	Private
MCNF3	7398	R105W, T31N, S32, NW 1/4	Upstream of road crossing on Don Jensen property	Private
POCK1	7366	R106W, T31N, S4, NE 1/4	At spur road crossing off County Road 127	Private
SILV1	7131	R107W, T32N, S15, NW 1/4	~ 0.25 miles upstream of Hwy 353 crossing	Private
SMC1	7145	R106W, T31N, S32, NE 1/4	Beginning ~ 0.25 mile upstream of County Road 113 crossing	Private
SPR1	7198	R107W, T32N, S11, SW 1/4	~0.50 miles upstream of confluence with Silver Creek	Private
<u>Pole Creek Level 5 HUC</u>				
FALL1	7188	R108W, T33N, S10, SW 1/4	Upstream of new bridge on old two-track	Private
FALL2	7798	R108W, T33N, S1, NE 1/4	Near Game and Fish hay reserves downstream of Burnt Lake	State
POLE1	7043	R108W, T33N, S30, SE 1/4	~ 0.25 mile upstream of Hwy 191 bridge on Pole Creek	Private
POLE2	7128	R108W, T33N, S17, SW 1/4	Near end of bluffs and downstream of confluence with Fall Creek	Private
POLE3	7300	R108W, T33N, S3, NW 1/4	Upstream of sheep bridge	BLM

Appendix C continued.— Location description of sampled reaches across the 14 Level 5 HUCs sampled in 2005.

Site ID	Elevation (ft)	Legal Location	Location Description	Ownership
<u>Upper New Fork River Level 5 HUC</u>				
DUCK1	7201	R110W, T34N, S36, SE 1/4	On State land west of Pinedale	State
MRSH1	7771	R110W, T36N, S19, SE 1/4	Near pullout on Hwy 352 downstream of New Fork Lakes road.	BLM
<u>Little Snake River-Battle Creek Level 5 HUC</u>				
BAT1	6808	R88W, T12N, S13, SE 1/4	Upstream of road crossing on O'Toole property	Private
<u>Little Snake River-Powder Wash Level 5 HUC</u>				
LSR8	6197	R93W, T12N, S17, NW 1/4	LSR8 on the Little Snake River	Private
LSR10	6201	R93W, T12N, S8, SE 1/4	LSR10 on the Little Snake River	Private
LSR12	6207	R93W, T12N, S9, SW 1/4	LSR12 on the Little Snake River	Private
<u>Little Snake River-Willow Creek Level 5 HUC</u>				
CTLS2	6790	R90W, T13N, S22, NE 1/4	At artesian well on O'Toole property	Private
LSR18	6170	R93W, T12N, S11, SW 1/4	LSR18 on the Little Snake River	Private
LSR20	6173	R93W, T12N, S21, NE 1/4	LSR20 on the Little Snake River	Private
LSR22	6174	R93W, T12N, S13, NW 1/4	LSR22 on the Little Snake River	Private
LSR23	6161	R93W, T12N, S13, SW 1/4	LSR23 on the Little Snake River	Private
LSR24	6140	R93W, T12N, S13, SW 1/4	LSR24 on the Little Snake River	Private
LSR37	6198	R92W, T12N, S12, NE 1/4	LSR37 on the Little Snake River	Private
LSR39	6210	R91W, T12N, S7, NW 1/4	LSR39 on the Little Snake River	Private
LSR41	6215	R91W, T12N, S6, SE 1/4	LSR41 on the Little Snake River	Private
<u>Lower Muddy Creek Level 5 HUC</u>				
COW1	6597	R91W, T15N, S5, SW 1/4	Upstream of County Road 608 crossing	BLM
DCTRIB	6590	R91W, T16N, S29, SE 1/4	Between Dry Cow and Cow Creeks downstream of BLM road 3308	BLM
MCLS2	6397	R91W, T13N, S22, SW 1/4	At Young Draw	Private
MCLS4	6413	R91W, T14N, S19, NE 1/4	Downstream of Pines Draw	Private
MCLS5	6597	R91W, T15N, S31, NW 1/4	Upstream of Robbers Gulch	BLM
MCLS6	6600	R92W, T15N, S13, NE 1/4	Between Cow and Wild Cow Creeks	State
MCLS7	6571	R92W, T16N, S33, SW 1/4	Near Mexican Flats	BLM
WCC2	6597	R91W, T15N, S14, NW 1/4	In Canyon north of County Road 608	BLM
WCC4	7167	R90W, T16N, S35, NE 1/4	Upstream of confluence of South and Middle Forks Wild Cow Creek	BLM

Appendix C continued.— Location description of sampled reaches across the 14 Level 5 HUCs sampled in 2005.

