CANDIDATE CONSERVATION AGREEMENT WITH ASSURANCES FOR FLUVIAL ARCTIC GRAYLING IN THE UPPER BIG HOLE RIVER



Compiled and written by:

Peter Lamothe
&
Adam Petersen

Montana Fish, Wildlife and Parks

in cooperation with

USDA Natural Resources Conservation Service

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I. Introduction

A Candidate Conservation Agreement with Assurances (CCAA) is an agreement between the U.S. Fish and Wildlife Service (USFWS) and any non-Federal entity whereby non-Federal property owners who voluntarily agree to manage their lands or waters to remove threats to species at risk of becoming threatened or endangered receive assurances against additional regulatory requirements should that species be subsequently listed under the Endangered Species Act (ESA).

The conservation goal of the CCAA for the Fluvial Arctic Grayling in the Upper Big Hole River (Big Hole Grayling CCAA) is to secure and enhance a population of fluvial (river-dwelling) Arctic grayling (*Thymallus arcticus*) (grayling) within the upper reaches of their historic range in the Big Hole River drainage. Under the Big Hole Grayling CCAA, Montana Fish, Wildlife and Parks (FWP) holds an ESA section 10(a)(1)(A) Enhancement of Survival Permit issued to it by USFWS and will issue Certificates of Inclusion to non-Federal property owners within the Project Area who agree to comply with all of the stipulations of the Program and develop an approved site-specific conservation plan (Figure 1). Site-specific conservation plans will be developed with each landowner by an interdisciplinary technical team made up of individuals representing FWP, USFWS, USDA Natural Resources Conservation Service (NRCS), and Montana Department of Natural Resources and Conservation (DNRC) (the Agencies). The conservation guidelines of the Big Hole Grayling CCAA will be met by implementing conservation measures that:

1) Improve streamflows

2) Improve and protect the function of riparian habitats

3) Identify and reduce or eliminate entrainment threats for grayling

4) Remove barriers to grayling migration

The purpose of the Big Hole Grayling CCAA is to encourage non-Federal landowners within the Project Area to voluntarily implement proactive conservation measures that benefit grayling. In exchange for the conservation measures enrollment provides the landowner with assurances that their land and water management activities will not be required to change beyond the remedies identified in their site-specific conservation plan should grayling become listed as threatened or endangered. This planning effort will help alleviate private property concerns, as well as generate support from private landowners which will improve habitat conditions for grayling throughout the Project Area. The conservation goal of the Big Hole Grayling CCAA is to increase the abundance and distribution of grayling within the Project Area (FWP and USFWS 2006).

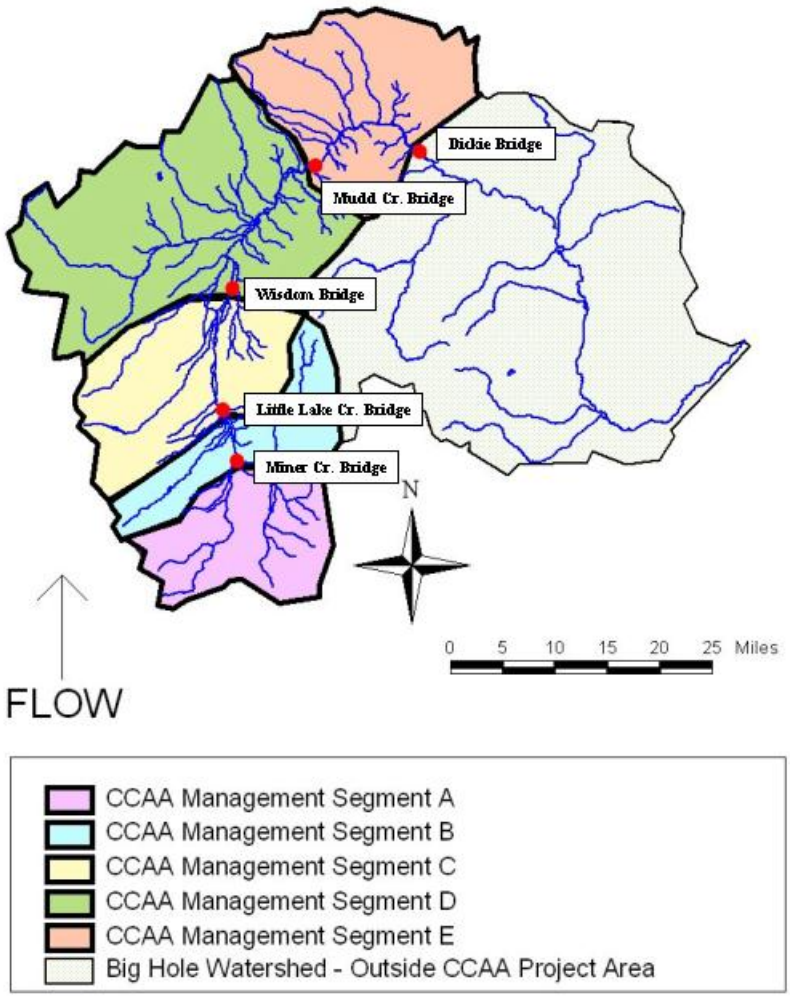


Figure 1. The Big Hole Grayling CCAA Project Area and Management Segments.

Most of the habitat occupied by grayling in the Big Hole River and its tributaries is on or adjacent to non-Federal lands. The recovery of grayling in the system is linked to the active involvement of non-Federal landowners and is viewed as critical to the conservation of the species in the Project Area. However, the occurrence or expansion of grayling in waters on their properties is a concern to private landowners because of potential regulatory restrictions on ranch operations should grayling be listed as

threatened or endangered under the ESA in the future. These restrictions may affect landowner willingness to participate in efforts to conserve the species.

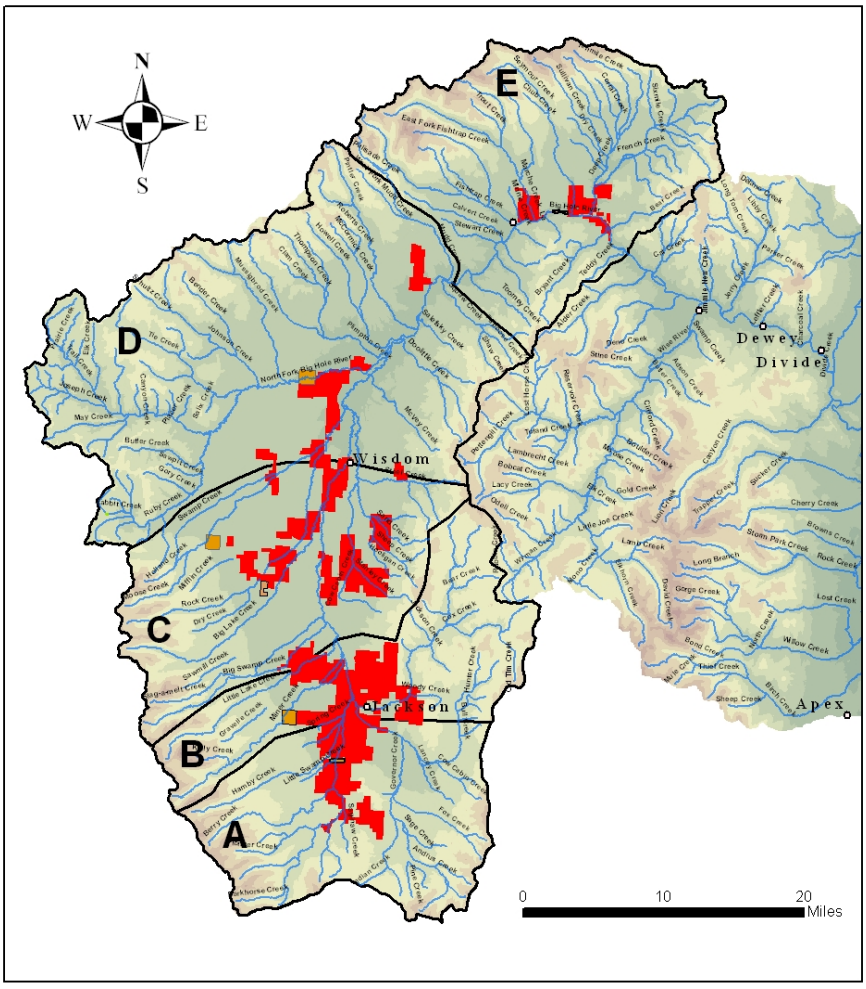
The Big Hole Grayling CCAA is a collaborative effort among private landowners, state and federal agencies, and non-government organizations. These stakeholders have agreed to work together for the common goals of preserving grayling, addressing private property concerns, land ownership dynamics, and enhancing the overall health of the upper Big Hole watershed.

