Montana Fish, Wildlife & Parks

1400 South 19th Avenue
Bozeman, MT 59718

December 22, 2005

To: Governor's Office, Mike Volesky, State Capitol, Room 204, P.O. Box 200801, Helena, MT 59620-0801
Environmental Quality Council, State Capitol, Room 106, P.O. Box 201704, Helena, MT 59620-1704
Dept. of Environmental Quality, Metcalf Building, P.O. Box 200901, Helena, MT 59620-0901
Dept. of Natural Resources & Conservation, P.O. Box 201601, Helena, MT 59620-1601
Montana Fish, Wildlife & Parks:

Director's Office	Parks Division	Lands Section	FWP Commissioners
Fisheries Division	Legal Unit	Wildlife Division	Design & Construction

MT Historical Society, State Historic Preservation Office, P.O. Box 201202, Helena, MT 59620-1202
MT State Parks Association, P.O. Box 699, Billings, MT 59103
MT State Library, 1515 E. Sixth Ave., P.O. Box 201800, Helena, MT 59620
James Jensen, Montana Environmental Information Center, P.O. Box 1184, Helena, MT 59624
Janet Ellis, Montana Audubon Council, P.O. Box 595, Helena, MT 59624
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Jerry DiMarco, P.O. Box 1571, Bozeman, MT 59771
Montana Wildlife Federation, P.O. Box 1175, Helena, MT 59624
Wayne Hurst, P.O. Box 728, Libby, MT 59923

Ladies and Gentlemen:

Montana Fish, Wildlife and Parks announces the release of a draft Environmental Assessment (EA) for the Fluvial Arctic Grayling Candidate Conservation Agreement with Assurances (CCAA). The EA proposes that Montana Fish, Wildlife and Parks (FWP) implement a 20-year umbrella Candidate Conservation Agreement with Assurances for fluvial Arctic Grayling in the Big Hole River watershed.

The draft EA and the associated CCAA document are available for review in Helena at the FWP Headquarters, the Montana State Library, and the Environmental Quality Council and available by request in either hard copy or CD format from the address, email, or phone number below. The documents are also available on FWP's website at: http://fwp.mt.gov/wildthings/concern/grayling.html. (Please note that these are large documents.)

Montana Fish, Wildlife and Parks invites you to comment on the proposal. Public comments will be accepted until 5 p.m. on January 23, 2006. Comments should be sent to the following address:

Montana Fish, Wildlife and Parks
Fisheries Division
C/o Arctic Grayling CCAA EA
PO Box 200701
Helena, MT 59620-0701
406-444-2449

Comments and questions may be emailed to: fwpgraylingccaa@mt.gov or faxed to: 406-444-4952.

In addition, a public open house will be held at the Wisdom Community Center on January 9 from 2 p.m. to 9 p.m. A public meeting will be held at the FWP Butte Area Office (1820 Meadowlark Lane) on January 12 from 7 p.m. to 10 p.m. Public comments will be accepted at both meetings.

Sincerely,

Patrick J. Flowers
Region 3 Supervisor

DRAFT PROGRAMMATIC ENVIRONMENTAL ASSESSMENT

for

Candidate Conservation Agreement with Assurances and Associated Permit for fluvial Arctic grayling in the upper Big Hole River, Montana

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October 2005

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EXECUTIVE SUMMARY

The purpose of this Environmental Assessment (EA) is to satisfy the National Environmental Policy Act (NEPA) and Montana Environmental Policy Act (Montana EPA) requirements for a proposed action to implement a 20-year umbrella Candidate Conservation Agreement with Assurances (CCAA/Agreement) with Montana Fish, Wildlife and Parks (Montana FWP) (Appendix 1). Through the NEPA process the U.S. Fish and Wildlife Service (USFWS) will decide whether to issue Montana FWP a section 10(a)(1)(b) Enhancement of Survival permit (Permit). The Montana FWP will decide through Montana EPA analysis whether to implement the Agreement. The Agreement has been prepared by Montana FWP, with assistance from USDA Natural Resources and Conservation Service (NRCS), Montana Department of Natural Resources and Conservation (Montana DNRC), and the USFWS. The purpose of the Agreement is to promote conservation of Arctic grayling (*Thymallus arcticus*) in the upper Big Hole River in southwestern Montana. Two other alternatives are compared to the proposed action to assess whether the action causes significant effects to the human environment in the project area.

The majority of present and historic fluvial Arctic grayling habitat is located adjacent to non-Federal lands. Therefore, the survival and recovery of the species is closely associated with the current and future land and water uses occurring on the non-Federal lands. The potential for an Endangered Species Act (ESA) listing of fluvial Arctic grayling, which would have economic, legal, and social repercussions for affected individuals; and the large spatial scale at which habitat must be protected and restored has highlighted the need for a more comprehensive, collaborative, and long-term approach to fluvial Arctic grayling conservation in the Big Hole River. Therefore, there is an obvious need to secure the cooperation of those non-Federal landowners in the Big Hole River watershed who reside within the range of the species to promote the implementation of land uses that would be beneficial to the fluvial Arctic grayling.

The umbrella Agreement describes specific land and water-use activities and conservation practices that would be implemented to benefit the species on the non-Federal lands. In exchange for volunteering to implement beneficial practices for fluvial Arctic grayling, the participating landowners would be granted authorization to incidentally 'take' fluvial Arctic grayling under a Permit issued pursuant to section 10(a)(1)(A) of the ESA, and by receiving assurances that they would not incur additional land-use restrictions if the species is listed under the ESA. The Permit would become effective if the fluvial Arctic grayling was subsequently federally listed, and would then authorize a level of 'take' for each enrolled landowner. Thus, an operational conservation program would be in place that would improve the species status, and the participating non-Federal landowners would benefit by receiving take authorization and assurances that they can continue with agreed upon land and water uses.

The Agreement is consistent with the USFWS' "Candidate Conservation Agreement with Assurances Final Policy" (64 FR 32726). This policy encourages the implementation of conservation measures for species that have not been listed under the ESA, but warrant agency concern. The Agreement identifies obligations of the parties, including participating landowners. Approval of the Agreement would provide conservation benefits for fluvial Arctic grayling on non-federally owned lands in Beaverhead and Deerlodge Counties, Montana.

Fluvial Arctic grayling have declined throughout their historic range. Fluvial Arctic grayling currently occupy only a fraction (~5 percent) of their historic range within the Missouri River watershed upstream of the Great Falls (Figures 2 and 3). Kaya (1992a) concluded that the major factors causing the range-wide decline of fluvial Arctic grayling in the upper Missouri River system include habitat degradation, angling exploitation and overfishing, and interactions with introduced nonnative salmonid fishes. Fluvial Arctic grayling in Montana are presently restricted to an approximately 80-mile long segment of the upper Big Hole River. Historical and contemporary land use in the Big Hole Valley has led to habitat degradation, fragmentation, and loss. Specifically, irrigation diversions have reduced streamflows and may block migratory pathways, and uncontrolled livestock grazing has severely impacted streamside (riparian) habitats. Collectively, these circumstances have led to stream dewatering, elevated summer water temperatures, channel alterations and habitat simplification, and the reduced the ability of fluvial Arctic grayling to access necessary habitats. In addition, fluvial Arctic grayling may be accidentally entrained (captured) in irrigation ditches. Brook trout (*Salvelinus fontinalis*), brown trout (*Salmo trutta*) and rainbow trout (*Oncorhynchus mykiss*) are three species of nonnative trout that have established populations in the system and may threaten fluvial Arctic grayling through competition and predation.

The Montana FWP has been committed to the protection and restoration of fluvial Arctic grayling throughout its historic range in Montana. In 1996, Montana FWP signed a Memorandum of Agreement (MOA) with the USFWS (Montana FWP and USFWS 1996) that recognizes the Montana Fluvial Arctic Grayling Restoration Plan (Restoration Plan) (Montana FWP 1995) as the conservation strategy to guide restoration and management of fluvial Arctic grayling in the upper Missouri River. The Restoration Plan was developed by the Montana Fluvial Arctic Grayling Workgroup (Workgroup), an interagency committee established in the 1980s to provide guidance on fluvial Arctic grayling restoration, research, and management. The Restoration Plan's general restoration approach is to: a) reestablish four additional fluvial Arctic grayling populations in historic waters, and b) secure and expand the existing population in the Big Hole River. The Montana FWP, in collaboration with other agencies, has been implementing the MOA and Restoration Plan provisions in good faith. For the past decade, Montana FWP and the USFWS' Partners for Fish and Wildlife (Partners) program have engaged Big Hole River valley landowners in small-scale restoration projects to benefit fluvial Arctic grayling. In both 2004 and 2005, the NRCS has utilized special initiative Environmental Quality and Incentives (EQIP) programs to provide technical and financial assistance to producers willing to implement both short- and long-term practices to improve habitat conditions for fluvial Arctic grayling in the Big Hole River.

ALTERNATIVES ANALYZED IN THIS ENVIRONMENTAL ASSESSMENT

Alternative A - *No Action Alternative* - An Agreement would not be developed, a Permit would not be issued, and landowners would not receive any future incidental take authorization or assurances for future management of their lands should Federal listing occur. Some beneficial conservation measures identified in the Restoration Plan may be implemented under this alternative, Montana FWP and USFWS' Partners would continue to collaborate on conservation of fluvial Arctic grayling. Watershed groups or other interested parties also may implement habitat conservation projects. The NRCS may continue with EQIP or other programs depending

on agency funding and producer interest. However, these individual actions may not be coordinated in a large-scale restoration effort and the landowners would not receive regulatory assurances for their participation.

Alternative B - *Proposed Action (Preferred) Alternative* - An Agreement would be developed, and a Permit would be issued to Montana FWP. The Project Area would cover approximately 380,000 acres in the upper Big Hole River watershed. Participating landowners would sign up under the Agreement, be issued a Certificate of Inclusion (CI) and be covered by the Permit. The conservation goal of the Agreement is to secure and enhance populations of fluvial Arctic grayling within the historic range of the species in the upper reaches of the Big Hole River drainage. The conservation guidelines of the Agreement would 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 fluvial Arctic grayling
4) Remove barriers to fluvial Arctic grayling migration

Conservation measures on non-Federal lands would be implemented by the participating landowner or cooperating agencies, and the landowner would receive a level of incidental 'take' coverage and assurances that no further conservation measures would be required if Federal listing occurs. These activities would include farming and ranching related activities such as hay production and livestock grazing, and supporting activities such as diversion of irrigation water and operation of farm equipment.

Alternative C – *Limited Umbrella Agreement* – A "limited" umbrella Agreement would be implemented in only a portion of the Project Area described in Alternative B. The area would correspond generally to the portion of the upper Big Hole River watershed characterized as Management Segment C in the Agreement and would include approximately 130,000 acres of non-Federal lands in the vicinity of Wisdom, Montana. The Agencies generally consider restoration of this section of the river a priority.

I. PURPOSE AND NEED FOR TAKING ACTION

A. **Introduction**Error! Bookmark not defined.

This EA is being prepared to address the impacts of (1) issuing an ESA section 10(a)(1)(A) Permit to Montana FWP and execution of an umbrella Agreement (Appendix 1) for the fluvial Arctic grayling (*Thymallus arcticus*) in the upper Big Hole River, Montana, and (2) implementation of the Agreement for the fluvial Arctic grayling (*Thymallus arcticus*) in the upper Big Hole River, Montana, by Montana FWP. The USFWS received the completed Permit application on April 5, 2005. The Permit application was updated on August 22, 2005, to include an expanded and revised version of the Agreement. Issuance of the Permit and execution of the Agreement are Federal actions subject to the NEPA (42 U.S.C. §4321 et. seq.). The Montana FWP's decision to implement the Agreement is subject to the Montana EPA (Montana EPA, 75-1-101, Montana Codes Annotated, et seq.).

The purpose of this EA is to determine whether there will be significant impacts to the human environment as a result of the proposed action or its alternatives (NEPA, 42, U.S.C. §4321 et. seq.). If there were a finding of significant impact then an environmental impact statement would be prepared. If a determination were made that there are no significant impacts then a Finding of No Significant Impacts (FONSI) would be issued by the USFWS. The EA presents an analysis of the impacts of implementing the proposed action and alternatives to the physical and human environment. A summary of this analysis appears in Table 13.

The enrollment of Participating Landowners into the Agreement and Participating Landowners' continued participation in the Agreement are strictly voluntary actions taken by the Participating Landowners. Site-specific plans that describe the conservation measures to be implemented on enrolled properties are developed cooperatively with and must be approved by Participating Landowners. Therefore, the proposed action and alternatives do not regulate the use of private property. Actually, the proposed action can protect landowners participating in the Agreement from future ESA regulatory actions. By participating in the Agreement, landowners receive assurances that land use restrictions additional to those described and agreed to in site-specific plans would not be required should the fluvial Arctic grayling be listed under the ESA.

The Agreement has been prepared by Montana FWP, with assistance from NRCS, Montana DNRC, and USFWS. Under the Agreement, Montana FWP would hold the Permit and issue individual CIs to non-Federal property owners who implement conservation measures to benefit fluvial Arctic grayling. In return, these property owners receive regulatory assurances that should fluvial Arctic grayling be listed under the ESA, they would be exempted from a specified level of incidental take and not be required to implement conservation actions beyond those specified in the Agreement. The cooperating agencies NRCS and Montana DNRC also are expected to sign the Agreement as a commitment to provide technical expertise and funding to implement the provisions of the Agreement.

1. MONTANA ENVIRONMENTAL PROTECTION ACT PROCESS

This document also will satisfy Montana FWP's requirements under Montana EPA. Any predecisional material contained within this section is to satisfy Montana EPA and should not be considered pre-decisional under the NEPA process.

In addition to the information provided in Table 13, Montana EPA also requires the consideration of the following criteria in addition to those required by NEPA for determining the significance of impacts on the human environment:

a) the severity, duration, geographic extent, and frequency of occurrence of the impact;

b) the probability that the impact will occur if the proposed action occurs; or conversely, reasonable assurance in keeping with the potential severity of an impact that the impact will not occur;

c) growth-inducing or growth-inhibiting aspects of the impact, including the relationship or contribution of the impact to cumulative impacts;

d) the quantity and quality of each environmental resource or value that would be affected, including the uniqueness and fragility of those resources or values;

e) the importance to the State and to society of each environmental resource or value that would be affected;

f) any precedent that would be set as a result of an impact of the proposed action that would commit the department to future actions with significant impacts or a decision in principle about such future actions; and,

g) potential conflict with local, State, or Federal laws, requirements, or formal plans.

Table 14 summarizes the review of these Montana EPA significance criteria for each of the 10 environmental parameters addressed in the EA. Based on this significance determination, Montana FWP has concluded there are no significant negative impacts from the proposed action. Additionally, Montana FWP has concluded that no mitigation or stipulations are required to keep the negative impacts below the level of significance. The Montana FWP has determined that there are no secondary impacts to the physical or human environment from the proposed action or alternatives and that there are no impacts that require mitigation.

In its determination to use an EA or an Environmental Impact Statement (EIS), Montana EPA requires Montana FWP to consider whether the proposed action or alternatives require regulatory restrictions on private property. Additional assessment of the impacts to private property is necessary to comply with the Private Property Assessment Act, Chapter 462, Laws of Montana (1995). A Private Property Assessment Act checklist was completed (Appendix 5) and Montana FWP determined that no taking or damaging implications result from the implementation of the proposed action.

The Agreement does not regulate the use of private tangible personal property or real property under a regulatory statute, does not result in taking or damaging implications to private property, and none of the anticipated impacts to the physical and human environment have been determined to have significant adverse effects.

After public review, USFWS will determine if additional environmental analysis is required pursuant to NEPA or if a FONSI can be made pursuant to the Council on Environmental Quality regulations and applicable guidance. The Montana EPA requires that an EA include "a finding on the need for an EA and, if appropriate, an explanation of the reasons for preparing the EA. If an EIS is not required, the EA must describe the reasons the EA is an appropriate level of analysis" (Administrative Rules of Montana 12.2.432(3)(j)). Therefore, for the reasons mentioned above, Montana FWP concludes that an EIS is not required for analysis of the proposed action under Montana EPA and, further, a sufficient level of analysis is provided by this EA.

B. Purpose and Need Error! Bookmark not defined.

The primary purpose of the proposed Agreement is to allow for implementation of a suite of conservation measures within an area of 382,200 acres to secure and expand the population of fluvial Arctic grayling in the Big Hole River upstream of Dickie Bridge (Figure 1). These conservation measures are designed to improve the function of the aquatic ecosystem, which is expected to lead to an increase in the abundance and distribution of fluvial Arctic grayling in the system. The second purpose is to provide participating non-Federal landowners, in return for their cooperation with implementing conservation measures on their properties, with regulatory assurances and limited exemption from incidental take should fluvial Arctic grayling be listed under the ESA. Collectively, the Agreement's goal is to facilitate sustainable land management operations (primarily livestock ranching) in the Big Hole River valley that is compatible with maintenance and restoration of aquatic habitats upon which fluvial Arctic grayling depend.

The need for the proposed Agreement results from the continued decline of fluvial Arctic grayling throughout their historic range. Fluvial Arctic grayling currently occupy only a fraction (~5 percent) of their historic range within the Missouri River watershed upstream of the Great Falls (Figures 2 and 3). Kaya (1992a) concluded that the major factors causing the range-wide decline of fluvial Arctic grayling in the upper Missouri River system include habitat degradation, angling exploitation and overfishing, and interactions with introduced nonnative salmonid fishes. Fluvial Arctic grayling in Montana are presently restricted to an approximately 80-mile long segment of the upper Big Hole River, and the USFWS has concluded this remnant population is threatened by ongoing drought, habitat fragmentation and degradation, and encroachment by nonnative trout (70 FR 24898, May 11, 2005).

Historical and contemporary land use in the Big Hole Valley has led to habitat degradation, fragmentation, and loss. Specifically, irrigation diversions have reduced streamflows and may block migratory pathways, and uncontrolled livestock grazing has destroyed streamside (riparian) habitats. Collectively, these circumstances have led to stream dewatering, elevated summer water temperatures, channel alterations and habitat simplification, and the inability of fluvial Arctic grayling to access necessary habitats. In addition, fluvial Arctic grayling may be

accidentally entrained (captured) in irrigation ditches. Brook trout (*Salvelinus fontinalis*), brown trout (*Salmo trutta*), and rainbow trout (*Oncorhynchus mykiss*) are three species of nonnative trout that have established populations in the system.

Fluvial Arctic grayling in Montana are a species of concern in Montana*, and the distinct population segment (DPS) for fluvial Arctic grayling of the upper Missouri River, which includes the Big Hole River population, is a Candidate for listing under the ESA (70 FR 24898). In response to a petition to list the fluvial Arctic grayling as endangered, the USFWS determined that listing the fluvial Arctic grayling was warranted but precluded by higher priority listing actions in 1994 (59 FR 37738).

The fluvial Arctic grayling has remained on the ESA Candidate list since the warranted by precluded determination in 1994, but its listing priority number was recently elevated to the highest level afforded a DPS (69 FR 24881) because the abundance of the remnant population in the Big Hole River declined substantially and the reestablishment efforts have not yet produced self-sustaining populations elsewhere in the upper Missouri River.

Montana FWP has been committed to the protection and restoration of fluvial Arctic grayling throughout its historic range in Montana. In 1996, Montana FWP signed an MOA with USFWS (Montana FWP and USFWS 1996) that recognizes the Restoration Plan (Montana FWP 1995) as the conservation strategy to guide restoration and management of fluvial Arctic grayling in the upper Missouri River. The Restoration Plan was developed by the Workgroup, an interagency committee established in the 1980s to provide guidance on fluvial Arctic grayling restoration, research, and management. The Restoration Plan's general restoration approach is to: a) reestablish four additional fluvial Arctic grayling populations in historic waters, and b) secure and expand the existing population in the Big Hole River. Montana FWP, in collaboration with other agencies, has been implementing the MOA and Restoration Plan provisions in good faith. For the past decade, Montana FWP and USFWS' Partners program have engaged Big Hole River valley landowners in small-scale restoration projects to benefit fluvial Arctic grayling. For example, in 2003 Montana FWP initiated restoration projects including riparian revegetation and fencing along Deep, Lamarche, and Steel Creeks; in-stream pool construction in a degraded section of Fishtrap Creek, and installation of a fish ladder to permit passage over an irrigation diversion on the North Fork of the Big Hole River (Magee and Lamothe 2004). The USFWS' Partners program has provided funding and technical assistance in the installation of 19 off-site watering systems (Magee and Lamothe 2003). Recently, NRCS utilized its special initiative EQIP program in the Big Hole to improve habitat conditions for fluvial Arctic grayling. In 2004, NRCS spent over $700,000 to provide technical and financial assistance to producers willing to shorten their irrigation seasons and implement alternate stock-water methods to provide instream flows for grayling. This program resulted in 14,491 acres of deferred irrigation and construction of 12 off-channel stock watering facilities. In 2005, NRCS committed $500,000 to provide

* Definition of Species of Concern used by Montana Fish, Wildlife and Parks: "The term "Species of Concern" includes taxa that are at-risk or potentially at-risk due to rarity, restricted distribution, habitat loss, and/or other factors. The term also encompasses species that have a special designation by organizations or land management agencies in Montana, including: Bureau of Land Management Special Status and Watch species; U.S. Forest Service Sensitive and Watch species; U.S. Fish and Wildlife Service Threatened, Endangered and Candidate species" (http://fwp.state.mt.us/fieldguide/statusCodes.aspx#sConcern). An identical definition is used by Montana Natural Heritage Program (http://mtnhp.org/SpeciesOfConcern/)

technical and financial assistance to producers in the upper Big Hole River watershed upstream of Dickie Bridge who install conservation practices in a continuing effort to benefit fluvial Arctic grayling habitat. The 2005 EQIP program focuses primarily on improving the management of irrigation water through the installation of water control structures and measuring devices, and providing grayling passage past irrigation diversion structures. The Big Hole Watershed Committee, a grassroots organization representing landowner interests in the area, received Federal funding to implement on-the-ground habitat restoration projects and is expected to begin implementing some projects in 2005.

The potential for an ESA listing of fluvial Arctic grayling, which would have economic, legal, and social repercussions for affected individuals; and the large spatial scale at which habitat must be protected and restored has highlighted the need for a more comprehensive, collaborative, and long-term approach to fluvial Arctic grayling conservation in the Big Hole River. The proposed Agreement far exceeds previous restoration activities in the Big Hole in scope and detail. The proposed Agreement would provide ESA regulatory assurances to participating landowners who agree to implement conservation measures necessary to benefit fluvial Arctic grayling, and also would give landowners access to technical expertise and financial support (as needed) from the collaborating agencies to ensure their land management activities are sustainable. Private landowner participation and support is vital to fluvial Arctic grayling conservation in the Big Hole River because the majority of present and historic fluvial Arctic grayling habitat is located adjacent to non-Federal lands (Montana FWP et al. 2005; Figure 4).

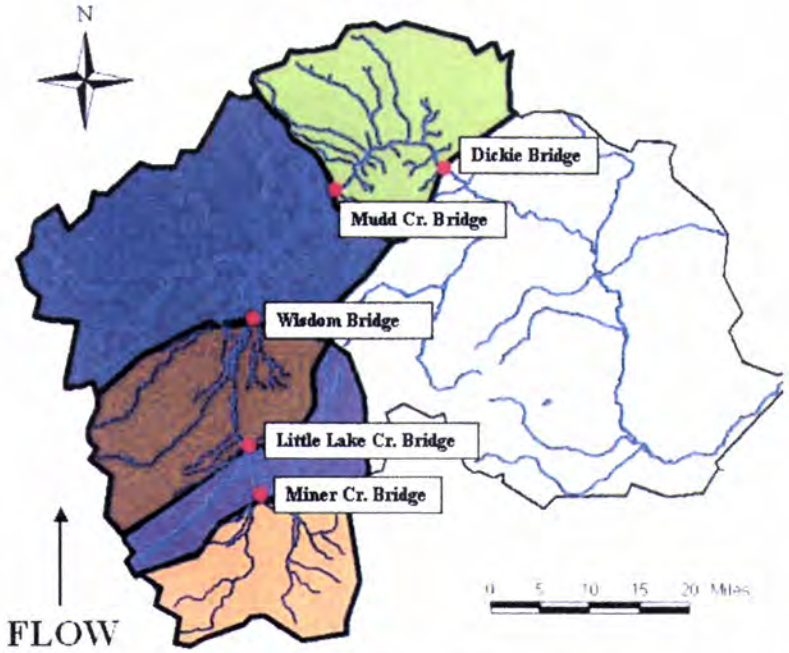

Figure 1. Big Hole River watershed in southwestern Montana. The proposed project area contains portions of the watershed upstream from Dickie Bridge that contains most of the habitat occupied by fluvial Arctic grayling in the watershed.

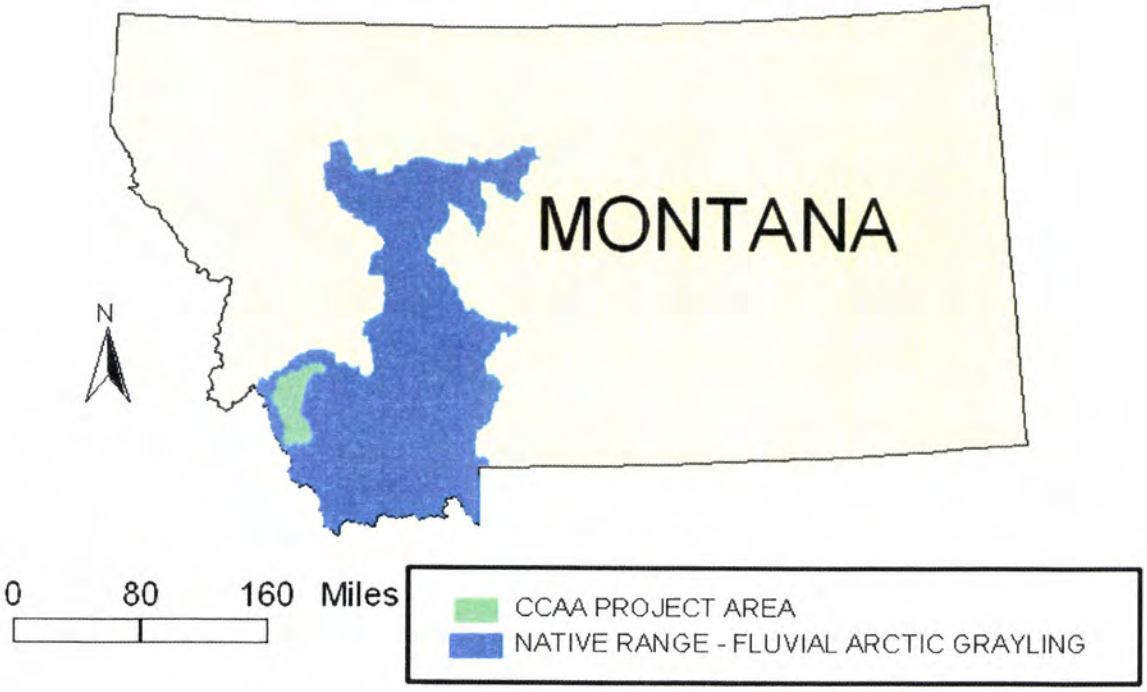

Figure 2. Location of the proposed project area in the Big Hole River in relation to the native range of fluvial Arctic grayling.

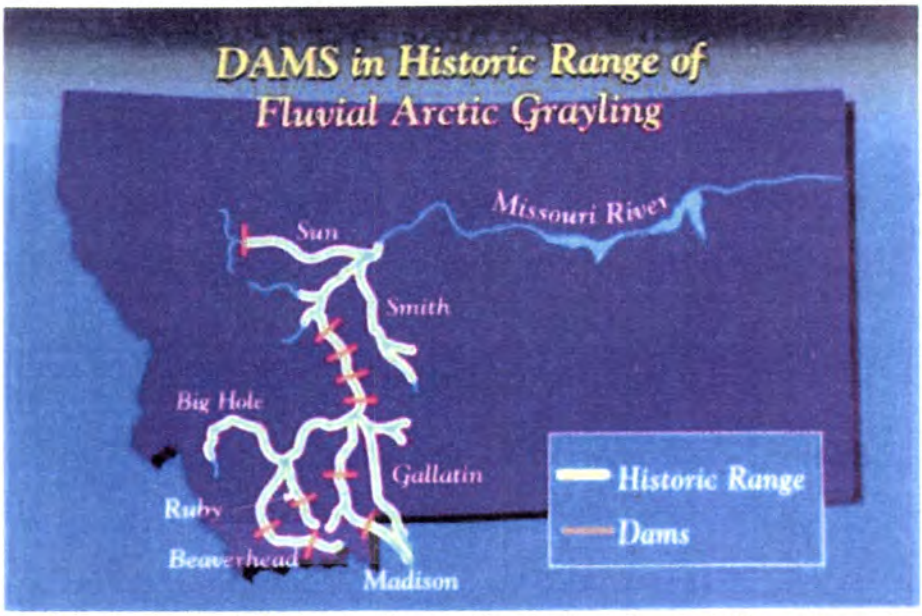

Figure 3. Historic range of fluvial Arctic grayling in the Missouri River above the Great Falls. The current range of fluvial Arctic grayling is restricted to the Big Hole River (map courtesy of Montana FWP).

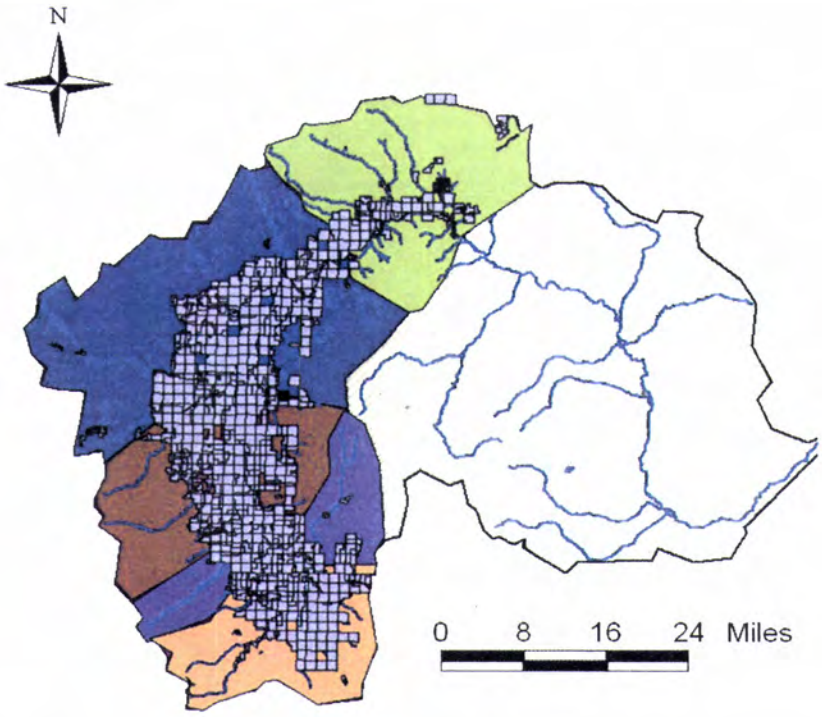

Figure 4. Distribution of private, non-Federal lands (light blue parcels) representing the 380,000-acre proposed project area in the upper Big Hole River drainage. The lower watershed (at right) is denoted by cross-hatched shading.

C. Decision to be Made by the Responsible OfficialError! Bookmark not defined.

The USFWS' decision is whether to issue a section 10(a)(1)(A) Permit and execute the Agreement under the ESA based on the Agreement as proposed, on the Agreement as further conditioned, or to deny the permit application and not approve the Agreement. To issue the Permit, the USFWS must find that--1) the taking of fluvial Arctic grayling that is incidental or purposeful would be lawful and in accordance with the terms of the Agreement; 2) the Agreement complies with the requirements of the CCAA policy; 3) the probable direct and indirect effects of any authorized take would not appreciably reduce the likelihood of survival and recovery in the wild of any species; 4) implementation of the terms of the Agreement is consistent with applicable Federal, State, and tribal laws and regulations; 5) implementation of the terms of the Agreement would not be in conflict with any ongoing conservation programs for species covered by the Permit; and 6) Montana FWP has shown capability for and commitment to implement all the terms of the Agreement. To approve and execute a CCAA, the USFWS must determine that the benefits of the conservation measures implemented by a property owner under a CCAA, when combined with those benefits that would be achieved if it is assumed that conservation measures also were to be implemented on other necessary properties, would preclude or remove any need to list the covered species (64 FR 32727).

Issuance of the Permit and execution of a CCAA are Federal actions subject to NEPA. The USFWS' Region 6 Director or his designee is the official responsible for selecting an alternative and issuing a decision document with respect to NEPA. If the Regional Director determines that the preferred alternative would not significantly impact the quality of the human environment as defined in section 102(2)(C) of NEPA, a decision in the form of a FONSI would be issued. The Regional Director could warrant that the proposed action requires further analysis in an EIS if a determination is made that the preferred alternative would significantly impact the human environment.

Montana FWP's decision is whether or not to implement the Agreement (Alternative A), to implement the Agreement as proposed (Alternative B), or to implement the Agreement with a more limited scope (Alternative C). This State's decision is subject to Montana EPA and will be based on a finding of whether or not there will be a significant impact on the quality of the human environment. Montana FWP's Region 3 Supervisor is responsible for Montana FWP's implementation decision. Once a determination has been made, Montana FWP will issue a Decision Notice.

D. Issues Raised During PlanningERROR! BOOKMARK NOT DEFINED.

Four general issues were considered during the development of the proposed Agreement--(1) roles and responsibilities of the partnering agencies, (2) expected landowner interest and participation in the Agreement, (3) minimum standards for landowners to be included in the Agreement, and (4) effects of nonnative trout on fluvial Arctic grayling.

The proposed Agreement is intended to be a collaboration among Participating Landowners and Montana FWP, NRCS, Montana DNRC, and USFWS. The Montana FWP agreed to serve as the applicant for the ESA section 10 Permit and has assumed the role of lead agency in making contacts with interested landowners, coordinating the on-the-ground development and implementation of the Agreement's provisions, and monitoring compliance and effectiveness for the Agreement. The NRCS agreed to provide technical expertise in the collection of baseline information, planning, and implementation the portion of the Agreement's site-specific plans dealing with agricultural and ranching operations (e.g., irrigation systems, grazing plans, crop management, nutrient management, etc.). Montana DNRC has agreed to provide expertise in hydrology, water management, and State water law that would be required to address one of the Agreement's central issues--water and the competing uses for that water. The USFWS has agreed to provide technical and field assistance in the development and implementation of plans, and maintains an oversight role in the approval of site-specific plans and compliance with applicable Federal laws.

Montana FWP, NRCS, Montana DNRC, and USFWS (Agencies) were initially uncertain about the willingness of landowners in the Big Hole River to enter into an Agreement with State and Federal agencies that would affect how they conducted their agricultural and ranching operations. Meetings and informal communication with individuals or small groups of non-Federal landowners from the upper Big Hole River watershed indicated strong interest in such an Agreement as a means to address long-term needs of fluvial Arctic grayling and provide some certainty their livelihoods would not be unduly affected by the ESA. In addition, over three dozen landowners, who collectively represent 200,000 acres of the proposed Agreement's 380,000-acre project area, signed a Montana FWP application affirming their willingness to participate in the proposed Agreement in April 2005. These same landowners are voluntarily implementing some of the same conservation measures described in the Agreement, so it is anticipated that these same landowners also would officially enter in the proposed Agreement if it was approved by USFWS.

The third issue relates to the consistency in the requirements of the proposed umbrella Agreement for Participating Landowners whose site-specific issues would differ. To ensure consistency and a set of minimum requirements, all Participating Landowners agree to four general conservation measures to benefit fluvial Arctic grayling--(1) improving instream flows; (2) conserving or restoring riparian habitats; (3) removing barriers to fluvial Arctic grayling migration; and (4) reducing or eliminating entrainment in irrigation ditches. Through the development of the site-specific plans that are consistent with the Agreement's general provisions, the Agencies and the Participating Landowner maintain the flexibility to address the threats and conservation opportunities identified on each enrolled property. An overall requirement of the Agreement and in any site-specific plan is allowing Agency access to enrolled lands for data collection, plan development and implementation, and monitoring. These measures described above, and implemented at the site-specific level, would result in a net benefit to fluvial Arctic grayling.

Competition and predation from nonnative trout species, including brook trout, brown trout and rainbow trout, are considered potential threats to fluvial Arctic grayling in the proposed Agreement's project area. However, threats from nonnatives are believed to be secondary to threats from habitat degradation and loss, and would be outside the direct control of Participating Landowners. The Agreement necessarily focuses on measures private landowners can take to improve habitat conditions for fluvial Arctic grayling on their property, but the Agreement includes provisions for the Agencies to address and deal with threats to fluvial Arctic grayling from nonnative trout as the need arises.

II. ALTERNATIVES INCLUDING THE PROPOSED ACTIONError! Bookmark not defined.

Each of alternatives was developed with the objective of reducing or eliminating threats to fluvial Arctic grayling to secure and expand the population in the Big Hole River, Montana. General threats include habitat degradation, loss and fragmentation resulting from irrigation diversions, riparian habitat destruction, physical barriers to fluvial Arctic grayling movement, and entrainment in irrigation ditches. With this objective in mind, three alternatives have been developed for analysis in this draft EA.

A. Alternative A - NO ACTIONError! Bookmark not defined.

Under the "No Action" alternative, the proposed Agreement would not be approved by USFWS and the Permit would not be issued to Montana FWP and the Agreement would not be implemented by Montana FWP. Thus, Participating Landowners would not be covered under the umbrella Agreement or Permit. Agricultural and ranching activities would continue within the Project Area in accordance with applicable laws, likely similar to current activities for many landowners. The predominant land use in the Project Area is irrigated agriculture for hay production and livestock pasture.

The certainty that conservation measures would be comprehensively implemented to benefit fluvial Arctic grayling is much less under the "No Action" alternative. Various State, Federal, and private groups have been involved in projects to improve habitat conditions for fluvial Arctic grayling in the project area, but such projects have generally not been coordinated or systematically implemented on a large scale. The Workgroup was established in the 1980s as an interagency committee to provide guidance on fluvial Arctic grayling research, management, and restoration. The Workgroup developed a Restoration Plan that included monitoring goals for the fluvial Arctic grayling population in the Big Hole River. For the past decade, Montana FWP and the USFWS' Partners program have engaged Big Hole River valley landowners in small-scale restoration projects to benefit fluvial Arctic grayling Montana FWP. For example, in 2003 Montana FWP initiated restoration projects including riparian revegetation and fencing along Deep, Lamarche, and Steel Creeks; in-stream pool construction in a degraded section of Fishtrap Creek, and installation of a fish ladder to permit passage over an irrigation diversion on the North Fork of the Big Hole River (Magee and Lamothe 2004). The USFWS' Partners program has provided funding and technical assistance in the installation of 19 off-site watering systems (Magee and Lamothe 2003). Recently, NRCS utilized its special initiative EQIP program in the Big Hole to improve habitat conditions for fluvial Arctic grayling. In 2004, NRCS spent over

$700,000 to provide technical and financial assistance to producers willing to shorten their irrigation seasons and implement alternate stock-water methods to provide instream flows for grayling. This program resulted in 14,491 acres of deferred irrigation and construction of 12 off-channel stock watering facilities. In 2005, NRCS committed $500,000 to provide technical and financial assistance to producers in the upper Big Hole River watershed upstream of Dickie Bridge who install conservation practices in a continuing effort to benefit fluvial Arctic grayling habitat. The 2005 EQIP program focuses primarily on improving the management of irrigation water through the installation of water control structures and measuring devices, and providing grayling passage past irrigation diversion structures. The Big Hole Watershed Committee, a grassroots organization representing landowner interests in the area, received Federal funding to implement on-the-ground habitat restoration projects and is expected to begin implementing some projects in 2005.

It is likely that many of these types of activities would continue to occur under Alternative A; however, fluvial Arctic grayling are strongly affected by land and water use on private lands and landowner attitude toward the species is an important conservation consideration. The State and Federal agencies active in fluvial Arctic grayling conservation are concerned that, should fluvial Arctic grayling be listed under the ESA, landowner concerns over potential land- and water-use restrictions could be a disincentive for them to cooperate and fluvial Arctic grayling conservation efforts could be hampered.

Successful conservation and recovery of fluvial Arctic grayling in the Project Area would require the active participation of private landowners willing to implement measures to provide adequate instream flows, restore degraded riparian habitats, and reduce habitat fragmentation from barriers and diversion structures. Without cooperation from these landowners, the prospects for conservation and recovery of graying would be compromised.

The fluvial Arctic grayling population in the Project Area is currently at very low abundance. Under the "No Action" alternative, habitat conditions may improve or certain threats may be addressed at specific locations in the watershed. However, conservation measures implemented under Alternative A are not expected to be comprehensively applied, and the continuation of current land and water use practices are expected to remain a substantial threat to the long-term survival of fluvial Arctic grayling.

B. Alternative B (Preferred Alternative) - PROPOSED ACTION Error! Bookmark not defined.Error! Bookmark not defined.

Under the Proposed Action, Alternative B, the umbrella Agreement (Montana FWP et al. 2005) would be approved for a Project Area of approximately 380,000 acres, the Permit would be issued to MOntana FWP, Montana FWP would implement the umbrella Agreement as written, and up to 318 non-Federal property owners would be able to enroll under the Agreement through CIs and be covered under the Permit. The Agreement would be a partnership between Participating Landowners and the Agencies (Montana FWP, NRCS, Montana DNRC, and USFWS). Participating Landowners would implement, or coordinate with the Agencies to implement, fluvial Arctic grayling conservation measures on their land as identified in the Agreement and in their individual site-specific plans. The Agreement would describe specific

land-use activities and conservation practices that would be beneficial to the species on non-Federal lands. In exchange for volunteering to implement beneficial practices for fluvial Arctic Grayling, the participating landowners would receive incidental take authorization (at a specified level) under an Permit issued pursuant to section 10(a)(1)(A) of the ESA and would receive assurances from the FWS that their agricultural and ranching activities would not be curtailed beyond what was stipulated in the Agreement and their individual site-specific plans if the species is listed under the ESA. The Permit would become effective if the fluvial Arctic grayling was subsequently federally listed, and would then authorize a level of 'take' for each enrolled landowner. Thus, an operational conservation program would be in place that would improve the species status, and the participating non-Federal landowners would benefit by receiving incidental take authority and assurances that they can continue with agreed upon land uses.

Conservation measures to be implemented under the Agreement and in each Participating Landowner's comprehensive site-specific plan, as applicable, can be grouped into four general categories--1) improving instream flows, 2) conserving or restoring riparian habitats, 3) removing barriers to fluvial Arctic grayling movement, and 4) addressing entrainment threats. Examples of specific actions under each of the general measures are listed below.

1. **IMPROVING INSTREAM FLOWS.** Specific actions include, but are not limited to--1) upgrading irrigation structures to improve control over water diversion and delivery; 2) compliance with water rights; 3) repairing leaking head gates and water diversion structures; 4) reducing irrigation withdrawals; 5) improving irrigation ditches to reduce water losses; 6) installing and maintaining off-stream livestock watering facilities; 7) investigating and using alternative less water intensive livestock forage; and 8) implementing a comprehensive irrigation water management plan developed by NRCS.
2. **CONSERVING OR RESTORING RIPARIAN HABITATS.** Specific actions include, but are not limited to--1) installing and maintaining fences that manage livestock within or exclude livestock from the riparian zones; 2) installing and maintaining off-stream livestock watering facilities; 3) replanting or transplanting native riparian vegetation such as willows; 4) implementing prescribed grazing plans; and 5) curtailing or relocating any ranching activities that degrade riparian habitats.
3. **REMOVING BARRIERS TO FLUVIAL ARCTIC GRAYLING MOVEMENT.** Specific actions include, but are not limited to--1) removing physical barriers to restore a "natural" stream channel; 2) installing fish ladders or other appropriate fish passage devices to permit fluvial Arctic grayling movement past irrigation structures (diversions) at all flows; and 3) redesigning and reconstructing diversion structures to facilitate fish passage where ladders or retrofitting is not feasible.
4. **ADDRESSING ENTRAINMENT THREATS.** Specific actions include, but are not limited to--1) permitting the Agencies access to irrigation ditches to perform surveys leading to a comprehensive assessment of entrainment threats; 2) allowing the Agencies to rescue entrained fluvial Arctic grayling; and 3) installing fish screens or other fish-exclusion devices as necessary to eliminate specific entrainment problems.

Complementary conservation measures or actions implemented by Participating Landowners under the Agreement that would benefit fluvial Arctic grayling include:

1. Allowing the Agencies to conduct an assessment of baseline environmental conditions and land use practices necessary to develop a comprehensive site-specific plan for their enrolled lands. Implementation of the site-specific plan, would meet the conservation guidelines of this Agreement.
2. Allowing translocation of fluvial Arctic grayling into suitable unoccupied habitats in streams on or adjacent to their enrolled lands to expand the distribution and abundance of fluvial Arctic grayling.
3. With agreed-to notification, allow agency or agency representative access to Participating Landowner's property for the purposes of--1) assessing the fishery resources and status of fluvial Arctic grayling in natural streams and irrigation ditches; 2) salvage of entrained fish in irrigation ditches; 3) removing barriers; 4) assessing riparian habitat conditions and associated land-use activities; 5) implementing conservation measures, and conducting compliance; and 6) biological monitoring pursuant to the Agreement and site-specific plan.
4. Actively pursing funding, as necessary, to implement the Agreement and site-specific plans.

The Agreement provides a framework for the development and implementation of conservation measures and site-specific plans which involves the coordinated efforts of State and Federal agencies (i.e., Montana FWP, NRCS, Montana DNRC, and USFWS) with expertise in fishery biology and management; wildlife biology; hydrology; and all aspects of agricultural, irrigation, and grazing management. Each of the agencies would have specific compliance and effectiveness monitoring duties under the terms of the Agreement.

Under this alternative, an umbrella Agreement would be initiated over a Project Area of approximately 380,000 acres and could involve up to 318 private property owners. The threats to fluvial Arctic grayling exist throughout the Project Area. Fluvial Arctic grayling are very mobile and may move tens of miles on a seasonal basis. The Agencies determined that a coordinated conservation effort involving all possible interested landowners would be the most effective strategy to reduce or eliminate threats to fluvial Arctic grayling at a scale commensurate with the ecology of the species. Providing Participating Landowners with ESA regulatory assurances should reduce concerns over a potential listing and enhance landowner cooperation in fluvial Arctic grayling conservation efforts. Thus, under Alternative B, the proposed action, conservation measures would be implemented such that fluvial Arctic grayling habitat would be protected and enhanced over a large area. Improved habitat conditions are anticipated to produce an increase in the abundance and distribution of fluvial Arctic grayling in the Big Hole River, thus greatly increasing the probability of long-term persistence for the species.

Private landowner interest in the proposed project appears to be considerable. In April 2005, Montana FWP and NRCS announced a program for landowners in the upper Big Hole River Valley to implement actions to benefit fluvial Arctic grayling and participate in a voluntary irrigation reduction program during 2005. Montana FWP made available "Applications for

Development of a Site-Specific Plan for a Potential CCAA for fluvial Arctic grayling" to address species needs in 2005 and to obtain information from individuals interested in voluntarily participating in a potential umbrella Agreement for fluvial Arctic grayling (i.e., the proposed action, Alternative B). Over three dozen landowners who cumulatively own over 200,000 acres (or 51 percent of the proposed project area) indicated their willingness to Montana FWP to participate in an Agreement have voluntarily begun to implement some of the conservation measures described in the Agreement (Montana FWP, Dillon, Montana, unpublished data). These 200,000+ acres also represent areas of high habitat significance for fluvial Arctic grayling (Montana FWP et al. 2005).

C. ALTERNATIVE C – "LIMITED UMBRELLA AGREEMENT"

Under Alternative C, a "limited" umbrella Agreement would be implemented in only a portion of the Project Area described in Alternative B (Proposed Action). This limited umbrella Agreement would generally correspond to the portion of the upper Big Hole River watershed characterized as Management Segment C in the Proposed Action (Montana FWP et al. 2005; see Appendix 1). The project footprint for Alternative C would include approximately 130,000 acres of non-Federal lands in the vicinity of Wisdom, Montana. The Big Hole River in and near Wisdom is considered an important spawning and rearing area for fluvial Arctic grayling, but the habitat in that river segment has been degraded and the fluvial Arctic grayling abundance is currently very low (Montana FWP et al. 2005). The Agencies generally consider restoration of this section of the river a priority.

Assuming the "limited" umbrella Agreement would be structured similarly to the Umbrella Agreement described under Alternative B, (same agencies and conservation framework), then a Permit would be issued to Montana FWP, and up to 131 non-Federal property owners would be able to enroll through CI and be covered under the Permit. The Agreement would be a partnership between Participating Landowners and Montana FWP, USFWS, NRCS, and Montana DNRC (the Agencies). Participating Landowners would implement, or coordinate with the Agencies to implement fluvial Arctic grayling conservation measures on their land as identified in the Agreement and in their individual site-specific plans. Participating Landowners would receive, should the species be listed under the ESA, incidental take authorization (at a specified level) for fluvial Arctic grayling and would receive regulatory assurances from USFWS that their agricultural and ranching activities would not be curtailed beyond what was stipulated in the Agreement and their individual site-specific plan. The conservation measures under the limited umbrella Agreement would be identical to those described under Alternative B, and will not be repeated here.

Providing Participating Landowners with ESA regulatory assurances should reduce concerns over a potential listing and enhance landowner cooperation in fluvial Arctic grayling conservation efforts, but these positive developments would be restricted to only a portion of the non-Federal lands in the upper Big Hole River watershed. Consequently, limiting enrollment would likely exclude landowners who would be interested in participating in the conservation of fluvial Arctic grayling and receiving regulatory assurances under the ESA in return. Should fluvial Arctic grayling be listed under the ESA, landowners outside the limited umbrella Agreement area would create similar issues to those described under the "No Action" alternative

whereby concerns over potential land- and water-use restrictions could be a disincentive for them to cooperate and fluvial Arctic grayling conservation efforts could be hampered.

Moreover, a limited umbrella would have reduced conservation benefits for fluvial Arctic grayling in the watershed. Fluvial Arctic grayling are mobile and use habitats separated in both time and space at different stages in their life, so biologically realistic conservation strategy for the species in the system requires threats be addressed at a watershed scale. The threats to fluvial Arctic grayling from land and water use activities extend across the upper watershed, so focusing on a single area disregards significant threats in other locations. This is particularly relevant for the irrigation-related threats facing fluvial Arctic grayling in the Big Hole River, because, for example, improvements to instream flows produced by Participating Landowners at one point in the river could be quickly offset by irrigation diversions from non-participants just downstream. While a limited umbrella Agreement would be expected to result in some conservation benefit to fluvial Arctic grayling, it would be significantly less than that expected if the measures were to be implemented across as large an area as possible and the probability of long-term persistence of fluvial Arctic grayling may be correspondingly reduced.

D. Alternatives Eliminated From Consideration Error! Bookmark not defined.

Two alternatives were eliminated from consideration for logistical reasons--a range-wide umbrella Agreement and individual landowner-by-landowner Agreements covering the same area as the proposed action. A range-wide umbrella Agreement for fluvial Arctic grayling would extend outside the Big Hole River system and include other drainages in the upper Missouri River system where fluvial Arctic grayling historically occurred and where fluvial Arctic grayling reintroduction projects may be planned or ongoing. As such, translocation efforts to reestablish fluvial Arctic grayling populations would be the focus in project areas outside of the Big Hole River. This alternative was eliminated as logistically unfeasible given current staffing and financial resources for the participating Agencies who determined the best use of these resources would be to focus on securing the remaining fluvial Arctic grayling population in the Big Hole River.