Site ID	Elevation (ft)	Legal Location	Location Description	Ownership
<i>Savery Creek Level 5 HUC</i>				
BGUL1	6838	R89W, T13N, S13, SW 1/4	At two track crossing on state land low in the drainage	State
BGUL2	7191	R88W, T13N, S29, SE 1/4	Upstream of County Road 760 crossing	Private
BIRD1	7120	R89W, T15N, S26, SE 1/4	~0.25 mile upstream of County Road 608 crossing	Private
LSAV1	7199	R88W, T15N, S19, NW 1/4	Immediately downstream of Sheehan Diversion	Private
LSAV2	7202	R88W, T15N, S19, NW 1/4	Upstream of Sheehan Diversion	Private
LSAV3	7398	R89W, T16N, S26, NE 1/4	At Grizzly Unit downstream of bridge crossing	State
LOCO1	6797	R89W, T13N, S11, NW 1/4	Upstream of Country Road 752 crossing	BLM
LOCO2	7397	R89W, T14N, S32, NE 1/4	Downstream of confluence of Loco and West Fork Loco Creeks	BLM
MCRT1	7431	R89W, T16N, S13, SE 1/4	At meadow just upstream of private at bottom of McCarty Canyon	State
SAV1	6597	R89W, T12N, S8, NW 1/4	On Tom Sitz property near Pioneer Mine	Private
SAV3	6789	R89W, T13N, S14, NW 1/4	Downstream of County Road 541 crossing	Private
SAV4	6982	R89W, T14N, S36, SW 1/4	On Wyoming Water Development Commission land	State
SAV5	6998	R89W, T14N, S24, SW 1/4	Upstream of confluence with Hell Canyon on Tom Sitz property	Private
SAV6	7198	R89W, T15N, S35, SE 1/4	At confluence with Coal Gulch	Private
SAV7	7201	R88W, T15N, S19, NE 1/4	Upstream of Sheehan property/downstream of High Savery Dam	BLM
<i>Upper Muddy Creek Level 5 HUC</i>				
GROV1	7433	R89W, T17N, S4, NW 1/4	Just upstream of large beaver dam complex on McKinney Creek	Private
GROV2	7591	R89W, T18N, S33, SW 1/4	Upstream of suspected beaver dam acting as a barrier	Private
MKIN1	7200	R89W, T18N, S31, NW 1/4	~1.5 miles upstream of confluence with Muddy Creek	Private
MKIN2	7398	R89W, T17N, S4, NW 1/4	Just downstream of large beaver dam complex on McKinney Creek	BLM
MKIN3	7998	R88W, T18N, S31, NW 1/4	At and upstream of confluence with East Muddy Creek	Private
MCLS8	6591	R92W, T16N, S8, SW 1/4	In George Dew wetlands	State
MCLS9	6699	R92W, T17N, S28, NW 1/4	~1.5 miles downstream of most northerly Hwy 789 crossing	BLM
<i>Vermillion Creek Level 5 HUC</i>				
VERM1	7058	R101W, T13N, S25, SW 1/4	State land three miles east of Hwy 430	State

Appendix D. Level 5 HUC sub-drainages within the 2006 target area.

Sub-Drainage Name	Sampled (Yes/No)
Alkali Creek	Yes
Boulder Creek	Yes
Little Snake River-Battle Creek	Yes
Little Snake River-Powder Wash	Yes
Little Snake River-Willow Creek	Yes
Lower New Fork River	No
Lower Muddy Creek	Yes
Muddy (East Fork River) Creek	Yes
Pine Creek	No
Pole Creek	Yes
Savery Creek	Yes
Upper New Fork River	Yes
Upper Muddy Creek	Yes

Appendix E.— Summary information for sites visited in the Alkali Creek Level 5 HUC in 2006.

<u>Stream</u>			Station	Station			Length	
Site ID	Date	Gear Type ^a	Length (ft)	Width (ft)	Species	Number Caught	Range (in)	Status ^b
<u>Alkali Creek</u>								
ALKA1 ^c	9/12/2006	BS	656	8.9	WHS	3	9.5-11.6	I
					FHM	964	1.3-3.1	I

^aThe letter code indicates the type of sampling gear used: BS=bag seine.

^bI=Introduced.

^c21 fish collected for later ID.

Appendix F.— Summary information for sites visited in the Boulder Creek Level 5 HUC in 2006.

<i>Stream</i>		Station	Station			Length		
Site ID	Date	Gear Type^a	Length (ft)	Width (ft)	Species	Number Caught	Range (in)	Status^b
<i>Boulder Creek</i>								
BOUL1 ^c	9/21/2006	DH	753	40.4	BNT	53	3.5-21.3	I
					FHM	1	2.2	I
					MSC	376	1.3-5.3	N
					MTS	1	2.9	N
					RBT	11	3.1-14.5	I
					RSS	57	1.0-3.9	I
					SPD	134	1.3-3.6	N
					WHS	202	1.5-4.8	I
BOUL2	9/20/2006	DH	656	81.5	BNT	34	2.9-15.6	I
					MSC	307	1.2-5.0	N
					RBT	41	2.6-12.7	I
					RSS	2	3.7-4.0	I
					SPD	122	1.6-4.8	N

^aThe letter code indicates the type of sampling gear used: DH=barge electrofishing gear.

^bI=Introduced and N=Native.

^cFive fish collected for later ID.

Appendix G.— Summary information for sites visited in the Green River-Big Twin Creek Level 5 HUC in 2006.

<u>Stream</u>			Station	Station		Length		
Site ID	Date	Gear Type ^a	Length (ft)	Width (ft)	Species	Number Caught	Range (in)	Status ^b
<u>Big Twin Creek</u>								
BTWN1	10/12/2006	SB	656	13.1	BKT	46	3.5-11.8	I
					BNT	5	5.4-7.3	I
					MSC	139	1.2-4.5	N
					MTS	4	4.1-4.9	N
<u>Little Twin Creek</u>								
LTWN1 ^c	10/12/2006	SB	656	No Width	BKT	70	2.8-10.9	I
					BNT	47	2.9-17.8	I
					MSC	18	3.1-4.0	N
					MWF	120	3.3-5.8	N
					RBT	16	5.0-8.7	I
					SPD	13	1.3-2.6	N
					SRC	1	8.3	I

^aThe letter code indicates the type of sampling gear used: SB=shore-based electrofishing gear.