II. Legal Status of Fluvial Arctic Grayling

The grayling Distinct Population Segment (DPS) in the upper Missouri River basin is currently considered a priority level 3 Candidate Species for listing under the ESA by the USFWS. By April 16, 2007, the USFWS shall submit for publication in the Federal Register a final determination made pursuant to the ESA as to whether or not the Montana fluvial Arctic grayling is an endangered or threatened species. The publication of this determination was a stipulation of lawsuit settlement agreement. The plaintiffs in the lawsuit are the Center for Biological Diversity and the Western Watersheds Project.

III. Landowner Enrollment

On August 1, 2006 the USFWS issued FWP ESA section 10(a)(1)(A) Enhancement of Survival Permit # TE-104415 authorizing the Big Hole Grayling CCAA. The issuance of this permit allowed for the official enrollment of any non-federal landowner within the Big Hole Grayling CCAA Project Area. Enrolled non-federal landowners are provided incidental take coverage and regulatory assurances once the non-federal landowner, FWP, and the USFWS counter-sign the Certificate of Inclusion and the approved site-specific conservation plan for the enrolled lands. As of December 31, 2006, twenty landowners (Participating Landowners) have enrolled 73,485 acres into the Program (Table 1, Figure 2). Enrollment for the Big Hole Grayling CCAA will remain open until 90 days prior to a proposed ESA listing date for grayling is published by the USFWS in the Federal Register. As of December 31, 2006, USFWS had not counter-signed the twenty Certificates of Inclusion signed and submitted by FWP. The USFWS is expected to counter-sign these Certificates of Inclusion by April 2007.



Legend

- Private Land Enrolled
- State Land Enrolled
- CCAA Management Segments

Figure 2. Area of state and private land enrolled into the Big Hole Grayling CCAA Program in 2006.

Table 1. Landowners and acreage enrolled in the Big Hole Grayling CCAA.

Landowner	Management Segment(s)	Private Land Enrolled (Acres)	State Land Enrolled (Acres)
1. Dooling Livestock Co.	A	6,300	N/A
2. Upper Big Hole LLC.	A	3,100	N/A
3. Lapham Ranch Co.	A&B	7,000	N/A
4. Jackson Ranches, Inc.	A&B	4,230	200
5. H Lazy J Ranch	A&B	3,370	640
6. Strodtman Trust	A&B	1,231	N/A
7. Rocky Mountain Ranches	B	3,445	N/A
8. Husted Ranches, Inc.	B&C	3,744	N/A
9. Johnson Brothers, Inc.	B&C	2,490	N/A
10. Ralph Huntley and Son, Inc.	C	9,200	560
11. Wisdom River Cattle Co.	C	3,721	N/A
12. Foster Company	C	2,017	400
13. John and Phyllis Erb / Erb Livestock Co.	C&D	23,174	560
14. Big Hole Grazing Association	C&D	5,192	N/A
15. Big Hole River LLC.	D	1,473	N/A
16. Stanley Rasmussen	D	160	N/A
17. Joe and Barbara Clemans	D	30	N/A
18. Ralston Ranch, Inc.	E	2,850	N/A
19. LaMarche Creek Ranch	E	2,370	N/A
20. Reinhardt Ranch Co.	E	900	70
Totals		85,997	2,430

IV. Big Hole Grayling CCAA Rapid Assessments

The Participating Landowners in the Big Hole Grayling CCAA must allow the Agencies to conduct a "rapid assessment" of the enrolled lands within 90 days. The rapid assessment focuses on the identification of immediate threats to grayling on the property and the validation of water rights compliance. Immediate threats to grayling are structures, mechanical devices or pollutants that pose a threat of immediate mortality to grayling. Examples include: unscreened pumping from a creek or river or toxic effluent entering into a creek or river. Additional information may be gathered through the assessments that assist with the development of the site-specific conservation plan with the Participating Landowner (Petersen and Lamothe 2006).

A. Surveys for Immediate Threats to Grayling

Surveys for immediate threats to grayling were completed in 2005 and 2006 for the 20 Participating Landowners and 19 landowners that have shown an interest in participating in the Big Hole Grayling CCAA. No immediate threats to grayling were identified in the

assessments. The Rapid Assessment Findings Report was updated to reflect the information gathered during the 2006 surveys (Petersen and Lamothe 2006).

B. Water Rights Compliance Evaluation

The DNRC provides expertise on all facets of water rights, water use, and water monitoring. The Agencies met with the 20 Participating Landowners in 2006 to specifically discuss their water rights and water use in the context of the Big Hole Grayling CCAA. These meetings typically involved discussions resulting in the gathering of information on operational and historic use of water and education of landowners on their legal rights to use water. The meetings were followed up by the Agencies assessing water use at every point of diversion belonging to the Participating Landowner. Approximately 400 points of diversion were assessed during this effort. Initial compliance with water rights was assessed as part of the Big Hole Grayling CCAA's rapid assessment requirement. At each diversion, flow was recorded as well as presence and condition of diversion dams, headgates, and measuring devices. During the fall of 2006 and continuing into the winter of 2007, water rights compliance reports detailing the findings of the water rights compliance assessments were and are being submitted to FWP by DNRC.

V. Site-Specific Conservation Plans Completed and Approved

There were no site-specific conservation plans completed in 2006. Components of the site-specific plans including: rapid assessment results, location of potential migration barriers, riparian assessments, results from entrainment surveys, stream channel morphology parameters, historic fish population data, and stream temperature and flow data were compiled in anticipation of completing several of the site-specific conservation plans in 2007. The timeline for completing site-specific conservation plans is 30 months from the date the USFWS co-signs the Participating Landowner's Certificate of Inclusion.

VI. Big Hole Grayling CCAA Conservation Measures

The goal of the Big Hole Grayling CCAA conservation measures is to take a holistic approach to addressing limiting factors to grayling that are within the control of the Participating Landowners within the Big Hole Grayling CCAA Project Area. The biological goal of the conservation measures is to increase the abundance and distribution of grayling within the Project Area (FWP and USFWS 2006).

A. Improving streamflows

The goal of improving streamflows within the Project Area is to promote stream ecosystem function, provide adequate seasonal high-flow events and baseflow conditions and eliminate human-caused dewatering events (FWP and USFWS 2006). The ability of the Agencies to meet this goal is dependent on: the availability of water (i.e. snowpack and precipitation conditions, and water-use dynamics of non-participating landowners), compliance of

Participating Landowners with existing water use laws, the ability of Participating Landowners to measure and control withdrawals from the Big Hole River and its tributaries, and Participating Landowner involvement in water conservation measures.

1. Conservation Actions to Improve Streamflows in the Big Hole River and its Tributaries

In 2006, the Agencies worked with Participating Landowners and Jim Boetticher, the Upper Big Hole Water Commissioner, to maintain suitable streamflows in the Big Hole River for grayling through the increased management of irrigation withdrawals during drought conditions. Contributions from 12 landowners at 15 points of diversion were documented over the period May 18, 2006 to September 14, 2006 resulting in a net contribution of 103.4 cfs to streamflows in the Big Hole River of water that could have been used for irrigation or stock watering. Contributions are defined as a reduction in irrigation withdrawals or allowing water to pass a point of diversion that may have been used legally by the landowner for irrigation or watering of livestock.

2. Projects to Improve Ability to Control and Measure Irrigation Withdrawals

NRCS Environmental Quality Incentives Program (EQIP) Special Initiatives for Fluvial Arctic Grayling

In 2005 and 2006, NRCS obligated $645,838 through program contracts with 19 landowners to treat 88 points of diversion within the Project Area. The 186 structures in need of replacement or modification contain either a new diversion, fish ladder, headgate, measuring device, or a combination of structures. At the end of calendar year 2006, 38 structures had been installed at 17 sites.

FWP and Partners Projects

FWP and Partners worked collaboratively to implement projects in the Project Area that improved the ability of Participating Landowners to control and measure irrigation withdrawals. In 2006, three headgates, three measuring devices, and one diversion were installed in irrigation systems off of the Big Hole River near the town of Jackson, MT.

Projects that reduce the need to divert water for watering livestock

FWP and Partners collaborated to implement projects with Participating Landowners that reduced or eliminated the need to divert water for watering livestock. A total of eight stockwater wells were installed as part of the efforts. These projects will lead to less water being diverted from or less livestock entering Berry Creek, Deep Creek, Fishtrap Creek, Seymour Creek and Lamarche Creek for watering purposes.