A landowner-by-landowner approach also was rejected as logistically unfeasible. Under this alternative, USFWS would make individual agreements and issue section 10 permits to each landowner interested in fluvial Arctic grayling conservation across the same project area described in the Proposed Action, Alternative B. The regulatory assurances and types of conservation measures implemented would be similar to those described in the Proposed Action. The landowner-by-landowner alternative was removed from consideration because USFWS does not currently have the resources to implement the Agreement in this manner and the cumulative conservation benefits to fluvial Arctic grayling would be diminished compared to the umbrella approach. The landowner-by-landowner alternative would require USFWS to develop, approve, and implement up to 318 individual plans (i.e., number of non-Federal landowners in the project area). The complexity of individual plans would vary, but many would be expensive and time-consuming to develop and would potentially replicate much of the efforts in the initial development of an umbrella Agreement. The time required to process up to 318 individual applications would likely result in less landowner participation and ultimately slow the actual implementation of conservation measures that are urgently needed to help fluvial Arctic grayling

in the project area. Thus, implementation of a landowner-by-landowner alternative would result in a piecemeal approach, less effective comprehensive conservation planning compared with the umbrella Agreement, and significantly reduced conservation benefits to fluvial Arctic grayling.

The USFWS also considered modifying Alternative C to give individual landowners excluded from the Project Area the option of individual Agreements. The USFWS would make individual agreements and issue section 10 permits to each landowner interested in fluvial Arctic grayling conservation in the excluded sections. The regulatory assurances and types of conservation measures implemented would be similar to those described in the Proposed Action. However, this modification was rejected for reasons similar to the landowner-by-landowner option above. In addition to being logistically unfeasible and time consuming, the action would bear little difference to the Proposed Action while requiring a more cumbersome process.

The USFWS considered a modified version of the Proposed Action that included only private property owners with lands adjacent to the Big Hole River and its tributaries upstream of Dickie Bridge. This alternative would be an umbrella agreement with the permit held by Montana FWP, and the regulatory assurances and types of conservation measures implemented would be similar to those described in the Proposed Action. This alternative could enroll up to 132 private landowners whose properties totaled more than 170,000 acres. This alternative would provide important protections for the riparian habitat in the upper Big Hole River watershed, and involve a number of landowners with senior water rights. However, this option was rejected because it would exclude those private landowners that held water rights but irrigated hay fields, pasture, or stock some distance from the river. Moreover, individual irrigation ditches may service multiple landowners, some of whom may not own property adjacent to the stream or river and would not be eligible to participate in such an agreement. The cooperative nature of the irrigation system in the upper watershed thus requires an integrated conservation program that can include all private property owners.

Table 1. List of representative activities that are likely to be implemented to benefit fluvial Arctic grayling under the four general categories of conservation measures outlined in the proposed project (Alternative B).**Error! Bookmark not defined.Error! Bookmark not defined.** The same or similar measures may be implemented under Alternative C, and to a lesser extent Alternative A. The right-hand column indicates whether the action or practices involves potential temporary or short-term ground disturbance.

General Measure	Strategy	Specific Action or Facilitating Practices	Temporary or Short-term Ground Disturbance
Improve streamflows	Compliance with water rights	Regulate diversion	No
	Voluntary irrigation reductions	Regulate diversion	No
	NRCS' Irrigation Water Management plan	Replace or repair headgates	Yes
		Replace or repair diversion structures	Yes
		Ditch lining or modification of existing conveyance	Yes
		Irrigation canal or field ditch	Yes
		Irrigation Land Leveling	Yes
		Land Smoothing	Yes
		Utilize livestock forage with less water demand/Pasture & Hay Planting	Unknown
		Construct groundwater wells	Yes
		Construct off-channel livestock watering facilities	Yes
		Install piping for water transport	Yes
Conserving or restoring riparian habitats	Passive riparian restoration	Prescribed grazing - Fencing livestock	Yes
		Moving livestock (rotational grazing)	No
	Active riparian restoration	Replanting willow, natural vegetation, or other riparian herbaceous cover (channel bank vegetation)	Yes
	Active channel restoration*	Excavate pools	Yes
		Bank stabilization	Yes
		Channel Stabilization	Yes
Provide passage for fluvial Arctic grayling	Removal or installation of necessary structures	Install fish passage	Yes
		Remove barriers	Yes
		Redesign and install "fish-friendly" diversions	Yes
Reducing Entrainment threats	Mitigation	Rescue entrained fluvial Arctic grayling	No
		Reduce diversion volume & timing of withdrawals	No
	Installation of necessary structures	Install fish screen	Yes
		Redesign diversion and flow regulation structures	Yes
Reduce stream nutrient loading†	NRCS 'Nutrient management guidelines	Reduced fertilizer application	No
		Manure transfer away from streams	No

* Restoration of channel morphology and function would be achieved primarily through the interactive effects of improved streamflows and restored riparian habitats. However, active channel restoration may be necessary.

†Although "Reduce stream nutrient loading" is not listed among the four general categories of conservation measures, it is highly probable given anecdotal reports on current conditions in the proposed project area that NRCS guidelines for nutrient management would be used to address nutrient loading issues on specific properties.

III. AFFECTED ENVIRONMENT

A. **Introduction**Error! Bookmark not defined.

The lands to be included in the proposed action and for analysis in this EA include the Big Hole River watershed in Beaverhead and Deerlodge Counties in southwestern Montana (Figures 1-5). The entire Big Hole River watershed is 1,785,600 acres (HUC# 10020004), and the watershed area upstream of Dickie Bridge, which is being defined as the "upper Big Hole River watershed" in the context of the proposed action, is about 1,026,099 acres. The project area includes over 388,000 acres of non-Federal lands in the upper watershed. Approximately 80.6 percent of the project area is in Beaverhead County while the remainder is in Deerlodge County. The project area includes about 6 to 7 percent of the believed historical distribution of fluvial Arctic grayling in native waters of the upper Missouri River system. The subsequent descriptions and detailed analyses of the affected environment contain information at a spatial scale greater than the proposed project area because some data were only available by total watershed area or county.

The Big Hole River drains an approximately 1.8 million-acre (ca. 2,800-square mile) intermontane basin characterized as the highest and widest mountain valley of southwestern Montana with much of the valley floor above 1,800 meters (6,000 feet) elevation (Figure 5). The river's headwaters are located in the Beaverhead Mountains of the Bitterroot Range southwest of Jackson, Montana. The river flows for about 150 miles before its confluence with the Beaverhead River at Twin Bridges to form the Jefferson River, a major tributary to the Missouri River to the east (Figure 3).

The upper watershed's climate is characterized by long cold winters, short hot summers and low annual precipitation (in valley locations). Much of the project area can be described as high elevation semi-arid rangeland. The area around Wisdom receives an average of around 28 centimeters/yr (11 inches/yr), while the headwater locations may average greater than 127 centimeters/yr (50 inches/yr) (Upper Big Hole River Total Maximum Daily Load [TMDL] 2003). Sub-zero temperatures are common in winter, maximum daily temperatures are below freezing an average of 75 days/yr, and the area has only about 88 frost-free days per year (Upper Big Hole River TMDL 2003). Vegetation is typical for higher-elevation sites in the Rocky Mountain ecoregion. Mountain areas are predominantly coniferous forests (e.g., lodgepole pine and Douglas fir), transitioning to mixed sub-alpine forest and mesic shrubs in the mid-elevation foothills, with sagebrush, grasslands, and agricultural lands in the valley bottom.

The Big Hole River watershed is situated in the thrust belt of the Northern Rocky Mountain physiographic province (Marvin and Voeller 2000). The mountains delineating the watershed are mostly "uplifted Proterozoic and Cretaceous sedimentary and igneous rocks" (Marvin and Voeller 2000). Much of the valley bottom is characterized as "Quaternary alluvial and glacial deposits often overlying Tertiary aged sedimentary rocks of the Bozeman Formation" (Upper Big Hole River TMDL 2003). Sediment fill deposits in the upper basin can be in excess of 10,000 feet thick (Marvin and Voeller 2000; Upper Big Hole River TMDL 2003).

Much of the watershed is under public ownership. Approximately 67 percent of the watershed is owned by the Federal government (58 percent U.S. Forest Service [USFS] 9.4 percent Bureau of

Land Management [BLM], and 0.04 percent National Park Service [NPS]) and 3.4 percent is owned by the State of Montana. The remaining 28.9 percent is privately owned (data from Table 1 in Marvin and Voeller 2000). The public lands are predominately located in the foothills and mountains and managed by the USFS and BLM (Figure 5). The valley bottoms are mostly privately and State owned and managed for hay production and livestock grazing on large ranches. The Big Hole Valley is rural and has only about 900 residents (>montanapartners.fws.gov/mt3c.htm<), but the watershed is extensively used for dispersed recreation, hunting and fishing.

Fluvial Arctic grayling are found primarily in the low-gradient reaches of the river and tributary streams located in the valley bottoms of the upper watershed, thus the majority of presently occupied fluvial Arctic grayling habitat in the Big Hole River watershed is adjacent to non-Federal lands in the proposed project area. The non-Federal lands in the project area, being characteristic of the valley bottom, are primarily sagebrush and low cover grassland, with a thin strip of vegetation (primarily willows) in remaining intact riparian habitats.

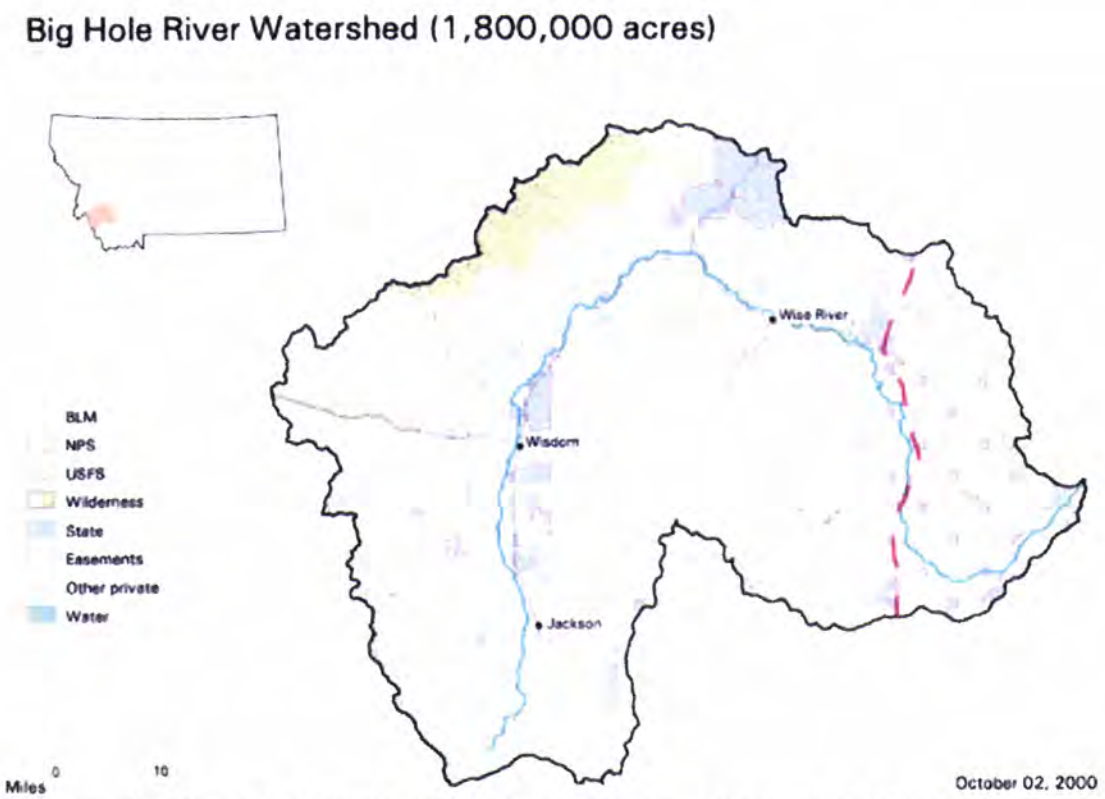

Figure 5. The Big Hole River watershed in southwestern Montana, with headwaters situated at bottom left of map. Map courtesy of the USFWS' Montana Partners (>http://montanapartners.fws.gov/images/bh1.jpg<).

B. Ecology of Fluvial Arctic Grayling Error! Bookmark not defined.

Fluvial (river-dwelling) Arctic grayling are adapted to life-long residence in stream environments and can make long seasonal migrations between spawning, feeding and wintering

areas within the river systems they inhabit (Shepard and Oswald 1989, Lamothe and Magee 2003). Fluvial Arctic grayling inhabit cool water streams having low-to-intermediate gradients, and prefer pool habitat (Kaya 1990; Byorth and Magee 1998). In Montana, fluvial Arctic grayling spawn from late April to mid May by depositing adhesive eggs over sand and gravel without excavating a redd or nest (Kaya 1990; Shepard and Oswald 1989). Eggs develop and hatch within a few weeks. The weakly swimming young-of-the-year fluvial Arctic grayling prefer slow-water rearing habitat along vegetated and unvegetated stream margins with velocity refuges, back-waters in side channels, or adjacent to beaver dams. Young-of-the-year fluvial Arctic grayling grow quickly, and can attain a size of 145 millimeters (>5 inches) by end of their first summer (Magee and Lamothe 2004). Fluvial Arctic grayling in Montana typically reach maturity in their third or fourth year of life, and seldom live beyond age-6 (Magee and Lamothe 2003). Fluvial Arctic grayling of all ages feed opportunistically on drifting invertebrates (Hughes 1992, 1998). The aggressive feeding behavior of fluvial Arctic grayling is linked to their pattern of habitat selection. Adult fluvial Arctic grayling prefer deep pools (Lamothe and Magee 2003, 2004), and may use water depth and turbulence as cover from avian and terrestrial predators.

1. Population Status of Fluvial Arctic Grayling

The indigenous fluvial Arctic grayling of the upper Missouri River basin was widely but irregularly distributed above the Great Falls (Vincent 1962), and inhabited up to 2,000 kilometers (1,250 miles) of stream habitat in Montana and portions of northwestern Wyoming until the early 20th century (Kaya 1990, 1992a). In addition to the waters of the mainstem upper Missouri River, fluvial Arctic grayling were documented in the drainages of the Sun, Smith, Jefferson, Beaverhead, Big Hole, Madison, Gallatin, Gibbon, and Firehole Rivers, and Grayling, Bridger, Bozeman, and Fan Creeks. Present fluvial Arctic grayling distribution has been reduced to less than 5 percent of its historic range, and the only remaining indigenous self-sustaining confirmed fluvial population is found in an approximately 80-kilometer (50-mile) segment of the upper Big Hole River and associated tributary streams (Shepard and Oswald 1989; Kaya 1990, 1992a). The core of this population is contained within the project area of the proposed action.

The fluvial Arctic grayling inhabiting the Big Hole River are part of the DPS that has been considered a candidate for listing under the ESA since 1994. The listing priority number for the fluvial Arctic grayling is currently the highest that can be assigned to a DPS, in recognition that the last remaining fluvial population in the Big Hole River is at very low abundance and at risk from combined effects of existing land and water use practices in the system and continuing widespread drought in southwestern Montana (70 FR 24898, May 11, 2005). Descriptions of the specific threats facing fluvial Arctic grayling in the Big Hole River watershed and in the project area for the proposed action are described below.

2. Threats to Fluvial Arctic Grayling

(1) The present or threatened destruction, modification, or curtailment of its habitat or range. The majority of the historic range of the upper Missouri River fluvial Arctic grayling DPS has been altered by the construction of dams and reservoirs that created barriers that have obstructed

migrations to spawning, wintering or feeding areas; inundated fluvial Arctic grayling habitat; and impacted the historical hydrology of river systems (Kaya 1990). In the Big Hole River watershed, local land and water use has affected surface water hydrology, riparian zone conditions, stream morphology, thermal characteristics, and possibly nutrient inputs to the aquatic system (Kaya 1990; OEA Research, Inc. 1995; Lohr et al. 1996; Lamothe and Magee 2004; Upper Big Hole River TMDL 2003). The operation of irrigation systems in the Big Hole has apparently led to direct fragmentation of stream habitats.

Surface Water Hydrology - The predominant land use in the upper Big Hole watershed is irrigated agriculture for hay production and livestock pasture. Irrigation demands on the system are very high because of over-allocation of water rights, difficult to control and inefficient surface water (flood) irrigation systems, a recent shift to increased pasture grazing, and a continuing drought. These demands have resulted in significantly reduced instream flows that pose a major threat to fluvial Arctic grayling. Reduced streamflows can reduce the growth and survival of fluvial Arctic grayling through reduction of available habitat.

Riparian Zone (Streamside) Conditions - Riparian zones are critical for the ecological function of most aquatic systems (Gregory et al. 1991). Riparian habitats dissipate stream energy during floods, filter sediments and pollutants, facilitate ground-water recharge, cool streams by shading, stabilize streambanks, maintain channel characteristics, promote floodplain development, and input woody debris, organic material, and terrestrial insects (e.g., Murphy and Meehan 1991; Prichard et al. 1998). Loss of riparian zones through streamside livestock grazing and direct removal of natural vegetation has led to degradation of adjacent stream habitat in the upper Big Hole River (OEA Research, Inc. 1995; Upper Big Hole River TMDL 2003; Lamothe and Magee 2004). Healthy riparian corridors are vital for maintaining instream habitat for fluvial Arctic grayling in the upper Missouri River basin.

Stream Morphology - The combination of reduced instream flows and loss of riparian habitats in the Big Hole River has led to decreased channel stability, increased erosion, and channel widening (e.g., Upper Big Hole River TMDL 2003). In concert, these changes have led to habitat simplification such as a reduction in pool and riffle sequences. Reduced habitat diversity affects fluvial Arctic grayling by decreasing the distribution and frequency of necessary spawning, feeding and refuge habitats.

Water Quality: Thermal Impairment and Nutrients - Reduced stream flows during summer, reduced shading because of riparian vegetation removal, and channel widening are factors that have combined to increase water temperatures by making surface waters more sensitive to solar radiation. Thermal alterations via increased summer water temperatures pose a threat to fluvial Arctic grayling in the mainstem Big Hole River (e.g., Lohr et al. 1996; Magee and Lamothe 2004).

Nutrient enrichment may be a potential problem in the upper Big Hole River (Upper Big Hole River TMDL 2003 and reference therein). Further data are needed to determine if nutrient enrichment is affecting water quality to the extent that fluvial Arctic grayling are being harmed. However, the potential for fertilizers applied to irrigated lands and livestock waste to provide a

source of nutrients to the river appears substantial given the surface (flood) irrigation techniques utilized in the upper Big Hole basin.

Habitat Fragmentation - Habitat fragmentation is often considered one of the most significant threats to the survival to salmonid fishes in the western United States (Behnke 2002). In addition to the effects of habitat loss and fragmentation from stream dewatering by irrigation, the presence and operation of irrigation diversions can fragment fluvial Arctic grayling habitat in two additional ways. First, cross-channel diversions may block fish passage under all or some flow conditions, impeding fluvial Arctic grayling access to necessary spawning, rearing and refuge habitats. Second, irrigation diversions and ditches may entrain (inadvertently capture) fluvial Arctic grayling (e.g., Shepard and Oswald 1989).

(2) Overutilization for commercial, recreational, scientific, or educational purposes.
Fluvial Arctic grayling in the upper Big Hole River are physically handled for recreational and scientific purposes. Fluvial Arctic grayling are easily caught by anglers (e.g., Alberta Sustainable Resource Development 2005), and historical angling exploitation likely contributed to, or initiated past declines or local extirpations throughout the upper Missouri River DPS (Vincent 1962). Currently, catch-and-release regulations are in effect for fluvial Arctic grayling in rivers in Montana. Under provisions of the Big Hole River Drought Management Plan, angling is closed when specific low flow and high temperature thresholds at the U.S. Geological Survey (USGS) Wisdom (#06024450) and USGS Melrose (#06025500) gaging stations are exceeded (Big Hole Watershed Committee 1997).

Montana FWP has consistently monitored populations of fluvial Arctic grayling in the Big Hole River since the early 1980s. The experience of Montana FWP fishery biologists, combined with sampling restrictions when environmental conditions are stressful, indicates negligible effects on fluvial Arctic grayling from scientific and resource management sampling. In the Big Hole River, overall threats to fluvial Arctic grayling from overutilization are not significant compared to those posed by direct alteration of habitat.

(3) Disease, competition, or predation.
Arctic grayling are resistant to whirling disease (Hedrick et al. 1999), but are susceptible to bacterial kidney disease (BKD). However, BKD tends to affect captive rather than wild populations (Myers et al. 1993; Peterson 1997).

Predation and/or competition with nonnative trout is thought to limit fluvial Arctic grayling in some situations (Kaya 1992a). Nonnative brook trout (*Salvelinus fontinalis*), rainbow trout (*Oncorhynchus mykiss*), and brown trout (*Salmo trutta*) are well-established with locally abundant populations throughout the upper Missouri River drainage including the Big Hole River. Research on competition between fluvial Arctic grayling and non-native brook trout found little evidence that brook trout negatively affected microhabitat use or growth of juvenile (age-1) hatchery-reared and wild fluvial Arctic grayling (Byorth and Magee 1998). However, further studies are necessary to determine whether competition or predation occur at other life stages or with brown or rainbow trout. Arctic grayling may have particular difficulty coexisting with brown trout (Kaya 2000). Overall, the decline of fluvial Arctic grayling in the upper Missouri River coinciding with encroachment by nonnative trout (Vincent 1962; Kaya 1990,

1992a, 2000), and the difficulty in reestablishing fluvial Arctic grayling populations where nonnatives are present (Kaya 1992b) provide circumstantial evidence of threats from nonnative trout.

Piscivorous American white pelican (*Pelecanus erythrorhynchos*), bald eagle (*Haliacetus leucocephalus*), osprey (*Pandion haliaetus*), great blue heron (*Ardea herodia*), and belted kingfisher (*Ceryl alcyon*) are seasonally present in Big Hole River valley, and can be effective fish predators. However, there are no data demonstrating these avian species are having a negative impact on fluvial Arctic grayling populations in the Big Hole River. These species are native to Montana (Montana Bird Distribution Committee 1996), and presumably have historically coexisted with fluvial Arctic grayling in the Big Hole River.

(4) The inadequacy of existing regulatory mechanisms.
State and Federal natural resource agencies in Montana have been monitoring the current population status of fluvial Arctic grayling and have been actively involved in conservation and restoration activities. However, despite the attention and protections fluvial Arctic grayling receive since they are a candidate species for listing under the ESA, there are no specific Federal laws currently in place to protect fluvial Arctic grayling in Montana. Montana considers fluvial Arctic grayling a "Species of Special Concern," but this designation does not confer any particular protection for the species.

Montana FWP instituted catch-and-release angling restrictions for fluvial Arctic grayling and increased possession limits for nonnative brook trout, and also have a policy to suspend recreational angling under drought conditions in reaches where water temperatures in the Big Hole River exceed 70°F for more than 8 hours per day for 3 consecutive days (Montana FWP Fishing Closure Policy, Headquarters, Helena, Montana). The Big Hole River is currently being evaluated under section 303(d) of the Federal Clean Water Act. Moreover, much of the Big Hole River system may soon be subject to water rights adjudication under Montana State water law.

(5) Other natural or manmade factors affecting its continued existence.
Drought is a significant threat to well-being of fluvial Arctic grayling populations in the upper Missouri River basin. Southwestern Montana has experienced a severe drought since 1999, which has exacerbated the impacts of water withdrawals in the upper Missouri and Big Hole River basin. Reductions in populations of fluvial Arctic grayling and nonnative trout in the Big Hole River appear to coincide with periods of drought (Magee and Lamothe 2003, 2004). Climate change (global warming) is predicted to result in habitat loss and fragmentation for salmonid species in the Rocky Mountains (Keleher and Rahel 1996), and should place further thermal constraints on fluvial Arctic grayling in the Big Hole River (Lohr et al. 1996) if other habitat conditions do not improve.

The fluvial Arctic grayling in the Big Hole River are possibly subject to environmental and genetic problems typically observed in small populations. The importance of demographic uncertainty, environmental uncertainty, natural catastrophes, and genetic uncertainty on population dynamics all increase with decreasing population size (Shaffer 1987). Fluvial Arctic grayling in Montana appear to have low genetic variability compared to populations elsewhere (Everett 1986; Redenbach and Taylor 1999). Thus, effects from random survival and reproduction of individuals (demographic uncertainty); variation in climate, food resources, competitors, parasites (environmental uncertainty); random occurrence of floods and drought (natural catastrophes); and genetic drift (genetic uncertainly) may threaten the long-term persistence of this population.

C. Hydrology Error! Bookmark not defined.

Monthly hydrographs for two locations in the upper watershed demonstrate that snowmelt runoff begins in April and generally peaks in June (Figure 6). Discharge declines throughout the summer as the snowpack melts. Baseflow conditions are generally reached in late summer and fall, when river flows are affected by discharge of ground water to the surface-water system (Marvin and Voeller 2000).

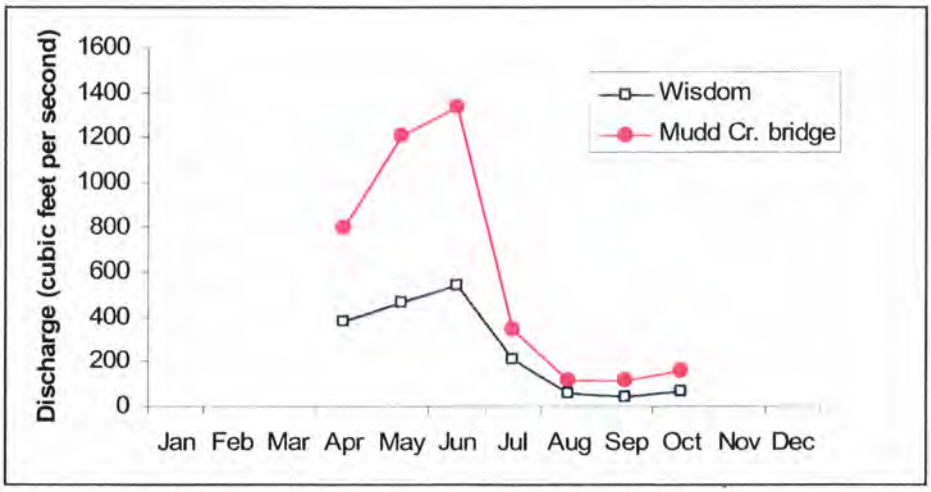

Figure 6. Hydrograph for two locations in the upper Big Hole River watershed. Points are the mean monthly discharge at Wisdom (1998-2004) and at the Mudd Creek Bridge (1998-2004). Gages are operated only during the months of April-October.

Human activities have compromised the structure and function of the Big Hole River in the proposed project area. The predominant land use in the upper Big Hole watershed and the proposed project area is irrigated agriculture, specifically hay production and livestock pasture. Flood (surface) irrigation is almost exclusively used to irrigate hay fields and pastures in the proposed project area. These land-use activities have been occurring in the area for more than a century, and have resulted in significant changes to the system's natural hydrology. Irrigation withdrawals, in concert with effects of drought, have attenuated high-flow events and lowered base flow conditions. The TMDL assessment in the upper Big Hole River concluded that flood irrigation during summer months influenced the dewatering that frequently occurs in the river

upstream of Wisdom (Upper Big Hole River TMDL 2003). The upper Big Hole River is listed as "impaired" under the State of Montana's 303(d) list, citing flow alterations and thermal modifications.

Flow alterations and dewatering are implicated in the poor reproductive success of fluvial Arctic grayling in the upper mainstem Big Hole River. These alterations to the natural system likely reduce the survival and growth of all age classes of fluvial Arctic grayling by limiting their ability to move between necessary habitats and by causing acute or chronic thermal stress. Overall, reduced instream flows tend to coincide with a reduced abundance of fluvial Arctic grayling in the upper Big Hole River (Magee and Lamothe 2003, 2004). Thermal conditions stressful to salmonid fishes such as fluvial Arctic grayling frequently occur in the mainstem Big Hole River during summer months (e.g., Magee and Lamothe 2003, 2004).

The available data indicates that the flood irrigation techniques used in the project area are relatively inefficient and that some fields and pastures are over-irrigated (Montana FWP et al. 2005 and references therein). The proposed Agreement generally concludes that reducing the magnitude of these diversions would improve overall hydrologic conditions and benefit fluvial Arctic grayling. There is some evidence that ground-water recharge and return flows from these irrigation practices may influence late summer and fall streamflows in some locations, but losses from evapotranspiration can be significant (Marvin and Voeller 2000). Moreover, some irrigation return flows may result in thermal or nutrient loading. Studies are ongoing to better characterize the interactions between irrigation diversions, groundwater recharge, irrigation return flows and surface-water discharge (M. Roberts, Montana DNRC, pers. comm.). However, the current weight of the evidence indicates the upper Big Hole River is plagued by chronic dewatering and that reducing the amount of water diverted for irrigation would improve habitat conditions for fluvial Arctic grayling. The proposed Agreement outlines changes (conservation measures) designed to promote a more "natural" hydrograph in the system to restore fluvial processes of erosion and deposition while providing instream flows that would promote recovery of fluvial Arctic grayling.

Collectively, the hydrological template of the upper Big Hole River system has been affected by irrigation withdrawals and flood irrigation techniques that have been used for more than a century. In addition, the physical template of the river system has been affected by irrigation and land use practices related to historical agricultural practices including the installation of diversion structures that block fish movement, operation of irrigation ditches that inadvertently entrain fish, disturbance of streambeds to create "push up" irrigation diversions, and degradation of riparian zone communities by livestock or direct human manipulation.

D. Vegetation Error! Bookmark not defined.

Vegetation in the upper Big Hole River watershed is somewhat typical of higher-elevation locations of the Rocky Mountain ecoregion. The predominant vegetation types, by area, are evergreen forests (Table 2), primarily lodgepole pine and mixed alpine forest. These types, plus other types of coniferous forest are the predominant vegetation types at higher elevations in the watershed. At mid-elevations, coniferous forest gives way to mixed forest and sagebrush or dry-land shrubs, while sagebrush, grasslands, and irrigated fields and pastures predominate at

lower-elevation sites characteristic of valley bottoms (Upper Big Hole River TMDL 2003). The proposed project area is on non-Federal lands in the upper watershed, which are primarily the valley bottoms or lowlands adjacent to the Big Hole River and its tributaries. Two independent datasets were used to more specifically characterize land cover and vegetation in the project area--the USGS' National Lands Cover Dataset and the 1998 GAP analysis for Montana (Tables 3 and 4, respectively). Both datasets indicate the majority of the project area is grassland and shrubland, with coniferous forests, irrigated agricultural lands (agriculture or pasture/hay), wetlands, and riparian zones comprising lesser, but significant, amounts (Tables 3 and 4).

Existing land use has resulted in changes to plant communities in the project area. Widespread loss of riparian vegetation has been observed in the project area, primarily as a result of livestock grazing or direct removal (Lamothe and Magee 2003; Upper Big Hole River TMDL 2003). Anecdotal reports suggest that over-irrigation has converted areas of sage or dry-land vegetation to wetland-type species including sedges and forbs (Upper Big Hole River TMDL 2003).

Two sensitive plant species, Lemhi beardtongue and Idaho sedge, occur in the project area (Table 5).

Table 2. Land use categories for the 1.8 million acre Big Hole River watershed based on the USGS' 1:250,000 scale Land Use/Land Cover dataset.

LAND USE*	ACRES (% of total)
Evergreen Forest	914,273 (51.0%)
Grass Rangeland	522,512 (29.2%)
Crop/Pasture	75,345 (4.2%)
Brush Rangeland	70,014 (3.9%)
Wetland	58,617 (3.3%)
Mixed Rangeland	53,380 (3.0%)

*Land use categories representing <1% of the total watershed area include (total acres): Exposed Rock (15,038), Shrub Tundra (9,607), Deciduous Forest (9,170) Transportation/Utilities (1,763), Lakes (1,518), Mine/Quarry (498), Other Agriculture (435), Mixed Tundra (320), Mixed Urban (184), Other Urban (165), Residential (128), Reservoir (47) and Commercial (6).
(*Data from: State of Montana NRIS database*)

Table 3. Land cover in the proposed project area within the upper Big Hole River watershed based on the USGS' National Lands Cover Dataset.**Error! Bookmark not defined.**

LAND COVER DESCRIPTION*	ACRES (% of total)
Grasslands/Herbaceous	237,160 (61.2%)
Shrubland	74,778 (19.3%)
Evergreen Forest	26,881 (6.9%)
Pasture/Hay	24,634 (6.4%)
Woody Wetlands	13,280 (3.4%)
Emergent Herbaceous Wetlands	6,822 (1.8%)

*Land use categories representing <1% of the total project area include (total acres): Open Water (1,582), Deciduous Forest (1,470), Small Grains (515), Bare Rock/Sand/Clay (189), Row Crops (49), Commercial/Industrial/Transportation (20), Mixed Forest (16), Transitional (11.6), Perennial Ice/Snow (9.6), Low Intensity Residential (6) and Urban/Recreational Grasses (<1).
(Data from: NLCS dataset and cover analysis conducted by Montana Natural Heritage Program on 8-11-05)

Table 4. Land cover in the proposed project area within the upper Big Hole River watershed based on the 1998 GAP analysis of land cover in Montana.**Error! Bookmark not defined.**

LAND COVER DESCRIPTION*	ACRES (% of total)
Dry Shrubland	112,808 (28.9%)
Upland Grasslands	102,200 (26.2%)
Agricultural	89,878† (23.0%)
Conifer Forest	28,532 (7.3%)
Moist Shrubland	25,975 (6.7%)
Mixed Conifer Forest	11,956 (3.1%)
Mixed Riparian	8,099 (2.1%)

*Land use categories representing <1% of the total project area include (total acres): Mixed Deciduous-Aspen (3,345), Mixed Deciduous-Conifer Forest (2,602), Exposed Rock (1,615), Water (1,145), Mixed Moist Forest (1,012), Barren Land (576), Alpine Areas (415), Barren Alpine Tundra (301), Cloud Shadow (<1), and Cloud (<1).
† Approximately 89,537 acres of the agricultural lands are irrigated.
(Data from: 1998 Montana GAP analysis and land cover analysis conducted by USDA Natural Resources Conservation Service on 8-11-05)

E. Wetlands Error! Bookmark not defined.

Wetlands are habitats on the interface between terrestrial and aquatic systems where the water table is at or near the surface, soils are often saturated with or covered by shallow water and vegetation communities are adapted to saturated soil conditions (Cowardin et al. 1979). Wetlands are ecologically significant and diverse habitats, providing important rearing and refuge habitat for wildlife species and influencing physical and hydrologic processes such as erosion, runoff, and the filtering of nutrients and minerals. The USGS 1:125,000 Land Use/Land Cover Dataset indicates there are approximately 58,617 acres of wetland habitat in the Big Hole River watershed, representing 3.3 percent of the total land area (Table 2). The National Lands Cover Dataset indicates there are approximately 20,103 combined acres of woody and emergent herbaceous wetlands in the ~382,000-acre proposed project area, which represents 5.2 percent of the total area (Table 3).

Table 5. List of sensitive and threatened plant and vertebrate animal species present in the proposed project area. All species listed here are considered Species of Concern in Montana, but have variable status under different listing authorities.**Error! Bookmark not defined.**

COMMON AND SCIENTIFIC NAME	ESA STATUS	USFS STATUS	BLM STATUS
PLANTS			
Lemhi Beardtongue (*Penstemon lemhiensis*)	-	Sensitive	Sensitive
Idaho Sedge (*Carex idahoa*)	-	Sensitive	Sensitive
ANIMALS (VERTEBRATE)			
Bald Eagle (*Haliaeetus leucocephalus*)	Threatened (potential de-listing)	Threatened	Special Status
Arctic Grayling - Upper Missouri River Fluvial (*Thymallus arcticus*)	Candidate	-	Special Status
Greater Sage-grouse (*Centrocercus urophasianus*)	-	Sensitive	Sensitive
Gray Wolf (*Canis lupus*)	Threatened (non-essential experimental)	Threatened	Special Status
Westslope Cutthroat Trout (*Oncorhynchus clarki lewisi*)	-	-	Sensitive
Canada Lynx (*Lynx Canadensis*)	Threatened	Threatened	Special Status
Northern Goshawk (*Accipiter gentiles*)	-	Sensitive	Sensitive
Great Gray Owl (*Strix nebulosa*)	-	-	Sensitive

(Data from Montana Natural Heritage Program May 31, 2005)

F. Fisheries Error! Bookmark not defined.

The Big Hole River watershed contains a moderately diverse mix of native and introduced fish species from five families (Table 6). Native species known or believed to occupy waters in the proposed project area include three species of sucker (longnose, mountain, white), mottled sculpin, longnose dace (a minnow), burbot (ling), and three salmonids (westslope cutthroat trout, fluvial Arctic grayling and mountain whitefish) (Oswald 2005). Lake trout are native to the watershed, but only occur in Twin Lakes that is outside the proposed project area.

Westslope cutthroat trout are native to the watershed and considered a Species of Special Concern by the State of Montana (Tables 5 and 6). They are found in at least 85 streams in the watershed, but are generally rare (Montana Fisheries Information System [MFISH], Montana Natural Resources Information System [Montana NRIS] and Montana FWP; >http://maps2.nris.state.mt.us/WIS/MFISHApp<). The species range of westslope cutthroat trout has been reduced factors similar to those which have affected fluvial Arctic grayling, namely habitat loss and degradation, and interactions with introduced salmonid species (Shepard et al. 2003). Westslope cutthroat trout also hybridize with introduced rainbow trout and other subspecies of cutthroat trout. Westslope cutthroat trout may occur in some waters in the proposed project area and may even be present in the same stream as fluvial Arctic grayling. However, westslope cutthroat trout are rarely found in the mainstem Big Hole River and tend to be found in higher-elevation tributary streams, whereas fluvial Arctic grayling (when present) occupy the lower-reaches of tributary streams and mainstem river habitats. Thus, even when the two species are present in the same stream their actual distributions seldom overlap. As described earlier, fluvial Arctic grayling are a species of special concern by the State of Montana, and the DPS that includes the Big Hole River fluvial Arctic grayling population is a candidate under the ESA (Table 5).

Introduced salmonid species support the important recreational fishery in the Big Hole River (Oswald 2005). Brook trout are most abundant, followed by brown trout and rainbow trout. Brown trout are arguably the single-most important game species in the river and are present in the project area, though they are much less abundant than brook trout. Introduced rainbow trout and Yellowstone cutthroat trout have hybridized with native westslope cutthroat trout at some locations in the watershed (Table 6). Introduced golden trout occur in mountain lakes outside the project area (MFISH database). Non-game introduced species present in the Big Hole River include redside shiner and common carp (*Cyprinus carpio*), but both are thought to be rare (MFISH database).

Table 6. Fish species occurrence in the Big Hole River watershed in Beaverhead and Deerlodge Counties, Montana.**Error! Bookmark not defined.**

FAMILY	SPECIES NAME	NATIVE OR INTRODUCED	BELIEVED PRESENT IN PROPOSED PROJECT AREA
Catostomidae	Longnose Sucker (*Catostomus catostomus*)	N	P
Catostomidae	Mountain Sucker (*Catostomus platyrhynchus*)	N	P
Catostomidae	White Sucker (*Catostomus commersoni*)	N	P
Cottidae	Mottled Sculpin (*Cottus bairdi*)	N	P
Cyprinidae	Longnose Dace (*Rhinichthys cataractae*)	N	P
Cyprinidae	Redside Shiner (*Richardsonius balteatus*)	I	
Gadidae	Burbot (*Lota lota*)	N	P
Salmonidae	Fluvial Arctic Grayling (*Thymallis arcticus*)	N	P
Salmonidae	Brook Trout (*Salvelinus fontinalis*)	I	P
Salmonidae	Brown Trout (*Salmo trutta*)	I	P
Salmonidae	Golden Trout (*Oncorhynchus aguabonita*)	I	
Salmonidae	Lake Trout (*Salvelinus namaycush*)	N	
Salmonidae	Mountain Whitefish (*Prosopium williamsoni*)	N	P
Salmonidae	Rainbow Trout (*Oncorhynchus mykiss*)	I	P
Salmonidae	Westslope Cutthroat Trout (*Oncorhynchus clarki lewisi*)	N	P
Salmonidae	Westslope cutthroat trout X Rainbow trout hybrid	I	
Salmonidae	Westslope cutthroat trout X Yellowstone cutthroat trout X Rainbow trout hybrid	I	
Salmonidae	Yellowstone Cutthroat Trout (*Oncorhynchus clarki bouvieri*)	I	
Salmonidae	Yellowstone Cutthroat Trout X Westslope Cutthroat trout hybrid	I	

(Data from Montana MFISH >http://maps2.nris.state.mt.us/WIS/MFISHApp<; note: The MFISH database search for the Big Hole River indicated common carp *Cyprinus carpio* were present, but carp were not detected when the search was constrained to Beaverhead and Deerlodge Counties so they were not included in the above table)

The tailed frog (*Ascaphus montanus*) and Columbia spotted frog (*Rana luteiventris*) are present in the upper Big Hole Watershed, though the tailed frog is less likely to occur in the project area because it tends to occupy higher elevation habitats and favors small, cold mountain streams (Montana Natural Heritage Program - http://nhp.nris.state.mt.us). A Montana Natural Heritage Program database search did not detect any sensitive or threatened species of amphibians in the proposed project area.

G. Wildlife Error! Bookmark not defined.

A handful of at risk wildlife species occur in the project area. The Montana Natural Heritage Program database indicates that three ESA-listed wildlife species (bald eagle, lynx, and gray wolf) and two sensitive bird species (great gray owl and greater sage grouse) may be present in the proposed project area (Table 5). Bald eagle is a federally threatened species is occasionally sighted in the proposed project area (Mike Roberts, Montana DNRC, Helena, Montana, pers. comm.). However, USFWS records indicate that the nest location for this territory (#38007) is located downstream and outside of the actual project area (USFWS 2005), so use of the project area may be limited to occasional foraging. The USFWS is currently considering whether bald eagle should be delisted (USFWS 1999).

Gray wolf is a federally threatened species and present in the project area. Wolves in the Big Hole River Valley are part of the "Battlefield" pack, and the pack is a component of a "non-essential experimental" population (under section 10(j) of the ESA) in the Central Idaho Recovery Area (USFWS et al. 2005). At least 10 wolves were believed to belong to this pack as of December 2004 (USFWS et al. 2005), but since that time the entire pack has been lethally controlled because of wildlife depredations (Joe Fontaine, USFWS, Helena, Montana, pers. comm.). Wolves designated as nonessential experimental that are not within units of the NPS or National Wildlife Refuge systems but are within the boundaries of the nonessential experimental population area are treated as proposed species for section 7 purposes. As such, Federal agencies are only required to confer with USFWS when they determine that an action they authorize, fund, or carry out "is likely to jeopardize the continued existence" of the species.

Lynx occur in the Big Hole River watershed, and generally prefer higher-elevation, forested montane habitats (McKelvey et al. 2000). The Montana Natural Heritage Program database search of "at risk" wildlife species indicates that lynx have been observed in the project area (Table 5), but such occurrences seem unlikely or infrequent because the majority of the project area is grassland or rangeland (Tables 3 and 4). Sensitive bird species in the project area include northern goshawk and greater sage grouse (Table 5).

The project area is large and bounded by large tracts of public lands and comparatively pristine mountain habitats, so various species of non-sensitive game and non-game wildlife may be abundant in the area. Big-game species that likely occur in the project area include whitetail deer (*Odocoileus virginianus)*, mule deer (*Odocoileus hemionus)*, antelope (*Antilocapra americana)*, elk (*Cervus elaphus)*, moose (*Alces alces)*, and black bear (*Ursus americanus)* (distribution inferred from species-specific hunting areas from Montana FWP "Plan a Hunt" database >http://fwp.state.mt.us/hunting/planahunt/default.aspx<). Upland game bird species that likely occur in the project area include sage grouse (*Centrocercus urophasianus)*, spruce

grouse (*Falcipennis canadensis)*, ruffed grouse (*Bonasa umbellus)*, and Hungarian (gray) partridge (*Perdix perdix)*. Carnivorous mammals including coyote (*Canis latrans*), red fox (*Vulpes vulpes*), bobcat (*Felis rufus*) and mountain lion (*Felis concolor*) may inhabit or occasionally enter portions of the project area (Montana Natural Heritage Animal Field Guide, http://nhp.nris.state.mt.us/animalguide). Mammal species associated with aquatic habitats, such as beaver (*Castor canadensis*), muskrat (*Ondatra zibethicus*), mink (*Mustela vison*), northern river otter (*Lutra canadensis*), and a variety of vole species (Family *Muridae*) may occur in the project area. Bird species including osprey (*Pandion haliaetus*), white pelicans (*Pelecanus erythrorhynchos*), great blue heron (*Ardea herodia*), belted kingfisher (*Ceryl alcyon*), and various species of waterfowl (Family *Anatidae*) and owls (Family *Strigidae*) may be found in the project area.

H. Social Considerations Error! Bookmark not defined.

1. Cultural and Historical Resources

The Big Hole River watershed is known to contain significant sites of archaeological, cultural and historic significance. For example, Native Americans historically inhabited the area, the Corps of Discovery (i.e., Lewis and Clark expedition) passed through the valley, and the Big Hole National Battlefield is located in the northwest corner of the watershed. The USFWS consulted with the Montana State Historical Preservation Office (Montana SHPO) in an attempt to characterize sites that may be present in the project area of the proposed Agreement. Because of the large number of Township-Range-Section plots in the proposed project area, the search was extended to the entire Big Hole River watershed for logistic simplicity given the structure of the Montana NRIS database. Thus, the database search was conducted over the 1.8-million acre watershed and included parts of six counties. The proposed project area represents only about 21 percent (380,000 acres) of this area. This search returned over one thousand historic or archaeological sites (Table 7), but over 60 percent of these sites were on Federal lands and would be outside the purview of the proposed Agreement. Approximately 185 sites (17.4 percent of total) potentially affected by the proposed Agreement were identified on private lands if they were located within the project footprint (Table 8).

Table 7. Results of a Montana SHPO search of previously recorded historic or archaeological sites within the 1.8-million acre (2,800 mi^2) Big Hole River watershed which includes portions of Beaverhead (1,974 mi^2), Deerlodge (321.3 mi^2), Silver Bow (285.3 mi^2), Madison (216.4 mi^2), Ravalli (1.0 mi^2), and Granite (0.2 mi^2) Counties, Montana. The project area of the proposed action is only about 21 percent (380,000 acres) of the search area (1.8 million acres).

OWNERSHIP	NUMBER OF SITES	PERCENT BY OWNERSHIP
BIA	1	0.1
BLM	207	19.5
BLM and Other	27	2.5
Burea of Reclamation	1	0.1
Combination	56	5.3
USFS	393	37.0
Montana Department of Transportation (Other)	1	0.1
NPS	26	2.4
National Wildlife Refuge	2	0.2
No Data	67	6.3
Other	9	0.8
Other State Owned	2	0.2
Private	185	17.4
State Owned	85	8.0
Total	**1,062**	**100**

[*Data from the NRIS at >http://nris.state.mt.us/<*]

These 185 sites include a variety of sites related to Native American culture, including lithic scatters and tipi rings; and Euro-American settlement, including homesteading, mining, transportation and agriculture (Table 8). It is not known which of these specific sites are present in the proposed project area, but any ground-disturbing activities to be implemented under the proposed Agreement or any site-specific plan would require an individual Montana SHPO consultation and/or survey (as necessary) to ensure compliance with applicable State and Federal regulations (i.e., National Historic Preservation Act [NHPA]).

Table 8. Recorded historical or archaeological sites (N=185) identified by Montana SHPO as being located on private lands within the 1.8-million acre Big Hole River watershed, Montana.

TYPE OF SITE	NUMBER
Cribbed Log Occupation Structure	8
Firehearths or Roasting Pits FCR	4
Historic Agriculture	2
Historic Architecture	1
Historic Dug-Out	1
Historic Euro-American Site	18
Historic Homestead/Farmstead	11
Historic Indian Agency	1
Historic Irrigation System	58
Historic Log Structure	1
Historic Mining	12
Historic Placer Mine	1
Historic Railroad Building/Structure	1
Historic Railroad Stage Route Travel	4
Historic Reclamation	1
Historic Residence	3
Historic Stock Raising	4
Historic Timber Harvesting	4
Historic Trash Dump	1
Historic Vehicular/Foot Bridge	3
Lithic Scatter	24
Other	1
Pictograph	1
Processing Area	1
Rock Alignment(s)	2
Rock Cairn(s)	5
Rock Shelter or Cave	1
Rock Structure(s)	1
Surface Stone Quarry	2
Tipi Ring	6
Vision Quest Structure	1
Workshop	1

2. Local Communities and Their Economies

The proposed project area is rural, with an economy, lifestyle and culture centered on traditional ranching. Population density in the Big Hole River watershed and proposed project area is very low. Beaverhead County, which contains over 80 percent of the project area, has a population density of 1.66 people per square mile, whereas Deer Lodge County averages 12.78 per square mile (data from 2000 Census, Montana Census and Economic Indicator Center [Montana CEIC]). Fewer than 10,000 people inhabit each of these two counties (Table 9), and fewer than 1,000 inhabit the Big Hole River watershed. The two towns in the project area, Jackson and Wisdom (Figure 5), each have fewer than 200 residents (Montana CEIC, Montana NRIS), and the human population density of much of the project area is <0.5 per square mile (Montana NRIS).

Table 9. Human Population for Counties included in the project area.

CRITERION	BEAVERHEAD	DEERLODGE
Total Population	9,202	9,417
Urban Population	4,301 (46.7%)	6,279 (66.7%)
Rural Population	4,901 (53.3%)	3,138 (33.3%)
Rural Farm Population	864 (17.6%)	113 (3.6%)
Rural Nonfarm Population	4.037 (82.4%)	3,025 (96.4%)

(Data from Montana Department of Commerce)

The rural nature of the project area also is indicative of conditions in the constituent counties. Over half of Beaverhead County is considered rural, compared to about one third of Deerlodge County. Over 62 percent of Deerlodge County's population is in the "urban" center of Anaconda, and the Big Hole Valley constitutes only 1 percent of the total estimated population (Beaverhead-Deerlodge Forest Plan Revision >www.fs.fed.us/r1/b-d/forest_plan/revision/reports_documents/social/index.htm<). About 36 percent and 29 percent of the total land areas in Beaverhead and Deerlodge Counties, respectively, are classified as being used for agriculture (Table 10). About 29 percent of the entire Big Hole River watershed is classified as being used for agriculture (Montana NRIS), and the 1998 GAP analysis dataset indicates there are approximately 89,500 irrigated acres in the project area (Table 4). Farms are large, averaging at least 1,200 acres in the two counties (Table 10), and the majority of these agricultural lands are used for livestock grazing (Table 11). For example, 205 of the 421 farms in listed in Beaverhead County are involved in beef cattle production (Montana Department of Labor and Industry). Similarly, about 79 percent of private lands in the Big Hole River watershed are used for livestock grazing (Montana NRIS).

Table 10. Agricultural Lands in Beaverhead and Deerlodge Counties, Montana.

STATISTIC	BEAVERHEAD	DEERLODGE
Number of Farms	421	109
Land in Farms (acres) and percent of total land area	1,279,031 (36%)	134,997 (29%)
Average Farm Size (acres)	3,038	1,239
Total Land Area (acres)	3,547,076	471,666

(Data from 2002 Census of Agriculture – Montana Agricultural Statistics Service)

Table 11. Beaverhead and Deerlodge Counties Agricultural Land Use.

	AREA (%) OF AGRICULTURAL USE TYPE	
AGRICULTURAL USE TYPE*	BEAVERHEAD	DEERLODGE
Grazing	928,477 (83.4%)	152,669 (60%)
Irrigated	128,554 (11.5%)	10,007 (3.9%)
NonQualAg	17,083 (1.5%)	23,422 (9.2%)
WildHay	15,771 (1.4%)	4,691 (1.8%)
Timber	13,766 (1.2%)	63,754 (25%)
FallowCrop	10,213 (0.9%)	-

*Abbreviations: Grazing = Land area of the parcel in native or domestic range used to support livestock; Irrigated = Land area of the parcel that is irrigated the majority of the time; NonQualAg = Land area under one ownership that falls into the acreage range of 2-160 acres for which no agricultural application has been approved; WildHay = Land area where either native grass or alfalfa is cut a majority of years for hay; Timber = Acres of the parcel in forest land exceeding 15 contiguous acres that is capable of producing timber that can be harvested in commercial quantity; and FallowCrop = Land area of the parcel cropped and left fallow in alternate years. (*Data from: State of Montana NRIS database*)

As mentioned earlier, much of the watershed is under public ownership. Approximately 67 percent of the watershed is owned by the Federal government (58 percent USFS, 9.4 percent BLM, and 0.04 percent NPS) and 3.4 percent is owned by the State of Montana, whereas the remaining 28.9 percent is privately owned. These figures for the watershed also are characteristic of the counties at large, where between 30-40 percent of the land area is in private ownership and the largest public ownership entities are the Federal government (especially the USFS) and State of Montana (Table 12).