^bI=Introduced and N=Native.

^cSeven juvenile fish collected for later ID.

Appendix H.— Summary information for sites visited in the Green River-Forty Rod Creek Level 5 HUC in 2006.

<u>Stream</u>		Station	Station	Length		Number	Range	Status^b
Site ID	Date	Gear Type^a	Length (ft)	Width (ft)	Species	Caught	(in)	
<u>Forty Rod Creek</u>								
FROD1	10/10/2006	SB	656	23.9	BKT	6	3.2-10.0	I
					BNT	26	4.2-19.8	I
					MTS	1	5	N
					MWF	39	3.8-18.4	N
					RBT	7	7.1-18.6	I
					SPD	2	2.3-2.8	N

^aThe letter code indicates the type of sampling gear used: SB=shore-based electrofishing gear.

^bI=Introduced and N=Native.

Appendix I.— Summary information for sites visited in the Muddy (East Fork River) Creek Level 5 HUC in 2006.

<u>Stream</u>		Station	Station	Length		Number	Range	Status^b
Site ID	Date	Gear Type^a	Length (ft)	Width (ft)	Species	Caught	(in)	
<u>Cottonwood Creek</u>								
CTNF1 ^c	9/26/2006	SB	656	11.5	BKT	1	7.6	I
					BNT	19	3.1-7.5	I
					MTS	3	3.6-5.0	N
					SPD	53	1.5-3.9	N
					WHS	4	3.8-4.3	I
CTNF2	9/26/2006	SB	656	8.9	NFP			
<u>Irish Canyon Creek</u>								
IRCCR1	10/11/2006	SB	656	16.8	MTS	1	3.4	N
<u>Lovatt Creek</u>								
LOVT1	9/28/2006	Reach was dry						
<u>Muddy Creek</u>								
MCNF1 ^d	9/14/2006	SB	656	11.2	BNT	117	2.5-20.6	I
					MSC	11	1.8-5.0	N
					MWF	9	3.4-4.8	N
					SPD	8	2.1-3.2	N
MCNF2	9/13/2006	SB	656	4.6	BKT	25	3.0-10.7	I
					MSC	212	1.7-4.8	N
MCNF3	9/14/2006	SB	656	7.5	NFP			
<u>Pocket Creek</u>								
POCK1	1-/03/2006	SB	656	3	NFP			
<u>Scab Creek</u>								
SCAB1	10/3/2006	Reach was dry						

^aThe letter code indicates the type of sampling gear used: SB=shore-based electrofishing equipment

^bI=Introduced and N=Native

^c Five fish collected for later ID

^dTwo fish collected for later ID

Appendix I continued.— Summary information for sites visited in the Muddy (East Fork River) Creek Level 5 HUC in 2006

<u>Stream</u>			Station	Station			Length	
Site ID	Date	Gear Type ^a	Length (ft)	Width (ft)	Species	Number Caught	Range (in)	Status ^b
<u>Silver Creek</u>								
SILV1 ^c	9/27/2006	SB	656	26.9	BNT	59	2.9-18.6	I
					MSC	198	1.2-4.1	N
					MTS	8	3.0-5.6	N
					RSS	20	1.2-3.1	I
					SPD	465	1.3-3.4	N
					WHS	221	1.8-10.1	I
<u>South Muddy Creek</u>								
SMC1	9/13/2006	SB	656	3	NFP			
<u>Spring Creek</u>								
SPR1 ^d	9/27/2006	SB	656	12.2	BKT	5	2.1-6.6	I
					BNT	14	2.8-19.7	I
					FXW	1	9.9	H
					MSC	1	2.8	N
					MTS	17	1.2-4.8	N
					RSS	11	1.0-3.5	I
					SPD	60	1.3-3.5	N
					WHS	9	2.0-11.5	I
SPR2	10/3/2006	Reach was dry						

^aThe letter code indicates the type of sampling gear used: SB=shore-based electrofishing equipment.

^bI=Introduced, N=Native, AND H=Hybrid

^c 75 fish collected for later ID

^d10 fish collected for later ID

Appendix J.— Summary information for sites visited in the Pole Creek Level 5 HUC in 2006.

<u>Stream</u>			Station	Station			Length	
Site ID	Date	Gear Type ^a	Length (ft)	Width (ft)	Species	Number Caught	Range (in)	Status ^b
<u>Fall Creek</u>								
FALL1 ^c	9/7/2006	DH	656	24.3	BNT	71	3.0-18.8	I
					FHM	1	2.2	I
					MSC	288	1.3-4.9	N
					MWF	1	7.1	N
					RBT	10	2.8-12.4	I
					RSS	305	1.2-4.3	N
					SPD	7	2.2-3.3	N
					WHS	260	1.7-11.3	I
FALL2	9/19/2006	SB	656	26.2	BKT	7	2.8-10.0	I
					FXW	1	7.2	H
					MSC	167	1.3-4.3	N
					MTS	11	2.0-6.3	N
					RBT	64	1.9-8.7	I
					RSS	3	3.7-3.8	I
					SPD	128	1.3-4.6	N
					WHS	53	2.7-13.3	I

Meadow Creek

MEDW1 9/12/2006 Reach was dry

^aThe letter code indicates the type of sampling gear used: SB=shore-based electrofishing equipment and DH=barge electrofishing equipment.

^bI=Introduced, N=Native, and H=Hybrid.