B. Improve and Protect the Function of Riparian Habitats

A healthy, functioning riparian corridor provides shade to the stream, water storage during flooding, and food sources for stream microbes and insects (Hunter 1991). Rivers

and creeks with healthy riparian vegetation have a high degree of bank stability, pool quality and habitat diversity.

In the upper Big Hole River, Lamothe and Magee (2004) found a direct correlation between the abundance of overhanging vegetation and the quality of instream habitat and Arctic grayling abundance. High quality pools are important to the life history of grayling as they provide critical feeding, wintering, and refuge habitats (Hughes 1992, 1998; Lamothe and Magee 2003). The abundance of relatively high quality pools in the upper Big Hole River is correlated to the presence of overhanging vegetation, with the river reaches with high quality pools and a diversity of pool types supporting a relatively high abundance of grayling. The current condition of much of the riparian vegetation and streambanks along the upper Big Hole River is considered to be poor (Upper Big Hole TMDL 2003, Lamothe and Magee 2004).

1. Prescribed Grazing Plans and EQIP Funded Projects

NRCS worked with nine Participating Landowners to develop the grazing portion of the site-specific conservation plan. Range inventory was completed on 20,000 acres for these nine Participating Landowners. Grazing plan alternatives have been developed and presented to the Participating Landowners on 17,000 acres. Two landowners have selected alternatives and NRCS is in the process of finalizing the grazing plans on 6,000 acres.

The 2006 EQIP special initiative for fluvial Arctic grayling funded three riparian fences, one riparian forest buffer, and three off-stream water development projects.

2. Riparian and Stream Habitat Restoration Projects

Rock Creek Reconnection and Stream Habitat Enhancement Project

Project Overview

Rock Creek historically flowed into the Big Hole River approximately three miles upstream of the town of Wisdom, MT. Changes to the local irrigation system bisected Rock Creek eliminating the connectivity between this creek and the Big Hole River. Historic grayling population data from the mid-1980s show that Rock Creek once supported over 60 grayling per mile (FWP and Confluence, Inc. 2006). In 2005, design alternatives were generated by Confluence, Inc., to restore the connectivity between Rock Creek and the Big Hole River. The stakeholders in the project decided that the best alternative to restore the connectivity was to reactivate a historic channel braid of Rock Creek. This project will provide access to approximately five miles of historically occupied grayling habitat (Figure 3).

Construction of the restoration project began in fall 2006. Rowe Excavation was hired for the construction of the project. In 2006, approximately five miles of five-strand barbwire fence was installed, a mile of a historic channel braid was restored to reference conditions, the stream habitat within 1.5 miles of existing channel was enhanced by

increasing the frequency of pool habitat and stabilizing streambanks, and the entire 2.5 miles of the project area was planted with natives willow species using a variety of planting techniques (mature transplants and sprigging). Streamflows within the project area will be managed by a diversion at the top of the new channel and a headgate located in the existing channel (Figure 3). Fish passage is provided through the diversion by a denil-type fish ladder. A majority of the project was completed in 2006 with the installation of a headgate in the old channel and additional willow planting from nursery stock left to complete the project in spring 2007 (Figure 4). The landowners (John and Phyllis Erb/ Erb Livestock Co. and Wisdom River Cattle Co. have agreed to defer grazing livestock within the project area for five years to allow the riparian vegetation to become established. After five years the area will be grazed in compliance with a prescribed grazing plan developed by NRCS.

Project Financial Partners

The Rock Creek Reconnection and Stream Habitat Enhancement Project is a good example of how collaborative efforts can put together the funding for an important restoration project. The funding partners for the project include: the landowners (the estimated value of on-site materials and NRCS EQIP funds), the Arctic Grayling Recovery Program (AGRP), the Big Hole Watershed Committee (BHWC), the USFWS' Partners for Fish and Wildlife Program (Partners), and FWP's Future Fisheries Improvement Program (FFIP) (Table 2).

Table 2. Funding Partners and contributions for the Rock Creek Reconnection and Stream Habitat Enhancement Project.

Funding Partner	Financial Contribution
FFIP	$99,000.00
BHWC	$65,000.00
Erb Livestock Co./ John and Phyllis Erb	$26,501.00 *
AGRP	$16,000.00
Partners	$15,331.74
Wisdom River Cattle Co.	$4,556.26 **

* Represents the estimated value of on-site materials used for implementing the project

** Represents the estimated value of on-site materials used for implementing the project and NRCS EQIP dollars for riparian fencing costs.

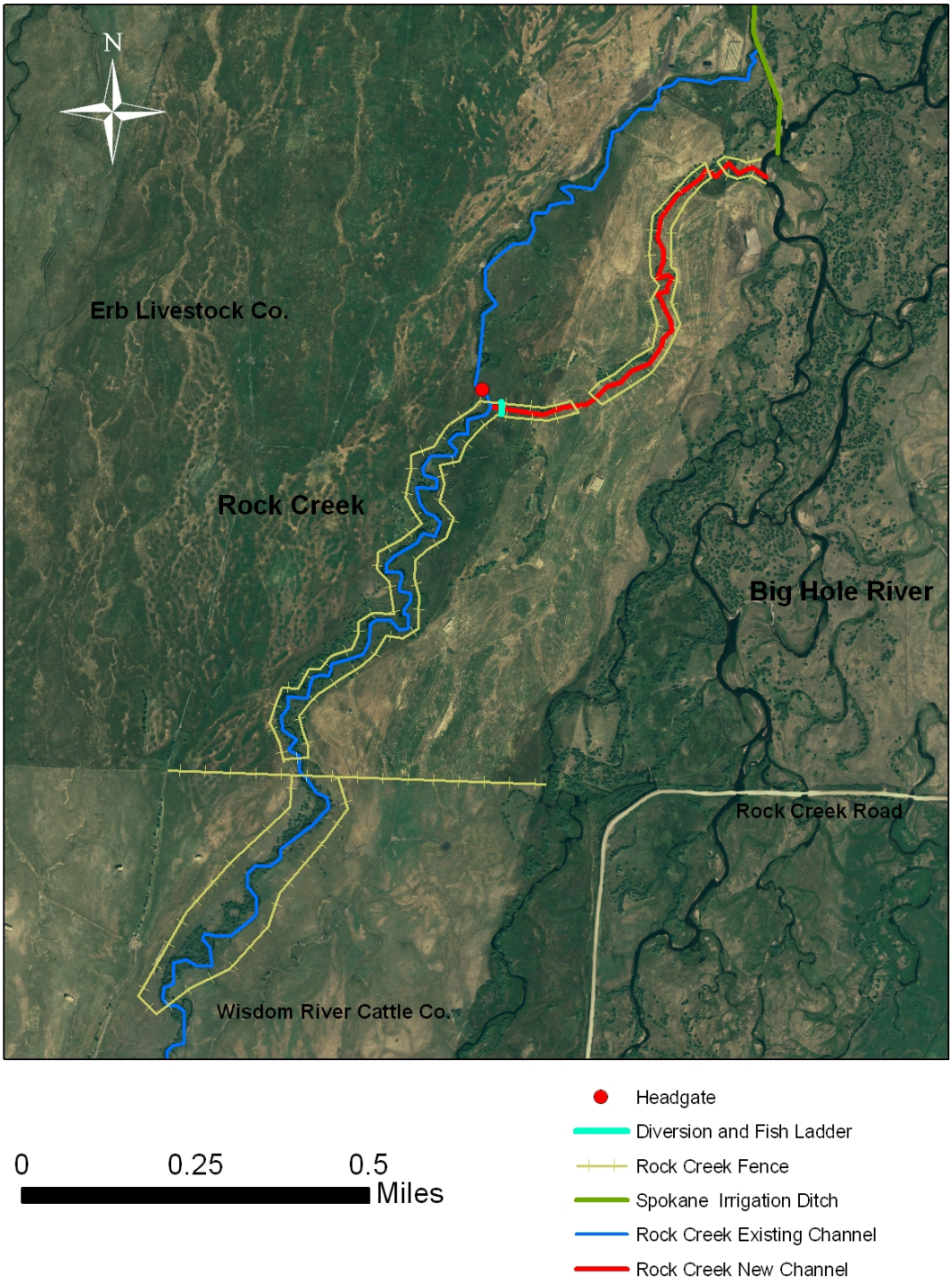


Figure 3. Location and conceptual design for the Rock Creek Reconnection and Stream Habitat Enhancement Project.