Table 12. Land ownership or designation for Beaverhead and Deerlodge Counties, Montana.

OWNER	ACRES IN OWNERSHIP OR DESIGNATION (% OF TOTAL)	
	BEAVERHEAD	DEERLODGE
USFS	1,446,281 (39.8)	192,500 (38.5)
Private	1,117,269 (30.7)	205,484 (40.8)
BLM	678,535 (18.7)	8,230 (1.6)
State Government	375,000 (10.3)	70,801 (14.1)
Water*	9,464 (0.3)	301 (< 0.1)
Undetermined	4,131 (0.1)	10,337 (2.1)
Right of Way	1,840 (< 0.1)	2,414 (0.5)
USFWS	1,590 (< 0.1)	
Local Government	1,197 (< 0.1)	4,373 (0.9)
U.S. Government	882 (< 0.1)	8,351 (1.7)
Bureau of Reclamation	784 (< 0.1)	-
NPS	665 (< 0.1)	444 (< 0.1)

* Area of surface waters in each county. (Data from: Montana NRIS database)

The importance of ranching in the project area is belied by the fact that Beaverhead County is the top cattle and calf-producing county in the State of Montana and second in cash receipts for livestock and livestock products (Montana Agricultural Statistics Service >http://www.nass.usda.gov/mt/<). In contrast, Deerlodge County is ranked 53 (out of 56) for cattle production and cash receipts for livestock. Mining and mineral extraction are much more important economically for the Deerlodge County, as a whole, compared to Beaverhead County. Recreation also is important in the Big Hole River, with fishing, hunting and rafting playing significant economic roles in the area.

Beaverhead County has slightly higher per capita income and lower unemployment rates compared to Deerlodge County, Montana. In 2003 Beaverhead had a per capita personal income of $24,204, which ranked 16th in the State and was 95 percent of the State average of $25,406, and 77 percent of the national average, $31,472. In 2003 Deer Lodge had a per capita personal income of $21,417, which ranked 34th in the State (84 percent of average) and 68 percent of the national average (data from U.S. Department of Commerce, Bureau of Economic Analysis - http://www.bea.doc.gov). Data from Montana Department of Labor and Industry indicates an unemployment rate of 5.5 percent and 7.8 percent for Beaverhead and Deerlodge Counties.

3. RECREATION

The large areas of public lands coupled with abundant fishery and wildlife resources make the Big Hole River Valley a popular recreational destination. However, much of this recreation is dispersed and generally includes fishing, hunting, camping, hiking, horseback riding, off-highway vehicle riding (all seasons), rafting, snowshoeing, cross-country skiing, and wildlife viewing. With the exception of fishing and rafting, much of these activities occur in the basin's uplands that lie within the Beaverhead-Deerlodge National Forest (BDNF) or to a lesser extent on lands managed by the BLM. Because the project area includes non-Federal lands mostly owned by private citizens or held by ranches, much of the access for these activities requires landowner consent. However, Montana State law permits public access of river and streams for recreational purposes.

The Big Hole River is a nationally-recognized trout fishery for brown trout and rainbow trout, and the lower portions of the river receive heavy use from both private anglers and outfitters. Montana FWP has developed a recreation management plan for the Big Hole River to better regulate recreational and pressure on the lower river (>http://fwp.state.mt.us/fishing/regulations/proposedbiennialrule.html<). Recreational angling does occur in the waters of the proposed project area, but the most significant fishery, in terms of angler visits and economic importance, occur mostly outside and downstream from the proposed project area. Overall, recreational angling does appear to play an important economic role in the watershed (e.g., Upper Big Hole River TMDL 2003).

Big game hunting, especially for elk, is a popular fall activity and does occur on private lands in the project area. The Big Hole National Battlefield, located outside the proposed project area, is perhaps the single-most popular tourist destination in the upper Big Hole River Watershed, drawing up to 60,000 annual visitors.

IV. ENVIRONMENTAL CONSEQUENCES

A. GENERAL DIFFERENCES AMONG THE ALTERNATIVES

The general land use would be similar across the three alternatives in that livestock ranching would remain the primary activity. The main difference among the alternatives would be the certainty and extent to which existing land and water management practices would be modified to reduce or eliminate threats to fluvial Arctic grayling. These modified practices would constitute "conservation measures" implemented to benefit fluvial Arctic grayling that also may affect other components of the environment. Assuming similar types of conservation measures would be implemented under all alternatives, the differences in environmental consequences would depend on the anticipated level of private landowner involvement, which is expected to vary significantly among the alternatives.

Implementation of conservation measures under Alternative A (No action) is highly uncertain because the absence of ESA regulatory assurances for implementing these measures may be a disincentive for landowners concerned with having an ESA-listed species in waters adjacent to their property. In contrast, both Alternatives B and C involve an Agreement that would offer regulatory assurances to participants under an ESA section 10 permit and thus remove this disincentive. Under Alternative A it is uncertain whether conservation and restoration projects undertaken by the various stakeholder groups (agencies and grassroots organizations) would be sufficiently coordinated or implemented at a scale necessary to benefit fluvial Arctic grayling in a timely fashion. Conservation measures would be systematically implemented under both B and C, but the scope of potential participation is much greater for B because of the larger proposed project area. In general, any of the alternatives may involve some level of ground disturbance depending on the specific actions taken to implement conservation measures on a given land area (see Table 1). The alternatives are expected to influence, to varying extents, the following environmental attributes: fluvial Arctic grayling, hydrology, vegetation, wetlands, fishes, wildlife, cultural resources, local communities and economies, and recreation. None of the alternatives are anticipated to influence the local climate, air quality, geologic or topographic features, general land use, or aesthetics. Overall, the Alternatives B and C are expected to result in no effect or a positive effect for fluvial Arctic grayling, hydrology, vegetation, wetlands, fishes, wildlife, cultural resources, local communities and economies, and recreation; while the status quo or piecemeal approach described under Alternative A would continue to have negative effects on some attributes. The following sections describe the effects of each alternative on these ecological attributes, and a summary table follows the detailed analysis (Table 13). A summary of the Montana EPA significance criteria for the proposed action is presented in Table 14.

B. FLUVIAL ARCTIC GRAYLING

ALTERNATIVE A

The effect of Alternative A (No Action) would appear to be inherently negative for fluvial Arctic grayling where environmental conditions create a conflict over water use and tend to perpetuate the same land and water use practices that have led to the decline of fluvial Arctic grayling in the Big Hole River. A suite of conservation measures could be implemented to address the effects of land and water use on fluvial Arctic grayling (e.g., Table 1), but the certainty that they would actually be implemented to the extent that fluvial Arctic grayling would benefit is comparatively low for two key reasons – lack of participation and piecemeal or inconsistent execution of measures. First, absent the ESA regulatory assurances provided under an Agreement, landowners would have little incentive to conserve fluvial Arctic grayling. There may, in fact, be an incentive to not conserve fluvial Arctic grayling in order to reduce the probability that an ESA-listed species would occupy waters adjacent to their property and result in land and water use restrictions. Second, while a number of State and Federal agencies have been involved to varying degrees in attempts to improve habitat conditions for fluvial Arctic grayling, the existing track record suggests that a collaborative and comprehensive approach would be more effective for fluvial Arctic grayling than an assortment of individual projects. While the agencies involved in developing the Agreement, watershed groups and some landowners have previously worked together to conserve fluvial Arctic grayling, the Agreement accelerates these efforts by

creating a more systematic framework for dealing with threats to fluvial Arctic grayling, coordinating the technical skills of the various agencies, and generally using a more consistent set of guidelines to implement conservation measures.

The distribution of fluvial Arctic grayling in the Big Hole and the threats facing the species necessitate private landowner involvement in any viable conservation program. Without the implementation of proactive conservation measures on private lands, it is likely that fluvial Arctic grayling would continue to remain at low abundance and the threats facing the species would persist. The probability of an ESA listing for fluvial Arctic grayling would appear to be much greater under Alternative A compared to the other alternatives. While any projects implemented under Alternative A may improve local conditions for fluvial Arctic grayling, the certainty they would be implemented at a scale necessary to ensure the long-term persistence of fluvial Arctic grayling is not high. The no action alternative would appear to have overall negative consequences for fluvial Arctic grayling by largely perpetuating the status quo activities that led to the endangerment. However, these negative impacts do not achieve the level of significance under Montana EPA criteria (Table 14).

ALTERNATIVE B

The effect of Alternative B (Proposed Action) should be positive for fluvial Arctic grayling and lead to an increase in the abundance and distribution of fluvial Arctic grayling across the upper portion of the Big Hole River watershed. This alternative would involve the implementation of conservation measures on up to 380,000 acres of non-Federal land adjacent to or in proximity to the known or believed historical distribution of fluvial Arctic grayling in the upper Big Hole River watershed. Existing land and water use, primarily related to cattle ranching and associated irrigation diversions, would be modified on enrolled lands to reduce threats to fluvial Arctic grayling associated primarily with habitat degradation and fragmentation resulting from reduced instream flows, non-functioning riparian habitats, physical barriers to fluvial Arctic grayling movement, and entrainment in irrigation ditches. Site-specific plans, consistent with the conservation requirements of the Agreement, would be developed on individual properties to implement any necessary conservation measures.

The probability that conservation measures would be implemented to the extent that the fluvial Arctic grayling population in the watershed would be secured and enhanced is greater for Alternative B compared with both A and C. The ESA regulatory certainty provided by the proposed Agreement would remove a disincentive to participate in fluvial Arctic grayling conservation because the enrolled landowners would receive assurances that their land and water use would not be modified above that described in the Agreement and their site-specific plans if fluvial Arctic grayling were later listed under the ESA. Private landowners who own and manage over 200,000 of the 380,000 acres in the project area have already indicated a willingness to participate in such an Agreement should it be approved. The implementation of conservation measures using a consistent set of guidelines would likely lead to a more efficient use of landowner and agency resources, a higher probability of proper implementation, and facilitate effective monitoring which can help direct further conservation efforts.

The conservation measures of the Agreement are designed to improve instream flows, conserve or restore riparian habitats, remove or mitigate for physical barriers to fluvial Arctic grayling movement and address population-level threats from entrainment.

Increased streamflows produced by implementation of Alternative B should be beneficial for fluvial Arctic grayling in the project area, because low streamflows and chronic dewatering as a result of irrigation diversions and overwatering are considered major threats to fluvial Arctic grayling. The Agreement proposes to improve streamflows through facilitating landowner compliance with water rights, upgrading irrigation structures to improve control over water diversion and delivery, repairing leaking head gates and water diversion structures, reducing irrigation withdrawals, improving irrigation ditches to reduce water losses, installing and maintaining off-stream livestock watering facilities, investigating and using alternative less water intensive livestock forage, and implementing a comprehensive irrigation water management plan developed by NRCS. The net result of these actions should be greater and more consistent instream flows throughout the project area compared to recent conditions, which should reduce the effects of low streamflow on the growth, survival and reproduction of fluvial Arctic grayling.

The conservation and restoration of riparian habitats proposed under Alternative B should be beneficial for fluvial Arctic grayling in the project area. Riparian habitats are transition zones between aquatic and terrestrial habitats, and exert a strong influence on the quantity and quality of fish habitat. Functional riparian habitats dissipate stream energy during floods, filter sediments and pollutants, facilitate ground-water recharge, cool streams by shading, stabilize streambanks, maintain channel characteristics, promote floodplain development via deposition of sediments during overbank flows, and input woody debris, organic material, and terrestrial insects (Bjornn and Reiser 1991; Hunter 1991; Murphy and Meehan 1991; Prichard et al. 1998; Poole and Berman 2001). Much of the riparian area in the upper Big Hole River watershed is at risk or nonfunctional because of past and existing land use practices including livestock grazing in the riparian zone and direct removal of vegetation. Fluvial Arctic grayling in the project area use pool habitats associated with the overhanging vegetation in existing riparian areas (Lamothe and Magee 2003). Alternative B proposes to conserve and restore riparian habitats through implementation of prescribed grazing plans, exclusion fencing, more active livestock management, and off-channel livestock watering facilities that would reduce or eliminate cattle grazing (in riparian areas). The net result should be improved riparian conditions that would in turn positively influence instream habitat conditions (e.g., reduced water temperatures, greater frequency of deep pools, greater channel stability, reverse channel widening). These types of habitat improvements should directly benefit fluvial Arctic grayling.

The removal of physical barriers to fluvial Arctic grayling migration as proposed under Alternative B should be beneficial for fluvial Arctic grayling in the project area. The removal of migration barriers would allow fluvial Arctic grayling access to a greater portion of watershed, and increase access to seasonally-important habitats including spawning, feeding, wintering, and refuge. Fluvial Arctic grayling should thus respond, if previously blocked from these necessary habitats, through greater reproductive success, and increased survival and growth of all age classes.

The rescue of fluvial Arctic grayling entrained in irrigation ditches and the removal of population-level entrainment threats as proposed under Alternative B would be beneficial for fluvial Arctic grayling in the project area. Rescue (salvage) efforts, installation of fish screens at diversions determined to pose a population-level threat, and improvements to irrigation structures is expected to reduce the population-level threats to fluvial Arctic grayling from entrainment in irrigation ditches. Reducing or eliminating entrainment problems would lead to a direct increase in the number of fluvial Arctic grayling in natural stream channels where their survival and growth would presumably be greater.

Implementing the conservation measures described above (or under any of the alternatives) may involve ground disturbance in some cases (Table 1) and the handling of fluvial Arctic grayling. Short-term negative effects to fluvial Arctic grayling from disturbances may be possible in some situations. For example, installation of fish screens, new headgates, fish ladders, riparian fence construction and active riparian and channel restoration projects may result in temporary soil and substrate disturbance in or near streams. These sediment inputs may negatively affect the growth, survival and reproduction of fluvial Arctic grayling in adjacent habitats. These disturbances are expected to be short in duration, and are a necessary consequence of implementing conservation measures that would lead to long-term improvement to habitat conditions. The overall impact to fluvial Arctic grayling from this type of disturbance is presumed to be far less than if the conservation measures themselves were not implemented. Moreover, the draft Agreement states that these types of effects "...will be minimized by utilizing expert personnel wherever conservation measures require construction or ground-disturbing activities, and by scheduling the work when streamflow and environmental conditions are suitable to reduce site impacts and sediment input" (pg. 72, Montana FWP et al. 2005). Fluvial Arctic grayling would be handled during entrainment rescue efforts and monitoring required under Alternative B, and these actions have the potential to harm fluvial Arctic grayling. Montana FWP's use of electrofishing and fish handling protocols (Appendix 2), and the experience of the biologists involved in these actions are expected to minimize any negative effects. Under the expected duration of Alternative B, any minor negative effects to fluvial Arctic grayling are expected to be counteracted by the positive effects of the conservation measures. Therefore, the conclusion is that the net result would be beneficial to fluvial Arctic grayling.

Nonnative trout have been implicated in the replacement and displacement of graying from waters outside the proposed project area. The actual threat to fluvial Arctic grayling from naturalized nonnative trout (brook, brown and rainbow trout) in the upper Big Hole River is not known, and the poor habitat conditions described above appear to be the most significant factors currently limiting fluvial Arctic grayling in the proposed project area. Implementation of the conservation measures described under Alternative B should result in improved habitat conditions for most, if not all, cool- or cold-water fish species including nonnative trout. Thus, nonnative trout populations also may increase in the project area. This could indirectly lead to negative effects for fluvial Arctic grayling if increasing nonnative trout abundance leads to competition with and predation by nonnative trout. Alternative B does propose a mechanism to evaluate threats posed by nonnative trout, but does not obligate a specific management remedy. However, if the current physical habitat limitations to fluvial Arctic grayling recovery in the project area are not addressed, then the potential for future negative effects from nonnative trout

may be irrelevant. Although an evaluation would be conducted for both Alternatives B and C, in effect there is no difference among any of the alternatives concerning the certainty whether management actions would be taken if it was later determined that nonnative trout were a threat to fluvial Arctic grayling in the project area.

Under the proposed action (Alternative B), impacts to fluvial Arctic grayling from land and water use activities related to livestock ranching would be addressed and mitigated at a large scale through the implementation of conservation measures described in the Agreement. The regulatory assurances provided to landowners (not included in Alternative A); the larger, more inclusive project area (compared to Alternative C); and the apparent landowner interest in the proposed action indicate a high probability of actual implementation and thus improved habitat conditions for fluvial Arctic grayling. Alternative B should be beneficial to fluvial Arctic grayling, producing an increase in the abundance and distribution of fluvial Arctic grayling across the project area and increasing the probability of long-term persistence of fluvial Arctic grayling in the Big Hole River.

ALTERNATIVE C

The effect of Alternative C (limited umbrella Agreement) should be positive for fluvial Arctic grayling, but these beneficial effects would be more localized because of the geographically-restricted project area. Alternative C would be similar to Alternative B in approach and content (umbrella Agreement, site-specific plans on enrolled lands, modification of land and water use to remove threats to fluvial Arctic grayling, etc.), but would only address a portion of the upper Big Hole River watershed and thus only encompass a portion of the fluvial Arctic grayling's distribution in the system. This alternative would involve the implementation of conservation measures on up to 130,000 acres of non-Federal lands in the vicinity of the Big Hole River between Wisdom and Little Lake Creek Bridge (see Figure 1). This segment of the Big Hole River is considered an important spawning and rearing location for fluvial Arctic grayling, but severe dewatering and habitat degradation have apparently reduced fluvial Arctic grayling abundance in that area in recent years (Magee and Lamothe 2004; Montana FWP et al. 2005). A number of large irrigation diversions in this river segment can exert a strong influence on hydrologic conditions and at least one has been shown to entrain fluvial Arctic grayling. Implementing conservation measures in this river segment to increase instream flows, restore riparian habitats, remove barriers to fluvial Arctic grayling movement and reduce entrainment threats would clearly be beneficial to fluvial Arctic grayling for the same reasons described under alterative B. Under Alternative C, fluvial Arctic grayling that spawn, rear, migrate through, or otherwise use habitats in this river segment would benefit and fluvial Arctic grayling abundance in that area should increase. However, the limited spatial extent of Alternative C may not adequately address the habitat requirements of fluvial Arctic grayling at watershed scale and may unnecessarily exclude the involvement of some landowners willing to implement conservation measures to benefit fluvial Arctic grayling.

Degraded habitat conditions are widespread in the upper Big Hole River, and not limited to the hypothetical project area under Alternative C. Individual fluvial Arctic grayling may range across the watershed at different life stages or seasonally (Shepard and Oswald 1989; Lamothe and Magee 2003). Even if conditions improve at one location, the ecology of fluvial Arctic

grayling suggests they may encounter poor conditions elsewhere as they move among or between complementary and supplementary habitats. The longitudinal connection of riverine systems and the extensive, though comparatively primitive, irrigation systems in the upper Big Hole River present the possibility that water conservation measures implemented in one river segment may not necessarily improve streamflows downstream (or even in the project area). Under Alternative C, irrigation diversions downstream of the project area may simply remove much of the conserved water if those irrigators are not implementing similar conservation measures. Moreover, irrigation diversions upstream of Alternative C's project area may preclude any actual conservation if inflows are low. However, this latter scenario is perhaps less likely because a number of the property owners encompassed by Alternative C have senior water rights and could request the reduction or shutdown of upstream irrigation diversions pursuant to their water rights.

Finally, limiting the project area to a specific river segment as described in Alternative C also may exclude landowners willing to conserve fluvial Arctic grayling and it appears that consistent and widespread implementation of conservation measures, especially those related to improving instream flows, would be necessary to address watershed-level threats to fluvial Arctic grayling. While Alternative C would improve conditions for fluvial Arctic grayling in a biologically-important river segment, participation at a larger scale (i.e., Alternative B) has a greater certainty of improving physical habitat conditions at a scale consistent with the ecology of fluvial Arctic grayling in that river system.

The types of short-term disturbance and any effects of handling fluvial Arctic grayling related to implementation of conservation measures under Alternative C would be similar to that described under Alternative B, but the overall magnitude of any negative effects would be correspondingly less because of the reduced project area. However, conservation benefits to fluvial Arctic grayling also would be correspondingly less under Alternative C.

Implementation of the conservation measures described under Alternative C should result in improved habitat conditions cool- and cold-water fish species in the project area. Thus, nonnative trout populations also may increase in the project area. Brook trout, in particular, are comparatively abundant in the limited umbrella project area and would be expected to increase in abundance under this alternative. As it is a modification of Alternative B, Alternative C also would presumably provide a mechanism to evaluate threats posed by nonnative trout (as with Alternative B), but (as with Alternative B) does not obligate a specific management remedy.

Alternative C is anticipated to result in positive effects for fluvial Arctic grayling and can be expected to increase spawning success and abundance in the proximity of the project area. This alternative may help secure an important habitat in the watershed, but the probability of long-term persistence of fluvial Arctic grayling is less than for Alternative B because Alternative C does not address overall habitat limitations at a scale commensurate with the ecology of the species.

SUMMARY

In order of beneficial effects to fluvial Arctic grayling, the three alternatives would be ranked as follows--(1) Alternative B, the proposed action; (2) Alternative C, limited umbrella Agreement; and (3) Alternative A, no action. Alternative B has the potential to improve physical habitat conditions for fluvial Arctic grayling across much of its current distribution in the Big Hole River. Alternative C would improve conditions in a particular, albeit important, segment in the watershed. While actions to improve habitat conditions for fluvial Arctic grayling may occur under Alternative C, it is uncertain whether they would be implemented at a scale necessary to adequately protect the existing population. Conversely, the effects of Alternative A may be largely negative where existing land and water use practices perpetuate threats to that have led to the endangerment of fluvial Arctic grayling.

C. HYDROLOGY

Aside from the effect of variable climatic conditions on streamflows, the most important influence on hydrologic conditions in the upper Big Hole River watershed is the diversion and application of irrigation water. The hydrologic consequences under each alternative will depend primarily on the extent to which they modify existing irrigation practices, but also will be affected by changes in riparian habitats.

ALTERNATIVE A

Alternative A (no action) generally describes the currently-existing conditions and represents negative hydrologic impacts to water quantity and quality through reduced surface water flows. Flood irrigation techniques are used to divert large volumes of water from the Big Hole River and its tributaries during approximately May-September and this water is applied to hay fields and pastures or used to water livestock. These irrigation techniques have been used in the basin for more than a century, and there is limited control over water because of a general absence of diversion control devices (e.g., headgates). The stream energy that would influence basic fluvial processes (of erosion and deposition) is dissipated by diverting large volumes of water and spreading that water over fields and pastures. Thus the physical template of the hydrologic system has likely been altered by irrigation. Few historical data are available on the actual volumes of water diverted, but recent information indicates that the flood irrigation techniques used in the upper Big Hole River watershed are relatively inefficient and that some fields and pastures are over-irrigated. Irrigation withdrawals, in concert with effects of drought, have attenuated high-flow events and lowered base flow conditions, and are responsible for changes to the system's natural hydrology. The upper Big Hole River is considered impaired by flow and thermal alterations under the State of Montana's 303(d) list. Stream temperatures in certain locations along the mainstem Big Hole River frequently exceed levels considered stressful for cool-water salmonid fishes like fluvial Arctic grayling (Magee and Lamothe 2003, 2004).

Discharge of groundwater to surface waters when streams are at or near baseflow should be a natural process in the Big Hole River, and flood irrigation techniques apparently influence this dynamic in some locations. There is some localized evidence in the system that existing flood irrigation practices promote groundwater recharge of the near-surface aquifer (Marvin 1997),

that may discharge into surface waters and influence streamflows following the end of the growing season (e.g., Marvin and Voeller 2000). The same investigators concluded from a study site in the upper basin that that evapotranspiration largely counter-acted any positive effects of irrigation return flows to surface waters (Marvin and Voeller 2000). The location of groundwater storage may be quite different under current irrigation practices compared to the historical condition. For example, much of the groundwater recharge under irrigation may occur in the proximity of ditches (which leak) and near fields where the water is applied, which may extend miles from the active stream channel. Presumably, groundwater recharge under historical conditions would occur in closer proximity to the active channel. The volume and timing of surface-water discharge has likely been moved away from natural (historical) conditions by existing flood irrigation techniques.

Riparian zones are crucial for the ecological function of many aquatic systems, and can play a functional role in water storage and aquifer recharge (e.g., Pritchard et al. 1998). The widespread degradation and loss of riparian habitats in the upper Big Hole River watershed would indicate that any role riparian zones play in surface and ground water dynamics in the system is likely compromised.

The best available data indicate that Alternative A (no action) would result in the continued alteration of hydrologic conditions in the Big Hole River. The implementation of conservation measures to counteract this impairment is uncertain under Alternative A.

ALTERNATIVES B AND C

In contrast, Alternatives B and C include a suite of actions designed to modify existing irrigation practices and restore riparian habitats so that instream flows are increased, resulting in improved instream water quantity and quality. The difference between the latter two alternatives would be extent of those positive effects, as Alternative B is to be implemented throughout the upper watershed whereas Alternative B is limited to one river segment.

Alternatives B and C include a set of actions designed to decrease the amount of water diverted for agricultural purposes, and thus increase streamflows relative to current conditions so they are more representative of the system's presumed natural hydrograph. Both alternatives also include measures to conserve and restore riparian habitats, which also may improve hydrologic function relative to the no action alternative. The difference in the beneficial effects of Alternatives B and C again relates to the basic longitudinal connection of surface waters in riverine systems and the geographic scale of the project areas. Alternative C's project area includes one of the most hydrologically-altered stream segments in the upper basin. This segment between Wisdom and Little Lake Creek Bridge (see Figure 1) has a number of large irrigation diversions that can strongly affect flows. Surface water flow in this segment actually ceased for a few weeks during a drought in summer 1988. Implementing conservation measures under Alternative C should lead to positive hydrologic effects (i.e., increased instream flows and reduced stream temperatures) in the project segment and possibly downstream. However, the extensive diversion and irrigation system in the upper basin, coupled with potential for irrigators on non-enrolled lands upstream and downstream of the project area to divert water, raise the possibility that positive effects from Alternative C may be reduced or negligible outside its

project area. Alternative B would be implemented across a larger area, essentially from the system's headwaters downstream over 80 mainstem river miles to Dickie Bridge (Figure 1). Thus, conservation measures would be implemented along contiguous river segments, and the probability that irrigation diversions on non-enrolled lands may counteract improved streamflows produced by actions on enrolled lands would be reduced because all landowners would be eligible to enroll. Thus, the hydrologic benefits for Alternative B (proposed action) should be more widespread than those for Alternative C (limited umbrella Agreement).

The overall benefits to hydrologic function from irrigation return flows in the upper basin are speculative. If irrigation return flows envisioned under Alternative A were found to provide benefits to hydrologic function, then implementation of Alternatives B and C may neutralize these benefits. This scenario appears unlikely. The benefits of keeping water in the natural river channel (versus the alternative of diverting it away from the stream with the expectation that irrigation return would subsequently conditions) are better supported by the scientific literature that suggests returning to a more natural flow regime helps hydrological and ecological processes (e.g., Poff et al. 1997).

SUMMARY

In order of beneficial effects hydrology, the three alternatives would be ranked as follows: (1) Alternative B, the proposed action; (2) Alternative C, limited umbrella Agreement; and (3) Alternative A, no action. The effects of Alternative C are mostly negative because this would not remedy continued alteration of hydrologic attributes, such as reduction in baseflows ; reduced frequency, duration and magnitude of high-flow events; and continuing thermal alterations. Alternatives B and C would both improve hydrological processes and instream water quantity and quality, but Alternative B is expected to realize these benefits across a larger area.

D. VEGETATION

The private lands considered in the analysis are almost exclusively agricultural and ranchlands. The land use would not change under any of the alternatives, but some specific practices, methods or infrastructure may result in changes to the vegetation communities in the project area. Changes to the vegetation communities on private lands in the upper Big Hole River watershed can be categorized by their effects on the three dominant land use or cover types: non-irrigated rangeland, irrigated hay fields and pasture, and riparian zones.

ALTERNATIVE A

Effects to vegetation under the Alternative A, the No Action Alternative would be similar to current conditions. Data collected by NRCS indicates that private rangelands in the upper Big Hole River contain a mix of native and introduced species and are degraded relative to expected historical conditions for that location (Tim Griffiths, NRCS, Bozeman, MT, personal communication, 8-3-05). The "range similarity index," which characterizes current range conditions relative to the expected historical condition, indicates that current rangelands are 20-30 percent of the expected species composition and productivity, with a few in the 40% range (Tim Griffith, NRCS, Bozeman, MT, personal communication, 8-3-05; Kris Berg, NRCS,

Dillon, MT, personal communication, 8-10-05). The vegetation community in hay fields and pastures is a mix of native and introduced species, and has been altered by flood irrigation practices. The majority of the plant species found in hay fields and pastures are facultative or obligate wetland species (i.e., hydrophytes; Tim Griffith, NRCS, Bozeman, MT, personal communication, 8-3-05) such as sedges (Kris Berg, NRCS, Dillon, MT, personal communication, 8-10-05), which is presumably caused by overirrigation. Areas of the upper watershed show significant loss of riparian vegetation (OEA Research, Inc. 1995), especially willows, which has been attributed primarily to livestock grazing in the riparian zones (Lamothe and Magee 2003). Overall, under the No Action Alternative, it is presumed that this general degradation of the vegetation communities would largely continue.

Idaho sedge, a USFS and BLM sensitive plant species in the proposed project area, may be negatively affected by the No Action Alternative. Idaho sedge is typically found in at the transition between wet meadow and sagebrush steppe habitat, and is threatened by heavy livestock grazing, competition with exotic species, hydrologic alterations, agricultural development and road construction and maintenance (Montana Plan Field Guide, Montana Natural Heritage Program >http://nhp.nris.mt.gov/plants/index.html?guidebook.asp<). The available information on the project area suggests livestock grazing is heavy in certain locations and hydrologic alterations are substantial, but their overall effect on Idaho sedge is not known. Lemhi Beardtongue, also a sensitive species, is present in the proposed project area and grows in habitat dominated by sagebrush and bunchgrasses, but may be less affected by agricultural and ranching activities on private lands because it's primary threats are encroachment by spotted knapweed and changes in wildfire frequency (Montana Plan Field Guide, Montana Natural Heritage Program >http://nhp.nris.mt.gov/plants/index.html?guidebook.asp<).

ALTERNATIVE B

Alternative B, the Proposed Action Alternative, should generally result in beneficial effects for native vegetation. The combination of conservation measures to be implemented under the Agreement, which includes irrigation water management, prescribed grazing, and riparian restoration, should favor native vegetation communities on rangelands, hay fields and pasture, and riparian zones. On rangelands, prescribed grazing plans to be developed under the Proposed Action should favor native vegetation, and shift the community composition (and its forage productivity) so that it is more representative of historical conditions (Tim Griffiths, NRCS, Bozeman, Montana, pers. comm.). Hay fields and pastures should be affected by irrigation water management plans developed under the Agreement such that incidental (artificial) wetlands or hydrophytic plant communities in uncharacteristic locations should shift to more dry-land species (Tim Griffiths, pers. comm.). Specifically, changes are expected where hydrophytic plants, such as sedges, occupy higher ground (benches) because irrigation on these areas would likely be reduced under irrigation water management plans (Tim Griffiths, pers. comm.). Thus, the plant community in these locations would likely shift back to native dry-land species more characteristic of the site. Natural wetlands which occupy lower-lying areas would not be altered by the Agreement. Any changes to natural wetlands would require compliance with State and Federal regulations. Sensitive Idaho sedge should benefit where conservation measures reduce grazing pressure and reduce hydrologic alterations, and compliance with State and Federal regulations are expected to limit any Agreement-related impacts to this or other sensitive plant

species identified (see Part VI, A of this draft EA). Riparian habitats would be conserved or restored though prescribed grazing plans or other conservation measures implemented through the Agreement. Overall, the Proposed Action should result in beneficial effects for native plant species and communities.

ALTERNATIVE C

Under Alternative C, the Limited Umbrella Agreement, the effect to plant species and their communities would be positive and similar to those under the Proposed Action, except that a smaller area would be affected by habitat enhancement measures. The positive effects to native plant species and communities in rangelands, hay fields and pastures, and riparian zones under Alternative C would be as described above under the Proposed Action Alternative, but limited to private lands in the vicinity of Wisdom. Overall, Alternative C should result in beneficial effects for native plant species and communities on private lands in the Limited Umbrella Agreement project area.

SUMMARY

In order of net beneficial effects to the plant communities in the Big Hole River watershed, the three alternatives would be ranked as follows--(1) Alternative B, proposed action; (2) Alternative C, limited umbrella Agreement, and (3) Alternative A, no action. Existing land and water use practices under the No Action Alternative would likely perpetuate the degraded conditions on non-irrigated rangelands, irrigated hay fields and pasture, and riparian zones. In contrast, the conservation measures to be implemented under Alternatives B and C would be expected to benefit the native plant communities in these habitats by returning them to a species composition more representative of historical conditions. These positive changes would be realized over a larger area under the Proposed Action Alternative compared to the limited umbrella Agreement alternative.

E. WETLANDS

Two of the alternatives, the Proposed Action (Alternative B) and the limited umbrella Agreement (Alternative C), propose conservation measures to benefit grayling that would either directly or indirectly influence hydrologic patterns and plant communities at varying scales. Wetlands are habitats defined in terms of specific hydrologic and vegetation characteristics (Cowardin et al. 1979), so Alternatives B and C are expected to affect some wetlands habitats relative to current conditions. Effects are anticipated to be different depending on whether the wetlands are maintained by natural physical processes versus human activity.

ALTERNATIVE A

Effects to wetlands under the Alternative A, the No Action Alternative would be similar to current conditions. Any projects that would be potentially undertaken to benefit fluvial Arctic grayling would need to be implemented in light of any applicable State or Federal regulations protecting wetlands. Irrigation practices in the upper Big Hole River watershed have apparently facilitated the spread of hydrophytic (wetland-adapted) plant species into locations with

topography generally not conducive to these species, such as benches or on slopes (Upper Big Hole River TMDL 2003; Tim Griffiths, NRCS, Bozeman, MT, personal communication, 8-3-05). Sedge meadows can occur where irrigation ditches run through large flat areas, along irrigation ditches, in low-lying areas that tend to remain wet or inundated, and at the end of flood irrigation network (DTM Consulting, Inc. et al. 2005). Irrigation is practices across tens of thousands of acres in the upper Big Hole River watershed (Montana NRIS), but USFWS could find no specific data on the relative composition of wetlands created or maintained by flood irrigation (i.e., incidental wetlands) versus natural wetlands.

ALTERNATIVE B

Under Alternative B, the Proposed Action Alternative, there should be no significant impact to natural wetlands, but some incidental wetlands may be affected. The agencies involved in the Proposed Action Alternative are generally precluded from impacting wetlands by State and Federal regulations, unless a Clean Water Act section 404 permit is obtained from the U.S. Army Corps of Engineers. Agency planning processes and environmental compliance provisions (e.g., see Appendices 3 and 5) should ensure that natural wetlands are not adversely affected by the Agreement. However, incidental wetlands that are created or sustained through overirrigation or are present in atypical locations may be affected by the Agreement. For example, wetlands or wetland plant communities located on steep slopes or at the terminus of a flood irrigation network may be affected where improved irrigation water management reduces the amount of water delivered to these locations. The extent of incidental wetlands, as well as those incidental wetlands that may be affected by the Agreement, is presently unknown. However, any changes to incidentally created or maintained wetlands under the Proposed Action would appear to promote habitat conditions more characteristic of the natural topography and hydrology at those locations.

ALTERNATIVE C

Under Alternative C, the Limited Umbrella Agreement, the effect to wetlands would be similar to that under the Proposed Action. Specifically, there should be no significant effect on natural wetlands, but some incidental wetlands may be affected by the implementation of conservation measures that improve irrigation water management. Any impacts to incidental wetlands should be realized over a smaller area for Alternative C compared to the Proposed Action.

SUMMARY

Alternative A, No Action, represents the status quo whereby no changes to wetlands are expected relative to current conditions. Alternatives B, Proposed Action, and C, limited umbrella Agreement, should not affect natural wetlands habitats. However, Alternatives B and C may affect some incidental wetlands habitats that are created or maintained in atypical locations because of overirrigation. The proportion of incidental wetlands (vs. natural) wetlands in the project area is unknown. The specific site characteristics (e.g., soil type, hill slope, irrigation amount) delineating an incidental wetland that would be affected, versus not affected, by conservation measures implemented under these two alternatives also is unknown.

F. FISHERIES

The general effect of the three alternative actions on the fishes residing in the project area should be roughly similar to that described for fluvial Arctic grayling (see Part B above), based on the assumption that the abiotic conditions that are currently depressing the fluvial Arctic grayling population (i.e., stream dewatering; thermal loading; habitat loss, degradation and fragmentation, etc.) also are influencing and in some cases regulating populations of other naturalized fishes. While at least 12 species of native and introduced fishes are known or believed to be present in the proposed project area (Table 6), a lack of data precludes a species-by-species analysis for each one. Instead, this analysis will describe how the alternative actions may affect the overall fish community and make special reference to specific native fishes where appropriate. Many of the projects that would be implemented under the proposed actions, while intended primarily to benefit fluvial Arctic grayling, are rather general in character (i.e., increase instream flows during summer months) and would be expected to similarly affect a suite of fish species having similar habitat requirements. The effect of the alternative actions on recreational angling will be analyzed in another section of this document.

ALTERNATIVE A

The effect of Alternative A (No Action) would appear to be largely negative for many fish species where environmental conditions create a conflict over water use and tend to perpetuate the same land and water use practices that have led to a general decline in the structure and function of the Big Hole River. Chronic and severe dewatering, loss of functional riparian zones, channel alterations, thermal loading, cross-channel diversion structures which block fish movement, and entrainment in irrigation ditches are some of the human-influenced factors which may influence resident fish populations. In addition to fluvial Arctic grayling, both native species (e.g., white sucker, mountain whitefish, longnose suckers, longnose dace and burbot) and nonnative species (e.g., brook trout) are known to be entrained in irrigation ditches (Lamothe and Magee 2003; J. Magee, Montana FWP, pers. comm.). Both of these species can move up to tens of miles (e.g., Lamothe and Magee 2003), which highlights the importance of maintaining connection between riverine habitats throughout the watershed. A fish kill in the Big Hole during 1994 resulted in the death of a number of mountain whitefish, white suckers, longnose suckers, longnose dace, burbot, mottled sculpin, fluvial Arctic grayling, and brook trout; and was blamed on high water temperatures (Byorth 1995). The current fishery resources and community structure would likely remain at current levels or change in a negative direction in the absence of measures to address these issues.

Under the status quo, which assumes habitat conditions stay the same or possibly deteriorate further, an expected outcome would be reduced abundance and distribution of existing species, loss of "desirable" species, or possibly the addition of "undesirable" species to the fish community. Where brook trout co-occur with fluvial Arctic grayling in the upper watershed, their relative abundances generally fluctuate in concert (e.g., Magee and Opitz 2000). Abundance of brown and rainbow trout downstream from the project area has declined in recent years, presumably as a consequence of stressful hydrologic and thermal conditions (Oswald 2005). Little information is available on the population status native non-game fish species in the project area (e.g., suckers, sculpin, and dace). However, these species are presumably

adapted to the hydrologic and habitat conditions prior to the Euro-American settlement, so the land and water uses that currently influence the Big Hole River are likely detrimental, rather than neutral or beneficial changes. Habitat loss, in concert with effects of nonnative trout, is a major threat to native westslope cutthroat trout in the watershed. While much of the currently-occupied westslope cutthroat trout habitat occurs outside the proposed action area, perpetuation of degraded habitat conditions elsewhere may preclude expansion of cutthroat trout into historical habitats.

Habitat degradation and alteration can shift community composition to more tolerant or disturbance-resistant fish species. For example, brook trout, brown trout and rainbow trout have been characterized as more tolerant of higher water temperatures based on their critical thermal maximum values compared with fluvial Arctic grayling (Selong et al. 2001). Thus, thermal loading may produce conditions favoring the established introduced salmonids at the expense of native salmonids having more stringent thermal requirements (e.g., Arctic grayling). Continued habitat degradation may increase the probability that fish species tolerant of poor water quality become established in the project area.

As was described in environmental analysis for fluvial Arctic grayling, there are a suite of projects that could be implemented to address some of the instream flow and habitat degradation issues which affect fluvial Arctic grayling and likely other resident species as well, the certainty that they would be systematically implemented is low under Alternative A. Any actions taken to benefit fluvial Arctic grayling would likely accrue some benefit for most, if not all resident fishes in the project area. However, with the exception of westslope cutthroat trout, conservation actions taken to specifically benefit fishes other than fluvial Arctic grayling appears highly unlikely given the social, biological and technical challenges to fluvial Arctic grayling conservation in the watershed.

The probability of a fluvial Arctic grayling listing is probably greatest for Alternative A. Conversely, if fluvial Arctic grayling were listed, then such a listing may result in the incidental protection of other species where ESA requirements or any enforcement actions result in improved habitat. However, an ESA listing may complicate conservation and management and reduce the willingness of private landowners to participate in such efforts.

ALTERNATIVE B

The effect of Alternative B (Proposed Action) should be positive for most of the native and nonnative fishes present in the project area. The conservation measures of the Agreement are designed to help fluvial Arctic grayling by improving instream flows, conserving or restoring riparian habitats, removing or mitigating for physical barriers to movement and addressing population-level threats from entrainment. These first two conservation measures, in particular, are quite general in terms of their effect on fish habitat and can be reasonably expected to be beneficial to resident fishes as well. The Big Hole River in the project area has been highly altered by land and water use, and the proposed action seeks to reverse some of this alteration. It seems unlikely that actions that remedy degraded habitat conditions, and attempt to restore abiotic and biotic elements of a functional river ecosystem, would have direct negative consequences for a native resident fish species. Similar positive effects are supposed for

nonnative fish species in the project area, especially for brook trout, brown trout and rainbow trout. In general and for most (if not all) resident fish species, the improved habitat condition from Alternative B should increase the carrying capacity of currently occupied habitats and increase the extent of suitable habitat.

Native fishes also may benefit where conservation measures are implemented to reduce population-level threats to fluvial Arctic grayling from entrainment. Installation of fish screens or other exclusion devices to benefit fluvial Arctic grayling also would keep many native fishes out of irrigation ditches, where their growth and survival would presumably be less compared with in a natural stream channel.

The removal or mitigation of physical barriers to fluvial Arctic grayling movement may have both positive and negative effects on other fishes, depending upon the ecological context of the particular barrier. While the Agreement makes specific provisions to provide passage for fluvial Arctic grayling (i.e., passage designed specifically for fluvial Arctic grayling), passage for other species with similar swimming abilities also should be provided. In general, removal of any barriers to fluvial Arctic grayling movement along the mainstem Big Hole River in the project area should facilitate passage of other fish species and reduce the frequency and extent of habitat fragmentation. Habitat connectivity is important for many fish species that require spawning, rearing and refuge habitat that may be separated in time and space (Schlosser and Angermeier 1995), thus the ability to move among these habitats may be essential for their persistence.

The potential for negative effects of barrier removal or mitigation focuses primarily on situations where the removal of a barrier to facilitate fluvial Arctic grayling passage could create a pathway for the invasion of nonnative trout. Westslope cutthroat trout in the Big Hole River watershed are threatened by encroachment from nonnative trout (Shepard et al. 2003), which can lead to displacement (brook trout) or hybridization (rainbow trout and Yellowstone cutthroat trout). This potential problem would be most likely to be observed in tributaries to the Big Hole River, because westslope cutthroat trout are seldom found in the mainstem river. Westslope cutthroat trout in the drainage, and elsewhere in its native range, are often subject to isolation management whereby their populations are isolated above a natural or man-made barrier to reduce the threat from nonnative trout. Removal of such a barrier to benefit fluvial Arctic grayling would thus be in direct opposition to management of another fish species of concern. Given the current distributions of fluvial Arctic grayling and cutthroat trout in the system (cutthroat trout in headwater streams, fluvial Arctic grayling in lower tributary reaches and mainstem river), this particular problem is anticipated to be infrequent. However, the Proposed Action explicitly notes this concern and states that potential impacts to native fish species would be analyzed prior to making a decision to remove any barrier.

Indirect effects of nonnative trout on native fish species also are possible as a consequence Alternative B. Alternative B is anticipated to result in changes in habitat conditions that would be beneficial to all species, including nonnative trout. It is currently not know if competition and predation by nonnative trout species are important mechanisms influencing the population status of native fish species in the project area, but it is reasonable to assume that the abundance and distribution of nonnative trout would increase because of improved habitat conditions. Abiotic (habitat) conditions are currently perceived to be a more significant influence on native fishes in

the project area than competitive interactions, but if the proposed action removes some of these abiotic limitations (i.e., dewatering, thermal loading) then biotic factors may come to play a more significant role.

ALTERNATIVE C

The effect of Alternative C (limited umbrella Agreement) on fishes should be generally positive, but the beneficial effects may be localized and species-specific because of the restricted scope of the project area. The types of specific actions and general consequences of these actions are adequately presented in the analysis for fluvial Arctic grayling in earlier paragraphs in this section. In general, Alternative C should result in beneficial effects for fish species that either reside in or seasonally utilize habitats in the project area because of the somewhat localized nature of the expected habitat improvements or conservation actions. Fish species that are not believed to exhibit wide-spread ranging behavior, for example mottled sculpin, and tend to reside in one area should especially benefit from improved local habitat conditions. In contrast, more wide-ranging fish species such as fluvial Arctic grayling (described earlier) or white sucker (that can move tens of miles; Lamothe and Magee 2003) may still require habitats only present in other locations in the watershed. If conditions remain degraded elsewhere in the watershed or if fishes encounter these conditions when passing through a migration corridor, then the positive effects of improved habitat conditions in one (albeit large) location may be tempered. If many individuals of a particular species are entrained in irrigation ditches in the area encompassed by Alternative C, then the proposed rescue efforts may provide a significant benefit. If entrainment occurs elsewhere, the overall benefits may be less certain.

The potential negative effects of Alternative C are similar to those described for the other alternatives but scaled based on the different-sized project area. Alternative C does not address habitat conditions elsewhere in the upper watershed. Conflicts in native fish conservation resulting from the potential removal of certain barriers may still occur, but such conflicts would be less numerous compared to Alternative B. Brook trout are the most common nonnative salmonid in the project area encompassed by Alternative C, and their abundance would be expected to increase. However, Alternative C may be less likely to facilitate the expansion of brown trout into the project area because a considerable gap would remain between the "improved" habitat and river reaches where brown trout are currently most abundant. Such expansion may still occur, but may be less rapid compared to Alternative B which would attempt to improve conditions along a contiguous river segment.

SUMMARY

In order of net beneficial effects to the fishes present in the upper Big Hole River, the three alternatives would be ranked as follows--(1) Alternative B, proposed action; (2) Alternative C, limited umbrella Agreement, and (3) Alternative A, no action. Alternative B has the potential to improve physical habitat conditions for fishes across the largest area, and may lead to the increased abundance and distribution of many resident species. Alternative C would improve conditions in a particular location in the watershed, and may provide benefits to more sedentary fish species but perhaps limited benefits to those more wide-ranging species that also use habitats in other parts of the watershed. Alternatives B and C have some potential negative aspects

(barrier removal conflicts, nonnative trout), whereas the overall effect of Alternative A may be largely negative if the existing land and water use practices perpetuate the ongoing degradation of the riverine system.

G. WILDLIFE

The private lands considered in the analysis are almost exclusively agricultural and ranchlands. The land use would not change under any of the alternatives, but some specific practices, methods or infrastructure may change.

ALTERNATIVE A

Effects to other wildlife species, including sensitive species, under the Alternative A, the No Action Alternative, would be similar to current conditions. Continued degradation of the riparian habitat may continue to have a detrimental effect on those species that depend on riparian zones or aquatic habitats for food, shelter, or migratory pathways.

ALTERNATIVE B

Under Alternative B, the Proposed Action Alternative, there should be no significant negative impacts on wildlife species. The numerous wildlife species that utilize riparian habitats might directly or indirectly realize benefits from actions that would be implemented under the Agreement. Conservation and rehabilitation of riparian habitats should be beneficial for wildlife species because of the importance of such habitats for feeding, reproduction, shelter and movement (reviewed by Kauffman and Krueger 1984). Responses by wildlife species would be concentrated mostly at locations where there are actual changes in riparian vegetation from the fluvial Arctic grayling conservation measures. The implementation of some conservation measures (e.g., installing a new headgate, constructing a stock watering facility) would involve a short-term ground disturbance, but the long-term effect on wildlife habitat would be positive because hydrologic and riparian habitat conditions would improve. Therefore, effects to these species would be minimal under the Proposed Action.

As noted earlier, some "incidental" wetlands created by inefficient irrigation practices may be negatively affected by proposed changes under the Agreement, so wetland-dependent species (e.g., waterfowl such as Canada geese, mallards, teal, etc.) may be affected. However, these species are native to the area and highly mobile, so should be adapted to respond to spatial and temporal changes in wetlands. Thus, these species are expected to respond to any reduction in incidental wetlands by shifting to alternate natural wetlands within the project area which probably, over time, provide more benefits to wetland-dependent species.

Conservation of sensitive wildlife species other than fluvial Arctic grayling would likely indirectly benefit from actions in the Proposed Action, because of the focus on those lands where collaborative efforts are projected to occur between Participating Landowners and the agencies. Bald eagles have been observed in the project area, but the nest location for this bald eagle territory is downstream outside the project area so the Proposed Action should not affect bald eagle reproduction. Bald eagles are most likely foraging for fish in the project area, so habitat

improvements realized under the Proposed Action should indirectly benefit eagles by increasing its prey base (i.e., the fishery in the project area). The Proposed Action should not affect Canada lynx, because they are thought to infrequently occur in the project area (predominantly range-grassland) as this is not their preferred habitat (i.e., montane coniferous forests). Moreover, the small amount of coniferous forest present in the project area is unlikely to be affected by the proposed action, which focuses on rangeland, agricultural lands, and riparian zones. Gray wolves also should not be affected because the resident pack in the project area has been controlled because of livestock depredations. Sage grouse should not be affected because the Proposed Action does not propose any general changes in land use and would not result in the destruction of sage habitat. No adverse effects are anticipated for northern goshawk or great gray owl.

While the attention would be directed toward fluvial Arctic grayling, it is reasonable to expect that conservation benefits for rare or sensitive plants and animals would be noted, with accompanying recommendations from the agencies for their protection, as well. The Proposed Action would not negatively impact these species.

ALTERNATIVE C

Under Alternative C, the effect to wildlife species and their associated habitats are similar to those under the Proposed Action, except, as noted above, there would likely be a somewhat greater number of fluvial Arctic grayling related conservation measures implemented under the Proposed Action than under Alternative C. Effects to other species from this activity are expected to be positive for some species, or negligible for other species, due to the smaller area that is likely to be affected by habitat enhancement measures. We do not anticipate that any native species would be negatively affected by habitat enhancement measures.

SUMMARY

In general, there should be no significant negative effects to wildlife species for Alternatives B and C, and these two alternatives should be beneficial for many species compared to the No Action Alternative. In order of net beneficial effects to wildlife present in the upper Big Hole River watershed, the three alternatives would be ranked as follows--(1) Alternative B, proposed action; (2) Alternative C, limited umbrella Agreement, and (3) Alternative A, no action. Under Alternatives B and C, the many wildlife species that use riparian habitats should benefit where conservation measures to help fluvial Arctic grayling result in the conservation or rehabilitation of riparian habitats. Alternative B has the potential to improve physical habitat conditions that would benefit wildlife across the largest area. Alternative C would improve conditions in a particular location in the watershed but not in as large an area as under Alternative B. Alternatives B and C may negatively affect some wildlife species, especially waterfowl, that use incidental wetlands created by overirrigation. However, these effects should be temporary and not significant because the affected species are highly mobile would likely utilize alternate (natural) wetlands in the project area.