^c 32 fish collected for later ID.

Appendix J continued.— Summary information for sites visited in the Pole Creek Level 5 HUC in 2006.

<u>Stream</u>			Station	Station			Length	
Site ID	Date	Gear Type ^a	Length (ft)	Width (ft)	Species	Number Caught	Range (in)	Status ^b
<u>Pole Creek</u>								
POLE1	9/6/2006	DH	656	44.3	BNT	106	1.3-18.8	I
					MSC	145	1.5-4.2	N
					RBT	11	2.6-13.5	I
					RSS	1	2.6	I
					SPD	16	1.7-3.1	N
					WHS	4	3.6-10.6	I
POLE1-S ^c	9/6/2006	BS	72.3	6.7	BNT	1	3.2	I
					MSC	7	1.1-1.6	N
					RBT	1	2.8	I
					SPD	1	1.1	N
					WHS	42	1.5-2.1	I
POLE2 ^d	9/6/2006	DH	803.8	41.7	BNT	73	2.4-23.1	I
					MSC	248	1.3-4.8	N
					MTS	6	2.6-3.2	N
					MWF	18	3.7-4.5	N
					RBT	34	2.4-11.5	I
					RSS	23	1.9-3.3	I
					SPD	13	1.9-3.0	N
					WHS	42	1.4-8.9	I
POLE3	9/8/2006	SB	656	33	BKT	1	6.9	I
					BNT	16	3.2-7.0	I
					MSC	109	1.3-4.0	N
					MTS	9	5.8-6.9	N
					RBT	130	2.3-11.5	I

^aThe letter code indicates the type of sampling gear used: SB=shore-based electrofishing equipment and DH=barge electrofishing equipment.

^bI=Introduced and N=Native.

^c 129 fish collected for later ID.

^d43 fish collected for later ID.

Appendix K.— Summary information for sites visited in the Upper New Fork River Level 5 HUC in 2006.

<u>Stream</u>		Gear	Station Length	Station Width	Species	Number Caught	Length Range	Status^b
Site ID	Date	Type^a	(ft)	(ft)			(in)	
<u>Duck Creek</u>								
DUCK1	10/4/2006	SB	656	18	BNT	28	7.0-21.1	I
					MSC	62	2.1-5.4	N
					MTS	3	4.3-4.8	N
					RSS	13	1.3-3.7	I
					SPD	212	1.3-3.6	N
					WHS	121	2.6-17.0	I
<u>Marsh Creek</u>								
MRSH1	10/4/2006	SB	656	24.9	No Fish Present			

^aThe letter code indicates the type of sampling gear used: SB=shore-based electrofishing equipment

^bI=Introduced and N=Native

Appendix L.— Summary information for sites visited in the Little Snake River-Battle Creek Level 5 HUC in 2006.

<u>Stream</u>		Gear	Station Length	Station Width		Number	Length Range	
Site ID	Date	Type^a	(ft)	(ft)	Species	Caught	(in)	Status^b
<u>Battle Creek</u>								
BAT1	7/6/2006	SB	656	65	MSC	64	1.6-4.5	N
					MTS	1	3.9	N
					SPD	21	2.2-3.8	N
BAT1P ^c	7/6/2006	BS	70	25	CKC	10	2.2-5.9	I
					FHM	4	2.0-2.2	I
					RSS	50	2.0-3.0	I
					WHS	2	6.8-8.9	I

^aThe letter code indicates the type of sampling gear used: SB=shore-based electrofishing gear and BS=bag seine.

^bI=Introduced and N=Native.

^cTwo fish collected for later ID.

Appendix M.— Summary information for sites visited in the Little Snake River-Powder Wash Level 5 HUC in 2006.

<u>Stream</u>			Station	Station			Length	
Site ID	Date	Gear Type ^a	Length (ft)	Width (ft)	Species	Number Caught	Range (in)	Status ^b
<u>Little Snake River</u>								
LSR8	6/15/2006	RF	5280	No width	BXW	2	12.4-14.1	H
					CRP	9	18.4-21.6	I
					FMS	3	3.0-16.1	N
					FXW	8	6.0-16.2	H
					RSS	6	1.8-3.0	I
					RTC	3	9.0-12.2	N
					SDS	2	2.2-2.3	I
					SPD	3	1.8-2.7	N
					WHS	24	2.8-15.8	I
LSR8-S ^c	6/15/2006	BS	62.3	23	RSS	1	1.6	I
					SDS	16	1.0-2.4	I
					SPD	4	1.5-1.6	N
LSR10	6/15/2006	RF	5280	No width	BXW	1	12.3	H
					CRP	4	19.8-20.4	I
					FMS	6	16.3-18.4	N
					FXW	2	8.4-11.6	H
					RTC	3	9.0-12.6	N
					SPD	1	2.7	N
					WHS	10	6.1-15.7	I
LSR10-S ^d	6/15/2006	BS	109.2	15.4	RSS	52	0.8-2.4	I
					SDS	16	1.0-1.3	I
					WHS	5	2.5-3.5	I

^aThe letter code indicates the type of sampling gear used: RF=raft electrofishing gear and BS=bag seine.

^bI=Introduced, N=Native, and H=Hybrid.

^cOne fish collected for later ID.

^dSeven fish collected for later ID.

Appendix M continued.— Summary information for sites visited in the Little Snake River-Powder Wash Level 5 HUC in 2006.