Figure 4. Photographs of stream channel construction of the Rock Creek Reconnection and Stream Habitat Enhancement Project.

Big Hole River Restoration – Wisdom Reach

Project Overview

The Big Hole Restoration – Wisdom Reach Project will focus on riparian habitat restoration and streambank stabilization on 1.75 miles of the Big Hole River adjacent to the town of Wisdom, MT (Figure 5). Both the riparian habitat and streambank stability are in need of enhancement in parts of the project area (Figure 6). The project is a collaborative effort among two private landowners (John and Phyllis Erb/Erb Livestock Co. and Stanley Rasmussen), state and federal agencies (FWP, Partners, and NRCS), and non-government organizations (BHWC and The Nature Conservancy). Project design, funding, and permitting were completed in 2006. Project implementation is scheduled for fall 2007. The project will include 3.5 miles of riparian fence (5-strand barbwire), riparian revegetation (mature willow transplants and nursery stock), and streambank stabilization (sodmats, revegetation and toe armoring). This reach of the Big Hole River is considered critical to grayling spawning and juvenile rearing.

Figure 5. Project area location for the Big Hole Restoration – Wisdom Reach Project.

Figure 6. Existing conditions within the Big Hole Restoration - Wisdom Reach Project Area.

Project Funding Partners

The Big Hole Restoration – Wisdom Reach Project is another good example of a collaborative funding effort put together to implement an important restoration project. The funding partners for the project include: the landowners (the estimated value of on-site materials and NRCS EQIP funds), AGRP, BHWC, and FFIP (Table 3). The value of on-site materials to implement the project will be estimated for each landowner upon completion of the project.

Table 3. Funding partners and financial contributions for the Big Hole Restoration - Wisdom Reach Project.

Funding Partner	Financial Contribution
BHWC	$87,453.50*
FFIP	$59,203.86
AGRP	$22,000.00
TNC	$20,840.00
Stanley Rasmussen	$4,259.00**
John and Phyllis Erb/Erb Livestock Co.	Value of on-site materials

* Includes the cost of the project design.

** Represents NRCS EQIP dollars for riparian fencing.

Big Hole River Restoration – Little Lake Creek Road Reach

Project Overview

The Big Hole Restoration – Little Lake Creek Road Reach Project will focus on riparian habitat restoration and streambank stabilization on one mile of the Big Hole River near the town of Jackson, MT (Figure 7). Both the riparian habitat and streambank stability are in need of enhancement in parts of the project area (Figure 8). The project is a collaborative effort among one private landowner (Dick Hirschy Cattle Company), a state and federal agency (FWP and Partners), and a non-government organization (BHWC). Project design, funding, and permitting were completed in 2006. Project implementation is scheduled for fall 2007. The project includes two miles of riparian fence (5-strand barbwire), riparian revegetation (mature transplants and nursery stock) and streambank stabilization (sodmats, revegetation and toe armoring). This reach of the Big Hole River is considered important for expanding the distribution of grayling in the upper Big Hole River.

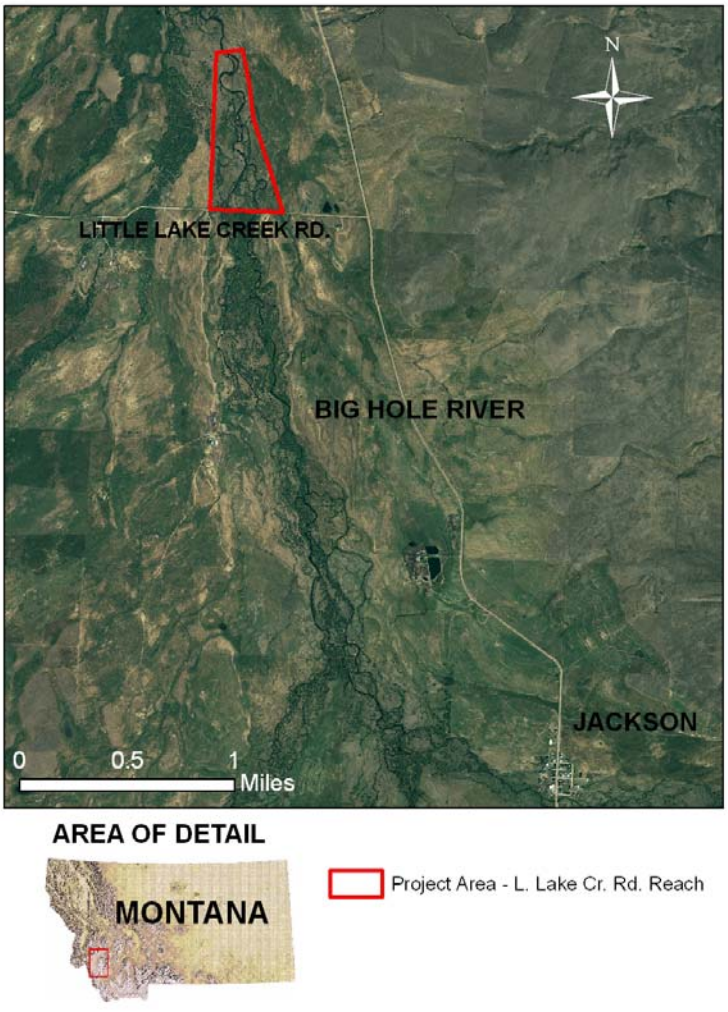


Figure 7. Project Area location for Big Hole Restoration – Little Lake Creek Road Reach Project.

Figure 8. Existing conditions within the Big Hole Restoration – Little Lake Creek Road Reach Project Area.

Project Funding Partners

The Big Hole Restoration – Little Lake Creek Road Reach Project is another example of a collaborative funding effort put together to implement restoration of grayling habitat. The funding partners for the project include: the landowners (the estimated value of on-site materials), BHWC, and FFIP (Table 4). The value of on-site materials to implement the project will be estimated for the landowner upon completion of the project.

Table 4. Funding partners and financial contributions for the Big Hole Restoration – Little Lake Creek Road` Reach Project.

Funding Partner	Financial Contribution
BHWC	$94,558.50*
FFIP	$70,514.12
Dick Hirschy Cattle Co.	Value of on-site materials

* Includes the cost of the project design.

Big Hole River Restoration – Jackson Reach

Project Overview

The Big Hole Restoration – Jackson Reach Project will focus on riparian habitat and stream channel restoration at two locations on approximately 0.75 mile of the Big Hole River near the town of Jackson, MT (Figure 9). The riparian habitat is in need of enhancement and the stream channel morphology needs to be returned to natural conditions (Figure 10). The

project is a collaborative effort among one private landowner (Upper Big Hole LLC), a state and federal agencies (FWP, Partners, and NRCS), and a non-government organization (BHWC). Project design, funding, and permitting were completed in 2006. Project implementation is scheduled for fall 2007.

Project Funding Partners

The Big Hole Restoration – Jackson Reach Project is another good example of a collaborative funding effort put together to implement an important restoration project that will enhance riparian and stream habitats. The funding partners for the project include: the landowners (the estimated value of on-site materials), BHWC, and FFIP (Table 5). The value of on-site materials to implement the project will be estimated for the landowner upon completion of the project.

Table 5. Funding partners and financial contributions for the Big Hole Restoration – Jackson Reach Project.

Funding Partner	Financial Contribution
BHWC	$40,860.49*
FFIP	$16,688.00
Upper Big Hole LLC	Value of on-site materials

* Includes the cost of the project design.

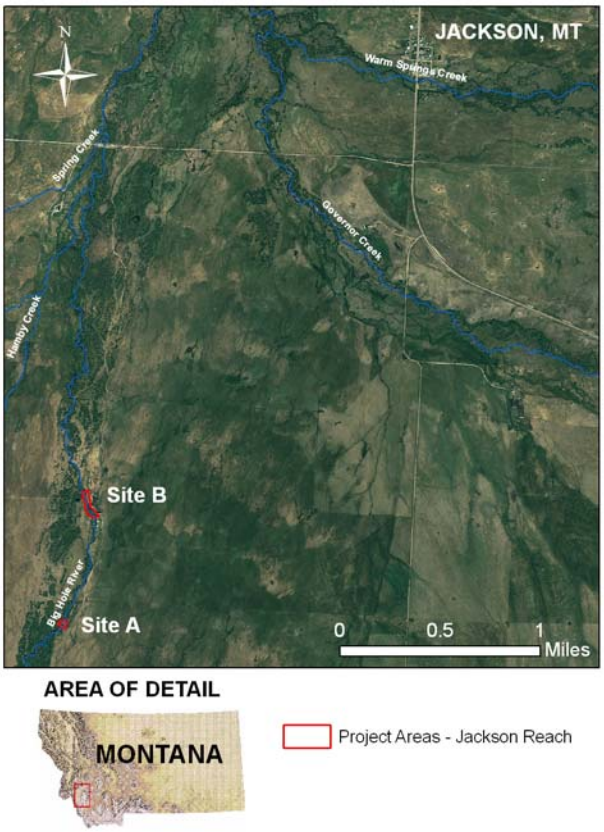


Figure 9. Project Area locations for the Big Hole Restoration – Jackson Reach Project.