H. SOCIAL AND ECONOMIC CONSIDERATIONS

1. CULTURAL AND HISTORIC RESOURCES

Any activity that requires ground disturbance is defined, in the context of this analysis, as an action with the potential to affect cultural and historic resources in the proposed project area. In this context, each of the three alternatives may include actions or practices (Table 1) that can potentially impact the type of cultural and historic resources present in the project area (Table 8). The differences among the alternatives in their influence on these resources depend primarily on specific actions/practices required, the (spatial) extent to which they would be applied, and the regulatory obligations incumbent on the participating parties.

Three general concepts establish the context for the analysis of effects of cultural and historic resources. First, the lands being considered in this analysis are almost exclusively privately owned (Figures 4-5) and dedicated to agricultural production, especially livestock ranching (Table 11). This general land use (i.e., agriculture) would not change, but alternative land and water use methods or techniques may be used on these lands to reduce and reverse impacts to habitat for fluvial Arctic grayling. Second, because the actual participation in any of the alternatives is unknown and data collection would be required before proposing specific actions on any given property, it is premature to analyze how the alternatives may impact the specific cultural and historical sites listed in Table 8. Instead, project or site-level analyses would be required on each property to ensure that these specific sites would not be adversely affected. Third, State and Federal agencies have specific regulatory requirements and associated accountability (vs. private landowners) in cases where they advocate, design, implement or are otherwise involved in any site-specific project involving ground disturbance. For this analysis, it is assumed that the State and Federal agencies involved in such a project within the context of any of the three alternatives would adhere to the appropriate environmental review requirements to protect cultural and historic resources. These requirements may, in some cases, necessitate project-level analyses (i.e., of site-specific plans) and involve consultation with the Montana SHPO, and compliance with applicable State and Federal regulations including Montana EPA, NEPA, and NHPA.

ALTERNATIVE A

Under Alternative A (no action) there should be no impact to previously identified cultural and historic sites; however, the potential does exist for negative impacts to sites that may be present but have not yet been identified or located by archaeological or historical surveys. Alternative A represents the status quo, so the existing agricultural and ranching activities would largely continue unchanged in the project area. To the extent that private landowners are already aware of the previously identified cultural and historic sites (i.e., the 185 sites listed in Table 8), this analysis assumes that landowners avoid disturbing those sites in the course of conducting their agricultural operations. Thus, the existing identified sites are presumed to be protected (i.e. no impact). However, the potential for agricultural activities to disturb cultural or historic sites may exist under situations where--(a) existing activities inadvertently or unknowingly disturb a site that has not yet been identified, or (b) landowner-directed changes to existing practices disturb known or previously unidentified sites. Hypothetical examples of each include--(a) discovery and disturbance of a lithic scatter operation of an existing corral or livestock processing area, and

(b) construction of a new irrigation ditch which either disturbs, through its construction, a previously unknown tipi ring or whose subsequent operation results in frequent flooding of an historic homestead site.

As previously noted, the probability that private landowners would modify their existing land and water use practices to benefit fluvial Arctic grayling is comparatively low under Alternative A. However, if they chose to do so and collaborated with State and Federal agencies, then such changes would require a level of environmental review where ground disturbing activities are proposed that would likely exceed their corresponding individual obligations. In some cases, the project-level analysis necessitated by agency involvement may result in the identification of previously undetected cultural or historic resources and would certainly provide information on known sites that could be considered in project planning and prior to any planned ground disturbing activities. The overall extent of such analysis would again depend on the level of private landowner participation and the involvement of State or Federal agencies, which is expected to be low under Alternative A, and the specific activities involved on any particular property.

ALTERNATIVE B

Under Alternative B (Proposed Action) there should be no impact to cultural and historic sites. Whereas this alternative may involve a change in agricultural practices or infrastructure and a suite of potentially ground-disturbing activities (Table 1) which would be implemented across a larger area than either Alternatives A and C, the Proposed Action explicitly involves State and Federal agencies in the planning process (site-specific plan development) and may require project-level environmental analysis. Agency involvement, and any required project or site-level environmental review to confirm that actions comply with laws and regulations that protect cultural and historic resources (e.g., Montana EPA, NEPA, or NHPA), should provide protection to known resources or those identified through surveys or in consultation with Montana SHPO. Ground-disturbing activities proposed in site-specific plans under the Agreement may be subject to environmental analysis by the action agency, and USFWS provides oversight and final approval of site-specific plans before any CIs can be issued and regulatory assurances extended to participating landowners.

Ultimately, ground disturbance may occur on some properties in the proposed project area as a result of implementing conservation measures under Alternative B to benefit fluvial Arctic grayling. However, the structure of the Agreement and the involvement of State and Federal agencies indicate that sufficient regulatory mechanisms are in place to protect cultural and historic sites in the proposed project area.

ALTERNATIVE C

Under Alternative C (limited umbrella Agreement) there should be no impact to cultural and historic sites. Analysis of environmental consequences for any site-specific plans proposed under this alternative would be identical to that described under Alternative B (Proposed Action). Specifically, the State and Federal agencies are involved in the planning process and may conduct environmental analysis and review where ground disturbing activities could affect

cultural and historic resources. The potential area of disturbance is smaller than under Alternative B, but the same regulatory protections should be in place to protect any cultural and historic resources identified on involved properties.

SUMMARY

All three alternatives should generally result in no impact to cultural and historic resources in the upper Big Hole River watershed compared to current conditions. Although Alternatives B (Proposed Action) and C (limited umbrella Agreement) may require some ground-disturbing activities to implement conservation measures to benefit fluvial Arctic grayling (see Table 1), protection of cultural and historic resources is anticipated through the involvement of State and Federal agencies in the project-planning (site-specific development) phase and their associated regulatory requirements. Under some scenarios, unintentional disturbance to cultural and historic sites may result from private landowner activities under Alternative A.

2. LOCAL COMMUNITIES AND THEIR ECONOMIES

The effect of the proposed action and the alternatives on the local communities in the upper Big Hole River would be gauged by their influence on the social and economic underpinnings of the traditional ranching culture that currently exists in the proposed project area. One assumption in this section, and throughout this assessment, is that the dominant land use in the affected area would not change. Agriculture and ranching would continue in the affected area; however, specific practices or infrastructure would be modified in some cases (e.g., amount or timing of irrigation, diversion structures, extent of grazing in riparian areas, species composition of hay grasses, etc.) to benefit fluvial Arctic grayling.

The listing of fluvial Arctic grayling under the ESA is perceived by residents of the Big Hole as a significant threat to their livelihoods because of the potential for regulatory enforcement actions could conceivably restrict or modify existing land and water use practices and reduce agricultural revenue.

ALTERNATIVE A

Effects to the local communities in the project area under Alternative A (No Action) would be similar to current conditions. However, the likelihood of listing the fluvial Arctic grayling under the ESA is considered more likely under the No Action Alternative than the other two alternatives because fewer conservation measures to benefit fluvial Arctic grayling would be implemented. The listing of fluvial Arctic grayling under the ESA is perceived by residents of the Big Hole as a significant threat to their livelihoods because of the potential for regulatory enforcement actions to disrupt their accustomed ranching activities. The diversion of surface waters to irrigate hay fields or pasture or to water livestock represents an otherwise-legal activity that may be subject to take prohibitions under section 9 of the ESA should fluvial Arctic grayling be listed as threatened or endangered. Similarly, entrainment of fluvial Arctic grayling in irrigation ditches may be subject to similar prohibitions. If private landowners were required to implement take avoidance measures, then this may impose an economic burden in terms of the actual cost of implementing such measures (e.g., installing a fish screen) or through the loss of

revenue where agricultural operations were affected. The overall effect of an ESA listing on the local community in the affected area cannot be known with certainty, but would most likely result in some situations of at least temporary economic hardship or possibly changes in land use or ownership.

While the potential effects of an ESA listing are speculative, it has been suggested that current land and water use practices in certain locations within the affected area may be ecologically unsustainable. Water consumption has apparently increased in recent decades because the irrigation of pastures that has extended the irrigation season past its traditional endpoint in July (DTM Consulting et al. 2005). Climatic conditions have resulted in lower than average snowpack in recent years, thus less water has been available for both instream and agricultural uses. If these trends for increased water demand during a period of reduced supply continue, then the status quo economic output of local ranches may be difficult to maintain irrespective of the listing status of fluvial Arctic grayling.

Under the No Action alternative, private landowners may choose to implement conservation measures to benefit fluvial Arctic grayling. They would be solely responsible for the cost of such measures if they chose to implement them independently. They may be able to obtain cost-share for those same measures should State or Federal agencies or a non-profit organization (e.g., watershed group) participate in the planning and/or implementation, and thus reduce the associated financial burden. However, the probability of conservation measures actually being implemented is less under the No Action alternative because private landowners would not be receiving regulatory assurances.

ALTERNATIVE B

The land-use planning process to be utilized under Alternative B, the Proposed Action, is expected to result in economically and ecologically sustainable ranching operations in the project area, so no long-term economic or social impacts are anticipated. The NRCS would play a central role in land use planning under the Proposed Action, and would take the lead in developing major components of the site-specific plans including prescribed grazing, irrigation water management, riparian conditions, and nutrient management (Montana FWP et al. 2005). All NRCS plans under the Proposed Action would generally be developed under Resource Management Standards (NRCS 2000). Under Resource Management Standards level plans, the practices to be implemented must meet *quality criteria* for resource sustainability. *Quality criteria* are defined as "quantitative or qualitative statements that are established in accordance with local, State, and Federal programs and regulations in consideration of ecological, economic and social effects" (NRCS 2001). These criteria represent a level "that sustains the use and productivity of the resource indefinitely", although it is noted that short-term effects are possible to achieve long-term benefits (NRCS 2001). Overall, the planning process to be used by NRCS in the context of site-specific plans developed under the Proposed Action should result in the implementation of practices that would "provide for the long-term conservation, protection and/or improvement of the resource base" (NRCS 2001).

Capital or labor expenses needed to implement fluvial Arctic grayling conservation measures under the Proposed Action would be covered by State and Federal funding programs, to the

extent possible. A suite of funding options is available through, for example, various Farm Bill programs administered by NRCS, and Future Fisheries Improvement Program administered by Montana FWP (Montana FWP et al. 2005). However, financial or labor investments by participating landowners may be needed in some cases to implement conservation measures. Contributions from landowners may be expected where funding programs require cost-share from participants or where a participant's income exceeds program criteria and precludes participation.

Under the Proposed Action, the economic output of agricultural lands should be equal to current levels because of more efficient utilization of resources leading to economically and ecologically sustainable ranching operations. Changes in ownership caused by economic hardship should be minimal or nil, and the cost of implementing conservation measures would be offset by State and Federal programs in many cases. Thus, the traditional ranching culture in the project area should remain largely intact and there should be no negative effect on the local community and its economy.

ALTERNATIVE C

The land-use planning process to be utilized under Alternative C (limited umbrella Agreement) would be identical to that used for Alternative B (Proposed Action) and is expected to result in economically and ecologically sustainable ranching operations in the limited project area, so no long-term economic or social impacts are anticipated. Participating landowners under Alternative C would be conducting their ranching operations in accordance with the sustainability principles described under the Proposed Action, but these principles would be only uniformly applied across the limited project area (i.e., a portion of the upper watershed). Condition of private lands outside the limited project area would be as described under the No Action Alternative.

The potential for social tensions between landowners may exist under Alternative C because of the exclusive description of the limited project area versus the more inclusive and larger project area for the Proposed Action. Landowners participating in Alternative C would receive ESA regulatory assurances for implementing conservation actions to benefit fluvial Arctic grayling, whereas those landowners outside the limited project area would not receive assurances for implementing identical measures unless they were covered under another Agreement. The USFWS is not aware of the development of any other Agreement to benefit fluvial Arctic grayling besides the Proposed Action.

There may be perceived or real differences in cost-share or funding support for implementing conservation measures. Some landowners may anticipate that participation in the Agreement is a prerequisite to obtain financial assistance to implement conservation measures to benefit fluvial Arctic grayling. This should generally not be the case because similar funding mechanisms should be available to address the needs of both Agreement and non-Agreement participants. However, it is conceivable that the prioritization system of some funding programs may recognize existing conservation agreements, so that Agreement participants would have a greater likelihood of receiving such funds.

Overall, there are no anticipated long-term impacts to the local communities and economies of the upper Big Hole River watershed as a result of implementing Alternative C. This alternative represents a combination of the Proposed Action (i.e., inside the limited project area) and the No Action Alternative (i.e., outside the limited project area), both of which individually were concluded to have no effect. Thus, under Alternative C ranch production and land ownership should remain similar to current conditions, and the local ranching culture would not be significantly affected.

SUMMARY

Each of the three alternative actions is expected to have no affect on the ranching community in the upper Big Hole River watershed and its economy although there might be some effect under Alternative A if grayling are listed as threatened or endangered under the ESA. The No Action Alternative represents the status quo, whereas Alternatives B and C represent Agreements leading to the implementation of conservation measures across project areas of varying size. The planning process to be used under Alternatives B and C consider ecological, economic and social effects, with the final goal of implementing conservation plans that sustains and preserves the resource base. Thus, no significant social and economic effects are expected under either alternative.

3. RECREATION

Fishing and hunting are the two primary recreational activities occurring within the proposed project area that have the potential to be affected by the proposed action or any of the alternatives. While rafting does occur in the Big Hole River within the proposed project area, most of it is done in the context of fishing. The Big Hole River is a low-gradient river with few stretches of white-water, so recreational rafting is comparatively less significant river use than angling from a raft and will not be considered in this analysis.

ALTERNATIVE A

Under Alternative A (no action) the status quo should generally hold, and there should be no impact on fishing and hunting beyond current levels. Variable environmental conditions may prove either beneficial or detrimental to fishery and hunting resources. While the no action alternative is generally considered the default or null condition relative to the other alternatives, any human-mediated change to fishing and hunting under Alternative A would likely be negative. If current land and water use practices continue under Alternative A, then the impairments to the aquatic system (dewatering, thermal loading, and habitat and channel simplification) would likely continue and the effect on sport fishery resources in the river would be negative. Fishery resources in the Big Hole River are currently being impacted by the combined effects of drought and human-influenced habitat degradation (Magee and Lamothe 2004; Oswald 2005). Degraded physical habitat conditions also have lead to regulatory restrictions on the fishery. Angling restrictions in the upper Big Hole River have frequently been imposed during recent years because of low streamflows and high water temperatures. Low streamflows may preclude rafting access of certain river segments during summer months, and thus reduce access to the fishery.

The probability of listing fluvial Arctic grayling under the ESA is comparatively greatest under Alternative A. If fluvial Arctic grayling were listed, then regulatory restrictions may be imposed on the fluvial Arctic grayling fishery (currently catch-and-release) or the general sport fishery that may affect anglers targeting other species, such as brown trout, brook trout and rainbow trout.

The No Action Alternative is generally assumed to result in no impact to hunting resources. That is, hunting for big game, upland birds or waterfowl in the project area would remain unchanged from current levels. Variation in the quality of the resource would primarily depend on how environmental conditions affected populations of game species. As with the fishery, any human-mediated affects to hunting resources would likely be negative under Alternative A because it assumes that current land and water use practices would continue. Game species that depend intimately on aquatic resources and/or riparian habitats might be affected where the No Action Alternative lead to continued impairment. The probability that aquatic and riparian habitats would be restored is much less under Alternative A compared with Alternatives B and C.

ALTERNATIVE B

Under Alternative B (Proposed Action) there should be beneficial effects for fishing and mostly no impact or beneficial effects for hunting. The implementation of conservation measures to benefit fluvial Arctic grayling also is expected to benefit other game fish species. Despite some temporary ground or substrate disturbance associated with the implementation of conservation measures under the Proposed Action, the net result should be an improvement to the structure and function of the aquatic ecosystem in the upper Big Hole River relative to current conditions. Instream flows should increase, riparian habitats would be protected or restored, barriers that fragment habitat would be removed, and entrainment in irrigation ditches should be reduced. Populations of fluvial Arctic grayling, brook trout, brown trout, and rainbow trout are expected to respond positively to these changes, thus the overall sport fishery resource would be improved. Angling closures would be less likely because improved habitat conditions should reduce the frequency of low streamflow and thermal loading that would otherwise necessitate regulatory action.

The overall effect of Alternative B on hunting should be nil or positive, but effects on individual game species may range from negative to positive depending on their habitat requirements. Riparian habitats are ecologically important for many species of wildlife (reviewed by Kauffman and Krueger 1984), so the proposed action should benefit those game species, for example elk and moose, which forage in and use riparian zones for migration corridors. Private lands in the proposed project area would remain in agricultural production, so little or no change from current population levels is anticipated for many game species. However, game species that use certain wetlands may be affected. Overirrigation and water loss from inefficient irrigation ditches has created "incidental" wetlands at some locations in the proposed project area. Alternative B may result in actions which reduce overirrigation and increase irrigation ditch efficiency, and reduce the size of or eliminate these incidentally-created wetlands. Waterfowl

that use such habitats would have to relocate, so the spatial distribution of certain wetland-dependant game species may change under Alternative B. Alternative B is not expected to affect naturally-occurring wetlands.

ALTERNATIVE C

Under Alternative C (limited umbrella Agreement) there should be beneficial effects for fishing and mostly no impact or beneficial effects for hunting, but the scale of these effects would be reduced relative to Alternative B. In general, Alternative C should result in beneficial effects for fish species that either reside in or seasonally utilize habitats in the Big Hole River between Wisdom Bridge and Little Lake Creek (Figure 1). Thus, the fishery in this section of the river should improve. However, this river segment's primary fishery resource is brook trout (and perhaps fluvial Arctic grayling) and anglers typically target brown trout and rainbow trout in downstream segments. Positive effects of conservation actions implemented under Alternative C may translate to improved aquatic habitat conditions downstream from the "limited" project area, but it is equally likely that such effects would be attenuated or counteracted by actions outside the area (i.e., non-participating landowners outside the limited project area that divert water "conserved" by actions in the limited project area unless flows were adequately protected through leases).

The overall effect of Alternative C on hunting should be nil or positive, and the effects on specific game species or habitats should be identical to that described under Alternative B but would be evident across a smaller spatial scale. It is not known if changed (improved) habitat conditions within the limited project area would affect the relative distribution of game species and hunting pressure in the watershed.

SUMMARY

All three alternatives should generally result in no negative impacts to the primary recreational activities in the upper Big Hole River watershed compared to current conditions. In order of beneficial effects to the primary recreational activities (hunting and fishing) on private lands in the proposed project, the three alternatives would be ranked as follows--(1) Alternative B, proposed action; and (2) Alternative C, limited umbrella Agreement. Alternative A (no action) is generally assumed to be neutral. Alternative B has the potential to improve physical habitat conditions for fishes over a large segment of river and should improve the sport fishery. Alternative B should generally have no effect or a beneficial effect on hunting. Beneficial effects would be most evident where game species respond positively to riparian habitat conservation and restoration. Alternative C would improve conditions in a specific segment in the watershed and should improve angling opportunities for brook trout and fluvial Arctic grayling. Alternative C should generally have no effect or a beneficial effect on hunting. Alternative A is the status quo which assumes no change to fishery and hunting opportunities; however, the perpetuation of existing land and water use practices might also lead to a decline in those resources where degradation of aquatic and riparian habitats continue.

I. CONSIDERATION OF CHANGED CIRCUMSTANCES AND ADAPTIVE MANAGEMENT PROVISIONS UNDER THE PROPOSED ACTION

This EA analyzes actions that are reasonably certain to occur if the Alternative B, the Proposed Action (umbrella Agreement) were executed and implemented. However, the Proposed Action also includes a number of actions that are less likely to occur. These less likely actions are best characterized as potential responses to changed circumstances or adaptive management provisions, but are not formally analyzed in the present assessment because--(a) such actions are already accounted for in the existing analysis as they represent an extension of Agreement's conservation strategy; (b) existing regulatory mechanisms are in place to ensure proper environmental review; (c) the Agreement presents a general approach or solution and any subsequent proposal for action would be subject to environmental review; or (d) there is little basis for environmental review. A summary of these actions, as well as their basis for environmental review, are presented below.

The Proposed Action presents provisions to deal with the changed circumstances of drought, floods, water rights adjudication, and impacts of nonnative species. An example of actions in response to a changed circumstance already accounted for in the existing analysis as they represent an extension of Agreement's conservation strategy would be possible actions to address drought consistent with the Agreement's conservation strategy whereby the participating agencies provide technical and financial assistance to landowners to reduce irrigation demands. An example of a response to changed circumstances where existing regulatory mechanisms are in place to ensure proper environmental review is if adjudication leads to an amendment, modification or revision of the Permit and Agreement to the extent that the existing conservation strategy is changed, then by the CCAA policy such a change would trigger review under applicable regulations. However, post-adjudication revision to any site-specific plans to ensure consistency between the plan and State water law would appear to be a formality and does not appear to constitute an action likely to affect the human environment. An example of changed circumstances where the Agreement presents a general approach or solution and any subsequent proposal for action would be subject to environmental review would be where the Proposed Action does not present any specific proposals to address threats from nonnative species. Subsequent specific proposals to deal with identified threats would be subject to applicable State and Federal regulations. An example of changed circumstances where there is little basis for environmental review would be the assessment of physical structures affected by floods. This does not appear to constitute an action likely to affect the human environment, so environmental review does not seem appropriate.

The Proposed Action also presents general adaptive management approaches to address threats to fluvial Arctic grayling from nonnative trout and transplant fluvial Arctic grayling within the project area if restoration targets are not being achieved. Any specific actions under these general guidelines are at the legal discretion of Montana FWP and would be subject to appropriate environmental review. For example, Montana FWP has the legal mandate to manage fishery resources in Montana and if it presented a proposal to suppress nonnative trout or translocate fertilized fluvial Arctic grayling eggs within the project area and within the context of the Agreement, such a proposal would be subject to environmental review under Montana EPA.

Table 13. Summary of environmental impacts to the human environment.

ENVIRONMENTAL PARAMETER	ALTERNATIVE A	ALTERNATIVE B	ALTERNATIVE C
Fluvial Arctic Grayling	Fluvial Arctic grayling likely to remain at low abundance, but some localized habitat improvements may result in population increases.	Fluvial Arctic grayling abundance & distribution likely to increase across watershed in proportion to landowner participation.	Fluvial Arctic grayling abundance & distribution likely to increase, but at a lesser spatial scale than Alt B because of localized project area.
Hydrology	Largely status quo – system's hydrology would remain altered by extensive irrigation diversions.	Reduced irrigation withdrawals across a large area would move river system to a more natural hydrograph & flow regime, with increased instream flows & reduced thermal loading.	Certain river segments in project area would experience improved instream flows, but irrigation withdrawals at existing levels outside project area would likely maintain hydrologic alterations across a greater area.
Vegetation	Largely status quo – alteration of plant communities on rangeland, hay fields & pastures, & in riparian zones would continue to result in degraded conditions except in locations where specific restoration projects are being implemented.	No impact or positive effects for native vegetation, because native vegetation may be protected or restored. Some impacts to existing agricultural species composition where restoration activities or changes in land or water use are required.	Effects same as for Alt B, except at a smaller spatial scale.
Wetlands	No significant impact. Incidental wetlands sustained by overirrigation would persist.	No significant impact to natural wetlands, but some incidental wetlands sustained by overirrigation may be affected	Effects same as for Alt B, except at a smaller spatial scale.
Fishes	Degraded habitat conditions would likely persist & may favor more tolerant, introduced species.	Hydrologic & riparian (streamside vegetation) improvements should improve habitat conditions for most fishes in project area.	Localized hydrologic & riparian improvements may benefit species likely to occur or utilize habitats in those specific areas.
Wildlife	Mostly no significant impact, but local benefits possible where specific restoration projects are being implemented.	Improved terrestrial & aquatic habitat conditions would result in no significant impact or benefits to most wildlife species. Species using riparian zones would especially benefit.	Effects same as for Alt B, except at a smaller spatial scale.
Listed species of wildlife	No significant impact, but localized benefits possible where specific restoration projects are being implemented.	Either a beneficial effect or no significant impact.	Similar to Alt B, but benefits at a smaller spatial scale.
Cultural resources	No impact other than existing (agricultural) land use.	No impact – ground-disturbing activities require EA & Montana SHPO consultation, as necessary.	No impact – ground-disturbing activities requires EA & Montana SHPO consultation, as necessary.
Local communities and economies	Increased potential for ESA listing of fluvial Arctic grayling may pose social and economic threats	Increased stability for local communities & its economy because--a) protection of fluvial Arctic grayling would reduce likelihood of ESA listing of fluvial Arctic grayling, b) regulatory assurances under Agreement would remove disincentive to cooperate in fluvial Arctic grayling conservation. Cost-share possible for conservation projects.	Likelihood of ESA listing of fluvial Arctic grayling greater than in Alt B (but less than in A) because of restricted project area. Positive effects for participants would be similar to those in Alt B, but economic threats would remain for landowners outside the project area if fluvial Arctic grayling were listed.
Recreation	No impact.	Either a beneficial effect or no significant impact. Recreational fishery should improve.	Similar to Alt B, but benefits at a smaller spatial scale. Recreational fishery may improve, but not necessarily for all salmonid species.

Table 14. Summary of Montana EPA criteria used to determine significance of impacts under the proposed action (Alternative B).

Significance Criteria	(a) severity, duration, geographic extent, & frequency of occurrence of impact	(b) probability that impact will occur if proposed action occurs; or conversely, reasonable assurance in keeping with potential severity of an impact that impact will not occur	(c) growth-inducing or growth-inhibiting aspects of impact, including relationship or contribution of impact to cumulative impacts	(d) quantity & quality of each environmental resource or value that would be affected, including uniqueness & fragility of those resources or values	(e) importance to State & society of each environmental resource or value that would be affected	(f) any precedent that would be set as a result of an impact of proposed action that would commit department to future actions with significant impacts or a decision in principle about such future actions	(g) potential conflict with local, State, or Federal laws, requirements, or formal plans
Fluvial Arctic Grayling	20-year Agreement duration, with expected extension. Long-term benefits to grayling abundance & distribution in Big Hole River.	Without implementation of proposed action, expectation is that status of grayling will remain unchanged, without benefits of proposed action.	None	Upper Missouri fluvial Arctic grayling are last native fluvial population in continental U.S. They are a Montana species of Concern. Proposed action will improve status & assure long-term of this native species.	Fluvial Arctic grayling is a Montana Species of Concern & an ESA candidate species.	None	None
Hydrology	Long-term benefits to natural river function, temperature profile & flows in Big Hole River by reducing irrigation withdrawals.	Significant benefits to river function & flows are very likely to occur; less likely or will not occur without Agreement.	None	Significant improvements to Big Hole River hydrology will improve instream habitat for resident fish including grayling.	Accrued benefits will reduce probability that water withdrawal restrictions will be imposed & recreational angling will be suspended under Montana Drought Plan.	None	None
Vegetation	No or minor beneficial impacts to native vegetation on enrolled properties. Minor impacts from changes to existing vegetation communities.	More productive vegetative communities on agricultural lands & revegatation of riparian zones will result from proposed actions.	None	Primary benefit will be reestablishment or expansion of native riparian vegetation.	Changes to vegetation community have potential to improve productivity of agricultural lands. Restoration of riparian vegetation will restore natural function & fish & wildlife habitat of Big Hole River.	None	None
Wetlands	No significant impacts to natural wetlands.	None	None	Not applicable	Not applicable	None	None

Significance Criteria	(a) severity, duration, geographic extent, & frequency of occurrence of impact	(b) probability that impact will occur if proposed action occurs; or conversely, reasonable assurance in keeping with potential severity of an impact that impact will not occur	(c) growth-inducing or growth-inhibiting aspects of impact, including relationship or contribution of impact to cumulative impacts	(d) quantity & quality of each environmental resource or value that would be affected, including uniqueness & fragility of those resources or values	(e) importance to State & society of each environmental resource or value that would be affected	(f) any precedent that would be set as a result of an impact of proposed action that would commit department to future actions with significant impacts or a decision in principle about such future actions	(g) potential conflict with local, State, or Federal laws, requirements, or formal plans
Fishes	Long-term benefits to abundance & distribution of all fishes in Big Hole River.	Without implementation of proposed action, expectation is that status of resident Big Hole fishes will remain unchanged.	None	Proposed action will improve abundance of native & non-native game fish species.	Fisheries & angling opportunities in Big Hole River should improve.	None	None
Wildlife	No significant impacts to terrestrial or aquatic wildlife.	Wildlife will primarily benefit from improvements to riparian habitats from proposed action.	None	Minor benefits to wildlife using riparian areas.	There are no anticipated significant impacts from proposed action.	None	None
Listed Species of Wildlife	No significant impacts anticipated for listed species.	Likely	None	Bald eagles may benefit from increased prey base (fish).	Bald eagles are a Montana Species of Concern.	None	None
Cultural Resources	No impact – ground-disturbing activities will require EA & Montana SHPO consultation as necessary	Not applicable	None	None	None	None	None
Local Communities & Economies	No significant impacts. Participating landowners benefit from ESA regulatory relief.	Regulatory relief for Participating Landowners more likely under proposed action.	None	Participating Landowners receive ESA regulatory relief & participate in conservation/restoration of fluvial Artic grayling.	Support of agricultural communities and conserving grayling are important to Montana. Both benefit from proposed action.	None	None
Recreation	Long-term improvement to recreational angling in Big Hole River. Minor impacts to hunted.	Increases in abundance of game fish species probable. Possible benefit to wildlife (elk & moose) that utilize riparian areas. Possible minor impacts to waterfowl that have used incidental wetlands.	None	Angling opportunities are expected to improve significantly. Minor impacts to wildlife (+ for big game species, - for waterfowl) are expected to be limited.	Recreational angling in Big Hole River is a resource of major State & national importance. Minor impacts to wildlife will have little noticeable affect.	None	None

V. CUMULATIVE EFFECTS

Cumulative effects include the impacts on the environment which result "from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time" (40 CFR 1508.7).

There are numerous non-Federal actions that are ongoing or will occur in the future; however, the locations of individual enrolled property owners will not be known until the Agreement becomes operational and willing landowners come forward to participate in the program. However, since April 2005, over three dozen landowners collectively owning more than 200,000 acres of private lands in the proposed project area have formally expressed their willingness to Montana FWP to participate in a CCAA to benefit fluvial Arctic grayling, should such a CCAA be executed and implemented. While the actual distribution or total acreage of lands that would be enrolled during the 20-year period of the Agreement cannot be predicted, the Montana FWP would not issue a CI to any non-Federal landowner if it is determined that ongoing or future actions at the site may compromise the efforts to improve habitat for Arctic grayling.

The following analysis addresses the potential cumulative effects from the proposed action and its alternatives when added to the past, present, and reasonably foreseeable future actions in the project area emphasizing actions on private and State lands in the project area that would be eligible to enroll in a CCAA.

A. FLUVIAL ARCTIC GRAYLING AND OTHER FISH POPULATIONS

Under Alternative A, the No Action alternative, agricultural and ranching activities would continue within the Project Area in accordance with applicable laws, with the predominant land use being irrigated agriculture for hay production and livestock. These activities have cumulatively led to fluvial Arctic grayling habitat degradation, fragmentation and loss. Factors such as angling exploitation, overfishing, and introduction of non-native salmonid fishes, in combination with the above-mentioned habitat-related impacts, have contributed to declining numbers of fluvial Arctic grayling. Although various State, Federal, and private groups, including Montana FWP, USFWS, NRCS, Montana DNRC, the Big Hole Watershed Committee, the Big Hole River Foundation, and Trout Unlimited have promoted, implemented or otherwise been involved in efforts to improve habitat conditions for fluvial Arctic grayling in the project area, coordinated actions have not been conducted on a large scale. Continuance of the *status quo* under Alternative A would most likely lead to continued habitat degradation and a continued decline in grayling population numbers. The potential for listing under the No Action alternative is greater than under the Action alternatives and if listed, over time, would have economic, legal and social repercussions for affected individuals.

Cumulative effects under Alternative B and to a lesser extent under Alternative C would be related to management actions taken by up to 318 non-Federal property owners under Alternative B and by up to 131 owners under Alternative C to conserve fluvial Arctic grayling at various sites throughout the project area. These actions that would generally be habitat improvements that would benefit the grayling include--1) improving of instream flows; 2) conserving or restoring of riparian habitats, 3) removal of barriers to fluvial Arctic grayling movement; and 4) addressing entrainment threats. These management actions would likely occur at more sites under the Proposed Action Alternative B than under Alternative C due to that alternative's greater likelihood for attracting landowners into collaborative grayling conservation measures under the Agreement.

There are likely two types of cumulative positive effects that could occur under Alternatives B and C--(1) approval of agreements under any of the alternatives could result in other landowners developing similar agreements in the future; and (2) changes through time in habitats, and in fluvial Arctic grayling and other fish populations, would occur from implementation of conservation measures at certain sites under any alternative.

For the first type of likely positive cumulative effects, under either Alternative B or C, if an agreement and site-specific plans are approved, and permits are issued to individual Participating Landowners, it is reasonable to foresee other landowners who are interested in fluvial Arctic grayling conservation, and/or desire ESA regulatory assurances, entering in to similar agreements with the agencies. Cumulative effects beneficial to conservation of the grayling could occur on lands throughout the estimated 382,200-acre project area, (approximately130,000 acres under Alternative C), from conservation measures being implemented by other landowners who enter into similar agreements. Effects from other landowners implementing similar conservation measures would be positive, in fact, should similar conservation measures be implemented on all necessary properties throughout the range of the species. Projects representative of those that would be implemented at a larger scale under the CCAA have been implemented or are ongoing in the Big Hole River watershed. For at least the past decade, Montana FWP and the USFWS' Partners program have engaged Big Hole River valley landowners in small-scale restoration projects to benefit fluvial Arctic grayling. In both 2004 and 2005, the NRCS has utilized special initiative EQIP programs to provide technical and financial assistance to producers willing to implement both short- and long-term practices to improve habitat conditions for fluvial Arctic grayling in the Big Hole River.

For the second type of likely positive cumulative effects, under Alternatives B or C, cumulative positive impacts would be expected to occur over time as a result of an increase in the quantity and quality of suitable habitat for grayling and other fish species at sites where grayling habitat conservation measures are implemented. The extent of suitable fluvial Arctic grayling habitat would be expected to increase from additional landowners implementing similar agreements, and habitat quality would be expected to improve over time from habitat improvements implemented to conserve fluvial Arctic grayling. These positive cumulative impacts would likely occur beyond the 20-year duration of the Proposed Action Alternative B since habitat improvements would be expected to extend over a longer period of time. These positive cumulative effects are

expected to contribute to the recovery and sustainability of fluvial Arctic grayling in the proposed project area and also to benefit other fish species that have similar habitat requirements.

The introduction of nonnative trout species has been cited as a secondary reason for decline of fluvial Arctic grayling in the Big Hole River. Actions taken under Alternatives B and C are generally designed to improve aquatic habitats and benefit fluvial Arctic grayling but may have a positive effect on other fishes, including nonnative trout. Since some uncertainty exists as to whether competition and predation by nonnative trout species are important mechanisms presently influencing the population status of native fish species in the project area, it is difficult to predict what the cumulative effects would be of increased numbers of nonnative fishes on fluvial Arctic grayling or other native fishes in the project area. Abiotic (habitat) conditions are currently perceived to be a more significant influence on native fishes in the project area than competitive interactions (biotic), but if the proposed action removes some of these abiotic limitations (i.e., dewatering, thermal loading, etc.) then biotic factors may come to play a more significant role. Monitoring the status of the fisheries over time would play a determining role in whether other actions may be necessary to address threats by nonnative trout populations if they are having a detrimental effect upon the status of native fish populations.

B. HYDROLOGY (Including water quality and quantity)

Cumulative effects to water quality and quantity, which have been severely degraded from past land management practices, should improve under the Proposed Action Alternative B and to a lesser extent under Alternative C, and would either not change or continue to degrade under the "No Action" Alternative A. More water would remain in the natural river channel leading to a more "natural" flow regime which would help hydrological and ecological processes. This process would be much more pronounced under Alternative B as conservation measures would be implemented along contiguous river segments leading to more widespread hydrologic benefits. Improvements in the hydrology of the stream and to riparian habitats would in turn improve water quality and quantity. For example, existing thermal impairments in the mainstem Big Hole River should be reduced by increased instream flows, functional riparian habitats, and longer-term adjustments in channel form.

Adjudication of claimed rights under Montana water law may interact with the effects of the three alternative actions. The past and present condition is that the Big Hole River system is overallocated, meaning that claimed water rights typically exceed water availability. Water adjudication is expected to occur within the next 20 years, presumably when the Agreement would be in effect. The adjudication process is anticipated to reduce the extent of overallocation, but it is unknown if it would be completely eliminated. Overall, adjudication is expected to increase streamflows above current levels. Relative to adjudication, the cumulative effects of Alternatives B and C, which propose to implement water conservation measures for participating landowners in addition to compliance with claimed or adjudicated water rights, should be additive and positive for hydrologic conditions and result in increased water quantity (instream flows) and water quality (reduced thermal loading). Alternative A can have some (positive) or

no cumulative effects relative to adjudication depending on the number of landowners who take specific actions to reduce irrigation demands and improve instream flows in addition to those changes effected by adjudication.

C. VEGETATION

Under the No Action Alternative (A), vegetation communities would remain the same or continue to degrade over time unless the larger-scale conservation actions were taken to reverse this situation. Cumulatively, this would be expected to affect the riparian zone resulting in continued degradation of habitat for fluvial Arctic grayling and other fish species. The cumulative effects of implementing either alternatives B or C would result in beneficial effects over time to the native vegetation. Some changes in vegetation may occur, through re-establishment of native plants in areas that currently support nonnative plants. Upland, native dry-land plants would become more abundant and widely distributed because of decreased irrigation in some of these areas. Overall, these alterations, over time, would benefit wildlife dependent on these species of plants.

D. WETLANDS

Under Alternative A, irrigation practices in the upper Big Hole River watershed have facilitated the spread of hydrophytic (wetland-adapted) plant species into locations with topography generally not conducive to these species, such as benches or on slopes. Under the *status* quo this phenomenon would continue resulting in the maintenance of existing and creation of additional incidental wetlands. Presumably, this has had the unintended positive result of providing additional habitat for migratory birds. The extent of incidental wetlands, as well as those incidental wetlands that may be affected by the Agreement, is presently unknown. However, it appears that the cumulative effects of the action alternatives B and C would be to promote habitat conditions more characteristic of the natural topography and hydrology at those locations. Incidental wetlands would gradually disappear and wildlife now using those wetlands are expected to shift back to utilization of natural wetland habitats.

E. WILDLIFE

The cumulative effect of the action Alternatives B and C over time on other wildlife also should be positive. Riparian-dependent species should benefit from improvements to the riparian zone. Bald eagles would experience an increase in forage due to an increase in the number of fish available. Some migratory bird species may have actually experienced benefits from past land and water management practices which would continue under Alternative A since they have led to the creation of incidental wetlands utilized by many of these birds. With implementation of conservation measures under Alternatives B and C, migratory birds may experience some impact with the loss of these wetlands, but over time they are expected to relocate to existing or restored natural wetlands which would have beneficial cumulative effects on all avian species migrating through the project area.

F. SOCIAL AND ECONOMIC CONSIDERATIONS

1. LOCAL COMMUNITIES AND ECONOMIES

The cumulative effects of the No Action Alternative on socio/economic parameters are based on the likelihood of listing the fluvial Arctic grayling under the ESA. If current land management practices were to continue Arctic grayling populations would continue to decline. The listing of fluvial Arctic grayling under the ESA is perceived by residents of the Big Hole as a significant threat to their livelihoods because of the potential for regulatory enforcement actions to disrupt their accustomed ranching activities. The overall effect of an ESA listing on the local community in the affected area cannot be known with certainty, but would most likely result in some situations of at least temporary economic hardship or possibly changes in land use or ownership because of the possibility of take of fluvial Arctic grayling from diversion of surface water or entrainment in irrigation ditches.

Even without the threat of listing under the ESA, current land management practices may be ecologically unsustainable as drought conditions continue to diminish water supplies needed to continue current irrigation practices. Over time, these practices may lead to economic hardships due to loss of resources needed to sustain current land management practices.

The cumulative effects of implementation of conservation practices under Alternatives B and C would allow for more economically and ecologically sustainable ranching practices. Expenses to implement these practices would be defrayed, to the extent possible, by State and Federal funding programs. Landowners may expect some financial investment where funding programs require cost-share from participants or where a participant's income exceeds program criteria and precludes participation. Over time this outlay should be justified by more efficient utilization of resources leading to more economically and ecologically sustainable ranching operations.

2. RECREATION

The cumulative effects of Alternative A on recreational fishing should be negligible or negative. Although past fishing practices may have contributed to the status of fluvial Arctic grayling in the upper Missouri River, habitat degradation is believed to be the primary factor threatening the species in the Big Hole River. Continued degradation of the environment would lead to continued loss of angling opportunities and may lead to an increased frequency of fishery closures in the upper Big Hole River following Montana FWP's management guidelines. If ongoing habitat degradation contributes to the listing of fluvial Arctic grayling under the ESA, then it is possible that Federal regulations also may limit or restrict angling. Implementation of Alternative B and to a lesser extent Alternative C over time would lead to improvements to instream flow and riparian habitat. This would in turn lead to improved angling not only for fluvial Arctic grayling but for other salmonid species. Additionally, improved recreational angling opportunities may have a positive effect on the economy by increasing the number of anglers to the area who would spend money on goods and services.

G. FEDERAL LANDS

Cumulative effects of interactions between land management activities on Federal lands and the three alternatives are considered independently from those in the preceding sections, which considered cumulative effects on private and State lands in or adjacent to the proposed project area (and are eligible to enroll in CCAAs). Approximately 67 percent of the entire Big Hole River watershed is owned by the Federal government (58 percent USFS, 9.4 percent BLM, and 0.04 percent NPS) and 3.4 percent is owned by the State of Montana. In the upper watershed, USFS holdings remain significant but lands held by the State of Montana comprise a comparatively greater percentage of the upper watershed area than those held by the Bureau of Land Management though their overall extent is much less than USFS lands (Figure 6 this EA; see draft CCAA, Montana FWP et al. 2005, Figures 5 and 6). Analysis of cumulative effects focuses primarily on aquatic resources (water quality and quantity and fisheries). No direct cumulative effects on vegetation, wetlands, wildlife, cultural resources, local communities and economies, and recreation are expected unless specifically noted.

NATIONAL FOREST LANDS – BEAVERHEAD DEERLODGE NATIONAL FOREST

Approximately 58 percent of the Big Hole River watershed is owned by the USFS and is part of the BDNF. The BDNF lands are adjacent to the proposed project area in some locations. Thus, it likely that past, present and future activities in BDNF have affected and would continue to influence environmental conditions in the proposed project area. While forest management activities may influence a range of environmental attributes outside the forest, the proposed action deals primarily with how land use affects the physical template for fluvial Arctic grayling. Aquatic systems are inherently linked such that upstream processes affect conditions downstream and vice versa. Thus, the present cumulative effects analysis focuses on how general land management practices (particularly grazing) in the BDNF affect hydrologic function and aquatic resources, and is further appropriate because aquatic resource conditions integrate effects of watershed-scale land management. The analysis also would consider if general management strategies employed by the BDNF are consistent with the proposed Agreement and the other two alternatives.

The existing BDNF forest management plan (Beaverhead Forest Plan) was approved in 1986 but is currently being revised. The general goal of the existing Beaverhead Forest Plan is "to maximize present net value while responding to the range of resource use demands and concerns of the public who utilize the Beaverhead National Forest land and resources" (USFS 1986, II-40). The existing plan includes a number of aims with regard to aquatic resources. For example, the planners recognized that "the fishery streams in the Forest are important for the recruitment of fish to the downstream fisheries both on and off the Forest" (USFS 1986, II-22). Among the goals of the Beaverhead Forest Plan are those to "ensure a high degree of water quality and sufficient water quantity in on-Forest streams to protect fisheries habitat, water based recreation, municipal water supplies, and downstream uses in accordance with State of Montana Water Quality Standards," and "provide opportunities for use of forage by domestic livestock at or above current permitted levels of use while protecting and enhancing fishery habitat, riparian areas, recreation and other forest resources"(from 1986 Beaverhead Forest Plan as quoted in FEIS Beaverhead Forest Plan Riparian Amendment, USFS 1997, III-1). The Beaverhead Forest

Plan acknowledges that land use activities such as livestock grazing and timber harvest have the potential to adversely affect water resources, and requires that the BDNF use Best Management Practices (BMPs) "... where potential impacts [to watersheds and soils] are identified" (USFS 1986, III-23) and "in all [grazing] allotment management activities to protect soils and water quality" (from 1986 Forest Plan as quoted in 1997 Beaverhead Forest Plan Riparian Amendment FEIS, USFS 1997, III-2). The Beaverhead Forest Plan designates westslope cutthroat trout and Arctic grayling among the 11 "wildlife indicator species" on the Forest (USFS 1986, III-18).

A 5-year review of the existing Beaverhead Forest Plan published in 1993 indicated that existing conditions for riparian areas were not as good as expected during forest planning and that existing standards were not sufficient to meet goals for fisheries, wildlife and forest resources (USFS 1997). Specifically, "the existing condition of the forest's riparian areas is significantly poorer than was assumed in the development of the of the Forest Plan" (Beaverhead Forest Plan Five-year Review 1993, as cited in FEIS Beaverhead Forest Plan Riparian Amendment, USFS 1997, III-15) and further that "monitoring (of riparian areas) has shown that the forage utilization standard is not protecting riparian dependent resources as specified..." by the Beaverhead Forest Plan (Beaverhead Forest Plan Five-year Review 1993, as cited in FEIS Beaverhead Forest Plan Riparian Amendment, USFS 1997, III-15). Livestock effects on stream channels (e.g., widening through bank trampling) were commonly cited as a reason contributing to non-functioning or functioning-at-risk (USFS 1997). On BDNF lands "The cumulative impacts of non-native fish interactions and reductions in fish habitat quantity and quality from land management activities have caused a decline, and in some drainages, the loss of native [fish] populations. Impacts from timber harvesting, mining, grazing, and recreational activities have been detrimental to fish densities and have created competitive disadvantages for westslope cutthroat trout. ... Widespread fish stocking in rivers and streams, a practice no longer done by the state in southwestern Montana, resulted in severe reductions or loss of cutthroat trout and river grayling populations" (USFS 1997, III-15). In response, the BDNF amended the Beaverhead Forest Plan to include "a forest-wide goal for riparian function, measurable objectives for riparian function, and utilization standards for riparian vegetation to be used unless/until site-specific analysis has generated different standards" (USFS 1997, I-1). The BDNF also has been actively involved in restoration and planning efforts for westslope cutthroat trout and fluvial Arctic grayling (USFS 1997).

The BDNF is currently revising the Beaverhead Forest Plan (USFS 2005a) (draft forest plan revision), and a final plan should be adopted in late 2005 or early 2006. With respect to aquatic resources, the draft forest plan revision provides forest-wide objectives for attributes including watersheds, stream channels, instream flows, riparian areas and habitat. The following objectives were excerpted from the draft forest plan revision (USFS 2005a, pp. 11-13).

> Watersheds: Maintain and restore watersheds to insure water quality, timing, and yields necessary for healthy riparian, aquatic ecosystems, and wetlands. Provide water chemistry and temperature that support native aquatic species reproduction and survival. Develop site-specific criteria for managing municipal watersheds, and restoring degraded water to meet goals of the Clean Water Act and Safe Drinking Water Act. Ensure management actions are consistent with TMDLs. Where waters are listed as impaired

and TMDLs and Water Quality Restoration Plans are not yet established, ensure management actions do not further degrade waters, but promote water quality restoration to support beneficial uses.

Stream Channels: Maintain and restore stream channel attributes and processes to sustain desired riparian, wetland and aquatic habitats and keep sediment regimes as close as possible to those with which riparian and aquatic ecosystems developed.

Watersheds and Instream Flows: Improve and protect watersheds and secure in-stream flows to support healthy riparian, aquatic habitats, and stable and effective stream function, including the ability to route in-channel flows.

Floodplains: Maintain and restore the condition of floodplains, channels, and water tables to dissipate floods and sustain the natural timing and variability of water levels in riparian, wetland, meadow and aquatic habitats.

Riparian Habitat: Maintain and restore habitat to support viable, well distributed populations of native and desired non-native plant, invertebrate, and vertebrate aquatic- and riparian-dependent species. Maintain and restore movement corridors within and between watersheds, where desired, to provide aquatic-dependent species' habitat needs and maintenance of metapopulations.

Aquatic Nuisance Species: Prevent new introductions of aquatic nuisance species in riparian and aquatic habitats. Where aquatic nuisance species are adversely affecting the viability of aquatic native species, we would work cooperatively with appropriate State, Federal agencies, and other stakeholders to reduce or eliminate impacts.

Channel Integrity: Maintain and protect channel integrity, stability, and beneficial uses.

The associated Forest Aquatic Strategy presents a suite of standards to implement the proposed objectives, with special emphasis on riparian habitats and protecting westslope cutthroat trout (and bull trout *Salvelinus confluentus*).

The Draft EIS (DEIS) for the Beaverhead-Deerlodge Forest Plan Revision, analyzes how timber harvest and vegetation management for the five alternative (forest plan) actions would affect threatened, endangered and sensitive fish species, and concludes that "Alternatives 3 (Proposed Action), 4 and 5 (DEIS Preferred Alternative) provide the most comprehensive strategies for conserving westslope cutthroat, bull trout and fluvial arctic grayling, because of their comprehensive, prescriptive standards and because they identify Key Watersheds" and "There are no special provisions for grayling in Alternative 1. In Alternative 2, where grayling are present and stream conditions do not meet stream objectives, new projects must have no impact or a beneficial impact on grayling to be implemented" (USFS 2005b, p. 202). In the corresponding analysis for grazing impacts on aquatic resources, the DEIS recognizes the influence of livestock grazing on aquatic systems, and States "Watershed conservation practices and updated grazing standards designed to protect water quality and riparian areas, where needed, will be included in allotment-management plans as they are revised and updated" (USFS

2005b, p. 196). Moreover, the DEIS concludes that [under any alternative] "Grazing management in the Ruby River and the Big Hole River drainages are sufficient to promote stream and watershed recovery, to benefit grayling" (USFS 2005b, p. 218). In the cumulative effects analysis for threatened, endangered and sensitive species, the DEIS notes that other land-management entities in the Big Hole River watershed have provisions to address fish habitat concerns, for example "Land Management practices as described in the Draft BLM resource management plan for the Dillon Resource Area, should lead to improved conditions for westslope cutthroat trout and arctic grayling (USFS 2005b, p. 226). Overall, the DEIS concludes that "Management actions on the BDNF will not result in any irreversible or irretrievable effects to westslope cutthroat, bull trout or fluvial arctic grayling" (USFS 2005b, p. 227).

Two specific issues also warrant mention under the cumulative effects--barriers to fish movement and effects of fire suppression. Alternative B (Proposed Action) and Alternative C (limited CCAA) in this EA call for the removal of barriers to fluvial Arctic grayling in the project area. Removal of barriers to benefit fluvial arctic grayling may conflict with management strategies to isolate populations of westslope cutthroat trout to protect them from invasion by nonnative trout. However, the Proposed Action requires a site-specific assessment where barrier removal is considered to benefit fluvial Arctic grayling, with the stated purpose of avoiding adverse impacts to westslope cutthroat trout (Montana FWP et al. 2005). Consequently, no cumulative effects to other sensitive fish species in the project area are expected with respect to the removal of barriers to benefit fluvial Arctic grayling.

The legacy of fire suppression beginning in the early 1900s in the BDNF has led to fuel build up and an increased probability for severe wildfires. If such fires did occur, resulting erosion and decrease in water quality would be expected to negatively affect water quality downstream and may be detrimental to fluvial Arctic grayling in the project area. While the potential cumulative effect of such a fire is negative, the Agreement does provide a general strategy to mitigate population-level impacts to fluvial Arctic grayling under changed circumstances.