<u>Stream</u>		Station	Station	Length		Number		Status ^b
Site ID	Date	Gear Type ^a	Length (ft)	Width (ft)	Species	Caught	Range (in)	
<u>Little Snake River</u>								
LSR12	6/15/2006	RF	6600	No width	BXW	1	15.8	H
					CRP	9	17.6-21.9	I
					FMS	1	19.4	N
					FXW	7	2.9-13.5	H
					RBT	1	14.2	I
					RSS	9	1.6-2.3	I
					RTC	3	5.7-6.8	N
					SPD	10	2.2-2.5	N
					WHS	31	2.1-16.8	I
LSR12-S	6/15/2006	BS	106.6	10.5	RSS	7	0.9-1.5	I
					SDS	1	1.3	N

^aThe letter code indicates the type of sampling gear used: RF=raft electrofishing gear and BS=bag seine.

^bI=Introduced, N=Native, and H=Hybrid.

Appendix N.— Summary information for sites visited in the Little Snake River-Willow Creek Level 5 HUC in 2006.

<u>Stream</u>			Station	Station			Length	
Site ID	Date	Gear Type ^a	Length (ft)	Width (ft)	Species	Number Caught	Range (in)	Status ^b
<u>Coalbank Draw</u>								
CBDRW1	8/28/2006	Reach was dry						
<u>Cottonwood Creek</u>								
CTLS2	7/6/2006	BP	656	6.9	CKC	214	1.9-5.4	I
					MTS	2	3.3-3.7	N
					WHS	46	3.0-7.3	I
CTLS3	8/14/2006	Reach was dry						
<u>Little Snake River</u>								
LSR18 ^c	6/23/2006	RF	2640	No width	CRP	7	18.5-20.5	I
					FXW	1	17.2	H
					RTC	1	11.6	N
					WHS	4	13.0-16.1	I
LSR20	6/23/2006	RF	2640	No width	BXW	4	10.6-15.7	H
					CCF	2	14.6-21.6	I
					CRP	5	19.1-21.1	I
					FMS	1	16.9	N
					FXW	2	13.1-16.4	H
					RSS	4	2.8-3.2	I
					SPD	4	2.6-2.9	N
					WHS	54	16.3-7.0	I

^aThe letter code indicates the type of sampling gear used: RF=raft electrofishing gear and BP=backpack electrofishing unit(s).

^bI=Introduced, N=Native, and H=Hybrid.

^cLost three CCF and multiple CRP and WHS in livecar transfer.

Appendix N continued.— Summary information for sites visited in the Little Snake River-Willow Creek Level 5 HUC in 2006.

<i>Stream</i>			Station	Station			Length	
Site ID	Date	Gear Type ^a	Length (ft)	Width (ft)	Species	Number Caught	Range (in)	Status ^b
<i>Little Snake River</i>								
LSR20-S	6/23/2006	BS	65.9	16.7	CKC	1	3.3	I
					FHM	59	1.3-2.2	I
					RSS	300	0.9-2.5	I
					SDS	22	1.2-1.7	I
					WHS	9	2.5-4.1	I
LSR22	6/23/2006	RF	2640	No width	BXW	2	13.3-15.5	H
					CCF	1	20.3	I
					CRP	8	19.4-27.1	I
					FMS	1	19.6	N
					FXW	5	16.2-19.1	H
					WHS	26	12.2-15.6	I
LSR23	6/23/2006	RF	2640	No width	CCF	4	14.4-21.9	I
					CRP	9	19.3-26.9	I
					FMS	2	19.5-19.7	N
					FXW	6	16.9-18.8	H
					RTC	2	12.1-12.3	N
					WHS	19	11.0-15.0	I
LSR23-S	6/23/2006	BS	64	8.9	RSS	2	0.9-1.9	I
					SDS	2	1.3-1.5	I

^aThe letter code indicates the type of sampling gear used: RF=raft electrofishing gear and BS=bag seine.

^bI=Introduced, N=Native, and H=Hybrid.

Appendix N continued.— Summary information for sites visited in the Little Snake River-Willow Creek Level 5 HUC in 2006.

<u>Stream</u>			Station	Station			Length	
Site ID	Date	Gear Type ^a	Length (ft)	Width (ft)	Species	Number Caught	Range (in)	Status ^b
<u>Little Snake River</u>								
LSR24	6/23/2006	RF	2640	No width	BXW	2	16.6-17.0	H
					CCF	2	19.3-20.6	I
					CRP	13	19.1-24.6	I
					FMS	2	15.1-18.1	N
					FXW	4	12.7-19.1	H
					RTC	10	7.6-14.8	N
					WHS	24	9.1-15.9	I
LSR24-S	6/23/2006	BS	85.6	20	FHM	26	1.1-1.7	I
					RSS	24	1.1-2.0	I
					SDS	322	1.1-2.4	I
					SPD	2	1.3	N
LSR37	6/13/2006	RF	5280	No width	BXW	3	15.5-16.9	H
					CCF	3	20.1-21.7	I
					CRP	4	22.4-24.8	I
					FHM	1	2.6	I
					FXW	11	2.8-18.7	H
					RBT	1	15	I
					RSS	82	1.5-2.8	I
					RTC	1	12.7	N
					SDS	7	1.9-2.4	I
					SPD	1	2.8	N
					WHS	19	5.2-16.3	I
LSR39	6/13/2006	RF	5280	No width	BXW	1	6.9	H
					CRP	2	20.9-22.0	I
					FXW	17	2.6-14.5	H
					RSS	4	2.3-3.0	I
					SPD	1	2.6	N
WHS	15	8.9-15.9	I					

^aThe letter code indicates the type of sampling gear used: RF=raft electrofishing gear and BS=bag seine.