Figure 10. Photographs of the Big Hole River within the Big Hole Restoration – Jackson Reach Project Area (Site-A (Top) and Site-B (Bottom)).

Willow Bank Development Project

During 2006, the pilot project for the Big Hole Willow Bank was implemented. In April, 7,500 willow clippings were collected from a variety of locations throughout the upper Big Hole watershed. These clippings were transported to the DNRC State Nursery in Missoula, where they were planted into 10 cubic inch containers and grown under climate controlled conditions in the greenhouse. This process allows the plants to develop a deep-binding rootmass in a short time compared to what would be experienced in the wild. Most of these willows will be transplanted into the Rock Creek project in the spring of

2007, and several hundred more will be used to revegetate around headgate replacement projects in the upper watershed. In 2006, matching funds were secured for the Conservation Innovation Grant, sponsored by the NRCS, and together these funds will build upon the 2006 pilot project to develop a willow bank which will provide 20,000 containerized, native rooted willows each year for the next three years, which will be used in Big Hole Grayling CCAA riparian restoration projects throughout the Project Area.

C. Removal of barriers to grayling migration

Adult grayling within the Project Area are highly mobile often moving greater than 40 miles to complete the life history (Lamothe and Magee 2003). Barriers to migration can often deny access to seasonally important habitats or lead to the entrainment of individuals within irrigation systems.

Projects initiated by the Agencies and the Participating Landowners to remove barriers to grayling migration include: 1) The Rock Creek Reconnection and Habitat Enhancement Project; 2) The Governor Creek Culvert Removal Project; and 3) the installation of fish ladders to allow passage through irrigation diversions.

1. The Rock Creek Reconnection and Habitat Enhancement Project

The connectivity between Rock Creek and the Big Hole River had been destroyed by the enhancement to the local irrigation system. In 2006, the Agencies implemented a project that restored the connectivity of Rock Creek with the Big Hole River and enhanced approximately 2.5 miles of stream habitat (*See - Riparian and Stream Habitat Restoration Projects*). Also, the diversion installed at the top of the new channel was fitted with a denil-type fish ladder.

2. NRCS EQIP Special Initiatives for Fluvial Arctic Grayling

In 2005 and 2006, NRCS obligated $645,838 through program contracts with 19 landowners to treat 88 points of diversion within the Project Area. The 186 structures in need of replacement or modification contain either a new diversion, fish ladder, headgate, measuring device, or a combination of structures. At the end of calendar year 2006, 38 structures had been installed at 17 sites.

3. Governor Creek Culvert Removal Project

Governor Creek was historically inhabited by grayling, but have not been found in this part of the watershed by FWP grayling monitoring efforts in over a decade (FWP unpublished data). The culverts at the Skinner Meadows Road crossing have the potential to become a seasonal velocity barrier to grayling migration (Figure 11). The energy focused by these structures coupled with changes to the riparian vegetation downstream is causing alterations to the local stream channel morphology and habitat quality. In 2006, a collaborative effort among BHWC, Partners, and Beaverhead County initiated a project that would result in the culverts being removed and replaced with a

bridge. The initial steps of creating a project design and acquiring project funding were completed in 2006. Project permitting and implementation are scheduled for 2007.

Figure 11. Culverts scheduled for removal in Governor Creek.

4. FWP and Partners Fish Ladder Projects

In 2006, FWP and Partners worked collaboratively to mitigate the potential barrier effect of irrigation diversions by installing two fish ladders, one in Governor Creek (Figure 12) and one in Rock Creek. The fish ladder installed in Rock Creek was a component of the Rock Creek Reconnection and Stream Habitat Enhancement Project. The fish ladder in Governor Creek ($3,390) was purchased with funds provided by AGRP through a grant from the Montana Chapter of the American Fisheries Society.

Figure 12. Fish ladder installed in a diversion on Governor Creek.

D. Identify and reduce or eliminate entrainment threats to grayling

The large number of points of diversion for irrigation water from the Big Hole River and its tributaries pose a potential threat to grayling by entraining individuals within the irrigation systems. The magnitude of the threat to grayling posed by entrainment is currently, largely unknown. The focus of this conservation measure is to: 1) identify the level of grayling entrainment within the Project Area; 2) rescue grayling captured in irrigation systems; and 3) work with Participating Landowners to exclude grayling from irrigation systems identified to entrain large numbers (20 or more) of individuals.

1. Surveys of Irrigation Ditches for Grayling Entrainment and Grayling Rescue Operations

In 2006, two and three person crews working for FWP using a combination of backpack and mobile anode electrofishers surveyed 42.5 miles of irrigation ditch at 35 discrete points of diversion within the Big Hole Grayling CCAA Project Area for entrainment of grayling (Figure 13). Irrigation ditches were selected based on location within the watershed, the maximum flow rate associated with the claimed water right (Gale 2005), the timing of operation, and previous instances of documented grayling entrainment.

In 2006, five grayling were captured in irrigation ditches off of the North Fork of the Big Hole River (North Fork) (Figure 13), transported and released in the North Fork. Two of the grayling were recaptured in an irrigation ditch downstream of the release location in the North Fork (Table 6). All grayling captured were anesthetized in a Tricaine Methanesulfonate (MS-222) bath and then measured for total length (± 0.1 in.) and weight (±0.01 lb.). All grayling were marked with a fin clip and a unique visible-implant (VI) tag. Upon recovery grayling were returned to nearest point of the Big Hole River or

a tributary downstream of the irrigation structure that entrained the grayling (FWP and USFWS 2006). The level of entrainment recorded in 2006 at any survey site did not reach the threshold of requiring landowners to install fish exclusion devices (FWP and USFWS 2006).

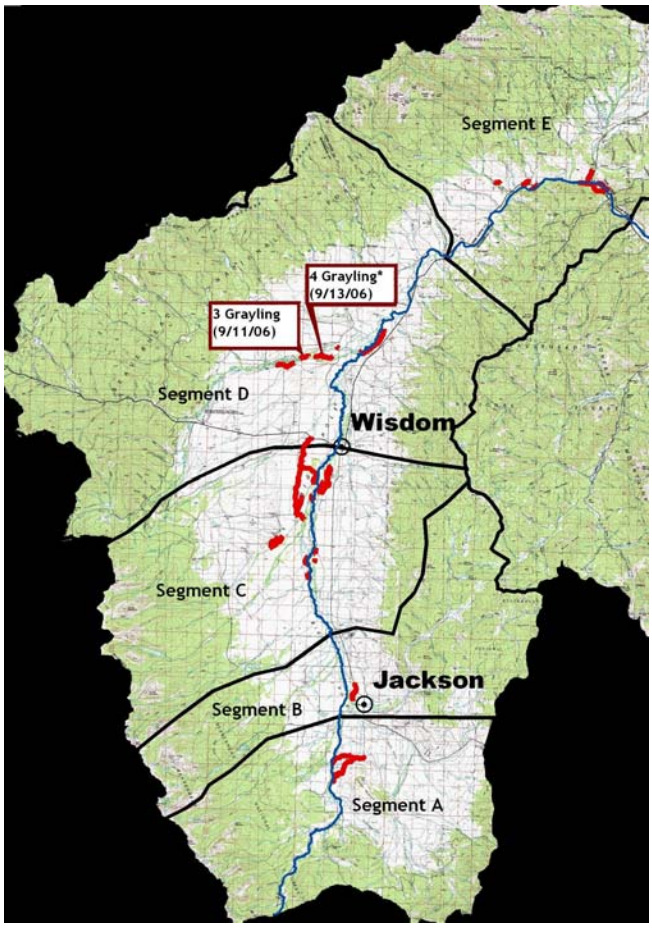


Figure 13. Locations of 2006 grayling entrainment surveys and rescue operations.

Table 6. Length, weight, and tag information for grayling captured during 2006 entrainment surveys.