Summary

Although USFWS is not aware of any specific instances, it is likely that implementation of the existing forest plan (adopted in 1986), when added to management practices on non-BDNF lands has cumulatively affected aquatic resources in the proposed project area for the fluvial Arctic grayling CCAA. However, amendments to the existing plan (e.g., for new riparian standards) and forest management objectives stated in the 2005 draft forest plan revision indicate that land management activities causing impairment to aquatic resources are being addressed and ameliorated at the programmatic level.

The direction of the forest plan revision indicates positive cumulative effects might be expected for Alternatives B and C considered in this EA. The draft forest plan revision appears to be consistent with the intent of the CCAA with respect to aquatic resources, including direction that management must insure watersheds provide water quality, timing, and yields necessary for healthy riparian, aquatic ecosystems, and wetlands. Thus, positive cumulative effects to water quality and quantity, channel morphology, instream flows, and resident fishes (including fluvial Arctic grayling) are expected for Alternatives B and C in this EA. Cumulative effects as a result

of the draft forest plan revision for Alternative A (No Action) may be neutral or positive for these same resources depending on the extent of landowners participation in efforts to conserve fluvial Arctic grayling in the absence of ESA regulatory assurances.

In conclusion, it is very difficult to explicitly consider how all the past, present, and future management actions in the BDNF interact with the alternatives considered in this EA given lack of site-specific data and the unknown level of actual participation in the Agreement. However, the general direction of forest management in the BDNF, which includes substantial land holdings in the Big Hole River watershed, indicates little potential for negative cumulative effects under any of the three alternatives in this EA, and the real potential for positive cumulative effects for aquatic resources, especially under Alternatives B and C.

BUREAU OF LAND MANAGEMENT

The BLM Dillon Field Office completed a Proposed Dillon Resource Management Plan and Final EIS (FEIS) in 2005 that includes alternatives for resource management alternatives on all but 12,380 acres of the approximately 169,000 acres BLM lands in the Big Hole River drainage (BLM 2005). These 12,380 acres are managed under the BLM's 1983 Headwaters Resource Area Resource Management Plan, but are outside of the Project Area for the Agreement (BLM 1983).

The goal for managing aquatic resources under the proposed alternatives presented in the 2005 FEIS is to restore and maintain the chemical, physical and biological integrity of waters within BLM lands to protect beneficial uses. The desired future condition (after 20 years) is that all waters provide water quality and quantity sufficient to meet State of Montana standards and to protect or restore beneficial uses. Stream channels should display the dimensions, pattern and profile that are representative of site potential to allow floodplain aquifer recharge, moderate stream flows and buffer the effects of flooding.

The management goals for managing fish, riparian vegetation and water resources under the Resource Management Plan would be consistent with the goals of the Agreement. While some impacts from existing condition and management practices would continue under the proposed alternative, emphasis is provided to improving the land management practices on and condition of lands adjacent to streams containing grayling and to improving instream habitat for grayling.

Under the proposed alternative (Alternative B) in the BLM's FEIS, fish habitat would be managed for resident coldwater species that are of high economical, social, or scientific values (BLM 2005). Aquatic habitat would be managed to support a diversity of plant and animal communities. Class I (blue ribbon) fish habitat and westslope cutthroat trout habitat would be managed to achieve Western Montana Standards for Rangeland Health and to achieve potential or an upward trend in habitat condition within 15 years. Water leases and improved water management would be pursued to benefit westslope cutthroat trout and fluvial Arctic grayling. Projects to improve habitat to benefit fisheries would be implemented. The goal for managing riparian vegetation and wetlands under the proposed alternative is to restore riparian wetland areas so that at least 906 miles of streams are in proper functioning condition.

Based on information contained in its FEIS for the Resource Management Plan covering the Big Hole River watershed, the BLM's goals for managing fish, riparian vegetation and aquatic resources are consistent with the goals of the Agreement. Thus, these objectives would be expected to have positive cumulative effects for aquatic resources (water quality and quantity, riparian vegetation, stream morphology, and fishes including fluvial Arctic grayling) when considered in conjunction with both Alternatives B (Proposed Action) and C (limited umbrella Agreement) in this EA. However, existing conditions on BLM properties may create a lag before such positive effects would be evident. Cumulative effects from Alternative A (No Action) in this EA to these resources may range from negative to positive depending on the extent and effectiveness of conservation measures implemented by landowners to benefit fluvial Arctic grayling in the absence of an Agreement.

NATIONAL PARK SERVICE – BIG HOLE NATIONAL BATTLEFIELD

The Big Hole National Battlefield (Battlefield) is located upstream of the Project Area on the North fork of the Big Hole River and is administered by the NPS. The primary purpose of the Battlefield is to provide information on the Nez Perce Indian wars of the 1870s. Fishing is allowed within the park and is regulated by the State of Montana. Improvements to the hydrology downstream may provide some benefits upstream in the way of improved fisheries and habitat. The USFWS is not aware of any current land management practices by private landowners, or those proposed under Alternatives B and C, that have a significant impact on the human environment at the Battlefield. The Nez Perce National Historic Park General Management Plan (NPS 1997) which includes the Battlefield includes the statement, "There is a desire to get rid of exotic species and noxious weeds, returning the land to native or historic vegetation. As part of the General management Plan, a *Vegetation Management Plan* for the Nez Perce National Historic Park and the Battlefield was developed (NPS 2002) which promotes that vegetation should be in as "natural a condition as possible" in order to preserve the historic view shed. The goal is to return the area to a condition that is as close as possible to the vegetation which existed at the time of the 1877 Battle of the Big Hole. This would be consistent with the desired condition for vegetation in the Project Area under Alternatives B or C and cumulatively would have a beneficial effect on the hydrology in the Project Area. The General Management Plan also considers it a priority to avoid impacts to species of special concern and one of its action items involves: "Surveys for special concern species will be conducted, and any mitigation needed to avoid impacts on such species will be implemented" (NPS 1997). Thus, cumulative effects to fluvial Arctic grayling (a species of concern) should be negligible with respect to the three alternatives considered in this assessment.

H. OTHER PARAMETERS

The USFWS is not aware of any past, present or future actions that would interact over time with any of the alternative actions to result in cumulative effects to geology, air quality, cultural and historic resources, and visual resources.

VI. COMPLIANCE, CONSULTATION, AND COORDINATION WITH OTHERS

A. NEPA COORDINATION AND ENVIRONMENTAL EVALUATION CONDUCTED BY THE AGENCIES

The Proposed Action is a programmatic Agreement, and this Programmatic EA analyzes the general effects of this Agreement and to determine the significance of any resulting impacts. Private landowner interest in the Proposed Action is apparently substantial, but the actual participation is presently unknown. Without specific knowledge of the properties involved and data on baseline conditions, it is not possible to analyze site- or property specific effects of the Proposed Action at this time. The effect of any plan or project proposed under a site-specific plan to be implemented under the Proposed Action would be subject to environmental review by the involved agencies to ensure such actions comply with appropriate State and Federal laws.

NATURAL RESOURCES CONSERVATION SERVICE

The NRCS is a Federal agency and its actions must comply with NEPA. The NRCS has conducted a national-level NEPA analysis of its planning process which would be used under the Proposed Action. The NRCS also is responsible for conducting environmental analyses on any aspect of a site-specific plan (under the Agreement) over which they have responsibility for planning, funding, or implementing.

An Environmental Evaluation would be conducted by NRCS on every conservation plan developed on an individual farm or ranch to document the resulting environmental effects (see Appendix 3). If the Environmental Evaluation determines there would be environmental effects, the proposed plan would potentially generate significant public controversy, or special environmental concerns (e.g., wetlands, threatened or endangered species, etc.) are evident, then an EA is conducted under the provisions of NEPA (Peter Husby, NRCS, pers. comm.; see Appendix 3 for relevant forms).

MONTANA FISH, WILDLIFE AND PARKS

Montana FWP is a State agency and its actions must comply with Montana EPA. Any ground-disturbing actions, such as headgate construction, barrier removal, fish passage structure construction, etc., that Montana FWP would perform or contract under a site-specific plan developed under the Proposed Action would require preparation of an EA in accordance with section 12 of the Administrative Rules of Montana that describe Montana FWP's implementation of Montana EPA (see Appendix 4). Each EA would include a public comment period and result

in a decision notice. An EA would be required were a specific plan to stock fluvial Arctic grayling eggs or fish in the Big Hole River proposed under the Agreement.

MONTANA DEPARTMENT OF NATURAL RESOURCES AND CONSERVATION

Montana DNRC is a State agency and it must follow Montana EPA requirements when working on projects. Montana DNRC would be involved primarily in monitoring streamflows and irrigation diversions and providing technical expertise on hydrology and State water law to the other agencies. The Montana DNRC's data collection activities do not require an environmental review under Montana EPA. Similar activities undertaken by Montana DNRC in other watersheds in Montana have not involved any formal environmental analysis under Montana EPA (Mike Roberts, Montana DNRC, pers. comm.).

U.S. FISH AND WILDLIFE SERVICE

The USFWS is a Federal agency and actions must comply with NEPA. The USFWS' Montana Partners program has been involved in ongoing fluvial Arctic grayling conservation efforts in the Big Hole River, and is expected to be USFWS' lead entity for implementation of the Proposed Action. The Partners program conducts an environmental evaluation for every conservation or restoration project with individual private landowners (see Appendix 6), and would follow an identical process under the Proposed Action. If this evaluation determines a significant environmental effect or identifies special environmental concerns, then an EA is conducted under the provisions of NEPA.

Site-specific compliance with laws and regulations protecting cultural and historic resources (e.g., NHPA and Montana SHPO) are generally accounted for in the above-described environmental analyses. Issues or concerns raised by the initial environmental analyses may lead to formal consultation with agency archeologists, historic preservation officers, and/or the Montana SHPO during the development of site-specific plans under the Proposed Action. The USFWS would review each proposed site-specific plan prior to issuing a CI under the Proposed Action's section 10 permit. In addition to evaluating each plan for consistency with the terms of the Agreement and the Permit, this review permits USFWS to verify that the agencies have met their environmental review obligations under applicable State and Federal laws.

Endangered Species Act

The potential issuance of a Permit that is associated with an Agreement is a Federal action that is subject to the consultation provisions of section 7 of the ESA. Section 7(a)(2) of the ESA requires all Federal agencies to ensure that "any action authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification" of designated critical habitat. The section 7 implementing regulations (50 CFR Part 402) require, among other things, analysis of the direct and indirect effects of a proposed action, the cumulative effects of other activities on listed species, and effects of the action on any designated critical habitat. Compliance with section 7 of the ESA is the Federal agency's responsibility, not the property owner's (i.e., not the applicant's). Therefore, USFWS must conduct an intra-USFWS (or

internal) consultation or conference to ensure that issuance of the permit is not likely to jeopardize any listed species or destroy or adversely modify designated critical habitat. The USFWS also is required to complete a conference biological opinion on fluvial Arctic grayling to meet permit issuance criteria under the CCAA policy.

B. ENVIRONMENTAL JUSTICE

Environmental justice is achieved when everyone, regardless of race, culture or income, enjoys the same degree of protection from environmental and health hazards and equal access to a healthy environment. None of the alternatives would have an impact upon women, minority groups, or civil rights of any citizen of the United States (Executive Order 12898). No Native American tribal resources would be negatively affected by the Agreement (Secretarial Order 3206).

C. PUBLIC REVIEW AND COMMENT

The USFWS will provide the Agreement and this draft EA to the public for review and comment for a period of 60 days, consistent with pertinent ESA and NEPA regulations and policy. The USFWS will send copies of the Agreement, and this draft EA directly to interested individuals including--Native American Tribes, private landowners, County Commissioners, congressional and State representatives, State and Federal agencies, and other potentially interested parties.

VII. REFERENCES

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Appendix 1. Draft Candidate Conservation Agreement with Assurances for fluvial Arctic grayling in the upper Big Hole River.

Appendix 2. Montana Fish, Wildlife and Parks electrofishing and fish handling protocols.

Appendix 3. Environmental Evaluation instructions and worksheet (NRCS-CP-52) used by USDA Natural Resources Conservation Service.

Appendix 4. Administrative Rules of Montana for implementation of the Montana Environmental Protection Act by Montana Fish, Wildlife and Parks.

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

BETWEEN

MONTANA DEPARTMENT OF FISH, WILDLIFE AND PARKS

AND

U.S. FISH AND WILDLIFE SERVICE

IN COOPERATION WITH

MONTANA DEPARTMENT OF NATURAL RESOURCES AND CONSERVATION

AND

USDA NATURAL RESOURCES CONSERVATION SERVICE

FWS Tracking # TE104415-0

September 15, 2005

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I. INTRODUCTION

A Candidate Conservation Agreement with Assurances (Agreement/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 this Agreement 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 this Agreement, Montana Fish, Wildlife and Parks (MFWP) will hold an ESA section 10(a)(1)(A) Enhancement of Survival Permit issued to it by USFWS once this Agreement is executed, 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 Agreement and develop an approved site-specific plan. Site-specific plans will be developed with each landowner by an interdisciplinary technical team made up of individuals representing MFWP, USFWS, USDA Natural Resources Conservation Service (NRCS), and Montana Department of Natural Resources and Conservation (MDNRC) (collectively, the Agencies). The conservation guidelines of the Agreement 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

These objectives will be met through development of site-specific plans intended to address in detail, these issues.

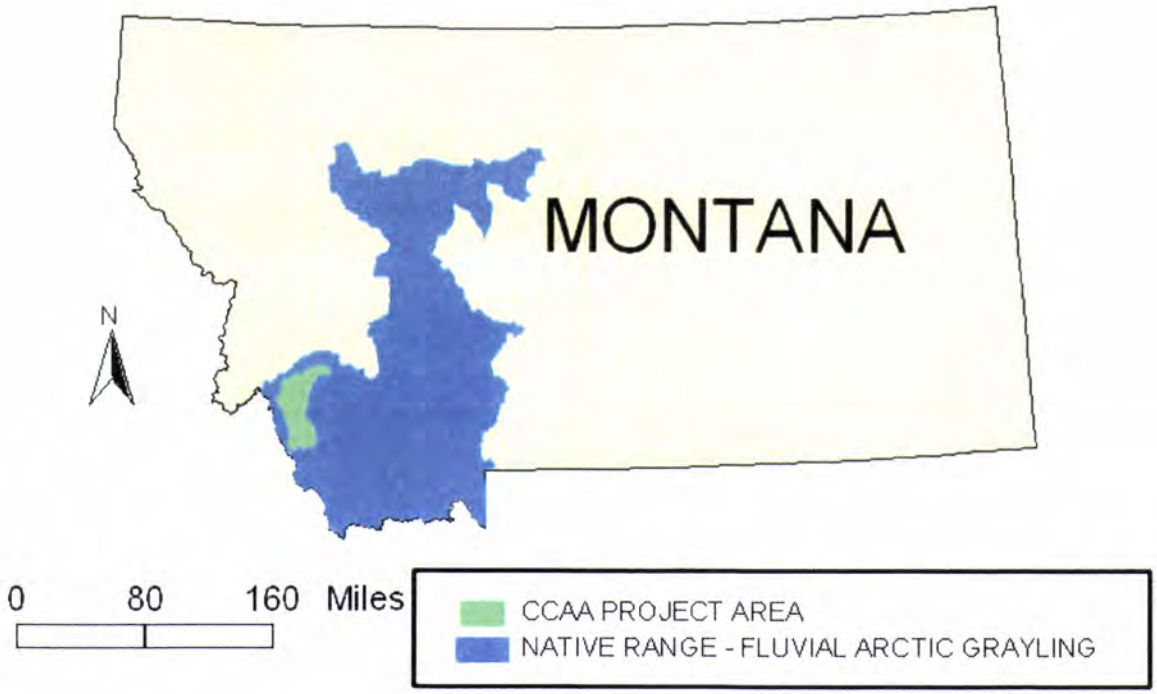


Figure 1. The Proposed Project Area Within the Native Range of Fluvial Arctic Grayling in Montana.

II. PURPOSE

The purpose of this Agreement is to encourage non-Federal landowners to voluntarily implement proactive conservation measures that benefit grayling in the upper Big Hole River Project Area in Beaverhead and Deer Lodge Counties, Montana, (Figures 1-3) by providing them with assurances that their land and water management activities will not be required to change beyond the remedies identified in their site-specific 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 this Agreement is to secure and enhance populations of grayling within the historic range of the species in the upper reaches of the Big Hole River drainage, and is consistent with the USFWS "Candidate Conservation Agreement with Assurances Final Policy" (64 FR 32726, June 17, 1999) and the regulations that implement the policy (69 FR 24084, May 3, 2004).

Most of the habitat occupied by Arctic grayling in the Big Hole River is on or adjacent to non-Federal lands. The decline of grayling in the system has been primarily linked to agricultural activities on these lands, so the active involvement of non-Federal landowners is viewed as critical to the conservation of the species in the Big Hole. However, the occurrence or expansion of grayling in waters on their properties is a concern to private landowners because of

potential regulatory restrictions on farm or 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 complexity of water use, water rights and water conveyance for agricultural purposes in the upper Big Hole drainage requires an approach where the majority of water users and landowners are engaged in basin-wide solutions to land and water uses that affect grayling. Changes in the operations of one landowner may affect the operations of one or more neighboring landowners, so coordination among landowners is essential. Such coordination will require significant personal attention and communication among both landowners and Agency personnel to foster the collaboration needed to restore grayling in the Big Hole River.

A comprehensive umbrella-type arrangement is addressed by MFWP and the Agencies in this Agreement whereby the Agencies have established a conservation framework to benefit grayling and will work with landowners to comprehensively implement conservation measures across a large area. An umbrella agreement is expected to be a more effective approach to grayling restoration in the Big Hole River than would a large number of individual agreements that would impose unnecessary burden on the Agencies and landowners during the planning and regulatory approval process. A piecemeal approach would lead to a less-consistent and less-widespread implementation of necessary conservation measures. In this instance, an umbrella-type agreement is expected to generate greater collective support from private landowners; to provide a more holistic approach to developing and implementing basin-wide conservation that recognizes the ecology of grayling in the Big Hole River must be addressed at a large spatial scale; and to provide the Agencies with a manageable method to ensure that landowners in the upper Big Hole watershed will be able to fully participate in the conservation of this species.

III. BACKGROUND AND STATUS OF FLUVIAL ARCTIC GRAYLING

Grayling have a primarily holarctic distribution, occurring in northern freshwater habitats from the western edge of Hudson's Bay, west across north/north-central Canada, throughout Alaska, and into northern Eurasia (Scott and Crossman 1973). In North America, two disjunct populations of grayling, representing stocks isolated during Pleistocene glaciation, have been recorded outside of Canada and Alaska (Vincent 1962). The first was found in streams and rivers of the Great Lakes region of northern Michigan, but these grayling were extirpated in the 1930s (Scott and Crossman 1973). The second isolated population historically inhabited the upper Missouri River basin above Great Falls, Montana. Grayling in Montana were the subject of a status review by the USFWS in 1994 (59 FR 37738), which identified grayling indigenous to the Big Hole and Madison Rivers as elements of a fluvial Distinct Population Segment (DPS) in the upper Missouri River. The grayling of the Big Hole River constitute the lone intact, confirmed fluvial, element of the upper Missouri River basin grayling DPS, and are the conservation focus of this Agreement.

Life History of Grayling in the Project Area

Grayling are adapted to life-long residence in stream environments and make seasonal migrations, sometimes in excess of 50 miles between spawning, feeding, and wintering areas within the river system (Shepard and Oswald 1989, Lamothe and Magee 2003). Grayling inhabit cool water streams having low to intermediate gradients, and adults prefer pool habitat (Kaya 1990; Byorth and Magee 1998). In Montana, they spawn from late April to mid-May by depositing adhesive eggs over sand and gravel without excavating a redd or nest (Kaya 1990; Shepard and Oswald 1989). Eggs develop and hatch within a few weeks. Young-of-the-year (YOY) grayling are weak swimmers and prefer rearing habitat along stream margins that serve as velocity refuges, back-waters in side channels, or waters adjacent to beaver dams. Grayling in Montana typically reach maturity in their third or fourth year of life, and seldom live beyond age 6 (Magee and Lamothe 2003). Grayling of all ages feed opportunistically on drifting invertebrates (Hughes 1992, 1998). The aggressive feeding behavior of grayling is linked to their pattern of habitat selection whereby they often reside in deep pools with little large woody debris that allow for efficient and opportunistic feeding by this visual predator (Lamothe and Magee 2003, 2004a). Water depth may function as cover from potential predators.

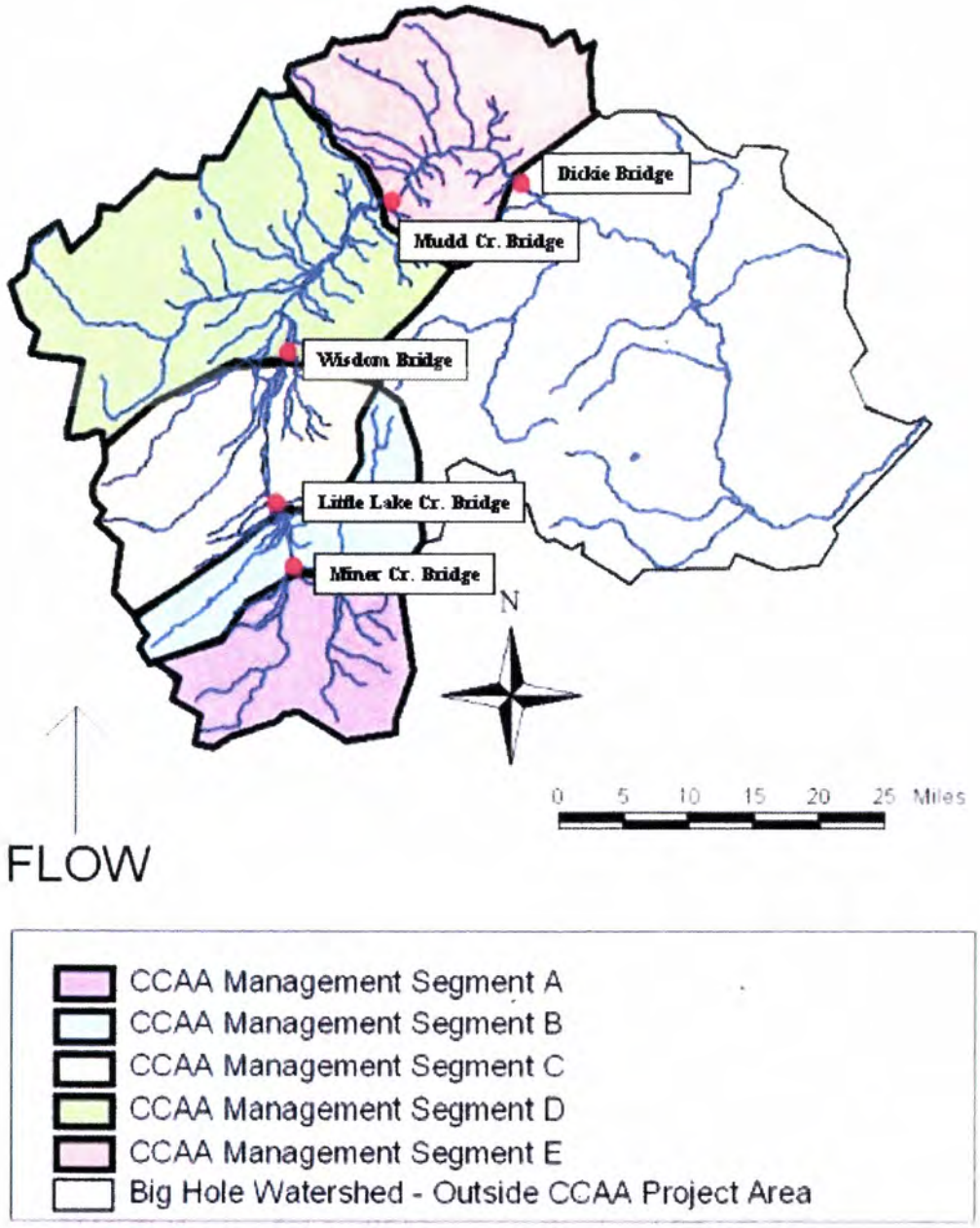


Figure 2. The Fluvial Arctic Grayling Agreement Management Segments for the Upper Big Hole River Watershed Project Area.

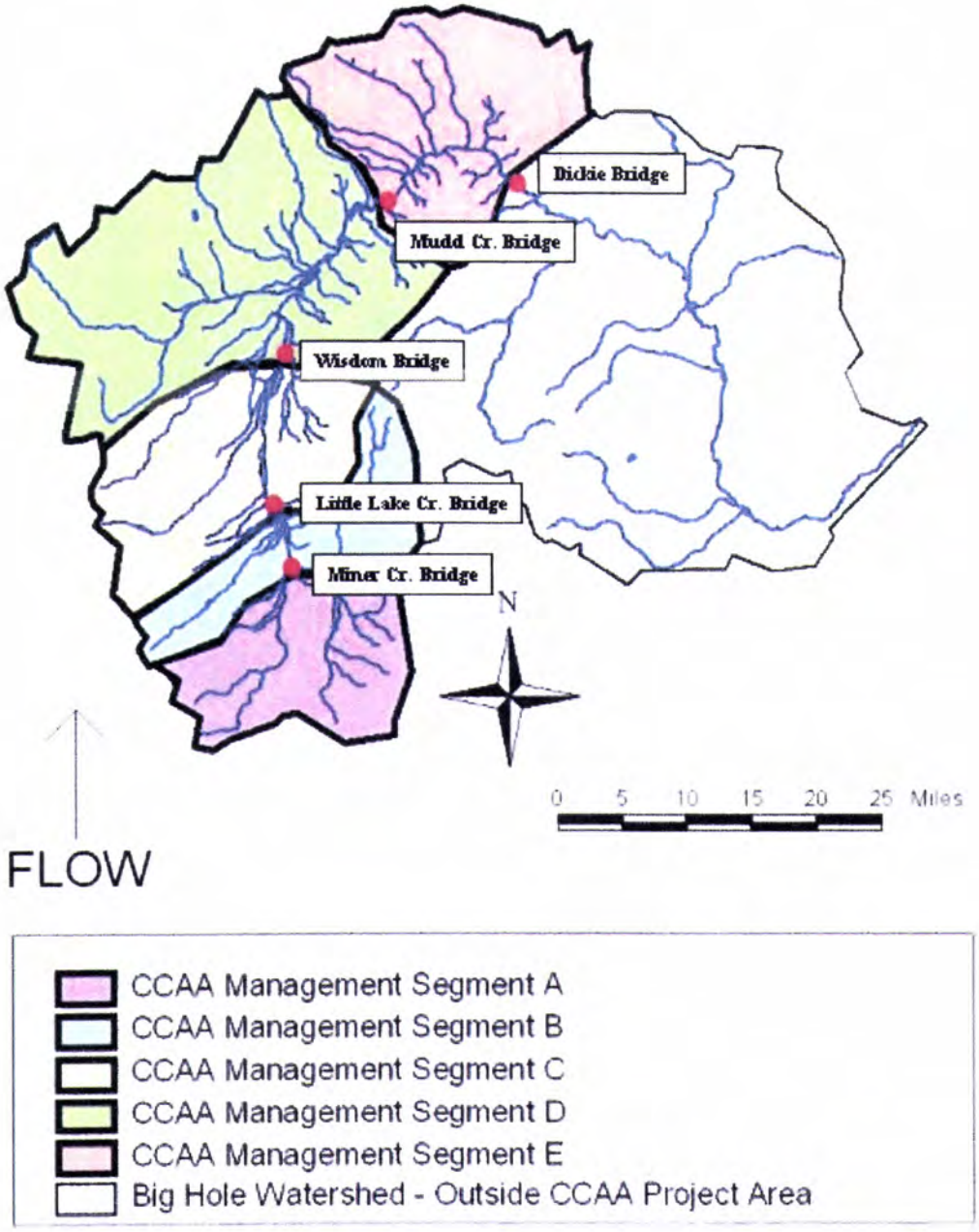


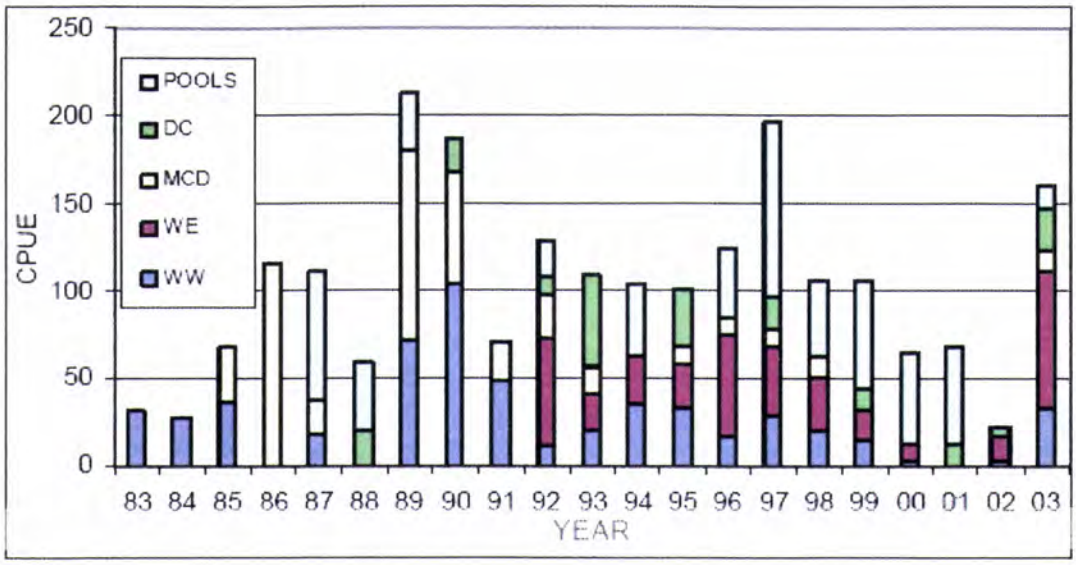
Figure 3. Major Tributary Streams to the Big Hole River in the Agreement Project Area.

Historical and Present Distribution

The native grayling of the upper Missouri River were predominantly fluvial (Vincent 1962), exhibiting a life history adapted to streams and rivers (Behnke 2002). The indigenous grayling of the upper Missouri River basin was widely but irregularly distributed above the Great Falls (Vincent 1962), and inhabited up to 2,000 kilometers (1,250 miles) of stream habitat in Montana and portions of northwestern Wyoming until the early 20th century (Kaya 1990, 1992a). In addition to the waters of the mainstem upper Missouri River, fluvial Arctic grayling were documented in the drainages of the Sun, Smith, Jefferson, Beaverhead, Big Hole, Madison, Gallatin, Gibbon, and Firehole Rivers; and Grayling, Bridger, Bozeman, and Fan Creeks. Present grayling distribution has been reduced to less than 5 percent of historic range, and the only remaining indigenous self-sustaining confirmed fluvial population is found in an approximately 80-mile segment of the upper Big Hole River and associated tributary streams (Shepard and Oswald 1989; Kaya 1990, 1992a).

Current Population Status in the Project Area

The USFWS determined in 1994 that the DPS of grayling in the upper Missouri River basin warrants consideration for listing under the ESA. In 2004, the grayling DPS was elevated in listing priority from a level 9 to a level 3. This is the highest listing priority level that can be assigned to this DPS. This listing priority level is justified by two assumptions--1) the current distribution of grayling represents 5 percent of its historic range and 2) recent population surveys have resulted in historic low numbers for the Big Hole River grayling. The MFWP annually conducts spring and fall surveys of grayling in the upper Big Hole River. Surveys did not occur during fall 2001 due to severe drought conditions. Spring 2002 spawning surveys resulted in the lowest number of grayling captured in 14 years of spring sampling. That fall, in traditional survey sections grayling population numbers remained at historic lows. Although YOY grayling numbers appear to have increased slightly in the Wisdom area since the historic lows of 2002 indicating the population can still reproduce given suitable environmental conditions, the overall population still appears to be at risk because of low abundance and irregular recruitment (Figure 4).



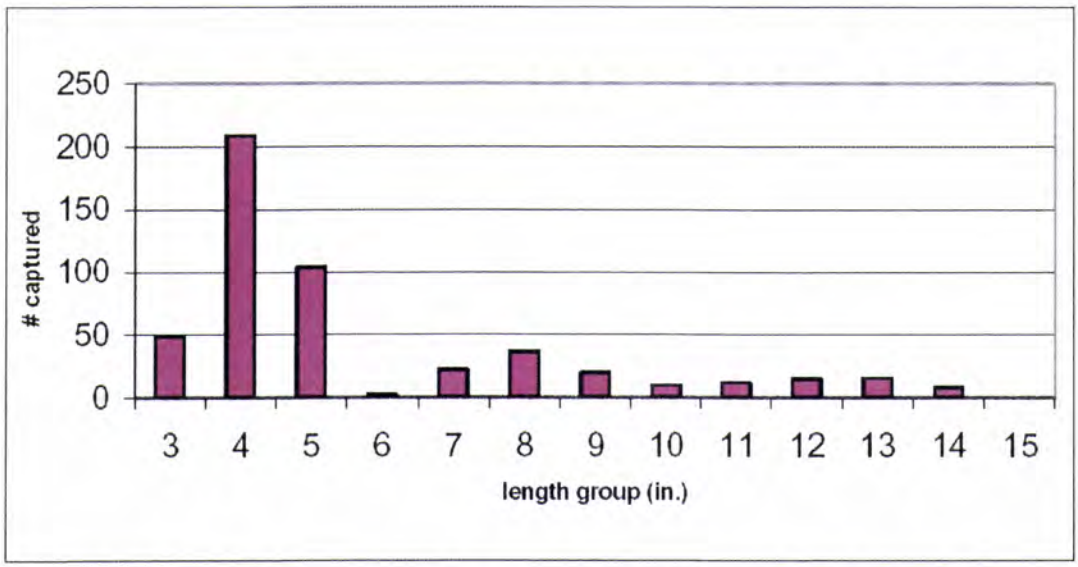


Figure 4 (A & B). Population Monitoring Data for Grayling in The Big Hole River. Panel A shows Catch-Per-Unit-Effort (CPUE) electrofishing of all-aged Arctic grayling from MFWP fall electrofishing surveys in the pools, Deep Creek (DC), McDowell (MCD), Wisdom East (WE), and Wisdom West (WW) sections in the Big Hole River, Montana, from 1983-2003. Panel B shows the length frequency of grayling captured in the 2003 surveys, showing that over 70 percent of the grayling captured in fall surveys that year were age-0 (length ≤ 6 inches).

Existing Conservation Measures

Conservation and restoration activities for grayling have been ongoing in Montana for nearly 2 decades. The Montana Fluvial Arctic Grayling Workgroup (Workgroup) was established in the 1980s as an interagency committee to provide guidance on grayling research, management, and restoration. A major accomplishment of the Workgroup was the development and approval of a Montana Fluvial Arctic Grayling Restoration Plan (Restoration Plan). In 1995, the Restoration Plan was recognized by MFWP and the USFWS as the conservation strategy that would guide restoration and monitoring for grayling in the upper Missouri River (MFWP 1995). The Restoration Plan called for the establishment of four additional fluvial populations in native waters, and outlined monitoring goals for the grayling population in the Big Hole River. At this time, there is no evidence that reintroduction efforts have produced self-sustaining populations (Lamothe and Magee 2004a). Further efforts to reestablish self-sustaining grayling populations will continue within the context of the Restoration Plan. Monitoring data from the Big Hole River do not indicate a secure or expanding grayling population (Magee and Lamothe 2004). The Restoration Plan is currently being revised to reflect these trends.

The restoration efforts of the Agencies over the past decade have resulted in cooperative relationships with the non-Federal property owners within the proposed Project Area. Research investigating the life history patterns of grayling inhabiting the Big Hole watershed has been conducted since the late 1970s (Byorth 1993). The MFWP has relied on landowner cooperation for access to the river to conduct population monitoring since the 1980s. Since 1994, the USFWS Partners for Fish and Wildlife Program and MFWP have provided technical and financial assistance to Big Hole valley property owners willing to implement water conservation measures and restore degraded riparian habitat. In response to a severe drought in 2004, NRCS Environmental Quality Incentives Program (EQIP) provided financial incentives to Big Hole River Valley landowners willing to temporarily remove acreage from irrigation and construct off-stream livestock watering facilities. In addition, several landowners have voluntarily allowed water, which they could have utilized under their existing water right under according to Montana law, to remain in the river. All of these efforts would not have been possible without the voluntary cooperation of non-Federal property owners.

The current status of grayling in the Big Hole River and the apparent lack of success of reintroductions increase the possibility that the USFWS will have to list grayling as either threatened or endangered under the ESA. The potential regulatory requirements associated with the listing of this fish may strain the relationship developed by the Agencies and the non-Federal property owners of the Big Hole River Valley. This Agreement provides the Agencies and the non-Federal property owners the opportunity to work together to develop site-specific plans that will significantly improve habitat conditions for grayling within the Project Area while offering property owners relief from the threat of additional regulatory burdens should grayling be listed. This Agreement represents a logical extension and enhancement of ongoing efforts to coordinate with landowners to improve conditions for grayling in the upper Big Hole River watershed.

IV. PROJECT AREA AND PARTICIPATING LANDOWNERS

This Agreement is an umbrella ("programmatic") plan covering approximately 382,200 acres of non-Federal lands within the 1,785,600-acre Big Hole River watershed in southwest Montana (Figures 2 and 3). Approximately 313,000 acres of the 382,200-acre non-Federal project area are privately owned, with the remainder owned by State, city, or county government or in right-of-way designation (Figure 5). The Project Area has approximately 318 private property owners. The non-Federal land within the Project Area is located primarily on the valley bottom with the surrounding uplands being owned primarily by the U.S. Forest Service (Figures 4 and 5). Of the 318 private property owners, 132 own parcels that are located adjacent to the Big Hole River or one of its tributaries (Table 1). The Project Area covers the Big Hole River and its tributaries upstream of Dickie Bridge to its headwaters. This area of the watershed supports the last remaining native population of fluvial grayling in the contiguous 48 States. While grayling are found within the Big Hole River downstream of the Project Area, the core of the population occurs within the Project Area. For the purposes of this Agreement, the Project Area has been divided into five management segments to make the conservation guidelines more spatially meaningful to property owners interested in developing site-specific plans and to allow the Agencies to track the progress of the conservation measures both temporally and spatially (Figure 2). The conservation guidelines described in this Agreement apply to the whole Project Area and will be necessary to secure the population and expand the abundance and distribution of grayling in the Project Area.

Management Segment A

Management Segment A includes the area of the Big Hole River and its tributaries between Dark Horse Creek and the mouth of Hamby Creek. Management Segment A includes an area of approximately 54,325 acres of private lands and includes 23 private property owners (Table 1). Of the 23 private property owners, 21 own property that is adjacent to either the Big Hole River or a tributary (Table 1). Management Segment A contains the headwaters of the Big Hole River and Governor Creek. Historically, Governor Creek supported grayling. The flow conditions of this management segment affect the flow conditions of all downstream segments.

Management Segment B

Management Segment B includes the reach of the Big Hole River and its tributaries between the mouth of Hamby Creek and the mouth of Little Lake Creek (Figures 2 and 3). Management Segment B covers an area of approximately 33,700 acres and includes 53 private property owners (Table 1). Of these 53 private property owners, 18 own property that is adjacent to either the Big Hole River or a tributary (Table 1). Historically this segment of the Project Area supported grayling. Recent population monitoring efforts failed to capture grayling. This area of the watershed could potentially serve as a reintroduction area once limiting factors have been identified and removed. Management Segment B is where Miner Creek, Governor Creek, and Warm Springs Creek enter into the Big Hole River. These tributaries are all important contributors to the flows of the Big Hole River.

Management Segment C

Management Segment C includes the reach of the Big Hole River and its tributaries between the mouth of Little Lake Creek and the Wisdom Bridge (Figures 2 and 3). Management Segment C covers an area of approximately 84,531 acres and includes 131 private property owners (Table 1). Of these 131 private property owners, 25 own property that is adjacent to either the Big Hole River or a tributary (Table 1). Historically this has been an important reach of the Big Hole River for grayling spawning and juvenile rearing. According to landowner accounts, the tributaries flowing into this management segment once supported grayling, but this no longer seems to be the case. With improvements to flow and habitat quality conditions these waters may once again support grayling. These tributaries also are important contributors to the flows of the Big Hole River.

Management Segment D

Management Segment D includes the reach of the Big Hole River and its tributaries between the Wisdom Bridge and Mudd Creek Bridge (Figures 2 and 3). Management Segment D covers an area of approximately 112,605 acres of private lands and includes 61 private property owners (Table 1). Of these 61 private property owners, 40 own property that is adjacent to either the Big Hole River or a tributary (Table 1). This reach of the river includes important grayling spawning (upstream of the North Fork) and wintering habitat. This management segment has historically supported significant numbers of grayling. Recent declining population trends for grayling in this management segment are not encouraging and this segment would benefit greatly from improved flow and habitat conditions. The North Fork, Steel Creek, and Swamp Creek are all important tributaries that join the Big Hole River in this management segment. Grayling have been documented during fall population monitoring efforts in each of these tributaries.

Management Segment E

Management Segment E includes the reach of the Big Hole River and its tributaries between the Mudd Creek Bridge and Dickie Bridge (Figures 2 and 3). Management Segment E covers an area of approximately 27,796 acres of private lands and includes 50 private landowners (Table 1). Of these 50 private property owners, 28 own property adjacent to either the Big Hole River or a tributary (Table 1). This reach of Big Hole River has served as a critical wintering habitat for grayling. This management segment also includes Fishtrap, Lamarche, and Deep Creeks (Figure 3). The results of fall population monitoring efforts show some of the highest densities of grayling in the Big Hole watershed exist within these tributaries (Magee and Lamothe 2003).

Table 1. Summary of Private Lands in the Agreement Project Area by Management Segment.

Management Segment	Number of Private Landowners*	Area of Private Land (acres)	Range of Parcel Size per Landowner (acres)	Number of Private Landowners Owning Streamside Parcels	Total Area of Private Land with Streamside Parcels (acres)
A	23	54,325	20 – 19,045	21	4,215
B	53	33,700	18 – 6,179	18	24,900
C	131	84,531	20 – 19,825	25	52,565
D	61	112,605	5 – 14,730	40	73,404
E	50	27,796	20 – 3,662	28	17,381
TOTAL	**318**	**312,957**		**132**	**172,465**

* Some landowners own parcels in multiple management segments, so the total of this column will be greater than the total number of individual landowners in the Project Area.

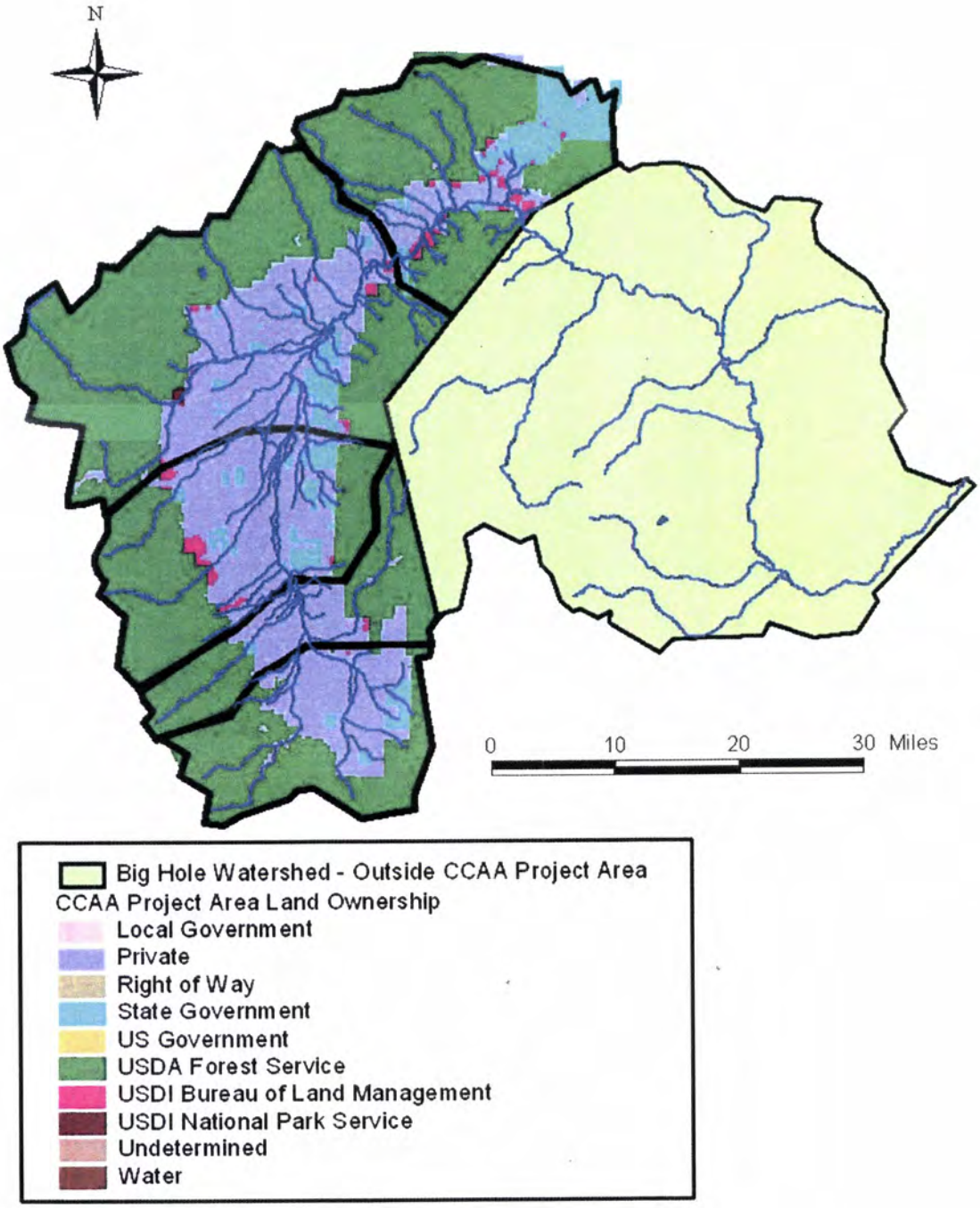


Figure 5. Land Ownership Within the Project Area. Project Area is Roughly Delineated by the Sum of State, Local Government (County And City), and Private Lands.

Landowner Interest in Implementing Conservation Measures to Benefit Grayling
In April 2005, MFWP and NRCS announced a program for landowners in the upper Big Hole River valley to implement actions to benefit grayling and participate in a voluntary irrigation reduction program during 2005. The MFWP made available "Applications for Development of a Site-Specific Plan for a Potential Candidate Conservation Agreement with Assurances for fluvial Arctic grayling" to address species needs in 2005 and to obtain information from individuals interested in voluntarily participating in a potential Agreement for grayling. The MFWP received outstanding interest in the program from over three dozen private landowners who cumulatively own over 208,000 acres, which is over 66 percent of the approximately 313,000 privately-owned acres in the Project Area (Figure 6). A majority of these lands are located in areas with the greatest Habitat Significance, as identified in Figure 22. These landowners have already committed to implementing the measures identified in Phases I and II of the Agreement (Appendices E and F) and rapid assessments (presented in Part VIII) have been initiated.

V. THREATS, ESA LISTING CRITERIA, AND THE CCAA POLICY

The following section provides a brief summary of the major threats to the existence of fluvial Arctic grayling in the upper Missouri River and in the Big Hole River using the ESA's five threat factor categories--A) the present or threatened destruction, modification, or curtailment of its habitat or range; B) overutilization for commercial, recreational, scientific, or educational purposes; C) disease or predation; D) the inadequacy of existing regulatory mechanisms; and E) other natural or manmade factors affecting the species' continued existence.

A detailed description of the threats facing grayling in the Big Hole River that that will be reduced by landowner participation in this Agreement appears in a subsequent section of this document (see Conservation Measures Part VI). The USFWS' annual Candidate Notice of Review contains a detailed analysis of the threats facing grayling across the range of the DPS, whereas the following sections (A-E below) provide a summary discussion of threats addressed by the Agreement (Part VI) in relation to the overall threats facing the grayling in response to Part 3 of the Candidate Conservation Agreement with Assurances policy (64 FR 32734). The policy states that the USFWS will only enter into an Agreement "when they determine that the benefits of the conservation measures implemented by a property owner under a Candidate Conservation Agreement with Assurances, when combined with those benefits that would be achieved if it is assumed that conservation measures also were to be implemented on other necessary properties, would preclude or remove any need to list the covered species" (69 FR 32734-32735). In addition, this section highlights the major threats to grayling that are under the direct control of MFWP and the Participating Landowners and will be addressed in this Agreement's Conservation Measures.

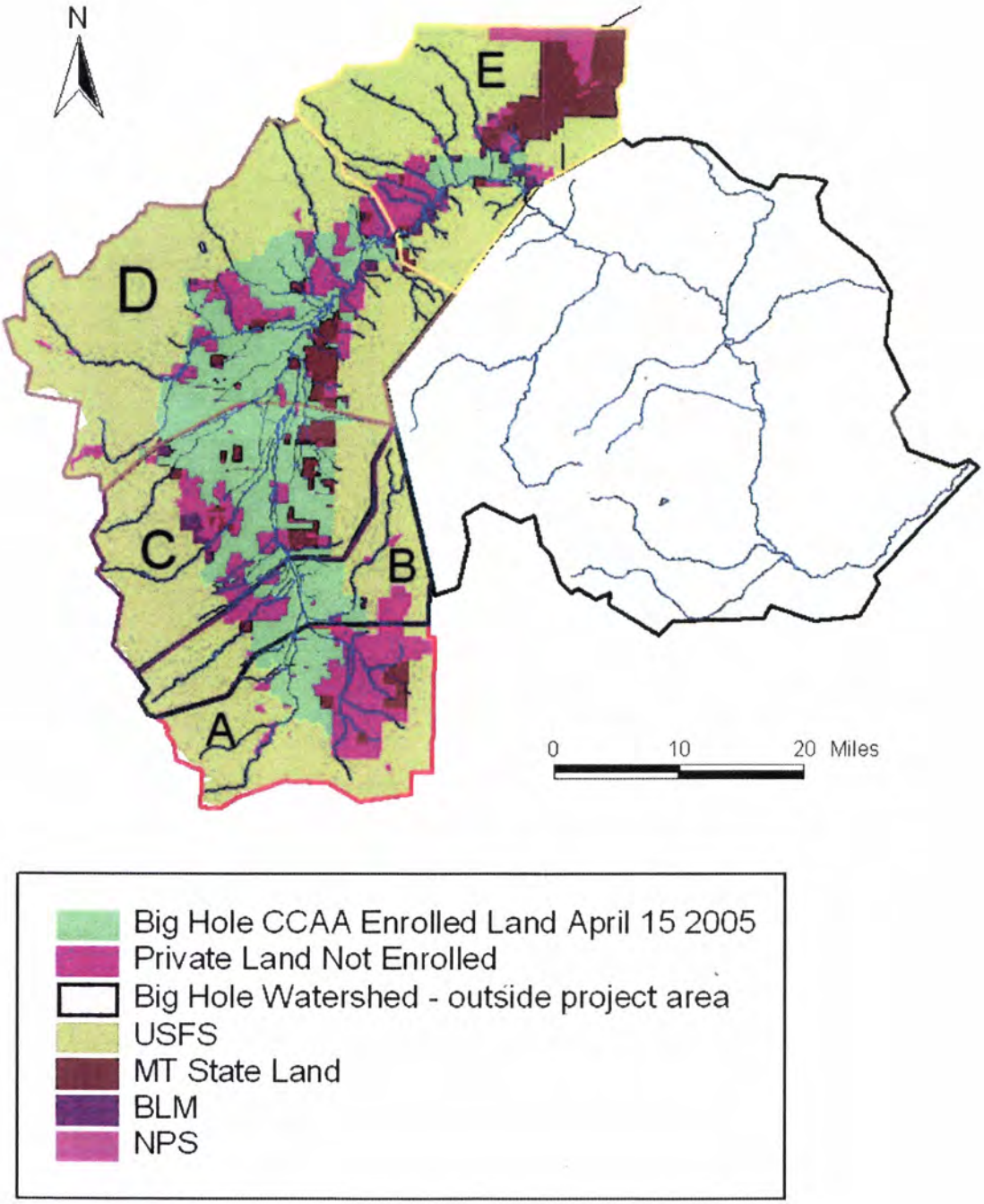


Figure 6. Area of Land Owned by Private Landowners Interested in Developing Site-Specific Plans Under the Potential Big Hole Grayling Agreement.