^bI=Introduced, N=Native, and H=Hybrid.

Appendix N continued.— Summary information for sites visited in the Little Snake River-Willow Creek Level 5 HUC in 2006.

<u>Stream</u>			Station	Station			Length	
Site ID	Date	Gear Type ^a	Length (ft)	Width (ft)	Species	Number Caught	Range (in)	Status ^b
<u>Little Snake River</u>								
LSR39-S1 ^c	6/13/2006	BS	150.9	23	FHM	3	1.1-1.4	I
					FMS	1	1.9	N
					SDS	5	1.0-1.3	I
					WHS	2	2.4-2.6	I
LSR39-S2	6/13/2006	BS	32.8	13.1	NFP			
LSR41	6/13/2006	RF	5280	No width	BXW	1	12.6	H
					CRP	2	21.3-23.3	I
					FXW	1	18.3	H
					WHS	22	2.0-14.6	I
LSR41-S	6/13/2006	BS	44.9	13.1	FHM	12	1.0-1.5	I
					RSS	10	1.0-1.4	I
					SDS	94	0.9-1.5	I
					SPD	3	1.1-1.5	N

^aThe letter code indicates the type of sampling gear used: RF=raft electrofishing gear and BS=bag seine.

^bI=Introduced, N=Native, and H=Hybrid.

^cSeven fish collected for later ID

Appendix O.— Summary information for sites visited in the Lower Muddy Creek Level 5 HUC in 2006.

<u>Stream</u>			Station	Station			Length	
Site ID	Date	Gear Type ^a	Length (ft)	Width (ft)	Species	Number Caught	Range (in)	Status ^b
<u>Cherokee Creek</u>								
CHER1	8/14/2006	Reach was dry						
CHER2	8/14/2006	Insufficient flows to support fish						
CHER3	8/14/2006	Insufficient flows to support fish						
<u>Cow Creek</u>								
COW1	6/21/2006	DN	328	3.5	NFP			
COW2	7/29/2006	Reach was dry						
COW3	7/29/2006	Reach was dry						
<u>Deep Creek</u>								
DEEP1	8/14/2006	Reach was dry						
DEEP2	8/14/2006	Reach was dry						
DEEP3	8/14/2006	Reach was dry						
<u>Deep Gulch</u>								
DGUL1	6/25/2006	Insufficient flows to support fish						
DGUL2	6/25/2006	Reach was dry						
DGUL3	7/29/2006	Insufficient flows to support fish						
<u>Dry Cow Creek</u>								
DCTRIB1	7/29/2006	BS	32.8	20	CKC	2	2.9-5.0	I
DCC1	7/28/2006	Reach was dry						
DCC2	7/28/2006	Reach was dry						
DCC3	7/28/2006	Reach was dry						
DCC4	7/28/2006	Reach was dry						

^aThe letter code indicates the type of sampling gear used: DN=dipnet and BS= bag seine.

^bI=Introduced.

Appendix O continued.— Summary information for sites visited in the Lower Muddy Creek Level 5 HUC in 2006.

<u>Stream</u>			Station	Station			Length	
Site ID	Date	Gear Type ^a	Length (ft)	Width (ft)	Species	Number Caught	Range (in)	Status ^b
<u>Muddy Creek</u>								
MCLS2 ^c	6/26/2006	BS	656	12.5	CKC	14	2.4-4.2	I
					FHM	117	1.5-2.6	I
					RSS	14	1.7-2.9	I
					SDS	10	1.7-2.1	I
					SPD	7	0.9-2.9	N
					WHS	101	2.2-5.9	I
MCLS3	7/12/2006	Reach was dry						
MCLS4 ^d	6/24/2006	BS	656	6.9	CKC	1	3.6	I
					FHM	1	2.6	I
					WHS	13	2.9-6.7	I
MCLS5	6/22/2006	BP	656	7.5	FHM	35	2.0-2.7	I
					WHS	2	3.2-3.5	I
MCLS6	6/22/2006	BP	656	10.5	CKC	12	3.7-8.1	I
					FHM	5	2.0-2.6	I
					FXW	117	2.9-15.0	H
					RSS	9	2.2-3.3	I
					RTC	2	2.7-8.7	N
					SDS	1	2.7	I
					SPD	3	2.6-3.0	N
					WHS	5	3.2-12.6	I
MCLS7	6/25/2006	BP	656	4.3	FHM	8	1.9-2.7	I

^aThe letter code indicates the type of sampling gear used: BP=backpack electrofishing unit (s) and BS= bag seine.

^bI=Introduced, N=Native, and H=Hybrid.

^c Seven fish collected for later ID.

^d21 fish collected for later ID.

Appendix O continued.— Summary information for sites visited in the Lower Muddy Creek Level 5 HUC in 2006.

<u>Stream</u>			Station	Station			Length	
Site ID	Date	Gear Type ^a	Length (ft)	Width (ft)	Species	Number Caught	Range (in)	Status ^b
<u>Wild Cow Creek</u>								
WCC1	6/21/2006	Reach was dry						
WCC2	6/29/2006	BS	656	3.3	CKC	244	1.2-5.8	I
					FHM	8	1.7-2.8	I
					RSS	1	2.9	I
					SPD	10	2.0-4.4	N
					WHS	46	2.8-6.9	I
WCC3	8/23/2006	Reach was dry						
WCC4	7/27/2006	BP	656	1.6	NFP			
<u>Middle Fork Wild Cow Creek</u>								
MFWC1	7/27/2006	Reach was dry						
<u>South Fork Wild Cow Creek</u>								
SFWC1	7/27/2006	Reach was dry						

^aThe letter code indicates the type of sampling gear used: BP=backpack electrofishing unit (s) and BS= bag seine

^bI=Introduced and N=Native

Appendix P.— Summary information for sites visited in the Savery Creek Level 5 HUC in 2006.