DATE	LOCATION	LENGTH (in.)	WEIGHT (lb.)	VI TAG INFO
9-11-06	North Fork #1	9.6	0.32	black/blue DT7
9-11-06	North Fork #1	9.3	0.27	black/blue DT6
9-11-06	North Fork #1	9.9	0.33	black/blue DT5
9-13-06	North Fork #2	9.1	0.21	black/blue DT4
9-13-06	North Fork #2	8.7	0.17	black/blue DT3
9-13-06	North Fork #2	*	*	black/blue DT5
9-13-06	North Fork #2	*	*	black/blue DT6

* Lengths and weights were not recorded for recaptured grayling.

2. Fish Exclusion Projects

The Agencies worked with two landowners in 2006 to begin the process of developing design options for installing fish exclusion devices within four irrigation systems. The motivations for these projects are: 1) low levels of grayling entrainment within two of the irrigation ditches (North Fork) and 2) the location of two of the irrigation systems is within riparian and stream habitat restoration project areas (Rock Creek and Big Hole – Jackson) (Figure 14). A Request for Proposals was sent to four consulting companies known to have the expertise needed to design fish exclusion devices. The Agencies and the Participating Landowners will pursue the design options for fish exclusion devices for these four locations in 2007 pending funding.

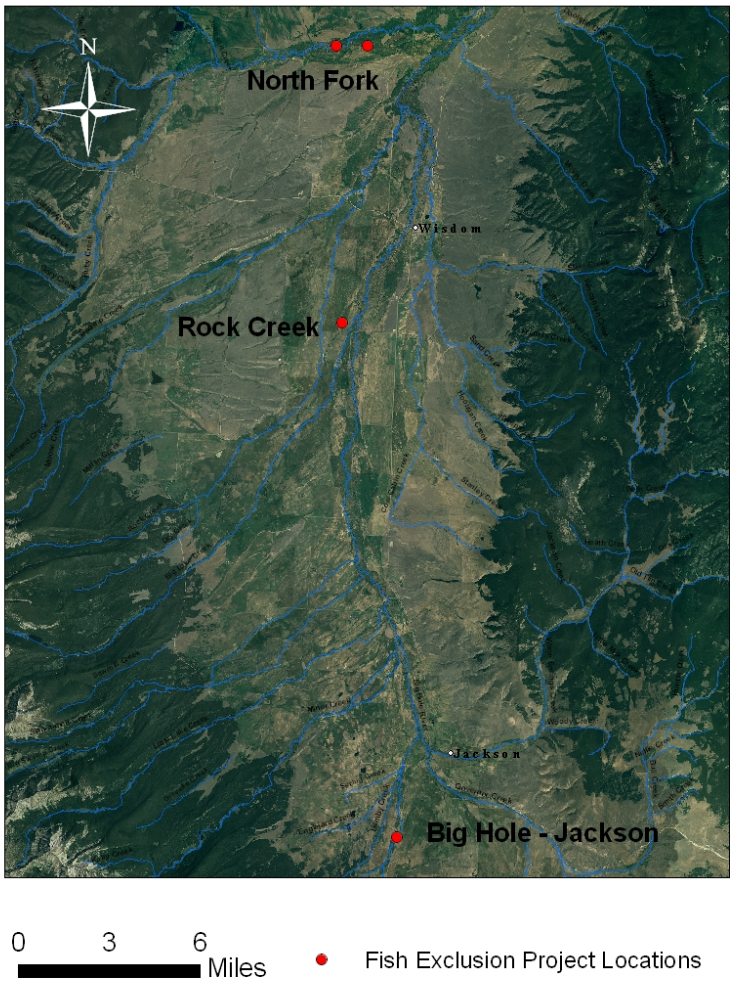


Figure 14. Location of proposed fish exclusion projects.

VII. Summary of Estimated Take Associated with the Big Hole Grayling CCAA

In 2006, the grayling DPS in the upper Missouri River basin remained a priority level 3 Candidate Species for listing under the ESA. Due to its legal status there was no take of grayling associated with the implementation or monitoring of the Big Hole Grayling CCAA.

VIII. Monitoring

The Agencies are responsible for monitoring the effectiveness of the conservation measures in eliciting a positive response from the grayling population(s) within the Project Area. The monitoring responsibilities fall into four categories: biological monitoring, habitat monitoring, project performance monitoring, and landowner compliance monitoring.

A. Biological Monitoring

FWP crews monitor the grayling population(s) within the Project Area using electrofishing techniques with a mobile-anode DC system powered by a generator coupled with a rectifying unit mounted on either a drift boat or Crawdad. Crews monitored grayling within 29 reaches of either the Big Hole River (14) or its tributaries (15). Crews captured 221 grayling within 12 of the sampling reaches. A majority of the grayling captured (190) was young-of-the-year. The complete results and analysis of the 2006 grayling population monitoring efforts can be found in the Montana Fluvial Arctic Grayling Recovery Project: Monitoring Report 2006.

B. Habitat Monitoring

1. Snowpack Conditions

The 2006 snowpack conditions at the NRCS Darkhorse Lake SNOTEL Site were average when compared to the 30-year period of record (1971-2000) (Figure 15). Warm temperatures in May caused the snowpack to melt earlier than normal. The combination of average snowpack amounts and early melt-off resulted in a relatively short duration high streamflow event in excess of 1900 cubic feet per second (cfs) at the Wisdom Bridge (Segment C) in early June (Figure 16). The total precipitation that fell at this site was below normal for the water year (October 1 – September 30) when compared to the period of record.

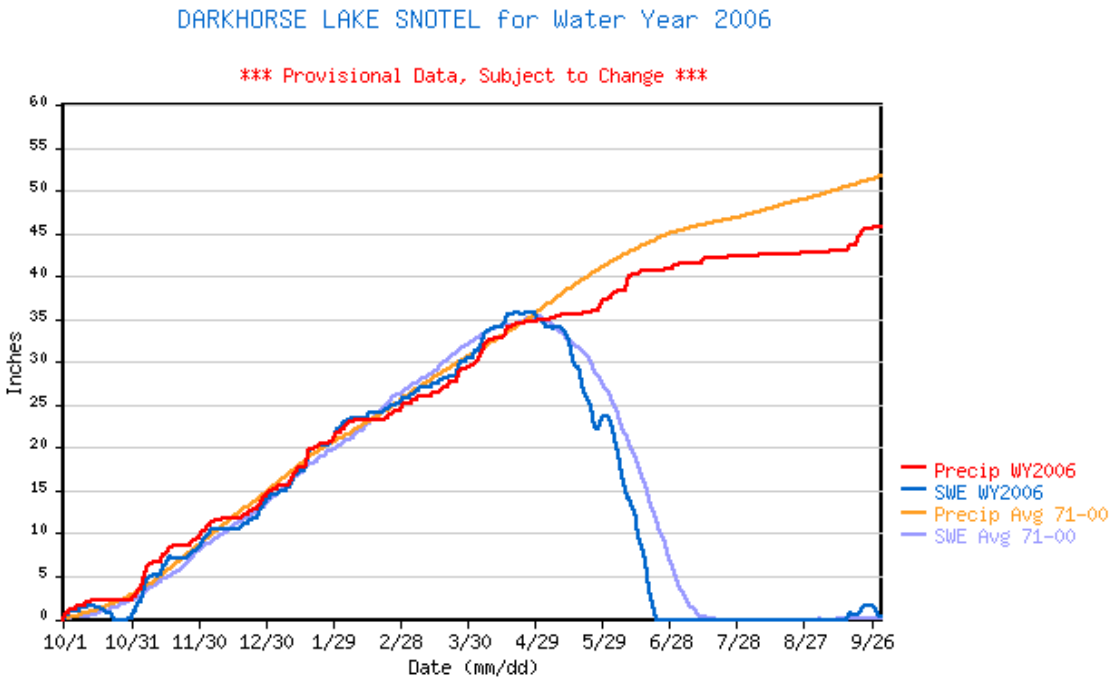


Figure 15. Snowpack and precipitation data for 2006 from the NRCS Darkhorse Lake Snotel Site.

2. Streamflow conditions for 2006

The establishment of hydrologic monitoring sites and the collection of hydrologic data was continued in 2006. Streamflow data provides quantification of the Big Hole mainstem, tributary, and selected irrigation ditch flows. These data are used to track baseline (pre-Big Hole Grayling CCAA implementation) status of flows, monitor flow targets outlined in the Big Hole Grayling CCAA, and will be useful with the development of site-specific plans. In addition to the 11 previously established sites, DNRC installed and maintained four new sites in 2006. The 15 continuous streamflow gages were maintained in 2006 using either AquaRod or Trutrack continuous stage recorders (Table 7).