A. The Present or Threatened Destruction, Modification, or Curtailment of Its Habitat or Range. The majority of the historic range of the upper Missouri River fluvial Arctic grayling DPS has been altered by the construction of dams and reservoirs that created barriers that obstructed migrations to spawning, wintering or feeding areas; inundated grayling habitat; and impacted the historical hydrology of river systems (Kaya 1990). In the Big Hole River watershed, local land and water use has affected surface water hydrology, riparian zone conditions, stream morphology, thermal characteristics, and possibly nutrient inputs to the aquatic system (Kaya 1990; OEA 1995; Lohr et al. 1996; Lamothe and Magee 2004b; upper Big Hole TMDL 2003). The operation of irrigation systems in the Big Hole has apparently led to the direct fragmentation of stream habitats.

Surface Water Hydrology - The predominant land use in the upper Big Hole watershed is irrigated agriculture for hay production and livestock pasture. Irrigation demands on the system are very high because of the over-allocation of water rights, the difficult-to-control and inefficient surface water (flood) irrigation systems, a recent shift to increased pasture grazing, and a continuing drought. These demands have resulted in significantly reduced instream flows that pose a major threat to grayling. Reduced streamflows can reduce the growth and survival of grayling through reducing the available habitat. The details of these mechanisms are discussed in the following section (Part VI).

Riparian Zone (Streamside) Conditions - Riparian zones are critical for the ecological function of most aquatic systems (Gregory et al. 1991). Riparian habitats dissipate stream energy during floods, filter sediments and pollutants, facilitate ground-water recharge, cool streams by shading, stabilize streambanks, maintain channel characteristics, promote floodplain development, and input woody debris, organic material, and terrestrial insects (e.g., Murphy and Meehan 1991; Prichard et al. 1998). Loss of riparian zones through streamside livestock grazing and direct removal of natural vegetation has led to degradation of adjacent stream habitat in the upper Big Hole River (OEA 1995; Upper Big Hole TMDL 2003; Lamothe and Magee 2004b). Healthy riparian corridors are vital for maintaining instream habitat for Arctic grayling in the upper Missouri River basin.

Stream Morphology - The combination of reduced instream flows and loss of riparian habitats in the Big Hole River has led to decreased channel stability, increased erosion, and channel widening (e.g., Upper Big Hole TMDL 2003). In concert, these changes have led to habitat simplification such as a reduction in pool and riffle sequences. Reduced habitat diversity affects grayling by decreasing the distribution and frequency of necessary spawning, feeding and refuge habitats.

Water Quality - Thermal Impairment and Nutrients - Reduced stream flows during summer, reduced shading because of riparian vegetation removal, and channel widening are factors combining to increase water temperatures by making surface waters more sensitive to solar radiation. Thermal alterations via increased summer water temperatures pose a threat to grayling in the mainstem Big Hole River (e.g., Lohr et al. 1996; Magee and Lamothe 2004).

Nutrient enrichment may be a potential problem in the upper Big Hole River (Upper Big Hole TMDL 2003 and reference therein). Further data are needed to determine if nutrient enrichment is affecting water quality to the extent that grayling are being harmed. However, the potential for fertilizers applied to irrigated lands and livestock waste provide sources of nutrients to the river appears substantial given the surface (flood) irrigation techniques utilized in the upper Big Hole basin.

Habitat Fragmentation - Habitat fragmentation is often considered one of the most significant threats to the survival to salmonid fishes in the western United States (Behnke 1992, 2002) and to species in general (Wilcox and Murphy 1985). In addition to the effects of habitat loss and fragmentation from stream dewatering by irrigation, the presence and operation of irrigation diversions can fragment grayling habitat in two additional ways. First, cross-channel diversions may block fish passage under all or some flow conditions, impeding grayling access to necessary spawning, rearing and refuge habitats. Second, irrigation diversions and ditches may entrain (inadvertently capture) grayling (e.g., Shepard and Oswald 1989).

B. Overutilization for Commercial, Recreational, Scientific, or Educational Purposes.
Arctic grayling in the upper Big Hole River are handled for recreational and scientific purposes. Arctic grayling are easily caught by anglers (e.g., Alberta Sustainable Resource Development 2005), and historical angling exploitation likely contributed to, or initiated, past declines or local extirpations throughout the upper Missouri River DPS (Vincent 1962). Currently, catch-and-release regulations are in effect for Arctic grayling in rivers in Montana. Under provisions of the Big Hole River Drought Management Plan, angling is closed when specific low flow and high temperature thresholds at the U.S. Geological Survey (USGS) Wisdom (#06024450) and USGS Melrose (#06025500) gauging stations are exceeded (Big Hole Watershed Committee 1997).

The MFWP has consistently monitored populations of fluvial Arctic grayling in the Big Hole River since the early 1980s. The experience of MFWP fishery biologists, combined with sampling restrictions when environmental conditions are stressful, indicates negligible effects on grayling from scientific and resource management sampling. In the Big Hole River, overall threats to fluvial Arctic grayling from overutilization are not significant compared to those posed by direct alteration of habitat.

C. Disease, Competition, or Predation.
Arctic grayling are resistant to whirling disease (Hedrick et al. 1999), but are susceptible to bacterial kidney disease. However, bacterial kidney disease tends to affect captive rather than wild populations (Myers et al. 1993; Peterson 1997).

Predation and/or competition with nonnative trout is thought to limit fluvial Arctic grayling in some situations (Kaya 1992a). Nonnative brook trout (*Salvelinus fontinalis*), rainbow trout (*Oncorhynchus mykiss*), and brown trout (*Salmo trutta*) are well-established with locally abundant populations throughout the upper Missouri River drainage including the Big Hole River. Research on competition between grayling and nonnative brook trout found little evidence that brook trout negatively affected microhabitat use or growth of juvenile (age-1) hatchery-reared and wild Arctic grayling (Byorth and Magee 1998). However, further studies

are necessary to determine whether competition or predation occur at other life stages or with brown or rainbow trout. Grayling apparently have particular difficulty coexisting with brown trout (e.g., Kaya 2000). Overall, the decline of grayling in the upper Missouri River coinciding with encroachment by nonnative trout (Vincent 1962; Kaya 1990, 1992a, 2000), and the difficulty in reestablishing grayling populations where nonnatives are present (Kaya 1992b) provide circumstantial evidence of threats from nonnative trout.

Piscivorous American white pelican (*Pelecanus erythrorhynchos*), bald eagle (*Haliaeetus leucocephalus*), osprey (*Pandion haliaetus*), great blue heron (*Ardea herodia*), and belted kingfisher (*Ceryl alcyon*) are seasonally present in Big Hole River valley, and can be effective fish predators. However, there are no data demonstrating these avian species are having a negative impact on fluvial Arctic grayling populations in the Big Hole River.

D. The Inadequacy of Existing Regulatory Mechanisms.

State and Federal natural resource agencies in Montana are aware of the current population status of fluvial Arctic grayling and have been actively involved in conservation and restoration activities. However, despite the attention grayling receive as a species of concern in Montana and a candidate species under the ESA, there are no specific Federal regulatory mechanisms currently in place to protect fluvial Arctic grayling in Montana.

The MFWP instituted catch-and-release angling restrictions for fluvial Arctic grayling and increased possession limits for nonnative brook trout, and also have a policy to suspend recreational angling under drought conditions when water temperatures in the Big Hole River exceed 70°F for more than 8 hours per day for 3 consecutive days (MFWP Fishing Closure Policy, MFWP Headquarters, Helena, Montana). The Big Hole River is currently being evaluated under section 303(d) of the Federal Clean Water Act. Moreover, much of the Big Hole River system may soon be subject to water rights adjudication under Montana State water law.

E. Other Natural or Manmade Factors Affecting Its Continued Existence.

Drought is a significant threat to the well-being of fluvial Arctic grayling populations in the upper Missouri River basin. Southwestern Montana has experienced a severe drought since 1999 (see Figure 7) which has exacerbated the impacts of water withdrawals in the upper Missouri and Big Hole River basin. Reductions in populations of fluvial Arctic grayling and nonnative trout in the Big Hole River appear to coincide with periods of drought (Magee and Lamothe 2003, 2004).

Climate change (global warming) is predicted to result in habitat loss and fragmentation for salmonid species in the Rocky Mountains (Keleher and Rahel 1996), and should place further thermal constraints on grayling in the Big Hole River (Lohr et al. 1996) if other habitat conditions do not improve.

Fluvial Arctic grayling in the Big Hole River are possibly subject to environmental and genetic problems that threatens many small populations. The importance of demographic uncertainty, environmental uncertainty, natural catastrophes, and genetic uncertainty on population dynamics all increase with decreasing population size (Shaffer 1987). Fluvial Arctic grayling in Montana appear to have low genetic variability compared to populations elsewhere (Everett 1986; Redenbach and Taylor 1999). Thus, effects from random survival and reproduction of

individuals (demographic uncertainty); variation in climate, food resources, competitors, parasites (environmental uncertainty); random occurrence of floods and drought (natural catastrophes); and genetic drift (genetic uncertainly) may threaten the long-term persistence of this population.

THREATS TO GRAYLING TO BE ADDRESSED UNDER THE AGREEMENT

For this Agreement, the most immediate human-influenced threats to fluvial Arctic grayling in the Big Hole River are habitat loss, degradation and fragmentation resulting from:

1) reduced streamflows
2) degraded and non-functioning riparian habitats
3) barriers to grayling movement; and
4) the potential for grayling entrainment in irrigation ditches

These habitat-related limiting factors (1-4 above) can be directly addressed by conservation measures implemented by landowners participating in the Agreement. Participating Landowners are not responsible for addressing threats to grayling from nonnative trout species. However, the partnering Agencies believe that actions may be necessary if nonnative trout limit the ability of grayling to positively respond to the Agreement's conservation measures.

VI. CONSERVATION MEASURES

The general conservation measures identified below are intended to address the significant limiting factors to grayling habitat and populations within the Project Area. These measures address potential limiting factors to grayling that non-Federal property owners will be addressing within the Project Area. The benefits of the conservation measures implemented by a property owner under an Agreement, when combined with those benefits that would be achieved if it is assumed that conservation measures also were to be implemented on other necessary properties, would preclude or remove any need to list the covered species. "Other necessary properties" are properties in addition to the property that is the subject of an Agreement with assurances on which conservation measures would have to be implemented in order to preclude or remove any need to list the covered species (64 FR 32735).

A. Instream Flows

Limiting Factor - Reduced Streamflows

Southwest Montana is currently experiencing severe drought conditions that are putting exceptional levels of stress on the aquatic species in this region (A. Brummond, April 19, 2005, MFWP memorandum). The current drought is at historic levels (Figure 7). The current drought conditions have resulted in below-average snowpack conditions in the mountains surrounding the Big Hole River (Figure 8). The lack of snow equates to reduced availability of water for grayling and irrigators in the Project Area (Figure 9).

The predominant land use in the upper Big Hole watershed is irrigated agriculture, specifically hay production and livestock pasture. This land use has resulted in changes to the system's natural hydrology. Under current State law many non-Federal landowners within the Project Area have the right to withdraw water from the Big Hole River and its tributaries for irrigation

and stock watering purposes. The right to use this water is regulated in terms of location of diversion, period of use, the amount of water removed from the source, and location where the water is used.

A natural hydrograph for a system like the Big Hole River should exhibit a seasonal peak during snowmelt runoff (late spring/early summer), declining flows through the summer, and base flow conditions from late summer through winter. The spatial and temporal variation in streamflows within the Project Area can be dramatic. During spring 2004, streamflows were observed to be in excess of 200 cfs in the North Fork of the Big Hole River while the USGS streamflow gage located at the Wisdom Bridge was recording streamflows of less than 10 cfs (MDNRC

unpublished data). This spatial variation in streamflow conditions prevents grayling access to streamflow refugia during environmental extremes. The spatial variability in streamflows may cause shifts in grayling movement patterns that are not captured in annual population monitoring efforts.

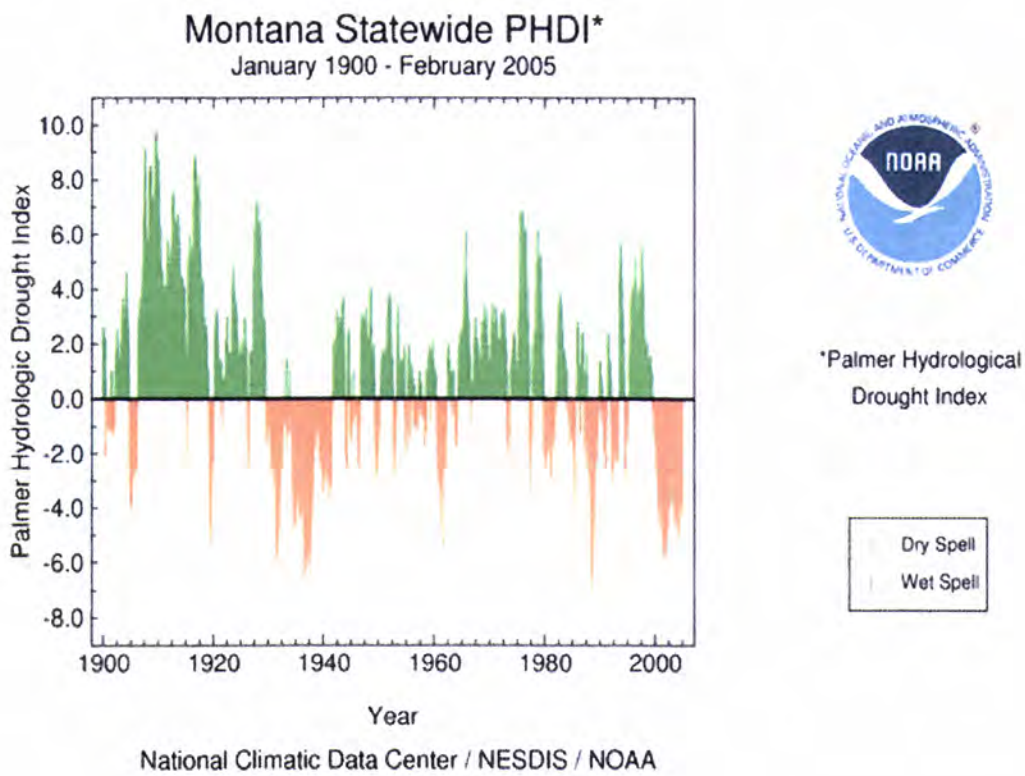


Figure 7. Historical Perspective of Current Drought Conditions in Montana. The Palmer Hydrological Drought Index indicator is based on moisture inflow (precipitation), outflow, and storage.

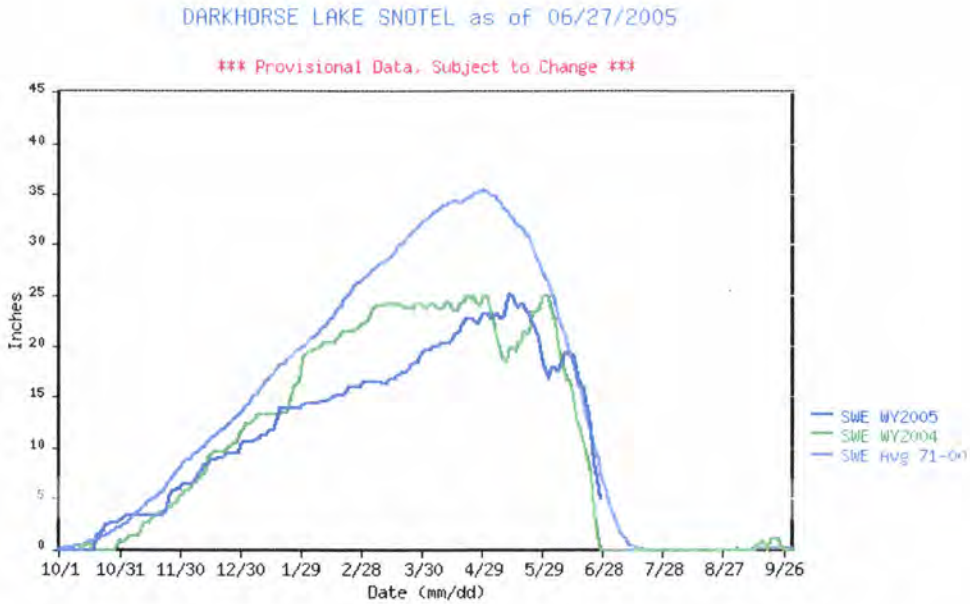


Figure 8. Current, Recent, and Historic Snowpack Conditions (Snow Water Equivalent (SWE)) from a NRCS Snowpack Monitoring Site in the Headwaters of the Big Hole River. Plots represent snow water equivalents for water years 2004 (SWE WY2004), 2005 (SWE WY2005), and the 30-year average over the period 1971-2000 (SWE Avg 71-00).

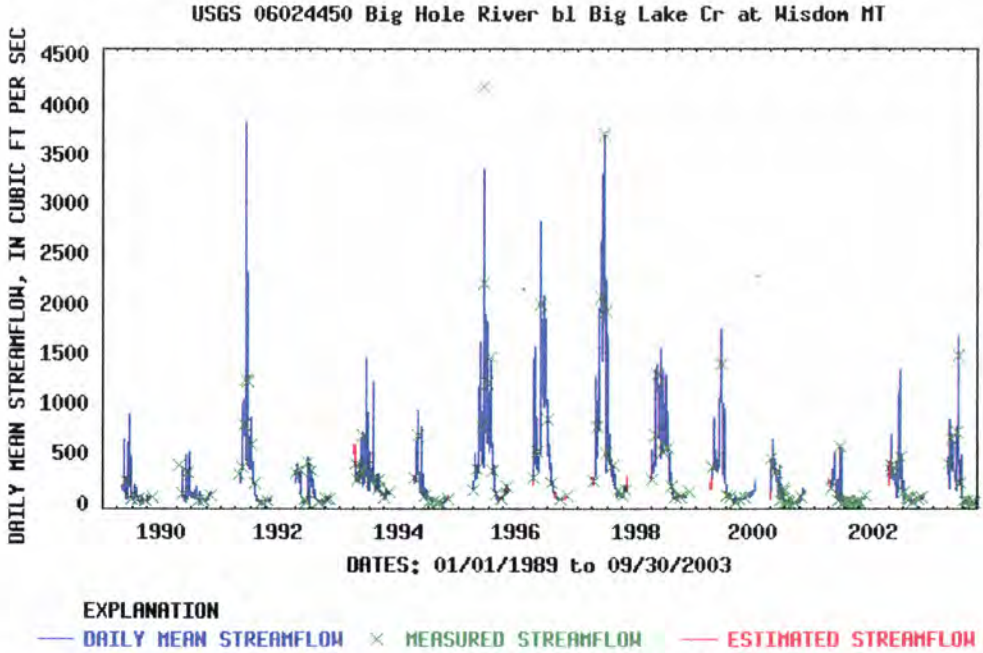


Figure 9. Historic Streamflows at the Big Hole River USGS Gauging Station at the Wisdom Bridge During 1989-2003.

Irrigation withdrawals, in concert with effects of drought, have attenuated high-flow events and lowered base flow conditions. Consequently, these hydrologic alterations are implicated in poor spawning success and recruitment of grayling, seasonal habitat degradation and fragmentation, and increased summer water temperatures (Magee and Lamothe 2003, 2004).

Early-season (April-May) irrigation withdrawals may dewater or block access to grayling spawning and rearing sites in the Big Hole River, which can prevent spawning, cause egg mortality, and reduce survival of YOY grayling and lead to reduced recruitment. For example, recent poor spawning and recruitment success has coincided with lower than normal spring flow conditions during 1999-2002 (Magee and Lamothe 2003). Low flows also can affect the quality of pool habitats preferred by older age classes of grayling (Byorth and Magee 1998; Lamothe and Magee 2004b), and reduce overall habitat volume.

Hydrologic alterations can affect all age classes or life stages of grayling by reducing connectivity between necessary habitats (i.e., fragmentation). Stream-dwelling fish such as grayling require distinct spawning, rearing, feeding, and refuge habitats located throughout the watershed. Movement between these necessary habitats is an important component of the ecology of Big Hole River grayling as these fish are known to move tens of miles on both a seasonal and daily basis (Shepard and Oswald 1989; Lamothe and Magee 2003). Habitat fragmentation can thus have detrimental consequences for all age classes of grayling, and lead to population declines.

Elevated summer water temperature in conjunction with low flows is a major water quality issue that impacts grayling. Irrigation and stock water removals during late summer reduce stream flows and lead to increases in water temperature in the river channel. For example, summer water temperatures during 2002-03 exceeded the upper incipient lethal temperature (UILT) for grayling (e.g., 25°C or 77°F; Lohr et al. 1996) at most monitoring stations throughout the Big Hole River (Magee and Lamothe 2003, 2004). The UILT is the temperature that is survivable indefinitely (for periods longer than 1 week) by 50 percent of the "test population" in an experimental setting. During mid-July 2004, water temperatures exceeded 25°C in a juvenile rearing area for grayling in the mainstem Big Hole River near Wisdom, Montana. Overall, summer water temperatures in the Big Hole River consistently exceed stressful levels for salmonids (e.g., 21°C or 70°F, Magee and Lamothe 2003).

Proposed Conservation Measures to Improve Streamflows in the Project Area

A key conservation strategy of this Agreement is to provide streamflows that promote stream ecosystem function and benefit grayling by facilitating adequate seasonal high-flow events, maintaining adequate baseflow conditions, and eliminating human-caused dewatering events. This Agreement seeks to provide base flows that are sufficient to create and maintain grayling habitat conditions, provide a healthy thermal regime, and allow for suitable foraging conditions (stream productivity).

To meet the objective of improving streamflows in the Big Hole River, three general approaches will be utilized in this Agreement--a) improving Participating Landowner control over diversion, delivery and measurement of water; and b) reducing the amount of water diverted and

c) increasing the effectiveness with which diverted water is delivered. Three complementary conservation measures will be implemented under these approaches--compliance with water rights, arrangements to reduce irrigation withdrawals, and improved irrigation management.

Landowner control over irrigation water at the point of diversion is a necessary pre-condition for each of the preceding conservation measures and is considered an over-arching objective for improving instream flows.

Implementation of the conservation measures detailed below will proceed in a tiered, sequential approach. First, the Agencies and Participating Landowners will ensure management and measurement of all irrigation water, and begin implementing measures to achieve this objective immediately after a landowner enters into the Agreement. Second, compliance (and monitoring of that compliance) with water rights shall begin immediately after a landowner enters into the Agreement. Third, interim diversion reduction arrangements shall be negotiated with a landowner upon entering into the Agreement. Fourth, implementation of improved irrigation management recommendations based on an irrigation system and agricultural operation assessment shall begin no later than the date upon which a site-specific plan is finalized for a Participating Landowner. The first and second steps will continue for the duration of the Agreement. The third step defines the amount and timing of a Participating Landowner's irrigation withdrawals, but these parameters may be revised or superseded by the fourth step (improved irrigation management).

Enrollment in the Agreement does not free the Participating Landowner of the responsibility of legal provisions provided in the Montana Water Use Act (MCA Title 85, Chapter 2) or the concept of "first in time, first in right." In other words, any official change to a water right, which can include changes in point of diversion, place of use, purpose of use (such as leases) and period of use, must be established through MDNRC's change authorization process. Also, priority water calls can still be placed from senior users to junior users regardless of agreements or arrangements formed under the Agreement.

Management and Measurement of Irrigation Diversions

Agencies will work with Participating Landowners, in order of priority, to ensure that all irrigation diversions on enrolled lands are properly functioning and have flow measuring devices within 5 years of enrollment (see Figure 22). Many existing diversion structures in the upper Big Hole River and its tributaries are only semi-functional. For example, a number of diversion structures, especially on tributaries, have no actual structure to stop diversion. Thus diversion becomes strictly a function of water availability (Roberts 2005). In addition, many diversions leak to varying degrees when closed (e.g., see Photo 2G). Agency personnel observed that many of the 40+ headgates monitored during the NRCS EQIP program during summer 2004 in the upper Big Hole system could not completely stop flow into irrigation ditches even when they were "closed;" however, the actual leak rates were not measured.

The primary mechanism to increase control of water at points of diversion will be to redesign, upgrade, and install physical diversion structures (e.g., headgates or the appropriate alternative) and flow measuring devices (e.g., flumes and weirs).

Water Savings 1 - The following is a simple example of how improving diversion structures will improve streamflows and assumes that water saved will be returned to the river system (but see Roberts 2005). This example should not be extrapolated to predict water savings across the Project Area, but is instead presented to highlight the potential for improving streamflows simply by installing, upgrading or otherwise improving diversion structures. A sample of irrigation diversions at both mainstem and tributary locations in the upper Big Hole River system were assessed on one day in May 2005 to provide a rough estimate of leak rates on closed headgates. The average leak rate of this sample was 1.25 cfs (n = 6, range = 0.1 – 2.63 cfs, standard error = 0.43). The amount of water that leaks through a "closed" diversion structure is a complex function of diversion type and its current physical condition, diversion location with respect to adjacent channel morphology and flow characteristics, and flow levels (among other variables); so estimating water savings across more than one thousand points of diversion is not possible at this time. However, improving diversion structures will raise the baseline for flow conditions, especially in the spring and fall (outside of the period of use for most water rights) when diversions should be closed.

Compliance With Water Rights

Participating Landowners shall comply within the historic limits and constraints of their claimed water rights in place at the time they enter into the Agreement. Under Montana water law, a water right describes the point of diversion, period of use, place of use, and the maximum flow rate. A summary of water rights in the Big Hole River basin can be accessed through MDNRC's website at >nris.state.mt.us/dnrc/waterrights/default.aspx<. The water rights on the mainstem Big Hole River and the majority of its tributaries in the Project Area are unadjudicated, and amendments to claimed water rights that happen through the adjudication process will be addressed in the "Changed and Unforeseen Circumstances" part of this Agreement.

Period of use of water rights in the Project Area can range from January to December for many stock watering rights to the more common May through September period for most irrigation water rights. Traditionally, much of the irrigation diversion ended in early July with the initiation of hay harvest; however, due to the recent conversion of hay meadows to irrigated pasture for livestock forage, irrigation during July thru September has become more common. The priority date for water rights is variable across the Project Area, but most of the pre-1890 water rights are located in the mainstem and tributaries of the Big Hole River above Wisdom (i.e., Management Segment C and upstream). Most of these senior water rights holders have already expressed interest in an Agreement (Figure 6), so priority calls for water rights made under Montana State water law are not likely to jeopardize the ability of the Agreement to augment flows for fluvial Arctic grayling in the Project Area if these same private landowners participate in the Agreement.

Most of the irrigation diversions in the Project Area do not have flow measuring devices that would permit landowners to measure irrigation withdrawals relative to their claimed water rights. As described earlier, the absence or condition of physical diversion structures also makes irrigation control very difficult in some situations. This combination of factors has resulted in some landowners inadvertently irrigating in excess of the water volume and period of use associated with their water right.

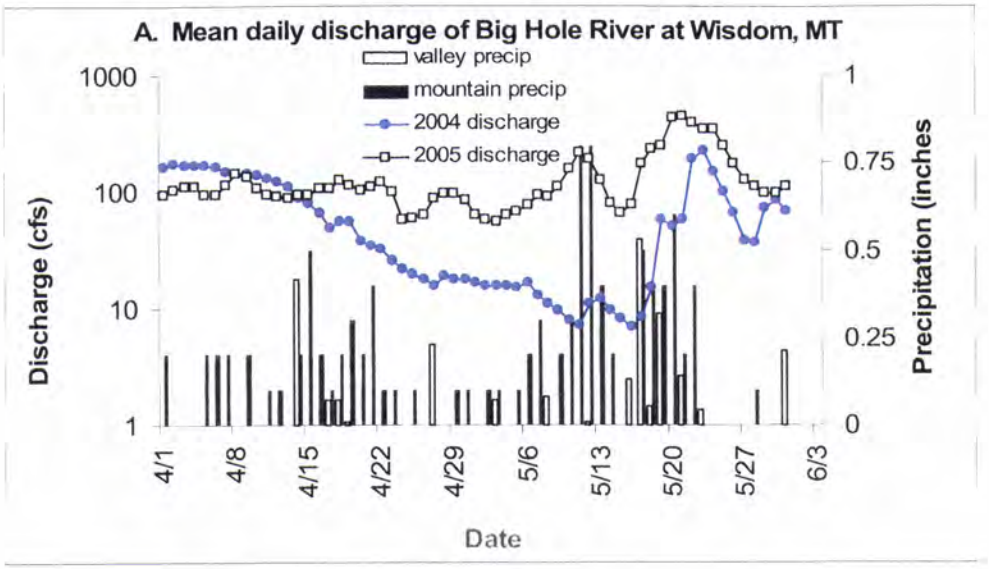
Improvements to irrigation structures and the installation of measuring devices described above will remove this problem and help Participating Landowner to comply with their water rights.

Water Savings 2 - The amount of water to be conserved through compliance with water rights is again difficult to estimate given the lack of historical data on diversion amounts and the large number of diversion points in the system. However, the timing of such conservation is more readily understood. For example, compliance with the timing of water rights will likely accrue benefits to instream flow at the beginning of the irrigation season when grayling typically spawn (e.g., mid-April and May), and in the late-summer and early fall when the river is at baseflow. Compliance with amount of diversion will increase streamflows throughout the irrigation season, roughly May-September.

Reduced Irrigation Withdrawal Through Interim Diversion Reduction Arrangements
The Agencies shall negotiate interim reductions in irrigation diversions (from historic or legally-permitted levels) with Participating Landowners, as necessary, to benefit instream flows and respond to environmental stressors (e.g., drought). These flexible arrangements will take the form of a conditional arrangement whereby Participating Landowners adjust (stop or reduce) diversions during specific calendar dates or flow conditions. These arrangements will be negotiated utilizing the analysis and professional judgment of fishery biologists and hydrologists from the participating agencies. The general strategy in negotiating these arrangements will be to keep water in the river at a timing that augments the form of the natural hydrograph (e.g., higher flows in spring, sustained baseflows in summer-fall) to permit grayling the full expression of their life histories in the system. These flexible arrangements can be negotiated beginning any time after a landowner enters into this Agreement (i.e., at "Phase I" of this Agreement – see Part VIII, Implementation of the Agreement), but in some cases data collection (diversion amounts) and physical upgrades to the irrigation system (diversion structures and flow measuring devices) will be necessary preconditions to negotiation and implementation of such arrangements. Stipulations of and compliance with provisions of the arrangements will be recorded and maintained in files held by MFWP.

Experience with existing voluntary diversion reduction arrangements (MFWP unpublished data), the summer 2004 EQIP flow enhancement program (e.g., Roberts 2005), and most significantly a voluntary diversion reduction program to address drought conditions in 2005 (MFWP unpublished data) demonstrates these conditional arrangements are effective mechanisms to augment streamflows and flexible enough to respond to changing conditions.

Over three dozen landowners in the upper Big Hole River, whose property encompasses over 200,000 acres, signed up to participate in the 2005 voluntary diversion reduction program coordinated by MFWP. Preliminary hydrologic data demonstrate the effectiveness of this program. First, streamflows at Wisdom in 2005 have been generally greater compared to 2004 in both absolute terms (Figure 10A) and in comparison to snowpack conditions in the upper watershed (Figure 10B), though valley and mountain precipitation also has played a factor (Figure 10A). The ratio between discharge and snowpack (Snow Water Equivalent) in 2005 is most striking, as the 2005 snowpack has been less than in 2004 for most of the year (Figure 10B) yet the discharge has generally been greater in 2005 (Figure 10A).



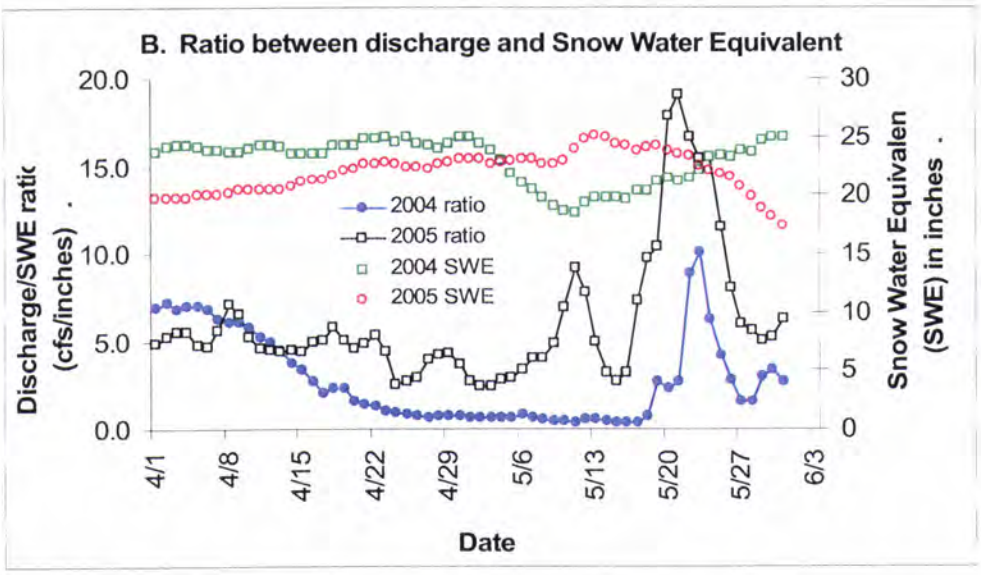


Figure 10 (A & B). Streamflow and Snowpack Conditions in the Upper Big Hole River Basin During April-May 2004 and 2005. Panel A shows the mean daily discharge recorded by a USGS streamflow gage at Wisdom, Montana, during 2004 and 2005 (y-axis at left) and observed precipitation in the Big Hole valley at Wisdom (y-axis at right) during April 13-May 31, 2005, recorded by a National Weather Service cooperative weather station (WISM8) and mountain precipitation during April 1-May 31, 2005, recorded at the Darkhorse Lake SNOTEL site (13d19s) operated by NRCS. Panel B shows the ratio between stream discharge at Wisdom and the Snow Water Equivalent (SWE); and the raw SWE data (y-axis at right) observed on the same day at the Darkhorse Lake SNOTEL site. Snow Water Equivalent is the amount of liquid water contained in a volume of solid snow.

Second, instantaneous stream discharge measurements taken on the same date at two locations in the upper Big Hole River give a snapshot view of the effect of voluntary irrigation reduction on streamflows (Table 2). On May 4, the inflows measured at Jackson were lower in 2005 vs. 2004, yet the flows downstream were greater; demonstrating, in part, the effect of voluntary irrigation closures between those locations on that date. Where water was being "lost" between the two locations by irrigation diversion on that date in 2004 (no irrigation reduction program in place during May and flows at Wisdom 23 percent of those at Jackson), water was actually being "gained" in 2005 (irrigation reduction program in place; flows at Wisdom 242 percent those at Jackson). On May 16, basin inflows were greater in 2005 (112 vs. 50 cfs in 2004) so absolute flows were also greater, but comparatively more water also was making it from Jackson to Wisdom in 2005 because flows at Wisdom were 66 percent of those at Jackson in 2005 (vs. 14 percent in 2004).

Table 2. Difference in Instantaneous Stream Discharge Measured at Two Locations on the Big Hole River on the Same Dates (May 4 And 16) in 2004 and 2005. The measuring locations at Jackson and Wisdom, Montana, are approximately situated at the downstream end of Agreement Management Segments A and C, respectively (see Figure 2). Snow water equivalent values are from the Darkhorse Lake SNOTEL site and represent mountain precipitation conditions in the upper Big Hole River basin.

Year	Date	Snow Water Equivalent (inches)	Big Hole River at Jackson (upstream)	Big Hole River at Wisdom (downstream)	Comparative Flow (Wisdom/Jackson)
			Discharge in cfs		
2004	May 4	23	69	16	23%
2005	May 4	22.9	26	63	242%
2004	May 16	19.6	50	7	14%
2005	May 16	24.2	112	74	66%

Improvements to irrigation systems at the points of diversion will help landowners to manage water (see previous sections), and increase the ability of landowners to respond to fluctuating streamflows and environmental conditions so that water can be returned to the river at a time that will benefit grayling. Water leases may be an appropriate tool to ensure that water saved will remain in the river and meet the requirements under State water law.

Water Savings 3 - The water conserved and returned to the river to benefit instream uses under these irrigation reductions is difficult to estimate given the lack of existing data on historical irrigation use and the site-specific nature of the arrangements. However, the cumulative contribution of these arrangements to instream flows may be substantial given the heavy water use that has historically occurred and the over-allocation of unadjudicated water rights in the Project Area. These arrangements also may provide more immediate benefits to instream flows compared to other measures that require more intensive assessments and have a longer timeline for implementation (see changes effected through **IMPROVED IRRIGATION MANAGEMENT**, below).

IMPROVED IRRIGATION MANAGEMENT

Improved irrigation water management involves both improving control over water diversions and measuring withdrawals, and quantifying the amount of irrigation water required for Participating Landowners to meet their production goals. Both approaches will result in less water diverted from the Big Hole River and its tributaries in the Project Area.

Irrigation Water Management - The NRCS will use its Irrigation Water Management guidelines to reduce irrigation demands to increase instream flows while helping producers maintain sustainable agricultural operations. Within 30 months of a Participating Landowner entering into the Agreement, the NRCS will conduct a comprehensive assessment of the irrigation system and current agricultural operation on the enrolled lands. This assessment will consider such attributes as water rights on the enrolled lands, water holding capacity of the soils (based on soil type, topography, etc.), the water requirement of the crop(s) (based on crop type and developmental condition, variability in environmental conditions, etc.), and cooperative use with adjacent landowners. This information will be used to estimate the irrigation water needed for production of hay and pasture forage. The final maximum irrigation diversion amount shall be determined by NRCS.

Based on final diversion amount, Participating Landowners will have the flexibility to upgrade their irrigation systems to achieve effective delivery of water to maintain agricultural production given existing crop type and distribution; or to adjust their operation such that agricultural production is maintained by altering the composition and distribution of irrigated crops on enrolled lands without intensive upgrades to the existing irrigation system (diversion structures excepted). A combination of these two options may be implemented in some cases--e.g., increased irrigation system efficiency (via ditch lining, land smoothing, system redesign, etc.) plus changing the location of irrigation or crop types. Changes in irrigation practices, such as altering the place of use or point of diversion, are subject to Montana State water law, which requires that such changes be filed with MDNRC. Whichever option or combination of options is utilized, the water savings will be substantial and the saved water will be turned back at the point of diversion to provide beneficial use for instream flows.

Revising the Interim Diversion Reduction Arrangement - The Participating Landowner and the Agencies will retain the flexibility to revise the interim diversion reduction arrangement in the context of a more comprehensive water management plan that will be implemented under the site-specific plan. During the time the interim arrangement is being utilized, the Agencies will be collecting baseline data toward development of the site-specific plan that establishes a final maximum diversion amount per NRCS' recommendations to improve irrigation water management that will meet Participating Landowner production goals while delivering water to the river system at a timing that benefits grayling. The interim diversion reduction arrangement may thus need to be revised in light of these new data and the implementation of the NRCS Irrigation Water Management guidelines. These longer-term diversion reduction arrangements will be similar in format to those "interim diversion reduction arrangements" described earlier in this section, and are expected to represent water saved in addition to that realized through implementation of NRCS Irrigation Water Management guidelines. Water leases may be used in conjunction with reductions in diversions.

Water Savings 4 - A Farm Irrigation Rating Index assessment of a representative surface water (flood) irrigation system in the upper Big Hole during 2005 indicated an efficiency of 15-20 percent (NRCS unpublished data). The NRCS Irrigation Water Management guidelines would require such a system to be upgraded to achieve 30 percent or greater efficiency (i.e., 50 percent or greater relative improvement). Similarly, the maximum irrigation diversion amount estimated by NRCS is anticipated to be substantially less than historic irrigation applications on many properties. Unfortunately, no quantitative data are available on historic irrigation volumes in the upper Big Hole because of the comparatively primitive irrigation system, the lack of control over diversions, and the widespread absence of flow measuring devices. Nonetheless, anecdotal observations of standing water in hay fields and pastures, inundated roads, conversion of upland vegetation (e.g., sagebrush) to wetland species, and presence of wetland plants in locations with >5 percent topographic slope provide circumstantial and direct evidence that over-irrigation has been widespread. The NRCS' strategy will help landowners avoid this practice and divert less water.

An example of NRCS' Irrigation Water Management strategy is presented in Appendix G (Example Site-Specific Plan). This example describes how the physical characteristics of the property, water requirements for crops, estimated irrigation system upgrades can be used to develop a comprehensive irrigation plan that results in a significant reduction in irrigation water needs relative to the existing water right (e.g., >50 percent reduction in diversion compared to the associated water right; Appendix G).

Stock Watering - Reducing the number and/or improving the conveyance efficiency of surface-water diversions for livestock watering will be another mechanism to reduce withdrawals from the Big Hole River and its tributaries. Some existing surface-water diversions deliver water to livestock >1 mile from the physical point of diversion (NRCS unpublished data), so water loss from evaporation and infiltration should be substantial. The net result is that the amount of water diverted greatly exceeds the actual consumptive use of livestock.

Site-specific stock water needs will be assessed by NRCS who will present a set of alternatives, as necessary, to supply livestock with adequate water while minimizing diversions from stream channels. Wells, pipelines, troughs, and lined ditches are potential alternatives to, or modifications of, existing surface water diversions that will reduce water loss during conveyance.

Water Savings 5 - Conveyance efficiency for stock water diversions is estimated to be about 50 percent (NRCS unpublished data). Stopping these diversions or dramatically improving their ability to deliver water will again help Participating Landowners divert less water and correspondingly improve instream flows.

Livestock Forage - On some properties, shifting the composition of livestock forage to less water-intensive "tame" or native hay or grass species will decrease irrigation demand and reduce diversions. Over-irrigation at some locations in the Big Hole River valley has converted upland grass-sage vegetation communities to wetland communities (e.g., dominated by sedges) that not only require more water but provide comparatively less nutritional benefit to livestock. If plant communities become dominated by wetland species and do not revert back to native upland

species without active intervention, this could theoretically create a situation where irrigation must be increased to support a forage base that is not sustainable for the climate and soil conditions.

The NRCS has expertise with helping producers utilize less water-intensive forage crops in other locations in the Rocky Mountain region, and is acquiring the site-specific data to do so in the Big Hole River watershed. In 2004 the NRCS initiated a pilot study at a ranch in the upper Big Hole to determine the most productive species of livestock forage across a variety of irrigation levels for the prevailing climate. Results will be implemented on enrolled lands to produce the same or greater livestock forage per area and water application, thus reducing irrigation demands while maintaining or increasing agricultural output.

Water Savings 6 - Increased instream flows resulting from a shift to less water-intensive livestock forage will likely accrue more slowly compared to other methods described above or below, but will have a long-lasting impact on the reducing irrigation demands in the system. An estimate of the relative consumptive water use for sedges or other wetlands plants is not possible because these species are not listed as forage (see NRCS' "Crop Consumptive Use" program >http://www.mt.nrcs.usda.gov/technical/eng/software.html<).

CUMULATIVE EFFECT OF CONSERVATION MEASURES IMPLEMENTED TO IMPROVE MINIMUM INSTREAM FLOWS

The combination of improved control over diversions, compliance with water rights, diversion reduction arrangements, and irrigation management will lead to dramatic improvements in streamflows within the Project Area. The best available data do not permit a precise estimate of the water conservation of the Agreement, but the cumulative effect of the individual actions described above will without question raise the baseline flow conditions under all environmental conditions. To guide implementation of the plan and measure the progress and accrual of benefits to streamflow under the conservation measures, the Agencies have developed interim minimum flow targets within the Project Area (Table 3 below).

The minimum flow targets presented in Table 3 were derived by MFWP and MDNRC based on the best available data and application of the wetted perimeter inflection point method (Leathe and Nelson 1989; Appendix B) and area-discharge relationships. The wetted perimeter method is a "standard setting" method concerned with protecting instream flows and providing minimum flows for fishery resources. Utilization of the method, in conjunction with professional judgment, is required to make final recommendations. The targets presented in this Agreement must thus be interpreted as baseline or minimum values to ensure instream flow resources sufficient to promote recovery of grayling above their current population level, and so should not be construed as final endpoints for the implementation of the Agreement. The parties to this Agreement recognize that--(a) streamflows fluctuate in unregulated (undammed) rivers so flows both above and below the targets should be expected, (b) the wetted perimeter method does not specify the high flows necessary for channel maintenance (which are primarily controlled by snowmelt runoff), and (c) they will strive, through implementation of the conservation measures, to provide flows that exceed the minimum flow targets presented here.

The optimal flow regime for each life stage of grayling in the Big Hole River is currently unknown, but the minimum target values presented are considered adequate to protect their habitat. The wetted perimeter method was developed to ensure adequate flows over riffle habitats, which are generally important for stream productivity. In addition to providing a source of aquatic invertebrates for grayling, riffles also are used by grayling for spawning. Riffle habitat, being comparatively shallow, tends to be affected earlier by dewatering compared to other stream habitats. Thus, when flows are maintained over riffles, deeper water habitats utilized by adult grayling (e.g., pools) also are protected. Cover at or near the stream bank appears to also be provided for salmonid fishes under flows at or above the upper inflection point under the wetted perimeter method (see Leathe and Nelson 1989).

Table 3. Minimum Flow Targets for the Agreement's Management Segments in the Big Hole River. Location of discharge measurements correspond to the points presented in Figure 2.

Management Segment	Approximate Location of Discharge Monitoring	Spring (April – June)	Summer and Fall (July – October)
		Minimum Flow Targets (cfs)	
A	Miner Creek Road	60	20
B	Little Lake Creek Road	100	40
C	Wisdom	160	60
D	Mudd Creek Bridge	350	100
E	Dickie Bridge	450	170

The Agencies estimate that after 10 years of Agreement implementation, streamflows in the Project Area will meet or exceed target values at least 75 percent of the days between April-October in years with average snowpack (based on Snow Water Equivalent estimates in the upper basin). This estimate is based on comparing minimum flow targets to streamflows recorded at Wisdom (Management Segment C) and Mudd Creek (Management Segment D), and assumes that conditions at Mudd Creek (Management Segment D) are more representative of Management Segments A, B, and E than conditions at Wisdom (Management Segment C; see Appendix C). The agencies expect the target values in Management Segment C (i.e., USGS gauge at Wisdom, Montana) to be met less frequently (see Appendix B). Based on the correlation between snowpack and streamflow in the upper basin (MDNRC unpublished data), the expected frequency of meeting minimum streamflow targets at any of the management segments should decline when the system has below-average snowpack. The natural variability in environmental conditions will thus exert a strong effect, apart from the Agreement's conservation measures, on the frequency of meeting the minimum instream flow targets.

Implementation of the conservation measures to improve instream flows will progress through time (see Table 5), but, as described above, the Agencies expect the flow targets will be achieved 75 percent of the time after 10 years of implementing the Agreement (i.e., 10 years after this Agreement is finalized and enrollment begins). If after this 10-year period the flow targets are not being met at the expected frequency and grayling abundance and distribution has not increased above current levels, then the Agencies will pursue all available options, both within (enrolled landowners) and outside the Agreement (non-enrolled landowners), to increase

instream flows in the Project Area. These options may include, but are not limited to, seeking additional Agreement participants (if enrollment is still open) or participation in other conservation planning efforts, compensation for additional reductions in irrigation diversions or water use, additional negotiated reductions in irrigation diversions or water use, water leases, and organization of hay banks to feed livestock so that irrigation diversions can be reduced. Similar options may be used to help grayling where drought is affecting grayling (see Changed and unforeseen circumstances, Part XIV).

APPROACH TO PROMOTE HIGH-FLOW EVENTS

This Agreement does not establish specific minimum target values for high flows in the Big Hole, which are primarily influenced by climatic factors (i.e., snowmelt runoff and localized precipitation). However, irrigation withdrawals very likely influence the amplitude and duration of these flows. Through the implementation of site-specific plans, the Agencies and the Participating Landowners will manage irrigation withdrawals during times of anticipated high streamflows to reduce the impact of irrigation withdrawals on the amplitude and duration of high-flow events necessary for channel maintenance.

EXPECTED BENEFITS TO GRAYLING FROM IMPROVED STREAMFLOWS

Historically, grayling were most abundant in parts of the Project Area during years when streamflows were relatively high (Figure 11). The timing of spawning in the spring is dependent on streamflow dynamics (Shepard and Oswald 1989). The availability of water directly influences habitat availability (wetted perimeter), habitat quality (depth and water temperature), and stream productivity (Leathe and Nelson 1989). Abundant water also is critical to maintaining habitat connectivity that allows grayling to complete its annual life cycle (spawning, feeding, and wintering). While it is true that due to the uncertainty associated with precipitation dynamics the proposed streamflow targets in this Agreement may not always be met under drought conditions, the conservation measures proposed in this Agreement will lead to direct benefits to grayling by improving streamflows throughout the year and improving overall habitat quality and availability.

The available data do not permit a thorough quantitative analysis, but a qualitative inspection indicates that the index of grayling abundance recorded at Wisdom has been higher in years where the proposed flow targets were consistently exceeded and lower when they were not. The 1991-2003 index values indicate grayling were comparatively most abundant during 1995-98 (mean 16.25 grayling/mile) and somewhat less abundant during 1991-94 (mean 11.25 grayling per mile from Figure 11; note that index values from 2000-03 are excluded because of limited fish surveys). During 1995-98, mean daily flows at Wisdom met or exceeded the spring and summer-fall targets 99 percent and 76 percent of the time, respectively; whereas during 1991-94 the flows met or exceeded spring and summer-fall targets 72 percent and 45 percent of the time, respectively. While this retrospective inspection is very limited in that it considers only one location (Wisdom), one component of fish habitat (instream flow), and does not make any distinction between how age classes of grayling may respond differently to variation in flow, it indicates that more grayling were captured during annual monitoring surveys in years when the proposed flow guidelines are met or exceeded at a high frequency.

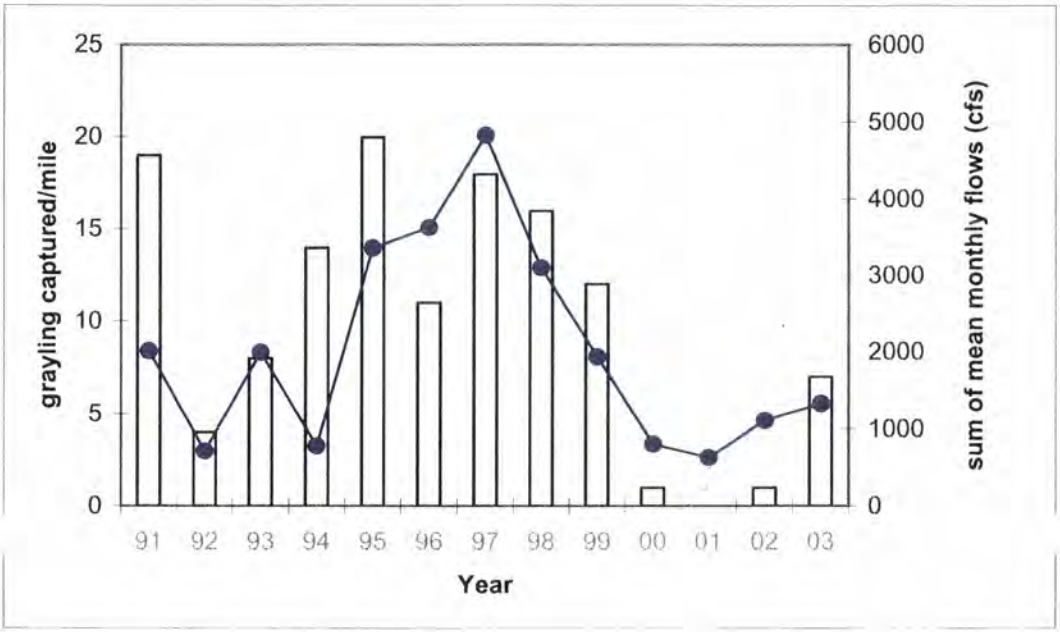


Figure 11. Relationship Between Discharge and an Index of Grayling Abundance (CPUE Including All Age Classes) in the Wisdom Reach During 1991-2003. Discharge represented by the sum of the mean monthly flows between April-October at the Wisdom bridge. Grayling surveys were restricted during 2001 because stream temperatures exceeded MFWP guidelines for electrofishing.