<u>Stream</u>		Gear	Station Length	Station Width	Species	Number Caught	Length Range (in)	Status ^b
Site ID	Date	Type ^a	(ft)	(ft)				
<u>Big Gulch</u>								
BGUL1	7/17/2006	BP	656	7.2	CKC	8	4.0-6.5	I
					MSC	146	0.7-5.2	N
					MTS	17	4.6-7.4	N
					SPD	22	2.2-4.4	N
BGUL2	8/28/2006	BP	656	5.2	CKC	82	0.9-7.6	I
					MTS	18	1.6-5.4	N
					SPD	6	2.6-4.0	N
<u>Bird Gulch</u>								
BIRD1 ^c	7/31/2006	BP	656	4.3	CKC	182	0.9-6.7	I
					MSC	119	1.7-4.2	N
					MTS	5	2.6-4.2	N
					RSS	4	1.9-2.6	I
					SPD	97	1.2-3.5	N
					WHS	50	2.7-9.4	N
<u>Coal Gulch</u>								
CGLS1	8/10/2006	Reach was dry						
<u>Hell Canyon Creek</u>								
HCLS1	7/13/2006	Insufficient flows to support fish						
<u>Little Sandstone Creek</u>								
LSND1	8/28/2006	Reach was dry						

^aThe letter code indicates the type of sampling gear used: BP=backpack electrofishing unit(s).

^bI=Introduced and N=Native.

^c Two fish collected for later ID.

Appendix P continued.— Summary information for sites visited in the Savery Creek Level 5 HUC in 2006.

<u>Stream</u>		Gear Type ^a	Station	Station	Species	Number Caught	Length	Status ^b
Site ID	Date		Length (ft)	Width (ft)			Range (in)	
<u>Little Savery Creek</u>								
LSAV1 ^c	8/9/2006	BP	761	8.9	CKC	94	0.8-5.5	I
					CRC	1	7.4	N
					MSC	116	1.2-3.6	N
					MTS	5	3.1-3.3	N
					RBT	1	6.8	I
					RSS	20	0.9-3.2	I
					SPD	28	1.4-3.4	N
					WHS	95	1.1-8.5	I
LSAV2 ^d	8/9/2006	BP	667.4	10.5	BNT	1	17.9	I
					CKC	127	1.1-5.6	I
					CRC	4	7.2-8.3	N
					MSC	89	1.3-3.2	N
					RBT	3	7.0-11.7	I
					RSS	8	1.1-3.4	I
					SPD	63	1.9-3.8	N
					WHS	105	1.4-17.8	I
LSAV3	7/7/2006	BP	656	8.5	CKC	31	2.2-7.4	I
					CRC	1	7	N
					MSC	282	0.9-4.4	N
					RBT	2	8.6-11.7	I
					RSS	1	4.2	I
					SPD	34	1.9-4.2	N
					WHS	11	6.6-16.6	I
<u>Loco Creek</u>								
LOCO1	7/16/2006	BP	656	3.3	CKC	16	2.0-5.3	I
					MSC	4	2.0-3.6	N
					RSS	10	1.9-4.3	I
					SPD	8	1.8-3.8	N
					WHS	6	1.2-7.0	I
LOCO2	7/17/2006	BP	656	3.9	CKC	320	1.8-5.0	I
					MTS	12	2.9-5.9	N
					SPD	60	2.1-4.4	N

^aThe letter code indicates the type of sampling gear used: BP=backpack electrofishing unit(s).

^bI=Introduced and N=Native.

^cFive fish collected for later ID.

^dOne fish collected for later ID.

Appendix P continued.— Summary information for sites visited in the Savery Creek Level 5 HUC in 2006.

<u>Stream</u>			Station	Station			Length	
Site ID	Date	Gear Type ^a	Length (ft)	Width (ft)	Species	Number Caught	Range (in)	Status ^b
<u>McCarty Canyon Creek</u>								
MCRT1	7/31/2006	BP	656	5.3	BKT	2	3.9-8.1	I
					CRC	5	5.7-8.1	N
					MSC	67	0.8-4.5	N
<u>Negro Creek</u>								
NEGR2	8/28/2006	Reach was dry						
<u>Savery Creek</u>								
SAV1 ^c	7/16/2006	BP	656	19.4	CKC	72	2.0-5.9	I
					FHM	10	1.3-2.5	I
					MSC	107	0.8-4.1	N
					MTS	23	2.3-4.9	N
					RSS	51	1.7-3.4	I
					SPD	272	1.7-3.0	N
					WHS	34	2.4-6.8	I
SAV3	7/15/2006	BP	685.7	28.9	CKC	24	3.0-4.9	I
					FHM	1	2.5	I
					MSC	634	0.7-3.4	N
					MTS	1	3	N
					RSS	2	2.0-2.1	I
					SPD	426	0.9-3.6	N
					WHS	1	3.9	I

^aThe letter code indicates the type of sampling gear used: BP=backpack electrofishing unit(s).