Table 7. Hydrological monitoring sites maintained by DNRC in 2006 within the Project Area.

Site	Aquarod #	Trutrack #	Date gage Established
Big Hole R @ Dickie Br.		0404053	2005
Big Hole R @ Saginaw	3218		2003
Big Hole R @ Peterson Br.	3262		2002
Big Hole R @ Miner Lakes Rd.	3343		2005
Big Hole R @ LLC (East)	3605		2005
Big Hole R blw Steel Cr.	3611		2002
Big Hole R @ Twin Lakes Rd.	3618		2005
North Fork Big Hole R	3342		2004
Steel Cr. @ Forest	3082		2006
Steel Cr. Abv mouth	3165		2006
Steel Cr. @ Hwy 43	3345		2002
Big Lake Cr @ Twin Lakes	3174		1999
La Marche Cr. @ Hwy 43	3308		2005
Harrington (Strowbridge) Ditch		0501298	2006
Huntley Ditch on 40 Bar		0602302	2006

In 2006, streamflows in the Big Hole Grayling CCAA Project Area were near average during spring and below average between July and September. With near average levels of basin snowpack and precipitation, the volume of flow at the Wisdom Bridge (Segment C) was 95% of the average between April 1 to June 30 and 43% of average from July 1 to September 1 based on the 19-year period of record at that gage. Similar conditions were observed downstream at the river gage near Mudd Creek (Segment D). Warm early season air temperatures resulted in a release of the snowpack throughout the upper basin approximately two to three weeks earlier than the 30-year average timing of snowmelt. The early season snowmelt resulted in bankfull flows occurring in the Big Hole River in mid-April. A second, higher magnitude, shorter-duration event occurred in response to precipitation, mostly rainfall, in mid-June. Early snowmelt, lack of mid- to late-summer rainfall, and warmer than normal air temperatures resulted in less than average river flows throughout the Big Hole Grayling CCAA Project Area between July and early September. Flows began to recover to near average levels in mid-September due to precipitation and a decrease in water demand by vegetation throughout the watershed. The average daily streamflows for each management segment are shown in Figure 16. The relationship between streamflows in 2006 and the flow targets for the Big Hole Grayling CCAA is shown in Table 8.

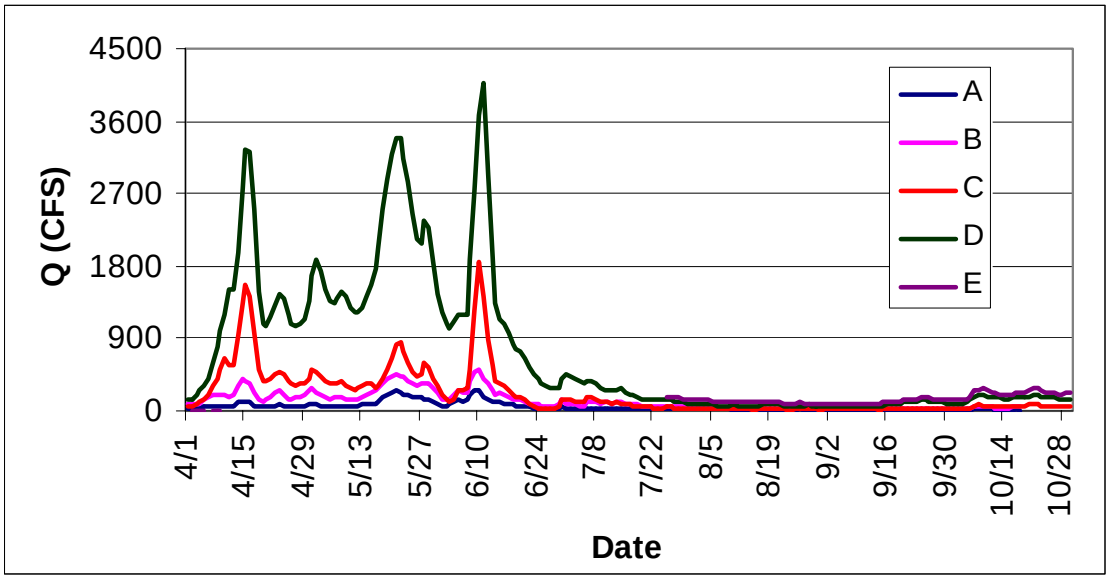


Figure 16. Average daily streamflows for 2006 (April-October) for the five Big Hole Grayling CCAA Management Segments (A-E).

Table 8. Summary of seasonal minimum streamflow targets and the relationship to 2006 streamflows within the Big Hole Grayling CCAA Management Segments.

Management Segment	Location of Monitoring	Minimum flow target - Spring	Minimum flow target – Summer/Fall	Percent of days above minimum flow target (Spring, Summer/Fall)
A	Miner Creek Road Bridge	60	20	(67, 27)
B	Little Lake Creek road Bridge	100	40	(87, 41)
C	Wisdom Bridge	160	60	(80, 31)
D	Mudd Cr. Bridge	350	100	(89, 53)
E	Dickie Bridge	450	170	(*, 29)

***** Spring streamflow data from Dickie Bridge was lost due to high streamflows and ice jams.

3. Stream temperature conditions

In 2006, the Agencies monitored stream temperatures at nine locations within the Big Hole Grayling CCAA Project Area. The Big Hole River – Miner Creek Road Bridge monitoring location provided the most favorable thermal conditions for grayling, with temperatures reaching stressful levels for 58 hours (Table 9). Rock Creek provided the least favorable conditions with temperatures reaching stressful levels for 626 hours (Table 9). This dynamic was due to a partial dewatering event in August. Stream temperatures first approached stressful levels at the monitoring sites in early to mid-May, about the time grayling spawning activity would be expected to occur (Figure 17). Mean temperatures peaked on July 23 with mean temperatures at five of the nine monitoring locations exceeding 70º F. Stream temperatures at six of the nine monitoring locations met or exceeded the upper incipient lethal temperature for grayling (Lohr et al. 1996).

Table 9. Summary of stream temperature statistics for the nine monitoring locations.

Location	Management Segment	# of monitoring days	Hours temperature over 70º F	Hours temperature over 77º F
Governor Creek (GC)	A	189	94	2
Big Hole River - Miner Creek Rd. Br. (MC)	A	196	58	0
Big Hole River - Little Lake Creek Rd. Br. (LLC)	B	196	147	0
Rock Creek (RC)	C	158	626	315
Big Hole River - Wisdom Bridge (WB)	C	177	321	22
Steel Creek	D	196	371	12
Big Hole River - Mudd Creek Bridge (MCB)	D	176	441	46
Deep Creek (DC)	E	204	150	0
Big Hole River - Dickie Bridge (DB)	E	193	341	18