B. Riparian Zone Conservation and Restoration

LIMITING FACTOR - DEGRADED AND NON-FUNCTIONING 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 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 (2003) found a direct correlation between the abundance of overhanging vegetation and the quality of instream habitat and Arctic grayling abundance. Arctic grayling abundance in the upper Big Hole River is correlated to the abundance of overhanging vegetation (Figure 12), with one study concluding that 73 percent of the variation in Arctic grayling abundance was explained by the relative abundance of overhanging vegetation (Lamothe and Magee 2003).

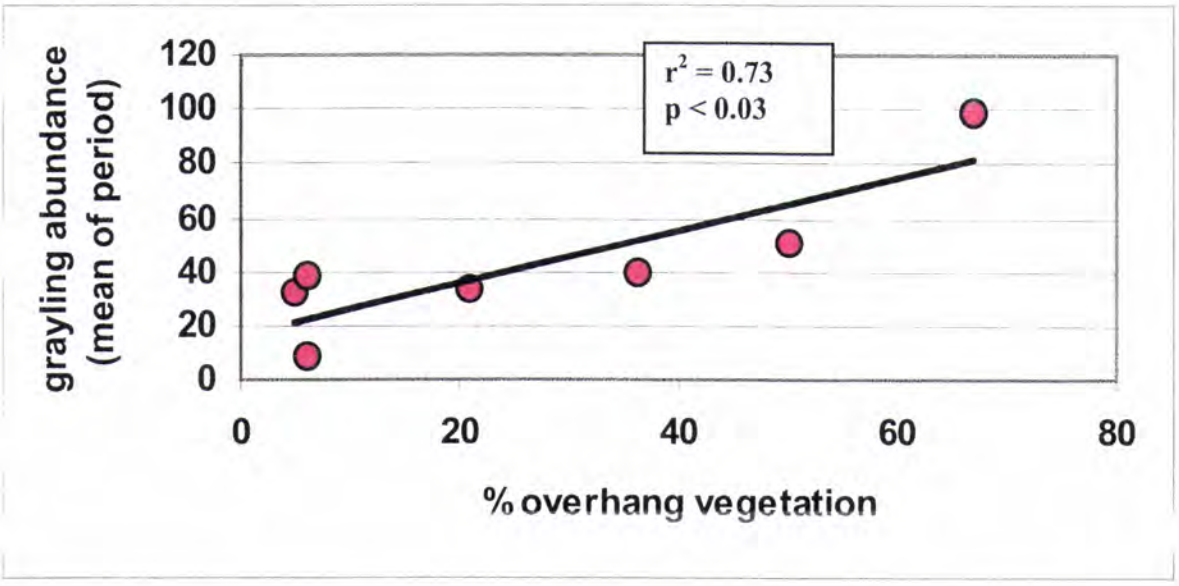


Figure 12. Relationship Between Arctic Grayling Abundance and the Abundance of Overhanging Vegetation Within an Inventory Reach Based on Data Collected During 1992-96 (from Lamothe and Magee 2003).

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 Arctic grayling. Lamothe and Magee (2004) observed that the current condition of much of the riparian vegetation and stream banks along the upper Big Hole River is poor.

The Fluvial Arctic Grayling Workgroup retained OEA Research, Inc., to conduct an inventory of the riparian and fisheries habitat in the upper Big Hole River during 1994. The habitat inventory generated baseline data for riparian conditions for much of the Project Area (Figure 13).

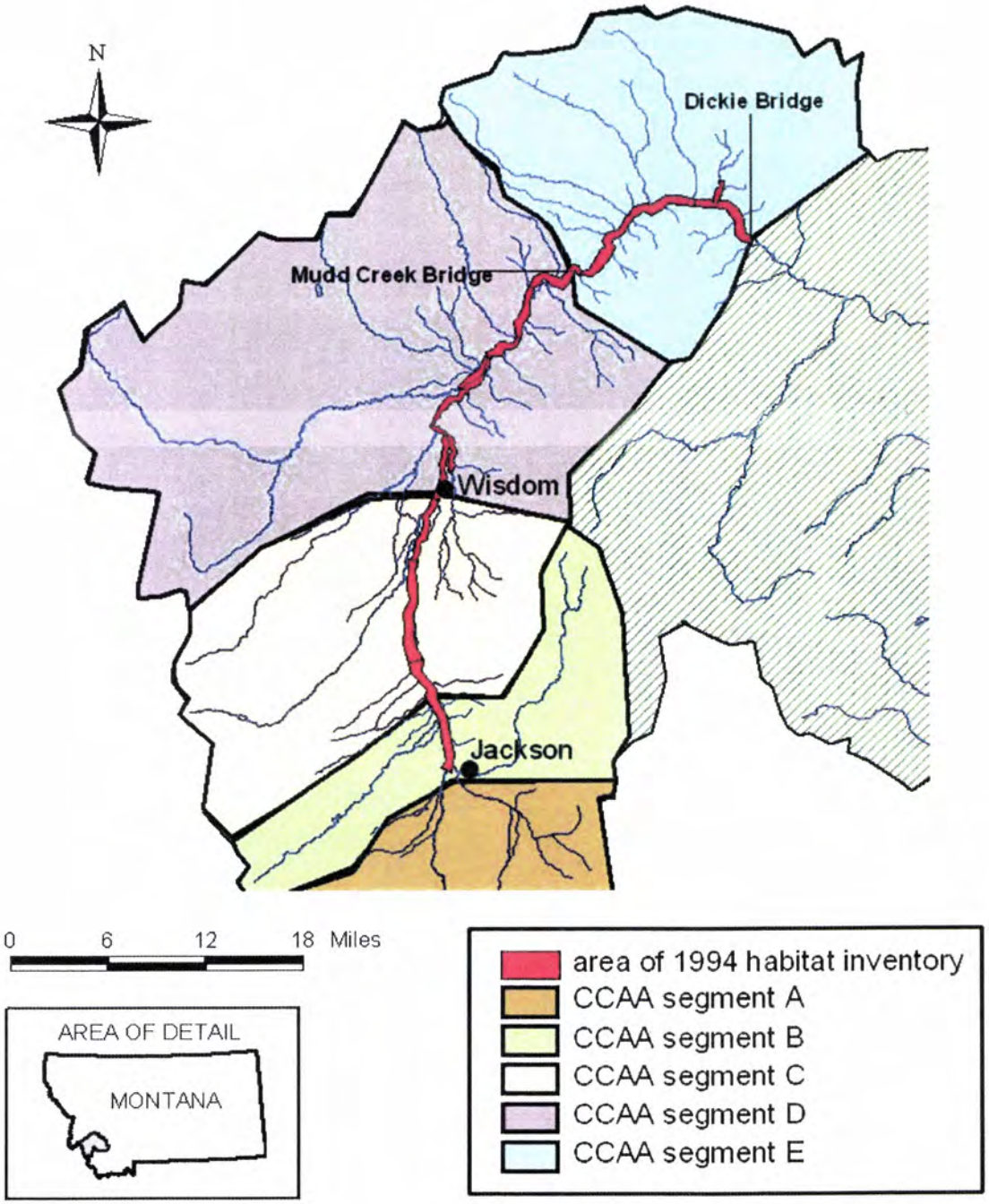


Figure 13. The Spatial Relationship Between the 1994 OEA Habitat Inventory and the Proposed Agreement Management Segments.

In 1994, healthy willow communities forming riparian areas were found to be rare within the inventory area. The majority (approximately 80 percent) of the willows in the area were found to be decadent or suppressed and less than 20 percent were found to be healthy (Figure 14).

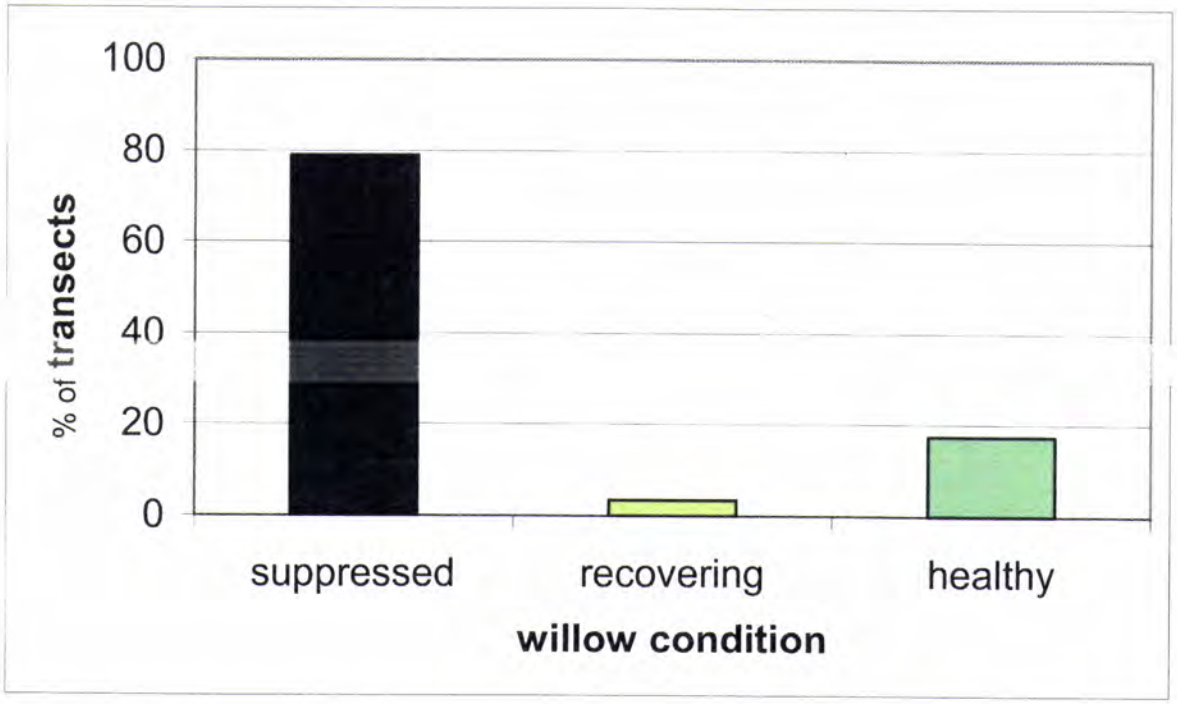


Figure 14. Condition of Willow Communities in Riparian Areas Within the 1994 OEA Habitat Inventory Area (Agreement Management Segments B-E).

The OEA summary report concluded that once these tall, suppressed plants die off, developed willow communities would be absent from the area. Thus, the willow communities in riparian zones of much of the Project Area have likely continued to decline since the 1994 surveys. Removal of willows and riparian vegetation clearing along the Big Hole River has apparently accelerated in recent decades (Figure 15), and, in conjunction with streamside livestock grazing, has led to localized bank erosion and channel instability (Upper Big Hole TMDL 2003).

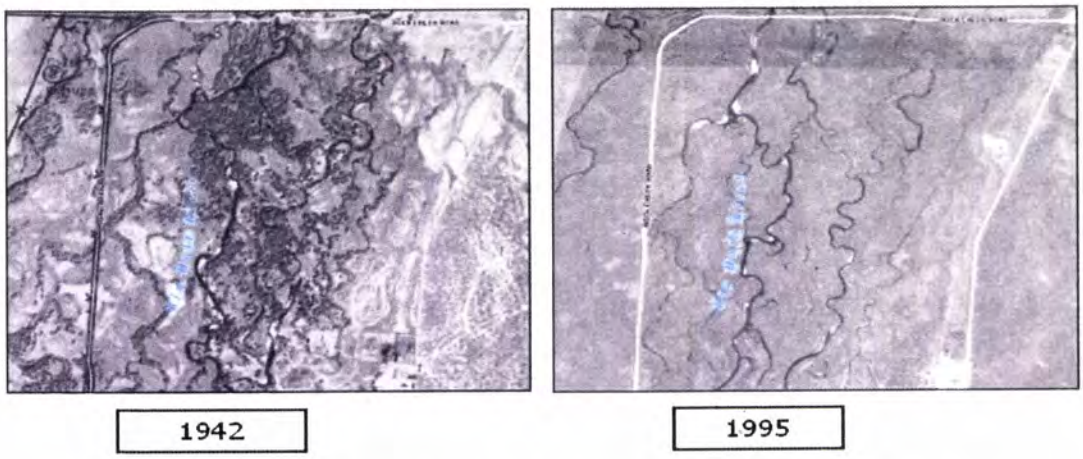


Figure 15. Aerial Photograph Showing a Significant Reduction in Riparian Coverage Within a Part of the Project Area Between 1942 and 1995.

The OEA summary report implicates the unregulated grazing of livestock and wildlife as the cause of the degraded condition of willow communities in riparian areas (Figure 16). The results of this inventory suggest that riparian areas within the Project Area are in need of some relief from the recent level of grazing pressure.

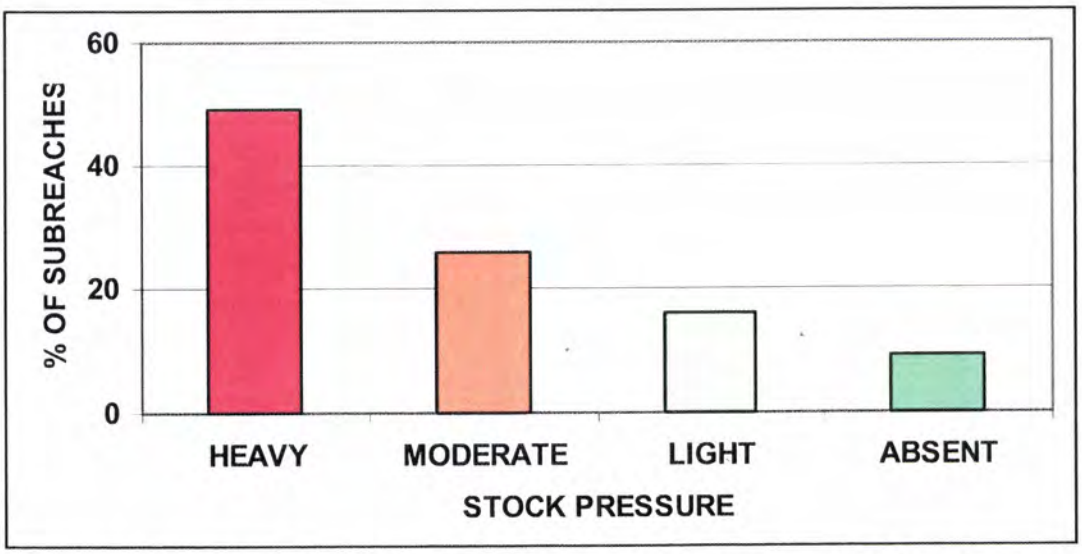


Figure 16. Estimated Stock Pressure in Riparian Areas from the 1994 OEA Habitat Inventory.

The land management practices associated with livestock production (OEA 1995, Upper Big Hole TMDL 2003) and the construction of bridges and roads has led to changes in channel morphology and function in reaches of the Big Hole River and its tributaries. The Upper Big Hole River Riparian and Fisheries Habitat Inventory (OEA 1995) classified the main channel of

the upper Big Hole River as predominantly C3 or C4 channel types (Rosgen 1994). These channel types are described as low gradient (< 2 percent), sinuous channels with high width-depth ratios (>12) and a riffle/pool sequence of approximately 5-7 bankfull channel widths in length (Rosgen 1996). The presence and condition of riparian vegetation is the primary regulating factor of lateral adjustment for these channel types (Rosgen 1996). In areas of the watershed where riparian function has been altered, a shift in channel type has occurred (OEA 1995). In areas where this transformation has occurred the channel has aggraded and widened, leading to a loss in aquatic habitat complexity (OEA 1995) including a shift from a multi-thread channels to a single, wide channel (Upper Big Hole TMDL 2003). This loss of complexity has lead to reductions in availability and quality of spawning (riffles, side channels), feeding and wintering (pools) habitats (Figure 17). According to OEA, approximately 20 percent of the area inventoried had evidence of this transformation.

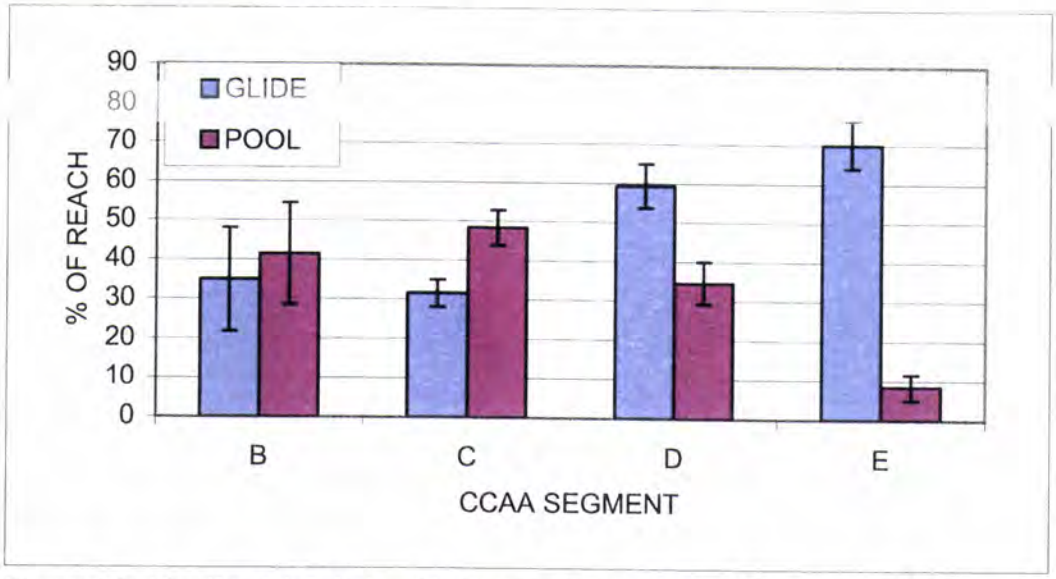


Figure 17. The Spatial Relationship Between the Relative Abundance of Pools and Glides Within the Project Area (OEA 1995).

The recent positive warming trend in water temperatures in parts of the Project Area may be attributed, in part, to reduced shading of the stream channel from the loss of riparian vegetation and the associated widening and shallowing of the stream channel where riparian vegetation has been removed (Figures 15 and 18). Previous studies have identified a similar relationship between the health of riparian vegetation and stream water temperature (Bjornn and Reiser 1991; Poole and Berman 2001; Opperman and Merenlender 2004). The specific thermal tolerances of grayling are undetermined and are dependant on various parameters such as time of exposure, dissolved oxygen content and acclimation (Kaya 1990). When monitoring and reporting temperatures as part of its Big Hole grayling monitoring program, MFWP has adopted 70°F (21°C) as the standard for determining when water temperature becomes unsuitable for grayling. If water temperatures in a reach of the Big Hole River exceed 70°F for more than 8 hours per day for 3 consecutive days, this reach will be remain closed to fishing until water temperatures do not exceed 70°F for more than 8 hours per day for 3 consecutive days (MFWP Fishing Closure Policy, MFWP Headquarters, Helena, Montana).

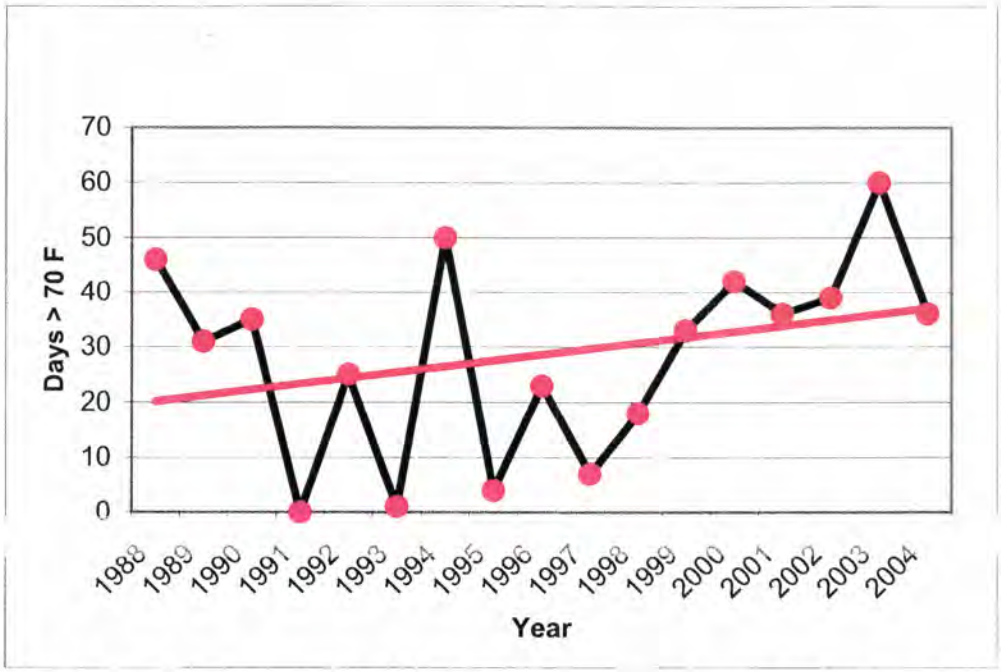


Figure 18. Plot of the number of days that water temperature in the Big Hole River at Wisdom exceeded 70°F (21°C), which is presumed to be stressful to salmonid fishes.

PROPOSED CONSERVATION MEASURES TO PROTECT AND RESTORE RIPARIAN FUNCTION IN THE PROJECT AREA

A goal of this Agreement is to maintain and restore sustainability to all riparian habitats on enrolled lands. The NRCS defines "sustainability" as the ability of a stream and its associated riparian area to perform specific physical and biological processes over time that contribute to the integrity, balance and stability of the riparian area (NRCS 2004). General conservation measures to achieve these guidelines include maintaining existing high-quality riparian habitats, implementing active restoration actions to replace lost riparian habitat, or permitting passive recovery of degraded riparian habitat through land management actions that allow recovery of willow and riparian vegetation communities. Specific conservation measures include, but are not limited to, development of prescribed grazing practices that detail the timing, intensity and duration of livestock use to promote healthy, sustainable riparian plant communities (e.g., using NRCS Prescribed Grazing guidelines); installing and maintaining fences which exclude or manage cattle within the riparian zone; installing and maintaining off-stream livestock watering facilities; and replanting or transplanting native riparian vegetation.

The NRCS' Riparian Assessment Method will be used to determine the present condition of riparian habitats on enrolled lands, and monitor progress toward the riparian conservation guidelines outlined in the Agreement and in any site-specific plan. The NRCS' Riparian Assessment Method categorizes riparian zone condition as--1) sustainable, 2) at risk, or 3) not sustainable based on a numerical score from 10 assessment questions (Natural Resources Conservation Service 2004). The 10 assessment categories include stream incisement, lateral

bank erosion, sediment balance, streambank vegetation, riparian vegetative cover, noxious weeds, undesirable plants in the riparian area, woody species establishment and regeneration, tree and shrub utilization, and floodplain characteristics. Participating Landowners will coordinate with the Agencies and any mutually agreed upon parties to assess riparian habitats on enrolled lands, and this information will serve as the basis for specific conservation measures to implement under the site-specific plan. Using the NRCS protocol for riparian assessment, the guideline for riparian condition for each management segment is set as "sustainable" with a ranking score of at least 80 percent. For individual landowners who develop a site-specific plan and have riparian habitats in the "at risk" or "not sustainable" categories, measurable improvements will be made throughout the duration of the site-specific plan. The health of riparian areas on enrolled lands will be assessed every 5 years for the duration of the Agreement using NRCS Riparian Assessment protocols.

Under this Agreement the parties are required to maintain or restore "sustainability" (per NRCS' definition) to all riparian habitats on enrolled lands, and that progress will be defined as measurable improvement (trending upward) or reaching the target of "sustainable" based on an NRCS riparian assessment to be conducted every 5 years. Progress will depend on baseline conditions on enrolled lands such as soil chemistry, age structure of existing riparian vegetation, the potential for existing vegetation to naturally recolonize open habitats, and degree of degradation of the stream channel. Given this site-specific variability, the Agencies anticipate that meeting the "sustainability" guidelines will take up to 15 years on some properties. Effectively, the Agencies and the Participating Landowners have agreed to a recovery timeline of 15 years for riparian habitats, and the parties have agreed to implement the measures necessary to achieve this goal. Consequently, the parties have agreed that measures in addition to those originally described in a site-specific plan may be required and will be implemented as soon as possible if, for whatever reason, it is evident that sustainability will not be attained within 15 years of beginning the implementation of the site-specific plan. Such measures may include expanding the extent of or accelerating the timeline for implementation of the specific riparian-related conservation measures described above (including active restoration) and identified after this Agreement or any site-specific plan have been finalized.

EXPECTED BENEFITS TO RIPARIAN HEALTH FROM CONSERVATION MEASURES

The development of prescribed grazing plans that manage cattle in riparian areas will lead to significant improvements in riparian health (Borman et al. 1999). Restoring riparian areas in the Project Area can be expected to lead to dramatic improvements in stream habitat and channel morphology parameters such as lower summer water temperatures, lower width-depth ratios, increased pool quality, increased bank stability, and higher spawning habitat quality (Bjornn and Reiser 1991; Hunter 1991; Poole and Berman 2001; Opperman and Merenlender 2004). Analysis of the OEA habitat inventory data shows a significant relationship between the abundance of overhanging vegetation (i.e., healthy riparian areas) and the quality and diversity of pools, and reduced bank cutting (erosion) in the proposed Project Area (Lamothe and Magee 2003). The result of this analysis illustrates the expected response of habitat parameters in restored riparian areas. The restoration of riparian habitats is anticipated to result in changes to channel morphology that should benefit grayling, including increasing the depth of pools and frequency of undercut streambanks as depicted in Figure 19.

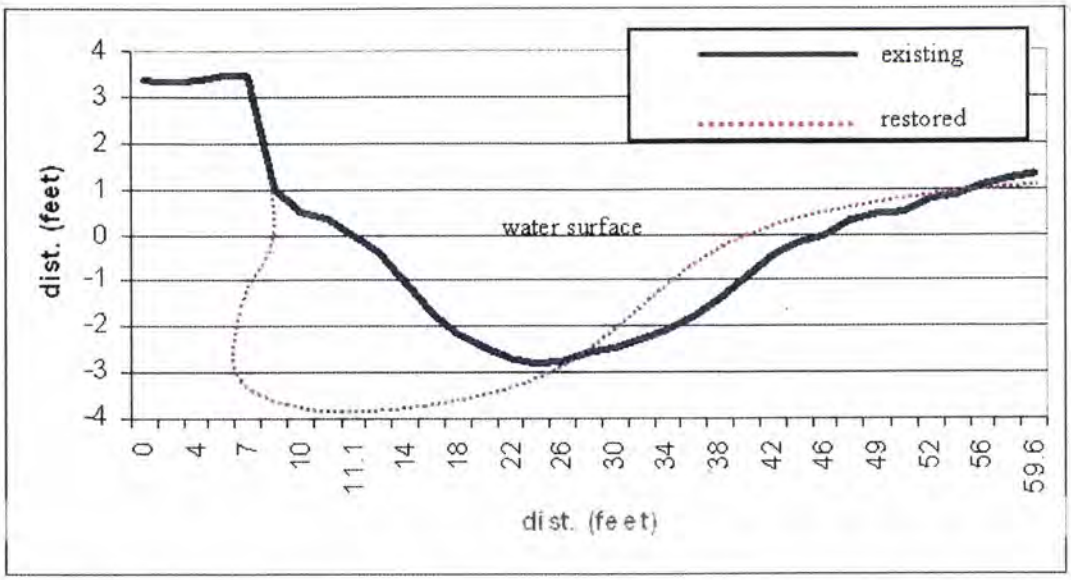


Figure 19. Cross-sectional elevation data from a typical pool within the Project Area (Steel Creek). The dashed line shows the expected restored condition from proposed conservation measures.

EXPECTED BENEFITS TO GRAYLING FROM CONSERVATION MEASURES

The improvements in riparian vegetation, stream habitat and channel morphology expected from the proposed conservation measures for restoring riparian areas will lead to an increased abundance and distribution of grayling in the Project Area.

C. Identifying and Reducing Entrainment Threats

POTENTIAL LIMITING FACTOR – ENTRAINMENT

The available information indicates there are numerous points of irrigation diversion in the Project Area and that grayling have been captured in a handful of irrigation ditches over the past 17 years, but the magnitude of the threat to grayling posed by entrainment is largely unknown. Water rights information on file with MDNRC indicates there are 1,014 distinct surface water points of diversion in the Project Area (MDNRC unpublished data); however, this number has not been verified by field surveys and should be considered a tentative estimate. Of the 1,000+ points of diversion preliminarily identified by MDNRC, approximately 372 are located where grayling are presently documented to occur (i.e., Management Segments B-E and lower 1 mile of tributaries in those same segments; Figure 20). These 372 points of diversion are considered the most likely sites of entrainment into irrigation ditches, 247 (or 66 percent) of which are located in Management Segments C and D that are considered high priorities for assessment and implementation of the Agreement's conservation measures (see Figure 22).

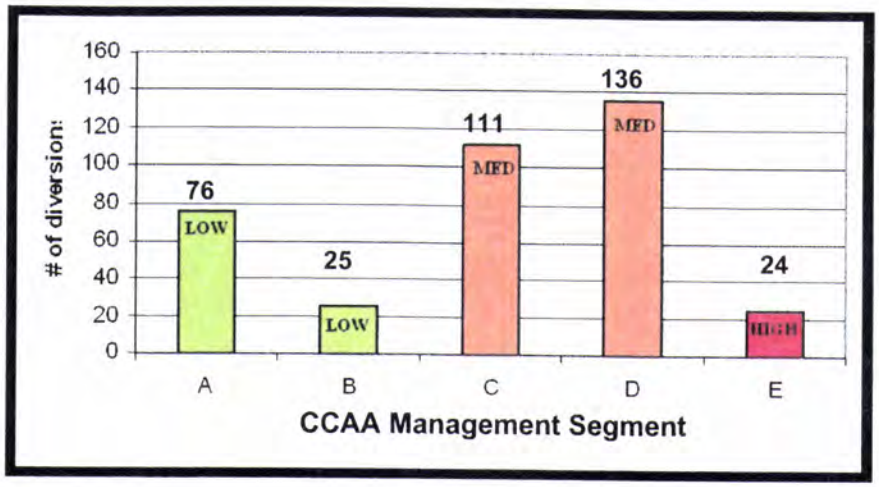


Figure 20. Distribution of the Approximately 372 Diversions Likely to be Entraining Grayling Within Irrigation Ditches by Management Segment Within the Project Area. The associated relative probability of grayling entrainment (HIGH, MED, or LOW) by management segment is based on the current known population status and range of grayling in the Project Area.

Grayling have occasionally been captured in irrigation ditches, primarily in Management Segment C, but a comprehensive entrainment survey has never been conducted in the irrigation system in the upper Big Hole River system. Skaar (1989) found YOY (age-0) grayling in 2 of 3 ditches surveyed during summer 1988 (65 and 4 age-0 grayling in the 2 ditches). Streu (1990) found age-0 and adult grayling in one of three ditches surveyed in summer 1990 (12 age-0 and 2 adult grayling). For the respective surveys, the greatest number of age-0 grayling entrained (Skaar 1989) or the only evidence of entrainment (Streu 1990) was found in the irrigation ditch with the comparatively greatest flow. Recent surveys have demonstrated that low numbers of grayling are being entrained in the ditches surveyed (Table 4).

Table 4. Summary of Recent Grayling Entrainment Surveys in Irrigation Ditches Conducted by MFWP Within the Proposed Agreement Project Area.

Year	Ditch ID#	Total # of Grayling Captured (# of YOY in Total Captures)	Length of Survey (miles)
1999	1	0	1.0
2000	1	0	1.0
2001	1	0	1.0
2003	1	3 (all YOY)	1.0
2003	2	3 (1 YOY)	0.5
2003	3	1	0.25
2003	4	0	0.25
2004	1	2 (1 YOY)	1.0

The existing data show that entrainment can and does occur in the Project Area. However, the frequency and extent of such entrainment is mostly unknown given the limited nature of the previous entrainment surveys. Entrainment appears to be a large potential threat to grayling because of the large number of diversions and associated ditches and may affect the grayling population in the Project Area and the Big Hole River in general, but a comprehensive and systematic survey of irrigation ditches is a prerequisite for a valid assessment of the threat. Lack of data on the impacts of entrainment on sensitive fish populations can compromise prioritization schemes, reduce the effectiveness of entrainment mitigation programs, and potentially lead to inefficient use of public funds (Moyle and Israel 2005).

PROPOSED CONSERVATION MEASURES TO ADDRESS POTENTIAL ENTRAINMENT THREATS

This Agreement will address entrainment by conducting a comprehensive fish survey of all irrigation ditches on enrolled lands, rescuing grayling from ditches concurrent with the surveys, and conducting a thorough analysis and assessment of the threat posed by entrainment. Identified population-level entrainment threats will obligate the Agencies and Participating Landowners to implement conservation measures to reduce or eliminate the specific threat.

The Agencies will coordinate and fund a comprehensive fishery survey of all irrigation ditches on enrolled lands to estimate grayling entrainment (see Appendix E). This survey will produce data necessary for an entrainment threat assessment, and if necessary, will be used to prioritize the mitigation of entrainment problems in the Project Area. Participating Landowners shall provide all reasonable access to the Agencies or their representatives so that the entrainment surveys can be conducted as soon after landowner enrollment as practicable.

Grayling rescue or salvage efforts will be conducted concurrent with the entrainment surveys. All grayling captured within irrigation ditches will be returned to the nearest point of the Big Hole River or a tributary downstream of the irrigation structure. Grayling rescue operations will be conducted in a manner that will minimize stress to individuals. For example, entrainment surveys and rescue operations will be curtailed when environmental conditions are potentially stressful to salmonid fishes. The Agencies anticipate, based on previous MFWP experience with the capture and handling of grayling, that nearly 100 percent of grayling captured in irrigation ditches will be released alive and unharmed into natural stream channels. Repatriation of these grayling will directly reduce the take of grayling in the Project Area.

In addition to potential rescue of grayling from irrigation ditches, other conservation measures are expected to directly or indirectly reduce the threat of entrainment in the Project Area. Fish entrainment is usually positively related to the amount of water being diverted at a given point, so reducing the amount of water diverted through compliance with water rights, upgrade of irrigation structures, interim diversion reduction arrangements, construction of stock-water wells, and implementation of the NRCS Irrigation Water Management plan is expected to decrease the probability of grayling entrainment. The ability to completely shut a diversion, by installing headgates or other structures, also will reduce the probability of entrainment outside of the period of use associated with the water right for that diversion.

Results of the comprehensive entrainment surveys will be published in MFWP's annual report required under the Agreement's monitoring provisions (see Part XII). Entrainment of grayling in irrigation ditches has been previously documented in a handful of irrigation ditches in the Project Area (Skaar 1989; Streu 1990; Table 4 above), but the impact of this and any other entrainment on the grayling population is largely unknown. Thus, MFWP's annual report shall include a thorough analysis of grayling entrainment on enrolled lands that will lead to an assessment by the Agencies of the population-level threat to grayling caused by entrainment. If this assessment indicates that that entrainment poses a population-level threat to the grayling population in the Project Area, the Agencies shall:

a) Develop a ranking system weighted primarily by number of individuals entrained, to prioritize entrainment mitigation efforts.
b) Resolve entrainment problems in order of the above priority.
c) Develop a framework to systematically reduce entrainment in the Project Area that includes, but is not limited to techniques such as redesigning or relocating diversions and associated structures, installing fish-exclusion devices, installing fish passage structures, changing the timing of water diversion and adjusting diversion amount relative to presence of grayling (e.g., Moyle and Israel 2005).
d) Install a minimum of three fish exclusion devices or screens per year*.

Regardless of the result of any entrainment assessment, the parties to this Agreement commit to the following:

a) Participating Landowners will continue to provide access to the Agencies for the duration of their site-specific plan to monitor entrainment in irrigation ditches, as necessary.
b) Incorporate adaptive management provisions in site-specific plans to include conservation measures to mitigate entrainment threats on enrolled lands if entrainment is determined to be population-level threat to grayling.
c) Irrigation ditches found to entrain juvenile and adult (age-1 and older) grayling will be re-surveyed by the Agencies at least every other year to permit an update to the threat assessment and to salvage grayling until a permanent solution to the entrainment problem is implemented.
d) Irrigation ditches not found to entrain juvenile and adult grayling in the initial comprehensive survey will be re-surveyed when they are suspected or expected to entrain adult grayling (i.e., when grayling are found or believed to be occupying or moving through habitats in the proximity of the diversion).
e) All grayling exclusion devices and techniques will be evaluated for effectiveness within 1 year of installation or implementation.

The Agencies have developed a mechanism to address population-level entrainment threats to grayling in the Project Area and are committed to dealing with entrainment as a dynamic threat that may change through time and will depend on the population status of grayling in the Project Area. For example, no entrainment threat exists for diversion structures and irrigation ditches

* Given current technical limitations, fish screens are not expected to be effective at limiting entrainment of young-of-the-year grayling because of their small body size. Exclusion devices installed under this Agreement will likely only be effective at excluding grayling age-1 and older.

located in habitats not currently occupied by grayling, but the expected increase in the distribution of grayling as a consequence of the Agreement's conservation measures may make these sites entrainment threats in the future. The existing conservation measures in this Agreement require the resurvey of ditches not found to entrain fish in the initial comprehensive survey (see "d" above). This will ensure the Agencies remain abreast of changes in entrainment over time and space. A reassessment of the overall entrainment threat, which considers all available entrainment information and mitigation, shall be conducted by the Agencies annually to determine if any ongoing entrainment poses a population-level threat to grayling. The Agencies will adjust their prioritization list accordingly using this information.

Whether entrainment poses a population-level threat to grayling is unknown at this time, but will be determined and addressed, as necessary, through the Agreement's conservation measures. However, the Agencies feel that a strategy should be in place to provide short-term mitigation (i.e., rescue) in cases where particular ditches entrain significant numbers of grayling. If surveys reveal that significant numbers of juvenile and adult grayling are being entrained in a particular ditch, MFWP will make repeat rescue visits during the year, with a final visit occurring shortly after the diversion is shut down for the year. Initially, 20 adult and/or juvenile grayling[†] will be the trigger to initiate repeat visits until a more refined estimate of "significant entrainment" can be determined based on the assessment of the comprehensive entrainment surveys and the annual reassessment of entrainment threats. If any of the visits reveal no grayling, future visits will not be necessary until the following year. These visits will continue annually for ditches meeting the trigger value until the entrainment problem for that diversion is permanently solved using one of the conservation measures described above.

EXPECTED BENEFITS

Entrainment surveys and grayling rescue efforts will lead to immediate reductions in take where entrainment is observed. If entrainment turns out to be a factor that limits the grayling population in the Project Area, then returning these individuals to a natural stream channel will "rescue" individuals who may in turn contribute to the population's stabilization and expansion. Conservation measures described elsewhere in the Agreement that reduce the volume of surface water diversions and lead to increased streamflows relative to adjacent irrigation ditches, also should reduce the probability and/or frequency of entrainment. A rigorous assessment of the entrainment threat across enrolled lands will allow the Agencies to prioritize conservation measures implemented to reduce entrainment should it be a population level threat, and also help to prioritize conservation measures to reduce entrainment relative to those for other identified threats. This prioritization will facilitate the effective allocation of financial and technical resources under the Agreement by targeting conservation actions where they will produce the greatest benefit to grayling.

[†] Twenty grayling represents approximately 5 percent of the mean number of grayling captured during MFWP's fall population monitoring efforts in 2003 and 2004. This number of grayling also is greater than the number of grayling captured in 20 of 34 electrofishing runs conducted by MFWP over that 2-year period.

D. Removing Barriers to Grayling Movement

LIMITING FACTOR: BARRIERS TO GRAYLING MOVEMENT

Many existing irrigation diversions lack fish passage structures and may be impassible under certain flows (e.g., Figure 21). These diversions may impede normal grayling migratory behavior and preclude them from accessing necessary spawning, feeding, and refuge habitats.

Figure 21. Example of Cross-Channel Diversion Structure in the Project Area That Likely Impedes Grayling Movement But Would Be Remedied Under the Agreement.

PROPOSED CONSERVATION MEASURE TO REMOVE MOVEMENT BARRIERS

Pursuant to this Agreement, Participating Landowners are required to remove any structure that is a barrier to grayling movement or modify it to permit passage of juvenile and adult grayling within 5 years of the determination that the structure impedes grayling passage.

Effective fish passage will be verified by the Agencies where barriers or physical structures are modified or removed to provide fish passage. This verification will occur within 1 year of completing the action, and any identified problems will be remedied as soon as possible.

Natural barriers also may exist in the free flowing waters of the enrolled lands. It will be the Agencies' responsibility to remove any natural barriers determined to warrant removal. The protection of other native species (primarily westslope cutthroat trout) from invasion by nonnative fish species will be considered in determining if a barrier should remain in place. Typically, all barriers to grayling movement will either be removed or passage will be provided. However, removal of some natural and man-made barriers may have a negative impact on other native fish species, particularly cutthroat trout. Barriers that provide isolation from neighboring rainbow trout populations maintain the genetic purity of many cutthroat trout populations in the Big Hole River drainage. These rainbow populations are a potential source of hybridization should these barriers be removed. Most cutthroat trout populations in the Project Area are associated with the headwaters of many of the tributaries to the Big Hole River, while grayling are associated with the Big Hole River and the lower portions of the tributaries. Since the range of the two species within the Project Area does not overlap, maintaining barriers that provide genetic isolation for cutthroat trout will not impact grayling. The potential impacts to native fish species, primarily westslope cutthroat trout, will be taken into consideration by the Agencies prior to making a decision to remove a barrier.

Adaptive management provisions for this conservation measure are not required because Participating Landowners, through enrolling in this Agreement and implementing their site-specific plans, are required to remove any structure that is a barrier to grayling movement or modify it to permit passage of juvenile and adult grayling within 5 years of the determination that the structure impedes grayling passage.

EXPECTED BENEFITS TO GRAYLING FROM THE CONSERVATION MEASURE

The removal of migration barriers will allow access to a greater portion of watershed for grayling throughout the year. The removal of barriers will increase access to seasonally important habitats including spawning, feeding, wintering, and refuge. Since most of the barriers are expected to be associated with irrigation diversion structures, the modification of these structures to allow passage also may reduce entrainment of grayling during downstream migrations. The combination of these two effects will provide significant benefit to the grayling population in the Project Area.

E. Nonnative Trout (Agency Oversight)

LIMITING FACTOR: INTERACTIONS WITH NONNATIVE SALMONIDS

The presence of nonnative salmonids in the Project Area has the potential to limit the response of the grayling population in the Project Area to the conservation measures proposed in this Agreement (Kaya 1992a).

PROPOSED AGENCY ACTIONS TO REDUCE INTERACTIONS BETWEEN GRAYLING AND NONNATIVE SALMONIDS

This Agreement does not propose direct measures for Participating Landowners to undertake to limit interactions between grayling and nonnative salmonids in the Project Area because this threat is not a result of landowner activities and directly addressing this threat is not the responsibility of landowners. However, the partnering Agencies believe that action may be necessary if interactions with nonnative trout limit the ability of grayling to respond to improved habitat conditions. At a minimum, the Agencies shall take the following actions:

1) Continuation of catch-and-release regulations for grayling and liberal bag limits for nonnative brook trout (MFWP 2004).

2) Establishment and subsequent annual meetings of a technical committee with expertise in the ecology and management of stream salmonids to review existing trout and grayling population monitoring data in the Big Hole River. The technical committee will assess the threat of nonnative trout to grayling and provide written recommendations to the Agencies. The MFWP has the legal mandate to manage fishery resources in the State of Montana and will determine appropriate management actions to address nonnative trout. Types of management actions to address threats from nonnative trout may include adjusting fishing regulations to encourage harvest of nonnative trout in the Project Area; and trapping, netting, electrofishing or other methods to suppress nonnative trout in certain habitats.

F. Summary and Integration of the Expected Benefits From Conservation Measures

The conservation measures to be implemented by Participating Landowners with assistance from the Agencies will improve stream flow conditions, maintain or restore riparian habitats, rescue any grayling entrained in irrigation ditches and provide a comprehensive assessment of entrainment threat, and facilitate fish passage within the Project Area. Collectively, these measures are expected to increase the abundance and distribution of fluvial Arctic grayling in upper Big Hole River by addressing key impairments to properly functioning stream ecosystems including alterations in the flow regime, reduced water quality and quantity, and degradation and fragmentation of habitat (see Table 5). Based on the characteristics of landowners already expressing interest in the program (e.g., water rights and size of ranching operations), the anticipated overall level of landowner participation, and the timeline for implementing conservation measures; the Agencies expect that the abundance of grayling in currently-occupied habitats will exhibit a positive trend within 5 years of the execution of this Agreement and that grayling will begin to reoccupy historic waters within 10 years of the execution of this Agreement (see Part VII, Restoration targets for grayling).

An objective of the Agreement is to improve streamflows in the Project Area such that they follow a more natural flow regime (e.g., Poff et al. 1997). The Agencies anticipate meeting this objective will promote stream ecosystem function and benefit grayling by facilitating adequate seasonal high-flow events, maintaining adequate baseflow conditions, and eliminating human-caused dewatering events. This Agreement will especially address these latter two

concerns, but also includes an approach to promote the first. The best available data indicate that grayling populations in the Big Hole River are more abundant when there is more water in the river (Figure 11).

Increased streamflows will reduce the frequency of thermal impairments to water quality in the Big Hole River, especially high summer water temperatures known to be stressful to salmonid fishes like grayling that depend on cold, clean water (Lohr et al. 1996; Magee and Lamothe 2003). Increased flows will result in lower summer water temperatures because a larger volume of water takes more energy (solar radiation) to heat. Increased flows, in combination with improved riparian conditions that increase stream shading and restored channel morphology that results in narrower, deeper channels will further reduce thermal impairments. Stressful thermal conditions may naturally occur in the system, for example during drought or climate change, but increased flows will increase the abundance and quality of cool-water refuge habitats like the deep pools (Hughes 1992, 1998; Byorth and Magee 1998; Lamothe and Magee 2003) or tributary streams utilized by grayling (Magee and Lamothe 2004).

The increased flows produced by implementing the conservation measures of the Agreement will ensure that habitats needed by grayling remain connected. Stream fishes like fluvial Arctic grayling typically require spawning, rearing, and refuge habitats that are often separated in space and time (Northcote 1995; Schlosser and Angermeier 1995). Fluvial Arctic grayling in the Big Hole River undertake extensive seasonal intra-basin movements to access these habitats in response to life history requirements or stressful environmental conditions (Shepard and Oswald 1989; Lamothe and Magee 2003). Dewatering impedes movement between habitats, thus reducing growth, survival, or reproduction.

High flows are critical for maintaining the fluvial processes of erosion and deposition that influence channel morphology and creation of habitat (Baron et al. 2002 and references therein). High discharge events mobilize streambed sediments and promote scour, leading to creation of pool habitat often utilized by fluvial Arctic grayling (e.g., Byorth and Magee 1998; Magee and Lamothe 2003). Working with Participating Landowners to reduce irrigation diversions during periods of high streamflows should increase the amplitude and duration of high-flow events, for example bankfull flows, that are expected to improve general habitat conditions for salmonid fishes by flushing fine sediments which tend to reduce spawning success (Bjornn and Reiser 1991), and by scouring excessive algal growth which, if left unchecked, can lead to increased biological oxygen demand and lower dissolved oxygen (e.g., Hauer and Hill 1996). Stream restoration strategies that utilize increases in peak and base flows to create and maintain habitat can benefit salmonids (e.g., Hill and Platts 1998).

Riparian zones are often critical for the ecological function of aquatic systems (Gregory et al. 1991). Riparian habitats dissipate stream energy during floods, filter sediments and pollutants, facilitate ground-water recharge, cool streams by shading, stabilize streambanks, maintain channel characteristics, promote floodplain development via deposition of sediments during overbank flows, input woody debris, organic material, and terrestrial insects (Bjornn and Reiser 1991; Hunter 1991; Murphy and Meehan 1991; Prichard et al. 1998; Poole and Berman 2001). Loss of riparian zones because of agricultural activities, including streamside livestock grazing and direct removal of natural vegetation, has led to degradation of adjacent stream habitat in the

upper Big Hole River (Upper Big Hole TMDL 2003; Lamothe and Magee 2004b). Fortunately, riparian habitats sometimes respond quickly when grazing pressure is reduced, depending on climate, soil characteristics, groundwater, and adjacent land use (Platts 1991). The development of prescribed grazing plans or exclusion fencing, like those to be implemented in this Agreement, that manage cattle in riparian areas will lead to significant improvements in riparian health (Borman et al. 1999) and channel morphology (e.g., Opperman and Merenlender 2004).

Site-specific data support a similar association between riparian conditions, in-stream habitat conditions and grayling abundance in the Project Area. For example, analysis of the OEA habitat inventory data shows a strong association between the abundance of overhanging vegetation (i.e., healthy riparian areas) and the quality and diversity of pools, and reduced bank cutting (erosion) in the proposed Project Area (Lamothe and Magee 2003). Grayling abundance in portions of the Project Area is positively correlated to overhanging vegetation (Figure 12). The protection of existing high-quality riparian habitats and the restoration of degraded or lost riparian habitats outlined in the Agreement are expected to result in increased streambank and channel stability, reduced erosion and fine sediment deposition, reversal of channel widening, improved water quality and availability, creation of pool habitats with adequate overhead cover utilized by grayling (Lamothe and Magee 2003), maintenance of high-quality spawning habitats, and reversal of thermal impairments.

Rescue (salvage) efforts, installation of fish screens, and improvements to irrigation structures reduce potential loss of fluvial Arctic grayling from entrainment in irrigation ditches. Mortality in irrigation ditches may result from stranding in a ditch or field, thermal stress, or predation. Sub-lethal effects, such as reduced growth or chronic stress, may be associated with temporary residence in irrigation ditches with poor water quality (e.g., high temperatures, agricultural runoff) or lacking adequate feeding or refuge habitat.

The comprehensive entrainment survey and threat assessment will produce a detailed prioritization list to focus the Agencies' efforts. If entrainment in irrigation ditches is identified as a population-level problem for grayling in the system, then reducing this threat will lead to a direct increase in the number of grayling in natural stream channels where their survival and growth would presumably be greater. The Agencies are committed to monitoring entrainment and conducting rescue operations throughout the term of the Agreement, as this threat may fluctuate in time and space depending on grayling population response and changes in habitat conditions in the system.

The removal of migration barriers will allow grayling access to a greater portion of the watershed, and increase access to seasonally important habitats including spawning, feeding, wintering, and refuge. Grayling should thus respond, if previously blocked from these necessary habitats, through greater reproductive success, and increased survival and growth of all age classes. Since most of the barriers are expected to be associated with irrigation diversion structures, the modification of these structures will not only allow passage also will reduce entrainment of grayling during downstream migrations. The combination of these two effects will provide significant benefit to the grayling population in the Project Area.