^bI=Introduced and N=Native.

^c21 fish collected for later ID.

Appendix P continued.— Summary information for sites visited in the Savery Creek Level 5 HUC in 2006.

<u>Stream</u>			Station	Station			Length	
Site ID	Date	Gear Type ^a	Length (ft)	Width (ft)	Species	Number Caught	Range (in)	Status ^b
<u>Savery Creek</u>								
SAV4	7/12/2006	BP	656	36.4	CKC	3	1.9-5.5	I
					CRC	2	7.8-8.8	N
					MSC	210	1.9-4.6	N
					MTS	3	4.6-5.4	N
					RBT	2	8.4-10.5	I
					RSS	17	1.9-3.9	I
					SPD	126	1.4-3.4	N
					WHS	29	1.1-16.9	I
SAV5	7/13/2006	BP	695.6	28.8	CKC	17	2.3-5.8	I
					MSC	399	1.1-4.4	N
					MTS	7	2.9-6.4	N
					RSS	2	2.3-3.5	I
					SPD	448	1.1-4.3	N
					WHS	11	3.7-9.9	I
SAV6	7/14/2006	BP	656	26.6	CKC	28	1.9-5.7	I
					MSC	35	1.1-4.1	N
					MTS	1	4.5	N
					RBT	1	16.3	I
					RSS	24	2.2-4.4	I
					SPD	83	2.0-3.7	N
					WHS	34	2.7-16.3	I
SAV7	7/14/2006	BP	656	20.7	CKC	86	1.5-4.9	I
					CRC	3	7.1-8.6	N
					MSC	12	3.7-4.8	N
					MTS	1	2.8	N
					RSS	51	1.7-3.6	I
					SPD	251	1.4-3.6	N
WHS	12	3.7-7.9	I					

^aThe letter code indicates the type of sampling gear used: BP=backpack electrofishing unit(s).

^bI=Introduced and N=Native.

Appendix Q.— Summary information for sites visited in the Upper Muddy Creek Level 5 HUC in 2006.

<u>Stream</u>			Station	Station			Length	
Site ID	Date	Gear Type ^a	Length (ft)	Width (ft)	Species	Number Caught	Range (in)	Status ^b
<u>Eagle Creek</u>								
EAGLE1	8/29/2006	Reach was dry						
<u>Grove Creek</u>								
GROV1	8/11/2006	BP	426.5	7.2	BHS	1	4.6	N
					BXW	1	6.5	H
					BKT	16	2.7-9.4	I
					CKC	230	1.1-6.2	I
					MTS	10	2.7-5.2	N
					SPD	337	2.1-4.1	N
					WHS	12	5.0-11.7	I
GROV2	8/29/2006	BP	656	8.2	BKT	175	1.5-9.3	I
					MTS	191	2.5-7.1	N
					SPD	38	2.3-5.0	N
					WHS	5	4.4-11.1	I
<u>McKinney Creek</u>								
MKIN1	8/13/2006	BP	656	10.2	BHS	23	2.6-4.8	N
					BXW	1	4.6	H
					CKC	408	1.0-6.3	I
					FMS	1	3.2	N
					FXW	4	3.3-3.7	H
					MTS	1	4.8	N
					RTC	7	3.8-7.9	N
					SPD	146	1.1-3.8	N
					WHS	153	1.4-13.2	I
MKIN2	8/10/2006	BP	656	9.8	BHS	3	6.7-11.3	N
					BXW	2	11.3-12.2	H
					BKT	13	2.4-11.1	I
					CKC	248	0.7-7.2	I
					FMS	1	15.5	N
					FXW	11	4.3-18.0	H
					MTS	2	5.7-5.9	N
					SPD	559	1.9-4.0	N
					WHS	97	2.7-13.7	I
MKIN3	8/13/2006	BP	656	3.9	BKT	353	1.7-8.8	I

^aThe letter code indicates the type of sampling gear used: BP=backpack electrofishing unit(s).

^bI=Introduced, N=Native, and H=Hybrid

Appendix Q continued.— Summary information for sites visited in the Upper Muddy Creek Level 5 HUC in 2006.

<u>Stream</u>		Gear	Station Length	Station Width		Number	Length Range	
Site ID	Date	Type^a	(ft)	(ft)	Species	Caught	(in)	Status^b
<u>Muddy Creek</u>								
MCLS8	6/26/2006	BP	656	3.9	CKC	12	1.4-4.9	I
					FHM	67	1.5-3.2	I
					SPD	1	3.1	N
MCLS9	8/23/2006	BP	656	4.3	BHS	5	3.0-5.4	N
					CKC	124	1.1-6.8	I
					FHM	10	2.2-2.5	I
					FXW	1	3.5	H
					RTC	49	1.2-5.5	N
					SPD	238	1.3-3.4	N
					WHS	30	1.7-8.8	I

^aThe letter code indicates the type of sampling gear used: BP=backpack electrofishing unit(s).

^bI=Introduced and N=Native.

Appendix R. Summary information for sites visited in the Vermillion Creek
 Level 5 HUC in 2006.

<u>Stream</u>		Gear	Station Length	Station Width		Number	Length Range	
Site ID	Date	Type^a	(ft)	(ft)	Species	Caught	(in)	Status^b
<u>Vermillion Creek</u>								
VERM1	6/8/2006	BS	32.8	25	MTS	373	1.3-6.6	N
					SPD	419	1.3-4.6	N

^aThe letter code indicates the type of sampling gear used: BS=bag seine

^bN=Native