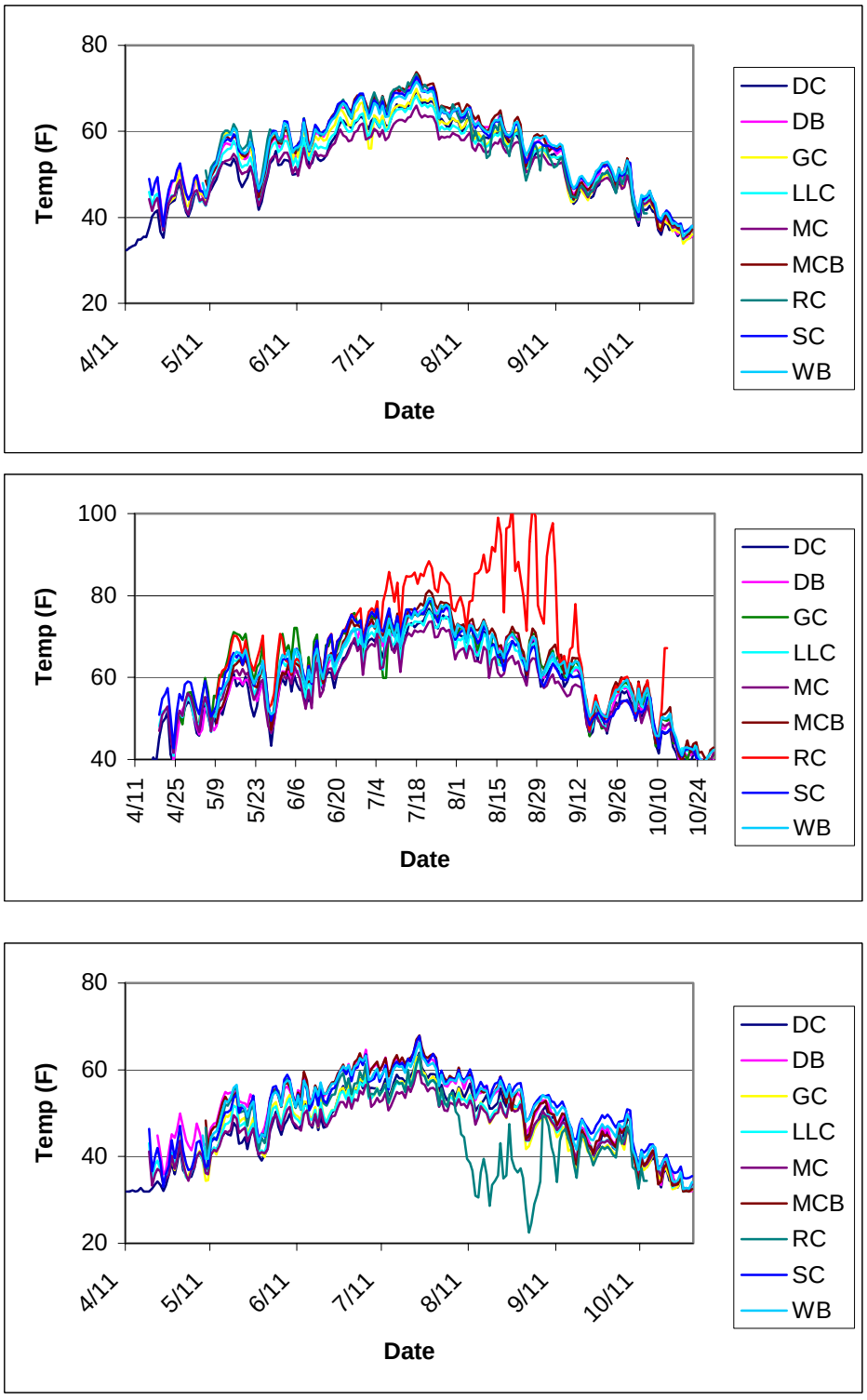


Figure 17. Daily mean (top), max (middle), and min (bottom) stream temperatures at the nine monitoring locations.

4. Stream channel morphology and habitat conditions

Stream morphology and habitat parameters were monitored at ten locations within the Project Area (Tables 10 and 11). These data will serve as indicators of how the conservation measures being implemented under the Big Hole Grayling CCAA are affecting stream habitat conditions. The data collected in 2006 by the Agencies will serve as baseline data for future analysis and comparison.

Table 10. Pool habitat data for the 10 Big Hole Grayling CCAA habitat monitoring reaches.

River Reach	Bankfull Width (ft)	Max depth (ft)	Wetted Perimeter (ft)	Width to depth ratio	Dominant particle size (in.)	D50 (in.)
Big Hole River (A)	22.5	2.9	16.5	7.8	1.26 – 1.77 Very Coarse Gravel	0.89 – 1.26 Coarse Gravel
Governor Creek (A)	36.0	2.9	25.5	12.4	0.63 – 0.89 Coarse Gravel	0.44 – 0.63 Coarse Gravel
Big Hole River (B)	43.0	3.7	30.5	11.7	1.77– 2.5 Very Coarse Gravel	1.26 – 1.77 Very Coarse Gravel
Miner Creek (B)	14.0	2.1	13.5	6.8	0.44 – 0.63 Medium Gravel	0.63 – 0.89 Coarse Gravel
Big Hole River (C)	40.4	3.8	23.0	10.5	1.26 – 1.77 Very Coarse Gravel	0.89-1.26 Coarse Gravel
Rock Creek (C)	18.0	2.4	8.0	7.4	0.44 – 0.63 Medium Gravel	0.63 – 0.89 Coarse Gravel
Big Hole River (D)	128	4.1	98.0	31.1	.08 – 0.16 Very Fine Gravel	0.16 – 0.22 Fine Gravel
Steel Creek (D)	41	3.7	34.0	11.0	0.89 – 1.26 Coarse Gravel	0.89 – 1.26 Coarse Gravel
Big Hole River (E)	202	5.0	180	40.6	3.5 – 5.0 Small Cobble	1.77 – 2.5 Very Coarse Gravel
LaMarche (E) Creek	30	5.8	13.0	5.1	1.77 – 2.5 Very Coarse Gravel	1.26 – 1.77 Very Coarse Gravel

Table 11. Riffle habitat data for the 10 Big Hole Grayling CCAA habitat monitoring reaches.

River Reach	Bankfull Width (ft)	Max depth (ft)	Wetted Perimeter (ft)	Width to depth ratio	Dominant particle size (in.)	D50 (in.)
Big Hole River (A)	33.5	2.1	16.5	15.9	1.77 – 2.5 Very Coarse Gravel	1.26 –1.77 Very Coarse Gravel
Governor Creek (A)	42	3.1	26.0	13.7	0.89 – 1.26 Coarse Gravel	0.89 – 1.26 Coarse Gravel
Big Hole River (B)	50.0	2.4	41.8	20.7	0.89 – 1.26 Coarse Gravel	1.77 – 2.5 Very Coarse Gravel
Miner Creek (B)	11.5	1.2	10.0	9.4	0.125 – 0.25 Fine Sand	0.63 – 0.89 Coarse Gravel
Big Hole River (C)	36.0	2.0	27.0	17.9	0.89 – 1.26 Coarse Gravel	1.77 – 2.5 Very Coarse Gravel
Rock Creek (C)	16.5	1.5	0.0	11.3	Fine Sand	0.44 – 0.63 Medium Gravel
Big Hole River (D)	191	2.7	108	71.5	.08 – 0.16 Fine Gravel	0.31 – 0.44 Medium Gravel
Steel Creek (D)	39.5	1.9	35.0	21.1	1.26 – 1.77 Very Coarse Gravel	0.89 – 1.26 Coarse Gravel
Big Hole River (E)	200	3.8	171	52.6	3.5 – 5.0 Small Cobble	2.5 – 3.5 Small Cobble
LaMarche Creek (E)	47.5	1.8	27.0	27.0	0.89 – 1.26 Coarse Gravel	1.26 – 1.77 Very Coarse Gravel

IX. Public Outreach, Technical Committees, and Special Funding

The Big Hole Grayling CCAA represents a collaborative effort among the Participating Landowners, the Agencies, and several non-government organizations with a conservation interest in grayling and the Big Hole watershed. Working groups and technical committees have and will be formed to deal with a variety of issues associated with the Big Hole Grayling CCAA as they arise to meet our commitments and maximize the effectiveness of this Program.

1. Hub and Spoke Working Group

The Hub and Spoke Working Group is made up of both government and non-government organizations directly involved in preserving the health of the Big Hole River watershed and the local grayling population. Members of the Big Hole Watershed Steering Committee created the concept for this group. Existing funding from both the Big Hole Watershed Committee and the Big Hole River Foundation were used to hire a Grayling Recovery Support Coordinator. The position is employed by the Big Hole Watershed Committee. The group has met regularly since May to provide updates on issues associated with the upper Big Hole watershed, grayling recovery, to discuss restoration project ideas, and brainstorm on project funding opportunities. Members of the Group represent: the Big Hole Watershed Committee, the Big Hole River Foundation, Montana Trout Unlimited, the Western Water Project, The Nature Conservancy, FWP, the USFWS, DNRC, and NRCS.

2. Upper Big Hole Watershed Water Rights Technical Committee

The Upper Big Hole Watershed Water Rights Technical Committee was formed to assist and provide technical expertise to the Agencies and private landowners in dealing with the water right issues associated with implementing the conservation measures described in the Big Hole Grayling CCAA. The Committee is made up of staff from FWP, DNRC, the Western Water Project, and the Montana Water Trust. In 2006, the Committee assisted landowners with Applications to Change a Water Right, provided input into streamflow monitoring needs, and worked on legislation that would protect Big Hole Grayling CCAA Participating Landowners that give up irrigation water to improve streamflow conditions from challenges of water right abandonment.

3. NRCS Special Funding

In 2005 and 2006, NRCS provided funding for a full-time technician with both FWP and DNRC. These positions are dedicated to collecting data that will assist in the completion of the site-specific plans. NRCS also provided funding and staff to complete a water rights database for the upper Big Hole River watershed.

4. The Arctic Grayling Recovery Website

FWP updates the AGRP Website on a regular basis to provide the latest information and access to reports related to grayling conservation and recovery efforts in Montana. The website can be accessed at: http://www.graylingrecovery.org/.

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