POPULATION-LEVEL BENEFITS OF CONSERVATION MEASURES TO IMPROVE HABITAT CONDITIONS FOR GRAYLING

The combined effect of the conservation measures described above will be to improve the extent and quality of grayling habitat in the upper Big Hole River. Size of habitat is critical to persistence of salmonid fishes (e.g., Dunham et al. 1997; Hilderbrand and Kershner 2000), so increasing the amount of habitat in the watershed will facilitate expression of grayling life history. The quality of habitat and the ability of individuals to move between habitats also are critical determinants of population persistence and abundance. Habitat quality is often couched in terms of complexity of combinations of water depth, water velocity and substrate (Angermeier and Schlosser 1989); structural elements such as overhead cover (Lonzarich and Quinn 1995) or habitat units (pool-riffle sequences) (Bission et al. 1982). More complex habitats often support a greater biomass of salmonids (Fausch and Northcote 1992), and increased habitat complexity can buffer a population against disturbance (e.g., Sedell et al. 1990; Pearsons et al. 1992). Connection of habitats permits grayling to access habitats necessary during different seasons or at different stages in their life (Northcote 1995), and may facilitate recolonization from former habitats. The Agencies predict the conservation measures will increase suitable grayling habitat, reconnect periodically or permanently isolated habitats, and increase habitat complexity, which will lead to a positive trend in grayling abundance in currently-occupied habitats (i.e., Management Segments C, D, and E) within 5 years of the execution of this Agreement and the reoccupation of historic waters (i.e., Management Segments A and B) within 10 years of the execution of this Agreement.

UNCERTAINTY AND THE PROPOSED CONSERVATION MEASURES

The conservation measures to be implemented to address problems with degraded riparian habitats, entrainment, and fish barriers have a more specific endpoint or level at which the problem may be fixed, compared to instream flows. For example, installing a fish screen or fish ladder is generally a clear fix of a specific problem. Apart from the general flow targets expected to benefit grayling (Table 3), the specific level of instream flows required to produce a specific population level response by grayling are largely unknown for grayling in the Big Hole River. The lack of quantitative data for irrigation use in the Project Area is a further complication that makes it difficult to estimate the specific response of the system to implementation of conservation measures to increase streamflows. Nonetheless, the best available data indicate that the conservation measures will dramatically improve habitat conditions even under pessimistic predictions of water conservation. For example, if all conservation measures except for instream flow augmentation were implemented at their expected levels, the Agencies would still, given natural variability in water supply (Figures 7-10), expect grayling populations to increase as a result of improved riparian conditions, habitat reconnection, and reduced entrainment in irrigation ditches. Clearly the integration of all these elements (including streamflows) defines suitable grayling habitat such that the whole is more than the sum of its parts, but it appears certain that the baseline flow conditions cannot help but improve under the Agreement's provisions for water rights compliance, irrigation diversion reduction arrangements, and irrigation water management plans.

VII. RESTORATION TARGETS FOR GRAYLING POPULATION WITHIN THE PROJECT AREA

The 1995 Grayling Restoration Plan and associated Memorandum of Agreement (MOA) between MFWP and the USFWS (MFWP and USFWS 1996) defined a set of guidelines for abundance and age-class structure thought to reflect a self-sustaining fluvial Arctic grayling population in the Big Hole River*. However, the Restoration Plan is currently being revised and its associated guidelines for population viability in the Big Hole River are undergoing re-evaluation to consider--(a) population monitoring data collected since the Restoration Plan and MOA were adopted, and (b) the spatial representation of sample sites necessary to properly characterize the status of the population. As in the 1995 Grayling Restoration Plan, abundance and age-class components will be included in the revised Grayling Restoration Plan's guidelines for defining a self-sustaining fluvial Arctic grayling population in the Big Hole River.

The abundance component of the definition for a self-sustaining grayling population will be expressed as CPUE by electrofishing, although the specific CPUE values are not known at this time. The MFWP is currently reviewing its grayling monitoring data for the Big Hole River and standardizing the existing data to index values of CPUE. Correlation analysis will be used to measure the association between CPUE index values and existing density estimates generated by capture-mark-recapture methods. The revised guidelines also will include a component describing an age class structure that minimizes the risks from demographic stochasticity. However, at this time both of these determinations await retrospective analysis of the standardized and updated dataset. The MFWP estimates a draft restoration plan may be completed by February 2006. Members of the Fluvial Arctic Grayling Workgroup with expertise in the management and ecology of grayling, and representing State and Federal agencies, academia, and the private sector, will review this draft in 2006.

The development of a measurable (quantitative) definition of a self-sustaining grayling population in the Big Hole River that might serve as a "restoration target" awaits further analysis (i.e., Restoration Plan revision). Nonetheless, a meaningful framework to measure progress of the Agreement in terms of increasing the abundance and distribution of grayling can be defined at this time. First, MFWP has committed to monitoring the abundance, distribution and age-class structure of fluvial Arctic grayling in each of the Project Area's 5 management segments, by sampling grayling in 2 monitoring reaches (1 mainstem and 1 tributary reach) per segment for a total of 10 monitoring reaches. These 10 reaches represent sites in addition to the existing long-term MFWP monitoring sites in the upper river. The expanded sampling framework is considered important to more accurately represent the status of the species at the watershed scale and to measure effects of the Agreement's implementation. Given current agency resources, the increase in number of monitoring dictates that single-pass CPUE electrofishing, and not mark-recapture, will generally be used to characterize grayling abundance within each of these monitoring reaches.

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* A. Based on an annual fall census of the McDowell-Wisdom section of the Big Hole River, the estimated density of age-1 and older Montana grayling in the Big Hole River must equal or exceed 30 grayling per mile.
B. Based on annual surveys, the proportion of age-1 and 2 grayling in the Big Hole River must constitute between 50 and 80 percent of the total population sampled in combined sections of the Big Hole River.

Second, success of the Agreement (i.e., progress toward a self-sustaining population) will be measured in terms of the trend in CPUE at occupied sites and presence/absence at currently unoccupied sites. The Agencies expect that the abundance and distribution of grayling will increase, and more specifically that--(a) the mean index of abundance (CPUE) of grayling at monitoring locations within currently-occupied habitats will exhibit a positive trend within 5 years of the execution of the Agreement, and (b) that grayling will begin to reoccupy or otherwise utilize habitats in historic waters within 10 years of the execution of this Agreement.

Systematic monitoring of the grayling population in the upper Big Hole River was not initiated until the 1980s, by which time grayling were presumably in decline, so the historical potential (abundance within the known historical distribution) for this population is uncertain. Therefore, developing specific restoration targets for currently unoccupied habitats or for habitat improved or created through Agreement conservation measures is difficult because the potential (carrying capacity) of or the specific life-stages of grayling that may reoccupy a given location are unknown. Also, currently unoccupied habitats may only provide seasonal habitat or may only be suitable habitat for specific life stages of grayling. For example if Management Section A and B were only used by grayling for spawning and juvenile rearing, then a restoration target based on fall sampling would have little meaning for adults because they would not be present and available for capture. Monitoring to detect reoccupation of currently unoccupied habitats will begin following the removal of existing passage barriers. Presence will be determined by the detection of grayling of any age class in any of the monitoring reaches established in currently unoccupied habitat within a given management segment. Once presence has been established, CPUE values can then be used to measure population trends for grayling within that management segment.

Revision of the Restoration Plan may lead to refinement in the definition of a self-sustaining population that can serve as a basis for evaluating the efficacy of the Agreement, and the Agreement will utilize these guidelines when they become available. However, progress and effectiveness of the Agreement can nonetheless be evaluated without this specific information through the assessment of trends in CPUE and presence/absence of grayling through time and across the Project Area as described above.

ADAPTIVE MANAGEMENT PLAN FOR GRAYLING POPULATION RESPONSE TO CONSERVATION MEASURES

If abundance of grayling in currently-occupied habitat does not exhibit a positive trend within 5 years of the execution of this Agreement and/or if grayling do not begin to reoccupy historic waters within 10 years of the execution of this Agreement, then MFWP agrees to work with the USFWS to develop a plan that stabilizes the population. This plan may include, but should not be limited to, working with Participating Landowners to implement additional conservation measures. In severe situations, the Agencies may consider planting fertilized eggs into suitable areas of the Project Area in order to reestablish grayling.
New scientific data may become available which, if incorporated into the design and implementation of the conservation measures of the Agreement, may result in significant population-level conservation benefits for grayling. Such data might pertain to, for example, the ecology of grayling, the landscape-scale population structure of grayling, flow-habitat

relationships and flow requirements for grayling, competitive and predatory effects of nonnative trout species on grayling, stream restoration methods, or rangeland management methods. Should such data become available, MFWP and Participating Landowners agree to discuss in good faith how to modify or supplement the Agreement's existing conservation measures to produce the expected population-level conservation benefits for grayling.

Table 5. Summary of Threats to Fluvial Arctic Grayling in the Big Hole River Watershed, the Conservation Measures Proposed in the Agreement to Reduce These Threats, and the General Timeline for Implementation and Threat Reduction Under the Agreement.

THREAT	CONSERVATION MEASURES TO ADDRESS THREAT	GENERAL TIMELINE FOR IMPLEMENTATION & THREAT REDUCTION UNDER THE AGREEMENT
HABITAT		
Water quantity (reduced instream flows)	Increased flows through: water rights compliance, improved irrigation management, less water intensive crops, instream flow leases, stock-water wells, etc.	• Immediate improvements through water rights compliance & installation of headgates/measuring devices to be installed within 5 years • Flow targets met 75% of time by year 10 & more frequently thereafter as the more complex site-specific plans reach full implementation
Riparian zone	Conservation & restoration of riparian habitats by fencing, off-channel livestock watering facilities, prescribed grazing plans, more active livestock management, etc.	• Frequency of livestock presence in riparian areas will decrease significantly during first 5 years leading to rapid improvement. • Steady riparian recovery thereafter with "sustainable" status achieved on 95% of enrolled lands by year 15.
WATER QUALITY		
• Thermal	Increased flows, conservation & restoration of riparian habitats	• Immediate reduction in thermal loading in relation to increased streamflows. • Longer-term reductions in temperatures from riparian zone recovery & channel morphology adjustments
• Nutrients†	Nutrient management per NRCS Field Office Technical Guide 590	• Immediate reduction in threat at time of site-specific plan implementation.
FRAGMENTATION		
• Dewatering	Increased flows (see above)	• Implementation & threat reduction timeline same as for "Water quantity."
• Migration Barriers	Remove barriers to grayling movement & install fish ladders on permanent barriers	• All barriers & grayling passage problems will be resolved within 5 years after identification.
• Entrainment	Survey & rescue, fish screens, improved headgates, reduced irrigation withdrawals, gradual ramping of irrigation withdrawals	• Immediate benefit of grayling rescue & installation of fish screen on a major diversion known to entrain grayling. • Entrainment problems addressed over time in order of priority (threat magnitude).
• Habitat simplification (reduced pool frequency, channel widening, etc.)	Increased instream flows, conservation & restoration of riparian habitats, active in-stream restoration projects	• Immediate effect from active restoration projects • Longer-term effect (>10 years in some cases) resulting from conservation measures (flows, riparian) that influence processes leading to natural changes in channel & streambed morphology
BIOLOGICAL		
Nonnative trout	Outside landowner control – Technical Committee will provide an annual assessment & management recommendations to the Agencies	• MFWP will determine appropriate actions to address identified threats • Management actions to address threats will require Environmental Assessment per Montana Environmental Policy Act. • Implementation timeline will depend on threat urgency & meeting any necessary regulatory requirements for the proposed management action

† Threats to grayling from nutrient loading have been putatively identified but are not among the four central grayling conservation issues (instream flows, riparian habitat, movement barriers, entrainment) identified in the Agreement. However, any observed problems with nutrient loading will be addressed during the development and implementation of the site-specific plan using NRCS guidelines.

VIII. IMPLEMENTATION OF THE AGREEMENT

Upon execution of this Agreement by all parties and compliance with all applicable laws, the USFWS will issue a section 10(a)(1)(A) Enhancement of Survival Permit to MFWP. This Agreement will constitute the Candidate Conservation Agreement with Assurances consistent with the USFWS' final policy (USFWS and National Marine Fisheries Service 1999). The Permit will include, among other things, ESA regulatory assurances set forth at 50 CFR §§ 17.32(d)(5) and 17.22(d)(5). As described below, assurances are provided to the Permittee and Participating Landowners that have a Certificate of Inclusion and an approved "Phase III" site-specific plan that their land and water management activities will not be curtailed or modified beyond what is stipulated under the Agreement and their site-specific plan so long as all requirements identified in Phases I, II, and III are being properly implemented.

The Agencies have developed a phased implementation schedule to provide immediate and long-term benefits to grayling, facilitate maximum landowner participation, enable development of meaningful site-specific plans that are tailored to the property, and make the most efficient use of agency financial and personnel resources. This schedule initially addresses threats to grayling that can immediately be affected by Participating Landowner and Agency actions, then moves toward the development of a long-term plan that attends to the overall conservation needs of grayling. The length of time required to complete the development of a long-term plan (i.e., site-specific plan) on a specific property will depend on the size and complexity of the land units, which influences the time needed to collect baseline data and develop a scientifically and economically sound site-specific plan. The Agencies anticipate that the enrolled lands to receive the most immediate attention in the assessment and planning phases will be those where land and water management are predicted to have the greatest influence on grayling (see Prioritization Ranking). Many of the initial site-specific plans are expected to be complex and among the most time consuming to complete, so the completion rate for site-specific plans is expected to increase through time as the Agencies progress through the prioritized list of enrolled lands.

Upon signature by the Participating Landowner to the "Phase I" stipulations, the Participating Landowner is considered to have entered (is enrolled in) the Agreement and must comply with all the applicable Phase I requirements described below and in Table 6. In exchange for agreeing to implement conservation measures identified by the Agencies during the Phase I rapid assessment, the Participating Landowner receives (during Phase II) a Certificate of Inclusion, counter-signed by the appropriate representatives of both MFWP and USFWS, that allows a specified level of take of grayling associated with covered activities, which are standard agricultural and restoration activities on the enrolled lands (see Appendix F). This take authority is only effective if grayling are listed under the ESA and if a Participating Landowner is properly implementing the conservation measures to remove threats to grayling on enrolled lands that were identified by MFWP during the rapid assessment in Phase I (regulatory assurances are granted later in the implementation schedule – see below).

Upon completion and approval of a site-specific plan at the end of Phase II and the counter signatures of both MFWP and USFWS, the Participating Landowner initiates Phase III of the Agreement and receives regulatory assurances that, should grayling be listed as either threatened or endangered under the ESA, the Participating Landowner will not be required to implement

conservation measures above and beyond those described in the site-specific plan, so long as all requirements are being properly implemented. The take authority granted during Phase II is extended through implementation of the site-specific plan (i.e., Phase III). The take authority extended during Phase III is only effective if and when the grayling is listed under the ESA and if a Participating Landowner is properly implementing their site-specific plan.

PHASE I – PROGRAM ENROLLMENT, RAPID ASSESSMENT, AND ACTIONS TO REMOVE IMMEDIATE THREATS TO GRAYLING

Non-Federal property owners interested in developing a site-specific plan under this Agreement must contact MFWP at: Montana Fish, Wildlife and Parks, Dillon Field Office, Attn: CCAA Program Coordinator, Dillon, Montana 59725, phone 406-683-2675, plamothe@mt.gov, to receive and fill out an official application form. The enrollment period will begin after the effective date of the Agreement and continue until 90 days prior to the publication in the Federal Register of a final determination about the listing status of the grayling under the ESA (see Figure 39). At the time of enrollment the landowner shall:

1. Provide signature(s) that represents the intent to voluntarily participate in this Agreement.
2. Identify the enrolled lands and the intent to develop a site-specific plan under this Agreement.
3. Comply with all water rights associated with the enrolled lands and assist with monitoring of withdrawals made for irrigation, watering of livestock, and other authorized uses.
4. Allow access to the Agencies, or a designated representative, under mutually agreeable conditions, for:
   - The development of the site-specific plan.
   - Validating compliance with water rights.
   - Conducting a "rapid assessment" of the enrolled lands within 90 days of enrollment to identify threats to grayling that can be immediately remedied and barriers to grayling movement that will be addressed beginning in Phase II (see Appendix E for Rapid Assessment form).
   - Conducting entrainment surveys of irrigation ditches.
5. Read an educational pamphlet provided by MFWP that describes the ecology of grayling within the Project Area, the associated habitat requirements, and simple actions that landowners can take to provide immediate benefit to grayling (see Appendix E for educational pamphlet).
6. After reviewing the education pamphlet, the Participating Landowner will work the Agencies to identify, document, and implement measures they can take to immediately improve conditions for grayling on their land prior to completion of the rapid assessment (see Appendix E for checklist of potential threats to grayling).
7. Negotiate and implement an interim irrigation diversion reduction arrangement as applicable. This also may begin at Phase II depending upon the data required and irrigation infrastructure required to implement such an arrangement (see Appendices E and G).
8. Allow the agencies to develop, in consultation with the landowner, a list of activities (covered activities) for which incidental take will be permitted during Phases I and II of the Agreement to the extent that landowners are carrying out those activities.

PHASE II – IMPLEMENTATION OF RAPID ASSESSMENT MEASURES AND DEVELOPMENT OF SITE-SPECIFIC PLAN

Phase II begins immediately after the completion of the rapid assessment (i.e., no more than 90 days after beginning Phase I) and concludes with the approval of a site-specific plan. Duration of Phase II will be no longer than 30 months, unless the Participating Landowners and the Agencies submit an extension request to USFWS (see Appendix F). Stipulations of Phase II include:

1. Participating Landowner's implementation of measures to remove threats to grayling on enrolled lands that were identified during the rapid assessment. This action leads to the issuance of a Certificate of Inclusion. Associated Agency requirements are as follows:
   - **a.** The MFWP will document any actions the Participating Landowner took to benefit grayling prior to or during Phase I.
   - **b.** The MFWP will provide the Participating Landowner with a specific list of conservation measures based on the rapid assessment surveys that shall be implemented throughout Phase II, along with a schedule for that implementation. This will include a plan and timetable to remove barriers and provide passage for grayling, as appropriate.
   - **c.** A Certificate of Inclusion is only valid if signed by the Participating Landowner and the appropriate officials from both MFWP and the USFWS. Within 30 days of receiving a Certificate of Inclusion signed by the Participating Landowner and MFWP and the documentation described below, the USFWS will provide its review, and if appropriate, concurrence and sign the Certificate of Inclusion. The MFWP shall provide the USFWS a copy of each Certificate of Inclusion with all necessary signatures. The documentation that must be reviewed before USFWS can sign a Certificate of Inclusion includes:
     - **i.** Phase I enrollment information.
     - **ii.** Summary of any actions described in part 1a (above).
     - **iii.** Results of rapid assessment survey and the resulting conservation measures that the Participating Landowner will be implementing during Phase II (as described in 1b above).
2. Agency verification of Participating Landowner compliance with water rights.
3. The completion of a survey of irrigation ditches on the enrolled lands to quantify grayling entrainment. Entrainment surveys also will entail the salvage of all grayling captured. Re-survey of some ditches may be necessary based on initial results.
4. The collection of data necessary for the development of the site-specific plan. The final site-specific plan will be negotiated, in good faith, between the Agencies and the Participating Landowner and shall, at a minimum, include:
   - **d.** A detailed description of existing habitat conditions for grayling in waters on or adjacent to enrolled lands.
   - **e.** A description of the threats to grayling on the enrolled lands and the conservation measures to be implemented to reduce those threats.
   - **f.** A commitment to implement all the conservation measures listed above and a detailed description and timeline for how these conservation measures will be implemented (Participating Landowners are responsible for implementing all the conservation measures identified in the site-specific plan that are within their control on their property).

g. A list of activities for which the Participating Landowner will be receiving assurances and incidental take authority.
h. Level of take to be authorized on that property.
i. A monitoring schedule to ensure compliance with the site-specific plan.

5. The final site-specific plan will reflect the needs of the Participating Landowner and will lead to either the long-term protection or restoration of grayling habitat on the enrolled lands.
6. The proposed site-specific plan will be reviewed by the Agencies, and an approved site-specific plan will bear the signatures of the Participating Landowner and the appropriate representatives from both MFWP and USFWS. The USFWS shall review each proposed site-specific plan after MFWP and landowner development and make a determination to accept or deny a plan within 30 days of receipt.

PHASE III – IMPLEMENTATION OF THE SITE-SPECIFIC PLAN

Phase III of the development of the site-specific plan requires the Participating Landowner to:

1. Initiate the implementation of the agreed-to site-specific plan for the enrolled lands.

FINAL APPROVAL PROCESS FOR SITE-SPECIFIC PLANS

The final approval of site-specific plans by MFWP and USFWS, in consultation with NRCS and MDNRC, will conclude Phase II (development of the site-specific plan) and initiate Phase III (implementation of site-specific plan) of this Agreement. Approval of site-specific plans will reflect the recommendations of and the information gathered by the Agencies and the Participating Landowner. Approval is contingent on determining that the plan is consistent with the provisions of the Agreement and will provide a net benefit to grayling on the enrolled lands. A site-specific plan will be considered "approved" when it has been reviewed and signed by the Participating Landowner, the Permit holder (MFWP), and the USFWS. Approval of the site-specific plan provides regulatory assurances to the Participating Landowner and extends the incidental take coverage provided during Phase II (see Table 6).

Should grayling be listed under the ESA prior to the completion and final approval of site-specific plans for enrolled landowners holding a Certificate of Inclusion, MFWP and NRCS shall provide the USFWS a timetable for the completion of these plans and will submit extension requests, as necessary, to complete these plans.

Table 6. Generalized Phased Implementation Responsibilities, Timelines, and Legal Protections Under the Agreement. Associated monitoring requirements are described elsewhere in the Agreement (*Extension of Phase II possible upon request and review by USFWS).

LANDOWNER ACTIONS	AGENCY ACTIONS	IMPLEMENTATION PHASE AND DURATION
ENROLLMENT • Complete application • Comply with water rights • Allow access for: o Development of site-specific plan o Water use monitoring o Rapid Assessment o Entrainment Surveys • Read pamphlet **Remedy immediate threats to grayling on enrolled lands** **Define "covered activities"** **Implement interim irrigation arrangements**	**Enroll landowners** **Perform Rapid Assessments** **Perform Entrainment Surveys** **Monitor water use** **Identify immediate threats to grayling on enrolled lands** **Define "covered activities"** **Negotiate interim irrigation arrangements**	**PHASE I** Up to 90 days from Enrollment
Receive Certificate of Inclusion with Incidental Take coverage **Implement conservation measures to remedy threats identified in Rapid Assessments** **Develop & approve site-specific plan & implementation schedule** **Continue to implement Phase I conservation measures**	**Issue Certificate of Inclusion with incidental take coverage** **Assist landowner address conservation measures identified in Rapid Assessments** **Gather data for site-specific plan** **Develop & approve site-specific plan & implementation schedule** **Continue entrainment surveys / salvage** **Perform necessary monitoring**	**PHASE II** Up to 30 months (Extension may be requested*)
Receives assurances & continued Incidental Take coverage upon approval of site-specific plan **Implement conservation measures identified in site-specific plan**	**Activate Assurances component of Certificate of Inclusion upon approval of site-specific plan** **Assist landowners implement conservation measures identified in site-specific plan** **Perform necessary monitoring**	**PHASE III** At least 10 years (May be extended prior to expiration of Certificate of Inclusion)

IX. RANKING CRITERIA TO PRIORITIZE CONSERVATION EFFORTS IN THE PROJECT AREA

All non-Federal property owners in the upper Big Hole River watershed above Dickie Bridge are eligible to enroll in the Agreement. Due to the large size of the Project Area and the significant landowner interest in the program, a prioritization scheme is necessary to efficiently allocate Agency resources during the implementation of the Agreement and the development of site-specific plans. The following ranking scheme prioritizes enrolled lands within the Project Area based on their potential to provide the greatest benefit to grayling and minimize the level of take during development of site-specific plans. The ranking scheme considers--1) the location of enrolled lands in relation to known and historical habitat use by grayling, 2) the potential (or observed) entrainment, 3) the amount of riparian habitat and 4) the potential to positively influence instream flows.

Grayling Habitat Significance (criterion 1) characterizes habitat importance to grayling in terms of the location of enrolled lands relative to the known and historical distribution of grayling and the location-specific life history requirements. More weight is given to Management Segments C and D because of the importance of this area for spawning and rearing and the significant impacts resulting from irrigation water withdrawals. Attention to this area will help address reproductive bottlenecks for the grayling population. Management Segment E receives less weight in the scoring system because is somewhat less affected by irrigation practices and this area is primarily adult grayling habitat. Historic grayling habitat (Management Segments A and B) represents habitat that could be reoccupied as the population responds, but receives less weight in the scoring system because grayling are not currently present.

Initial Entrainment Significance (Criterion 2) considers whether grayling have ever been captured in irrigation ditches on enrolled lands or whether enrolled lands contain any of the 296 points of diversion considered likely sites of entrainment in the Project Area.

RELATIVE RANKING ORDER AND ADDITIONAL CRITERIA TO RESOLVE TIED SCORES AND ESTABLISH FINAL RANKING

The first two criteria will be totaled to establish the initial relative ranking of each enrolled property. Two additional criteria will be used, as necessary and in the order they appear below, to resolve tied scores--Potential to Improve Instream Flows and Riparian Habitat Significance. These criteria will be invoked in order, so Riparian Habitat Significance is only scored to resolve any remaining tied ranks after the Potential to Improve Instream Flows has been assessed. The final relative ranking list will be used to prioritize implementation of the Agreement.

Potential to Improve Instream Flows (criterion 3) considers the extent to which water management practices on an enrolled property can influence instream flows. The metric utilized is area of irrigated land which is assumed to be proportional to the amount of water used for agricultural practices on the land. The criterion recognizes the potential for a landowner to provide water for instream flows to benefit grayling.

Riparian Habitat Significance (Criterion 4) considers the influence land use practices on enrolled lands have on adjacent stream habitat. The scoring system reflects the amount of riparian habitat on an enrolled property relative to the total amount of riparian habitat in the Project Area.

GRAYLING HABITAT SIGNIFICANCE

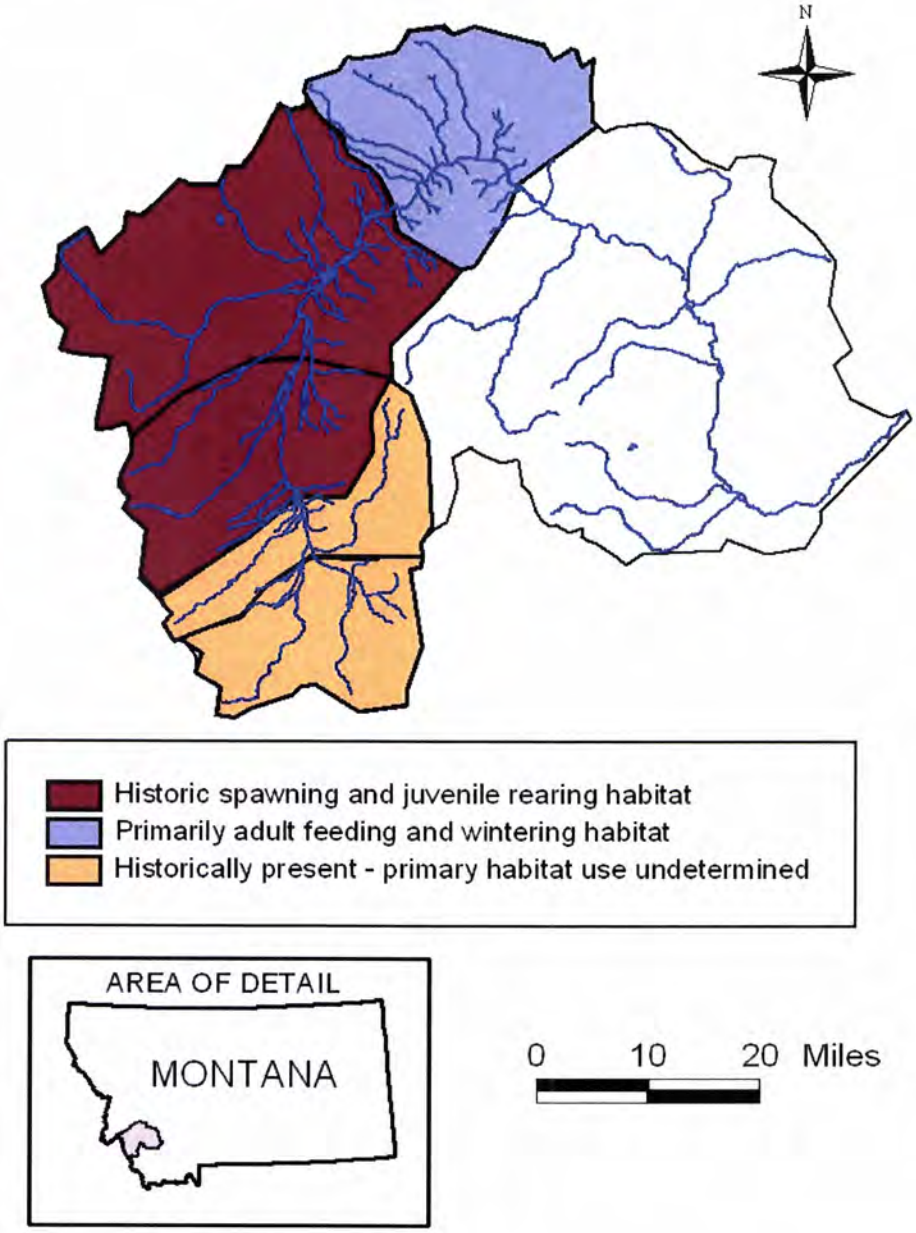

Figure 22. Distribution of three Grayling Habitat Significance ranking criteria across the Project Area. Letters represent the Agreement Management Segments.

RANKING CRITERIA WORKSHEET

1. Grayling Habitat Significance	Point Value
a) Enrolled lands in historic spawning and juvenile rearing segments (Segments C & D)	50
b) Enrolled lands in adult feeding and wintering habitat (Segment E)	20
c) Enrolled lands in area of historic presence - habitat use unknown (Segments A & B)	10
2. Initial Entrainment Significance	**Point Value**
a) Entrainment of grayling has been documented in irrigation ditches on the enrolled lands	20
b) Entrainment of grayling has not been documented in the irrigation ditches on the enrolled lands but enrolled lands include at least one of the 296 points of diversion considered a likely site of entrainment	5
c) Entrainment of grayling has not been documented in the irrigation ditches on the enrolled lands and enrolled lands do not include any of the 296 points of diversion considered a likely site of entrainment	0
Summary of Ranking Criteria 1 and 2	
A. Score	(max 50)
B. Score	(max 20)
TOTAL	(max 70)
Sequential Criteria To Resolve Tied Scores	
3. Potential to Improve Instream Flows	
Acres of irrigated land on enrolled lands	**Number of Acres**
4. Riparian Habitat Significance	
Linear length of riparian habitat on enrolled lands (sum of both sides of channel)	**Miles of Riparian Habitat**

(Note: The above information will be used to establish a relative ranking list to prioritize implementation of the Agreement. Criteria 3 and 4 are only used to resolve any tied scores after Criteria 1 and 2 have been evaluated).

X. OBLIGATIONS OF THE PARTNERS

The following is a summary of the Obligations of the Participating Landowners and the Agencies to the Agreement that are intended to reduce the threats to grayling and its habitat in the Project Area within the upper Big Hole River. Participating Landowners shall adhere to both the general obligations described here, and the particular obligations described in their site-specific plan. Similarly, the Agencies must fulfill the general obligations below (and any described elsewhere in this Agreement) and those agreed to in any site-specific plan.

A. Participating Landowners

1. Implement all phases of the Agreement as specified, beginning at the time of enrollment.
2. Permit the Agencies to conduct an assessment of baseline environmental conditions and land use practices leading to the cooperative development of a comprehensive site-specific plan for their enrolled lands. Implement the site-specific plan which meets the conservation guidelines of this Agreement.
3. As identified in the site-specific plans, Participating Landowners shall cooperatively implement water conservation measures to improve streamflows, which benefit grayling. These measures may include, but are not limited to--repairing leaking head gates and water diversion structures, reducing irrigation withdrawals, complying with water rights (period of use and amount of water withdrawals), improving irrigation ditches to reduce water losses, installing and maintaining off-stream livestock watering facilities, and using alternative less water-intensive livestock forage.
4. As identified in the site-specific plan, cooperatively implement riparian habitat conservation measures that maintain or improve existing conditions on enrolled lands. These measures may include, but are not limited to--installing and maintaining fences that manage livestock within or exclude livestock from the riparian zones, installing and maintaining off-stream livestock watering facilities, replanting or transplanting native riparian vegetation such as willows, and curtailing or relocating any ranching activities that degrade riparian habitats.
5. As identified in the site-specific plan, cooperatively implement conservation measures that promote grayling passage and reduce entrainment of fishes in irrigation ditches. These measures may include, but are not limited to--installing fish ladders or other appropriate fish passage devices to permit grayling movement past irrigation structures (diversions) at all flows, redesigning and reconstructing diversion structures to facilitate grayling passage where ladders or retrofitting is not feasible, installing screening or other exclusion devices to keep grayling out of irrigation ditches, and altering the time of diversion to avoid entraining grayling when they are present or migrating through the area.
6. Permit translocation of grayling into suitable unoccupied habitats in streams on or adjacent to their enrolled lands to expand the distribution and abundance of grayling.
7. With agreed-to notification, allow agency or agency representatives access to Participating Landowner's property for the purposes of assessing the fishery resources and status of grayling in natural streams and irrigation ditches, salvage of entrained fish in irrigation ditches, removing barriers, assessing riparian habitat conditions and associated land-use activities, implementing conservation measures, and conducting compliance and biological monitoring pursuant to the Agreement and site-specific plan.
8. Implement the specific conservation measures agreed upon within the site-specific plans for the duration of the Agreement.
9. Remain in compliance with the terms of the Agreement and their site-specific plan to maintain their Certificate of Inclusion. The MFWP and USFWS may suspend or revoke, in whole or in part, the Certificate of Inclusion for cause in accordance with the laws and regulations in force at the time of such suspension or revocation (50 CFR 13.28(a)). Participating Landowners will be given written notice, by MFWP and/or USFWS, of documented non-compliance with requirements of the Agreement and their site-specific plan.

B. Montana Fish, Wildlife and Parks

1. Hold the 10(a)(1)(A) Enhancement of Survival Permit issued under the Agreement.
2. Participate in the implementation of all phases of the Agreement, including, but not limited to--enrollment of landowners; rapid assessment surveys; entrainment surveys; negotiation of interim diversion reduction arrangements; collection of baseline data on enrolled lands; and development, negotiation and implementation of site-specific plans.
3. Develop mutually agreeable site-specific plans in cooperation with Participating Landowners and the other Agencies. Issue Certificates of Inclusion to Participating Landowners under the terms of this Agreement.
4. Carry out any responsibilities for implementing conservation or other measures assigned to MFWP under this Agreement and in any site-specific plan.
5. Carry out responsibilities for compliance and biological monitoring assigned to MFWP under this Agreement and in any site-specific plan.
6. Participate in the formation of a technical committee to assess threats to grayling in the Project Area from nonnative trout species.
7. Translocate grayling gametes into suitable unoccupied habitat in the Project Area, where appropriate, to meet guidelines for distribution and abundance of grayling. The reintroduction process may require the capture of fish, relocation of wild fish, and the collection of gametes.
8. Suspend or revoke, in whole or in part, the Certificates of Inclusion of Participating Landowners found to be in non-compliance with the requirements of the Agreement or their mutually-developed site-specific plans. The MFWP and USFWS may suspend or revoke the Certificate of Inclusion for cause in accordance with the laws and regulations in force at the time of such suspension or revocation (50 CFR 13.28(a)). Participating Landowners will be given written notice, by MFWP and/or USFWS, of documented non-compliance with requirements of the Agreement and their site-specific plan.
9. Actively pursue the funding necessary to implement the Agreement and each site-specific plan. Funding may be provided by a variety of sources including any appropriate Federal, State, and private source but is not guaranteed.
10. Prepare annual reports in accordance with the Agreement and the site-specific plans.
11. Maintain records for all phases of the Agreement's implementation for each enrolled Participating Landowner.

C. Montana Department of Natural Resources and Conservation

1. Participate, as necessary, in the implementation of all phases of the Agreement, including, but not limited to--enrollment of landowners; rapid assessment surveys; entrainment surveys; negotiation of interim diversion reduction arrangements; collection of baseline data on enrolled lands; and development, negotiation and implementation of site-specific plans.
2. Participate in the development of mutually agreeable site-specific plans in coordination with Participating Landowners, and the other Agencies. Provide expert analyses of water rights and hydrologic issues. Assist in the development of a water-rights database that may assist in the development of site-specific plans.
3. Monitor daily flow in the five flow management segments. Carry out any responsibilities for implementing conservation or other measures assigned to MDNRC under this Agreement and in any site-specific plan.

4. Carry out hydrologic monitoring as assigned to MDNRC under this Agreement and in any site-specific plan. Assist the other Agencies with the evaluation of instream flow recommendations, including professional evaluation of methods, data collection, and analyses.
5. Provide any requested information to MFWP to assist with preparation of annual reports.

D. USDA Natural Resources and Conservation Service

1. Participate, as necessary, in the implementation of all phases of the Agreement, including, but not limited to--enrollment of landowners; rapid assessment surveys; entrainment surveys; negotiation of interim diversion reduction arrangements; collection of baseline data on enrolled lands; and development, negotiation and implementation of site-specific plans.
2. Participate in the development of mutually agreeable site-specific plans in coordination with Participating Landowners, and the other Agencies. Specifically, NRCS will prepare the portion of the site-specific plans that ensures NRCS' quality criteria for soil, water, air, plants, and animals are met. This plan may include, but is not limited to--specific assessments and recommendations for riparian habitats, irrigation water management, prescribed grazing, and nutrients.
3. Carry out any responsibilities for implementing conservation measures in any site-specific plan that is contracted through a conservation program for which NRCS has administrative responsibility.
4. Carry out the responsibilities for riparian vegetation monitoring as assigned to NRCS under this Agreement and in any site-specific plan. Carry out any monitoring necessitated by NRCS contractual requirements or cost share programs.
5. Provide MFWP with information relating to plans written and practices planned and/or installed to assist with the preparation of annual reports, within statutory limitations and Participating Landowner approval.
6. Actively pursue and provide available Federal funding to support implementation of the Agreement and any site-specific plan.
7. Designate EQIP focus areas and provide financial assistance to private landowners as available.

E. U.S. Fish and Wildlife Service

1. Participate, as necessary, in the implementation of all phases of the Agreement, including, but not limited to--enrollment of landowners; rapid assessment surveys; entrainment surveys; negotiation of interim diversion reduction arrangements; collection of baseline data on enrolled lands; and development, negotiation and implementation of site-specific plans.
2. Participate in the development of mutually agreeable site-specific plans in coordination with Participating Landowners, and the other Agencies.
3. Upon execution of the Agreement and compliance with all applicable laws, issue MFWP the Permit, in accordance with 50 CFR 17.32 (d), that would provide MFWP and Participating Landowners authorization for take of grayling associated with covered activities at specified levels and provide regulatory assurances to Participating Landowners should the upper Missouri River grayling DPS be listed under the ESA. Take and regulatory assurances for covered activities will become effective according to the phased implementation schedule described in this Agreement.

4. Carry out any responsibilities for implementing conservation or other measures assigned to the USFWS under this Agreement and in any site-specific plan.
5. Carry out any responsibilities for implementing conservation measures in any site-specific plan that is contracted through a conservation program for which USFWS has administrative responsibility.
6. Carry out any responsibilities for compliance and biological monitoring as assigned to the USFWS under this Agreement and in any site-specific plan.
7. Participate in the formation of a technical committee to assess threats to grayling in the Project Area from nonnative trout species.
8. Provide oversight on the issuance of Certificates of Inclusion and approval of site-specific plans. Review and reach a determination (i.e. approve or deny) on-- a) implementation of rapid assessment provisions and Certificate of Inclusion issuance, and b) individual site-specific plans. The USFWS will make these determinations within 30 days of receipt.
9. Suspend or revoke, in whole or in part, the Certificates of Inclusion of Participating Landowners found to be in non-compliance with the requirements of the Agreement or their mutually-developed site-specific plan. The MFWP and USFWS may suspend or revoke the Certificate of Inclusion for cause in accordance with the laws and regulations in force at the time of such suspension or revocation (50 CFR 13.28(a)). Participating Landowners will be given written notice, by MFWP and/or USFWS, of documented non-compliance with requirements of the Agreement and their site-specific plan.
10. Suspend or revoke, in whole or in part, the Permit if the Permit terms are not being properly implemented.
11. Assist MFWP with the compilation of information and the preparation of annual reports.

XI. DURATION OF THE AGREEMENT, PERMIT, AND SITE-SPECIFIC PLANS

The duration of this Agreement will be 20 years from the date all parties have executed it. The Permit issued in accordance with this Agreement will become effective after the Agreement is executed and will expire on the same date upon which this Agreement expires. The MFWP will notify the USFWS prior to expiration of the Agreement to allow sufficient time to extend the Agreement, if desired.

The minimum duration of site-specific plans and the Certificate of Inclusion shall be 10 years. Upon agreement of the partners, the duration of a Participating Landowner's Certificate of Inclusion can be extended to accommodate continued participation in the Agreement as long as the Permit is in effect. If a Participating Landowner wishes to extend their participation, they must notify MFWP as soon as possible. Extension may involve re-evaluation and revision of the site-specific plan to reflect the existing conditions in the Project Area.

XII. MONITORING AND REPORTING

The monitoring component of the implementation of this Agreement strongly relies on the commitment of the partnering agencies. Responsibility for monitoring will be shared by the partnering agencies and will cover all aspects of the conservation measures of this Agreement. The monitoring occurring under this Agreement is composed of four components:

1. Biological response of grayling to conservation measures.

2. Habitat responses to conservation measures.

3. Performance or effectiveness of specific projects implemented as conservation measures.

4. Landowner compliance with Agreement stipulations and their site-specific plans.

A summary of the monitoring responsibilities and timelines of this Agreement appears in Table 7.

Biological Monitoring

Grayling Population Status and Response Monitoring
The MFWP has sampled the grayling population of the Big Hole River each fall to document population abundance, recruitment, age class strength, and distribution since 1983 (Magee and Lamothe 2004). Under this Agreement, MFWP shall continue annual monitoring of grayling in the upper Big Hole River. In order to show the effectiveness of the conservation measures described in this Agreement and measure progress toward the restoration targets of the Agreement (see Part VII), MFWP will establish a monitoring reach in a mainstem and tributary reach in each of the 5 management sections, for a total of 10 monitoring sites across the Project Area. Each fall throughout the duration of the Agreement, MFWP will conduct CPUE electrofishing sampling to measure grayling abundance, distribution and age-class structure in each of the 10 monitoring reaches.

The MFWP will use seasonal streamflow data (either from USGS gages or continuous recording instruments installed by MDNRC), channel morphology parameters (measured by USFWS Partners for Fish and Wildlife) and stream temperature (monitored by MFWP) in each management segment to correlate grayling population trends to habitat conditions. The data collected from these monitoring reaches and the resulting analysis will help the Agencies implement adaptive management plans and respond to changing conditions.

Entrainment
Entrainment surveys by MFWP or an MFWP-approved contractor will be conducted using the Entrainment Survey Protocol (Appendix E). The initial assessment of entrainment will be determined as part of the development of the site-specific plans. Entrainment monitoring will continue on unscreened ditches as described in conservation measures. When entrainment in a specific ditch or canal is greater than 20 juvenile and/or adult grayling, MFWP will conduct repeat rescue efforts annually until fish exclusion devices are installed. When no entrainment is documented, MFWP will reinitiate monitoring when the expansion of grayling distribution causes an expectation that grayling are being entrained.

Habitat Monitoring

Riparian Assessment
The NRCS will be responsible for monitoring riparian condition and improvement. Riparian monitoring will be initiated during the development of site-specific plans in Phase II using their riparian assessment protocol. Monitoring of riparian conservation measures implemented on each landowner's enrolled property will be performed every 5 years for the duration of the site-specific plan.

Channel Morphology
The USFWS Partners for Fish and Wildlife will establish and monitor channel cross-sections within the biological monitoring reaches. Permanent cross-sections will be established within each of the 10 grayling population monitoring reaches. The width, depth, and channel shape will be determined bi-annually using general surveying techniques.

Stream Water Temperature
The MFWP will monitor stream water temperatures in each of the 10 population monitoring reaches. Continuous recording thermographs programmed to record temperature on an hourly basis from April 1-October 31 will be installed in each monitoring reach and downloaded as needed. This data will allow for the determination of daily mean, maximum, and minimum temperatures.

Streamflow Monitoring
Streamflows will be monitored continuously from April 1-October 31 for the duration of the Agreement. Where USGS gaging stations are not present to provide measurements, continuous recording instruments (i.e., Aqua Rods or their equivalent) have been installed by MDNRC. Currently, streamflows will be monitored within Management Segments C and D using USGS gaging stations and MDNRC will monitor streamflows in Management Segments A, B, and E using continuous recording instruments.

The MFWP will compile seasonal streamflow data and summarize these data in terms of their relation to historical flow conditions, grayling abundance, and the extent to which target flows were attained.

Project Performance

Fish Exclusion
The MFWP will monitor the effectiveness of all installed fish exclusion devices within 1 year of their installation using the entrainment monitoring protocol.

Fish Passage
The MFWP will verify the effectiveness of all installed fish passage devices within 1 year of their installation. The MFWP will use either mark-recapture or trapping techniques to ensure the structure is functioning properly and providing access to upstream habitats.

Compliance Monitoring

Water Rights

Water rights compliance monitoring will be initiated as part of Phase I Rapid Assessments and will continue for the duration of the Agreement. Flow measuring devices will be installed in irrigation ditches where needed within the Project Area to quantify the results of site-specific plans. Landowners will be responsible for monitoring, managing and recording their water withdrawals. The MDNRC will be responsible for monitoring Participating Landowners' compliance with water rights.

Landowner Contact

Successful implementation of the Agreement will require repeated contacts between Agency personnel and landowners to document their concerns related to the Agreement, discuss compliance issues and to maintain working relationships. The MFWP will contact and, if agreed to by a landowner, visit each Participating Landowner at least twice a year throughout the landowner's enrollment in the Agreement. The MFWP will collect irrigation withdrawal monitoring data at these times.

General Compliance

The MFWP is responsible for the oversight of all compliance monitoring. The MFWP will determine landowner compliance with site-specific plans based on findings from its monitoring actions and the information provided from partnering agencies. The MFWP also will monitor compliance with negotiated reductions in irrigation withdrawals and any project maintenance agreements. Each agency will be responsible for monitoring the progress and quality of projects and contracts that it sponsors.

Reporting

The MFWP will be responsible for completion of an annual report on Agreement implementation by May 1 each year. This report will include, but is not limited to--1) a summary of Certificates of Inclusion issued and site-specific plans approved over the past year; 2) a summary of the grayling entrainment surveys and rescue efforts, 3) a summary of the estimated take from the implementation of conservation measures, monitoring activities, and any other take obviously resulting from land and water use related to the Agreement's covered activities; 4) a summary of projects related to the conservation measures described in the Agreement; 5) the results of completed biological, habitat project performance and compliance monitoring; and 6) recommendations for future management activities consistent with the Agreement. A copy of the report will be provided to the Agencies. Participating Landowners will receive a copy of the annual report upon request.

Table 7. Summary of the Responsibilities and Implementation Timeframe for the Four Monitoring Components (biological, habitat, project performance and compliance) Proposed in the Agreement.

Monitoring Type	Parameter	Phase of Monitoring	Frequency	Description
Biological	Grayling Population	Independent of site-specific plans	Fall monitoring will occur for duration of the Agreement	10 monitoring reaches among 5 management segments
Biological	Entrainment	Initiated in Phase II & monitored in Phase III	When entrainment is greater than 20 juvenile (age 1+) and/or adult grayling MFWP will conduct repeat rescue efforts annually until fish exclusion devices are installed. When no entrainment is documented MFWP will reinitiate monitoring when grayling entrainment is suspected.	MFWP will monitor entrainment using the protocol described in this Agreement.
Habitat	Riparian Assessment	Initiated in Phase II & monitored in Phase III	Every 5 years	NRCS will monitor using its riparian assessment protocol
Habitat	Channel Morphology	Phase III	Annual	USFWS (Partners) will establish & monitor channel cross-sections within the biological monitoring reaches
Habitat	Streamflows	Independent of site-specific plans	Annual (April – October)	Streamflows will be monitored within Management Segments C & D at USGS gaging stations. MDNRC will monitor streamflows in Management Segments A, B, & E using continuous recording instruments.
Habitat	Stream water temperature	Independent of site-specific plans	Annual (April – October)	MFWP will monitor stream water temperatures in one mainstem & one tributary reach with each management segment. These reaches will be associated with grayling population monitoring reaches.
Project Performance	Fish Exclusion	Phase III	Within 1 year of installation	MFWP will monitor the effectiveness of all installed fish exclusion devices.
Project Performance	Fish Passage	Phase III	Within 1 year of installation	MFWP will verify the effectiveness of all installed fish passage devices.
Compliance	Water Rights	Ongoing – through Phase III	Ongoing for the duration of the Agreement	Landowners will monitor withdrawals – MDNRC will monitor compliance
Compliance	Landowner Contact	Phase III	Every 6 months (Minimum)	MFWP will meet with Participating Landowners twice a year to discuss the status of site-specific plans
Compliance	General Compliance	Phase III	Annual	MFWP has oversight of compliance monitoring. MFWP will determine landowner compliance with site-specific plans based on its findings & the information provided from partnering agencies.

XIII. LEVEL OF IMPACTS TO GRAYLING FROM THE AGREEMENT AND TAKE

Should the grayling of the upper Missouri River be listed under the ESA, take will be authorized through the Permit, consistent with the terms of this Agreement, the Permit, and the Participating Landowners' Certificates of Inclusion.

Implementation of the Agreement could result in take of grayling in the Project Area should the fluvial Arctic grayling of the upper Missouri River be listed in the future as threatened or endangered under the ESA. Actions posing a risk of take to grayling generally include--
1) covered activities relating to land and water use (agriculture and ranching), and 2) restoration and monitoring activities required by the Agreement. Risk of take over the term of the Agreement will vary by activity.

A. Covered Activities – Agriculture and Ranching

Covered activities related to agricultural and ranching activities that are anticipated to have the most significant risk of incidental take can be categorized into three general areas--a) irrigation withdrawals, b) maintenance of physical structures that block fish migration (barriers), and c) livestock grazing in the riparian zone.

Take in the form of harm results from irrigation and stock water withdrawals that reduce habitat quality and quantity for grayling in the Project Area. Currently, little information is available on the amount of water taken by a given diversion, but the Agencies will be gathering these data over time as a result of this Agreement. Determining the exact number of grayling likely to be taken as a result of water diversion is difficult because--(1) determining whether an individual did not spawn as a result of water depletions versus natural causes would be extremely difficult to determine; (2) effects that reduce fecundity are difficult to quantify; (3) finding a dead or injured listed fish would be difficult, due to the large size of the Project Area and because carcasses are subject to scavenging; and (4) natural fluctuations in river flows and species abundance may mask project effects.

The Agencies anticipate that any take associated with irrigation withdrawals will generally be reduced in proportion to the water saved through implementation of the Agreement's provisions. Immediate water savings in years 1-5 of the Agreement, through improved landowner control of irrigation water, will greatly reduce the risk of take and full implementation of site-specific plans will steadily reduce that risk in subsequent years.

Take in the form of harm or death could result where grayling are entrained in irrigation ditches, which is a function of irrigation and stock water withdrawals. Rescue of grayling encountered in irrigation ditches will alleviate short-term risk of take, and the threat assessment and resulting prioritization scheme will establish a framework to deal with this threat over time. Lack of information about entrainment precludes a specific estimate for how the risk of entrainment will be reduced over time, but the prioritization scheme will ensure that the largest threats are dealt with first.

Fish screens or other exclusion devices can minimize entrainment and reduce potential incidental take, but will not eliminate the possibility because devices that can exclude tiny larval grayling are not currently available. Thus, a low level of entrainment positively related to fluvial grayling spawning success in that year or population size may occur, but the relative population-level impact of that entrainment on the grayling population should be less because of the increased abundance of the population.

Barriers result in take in the form of harm by preventing natural movement and decreasing genetic exchange and spawning opportunities. Barriers also can decrease survival if grayling are prevented from reaching sections of stream where environmental or habitat conditions are more favorable. This form of take will likely be highest during the first year of the Agreement, but will decrease quickly upon implementation of the rapid assessment recommendations and site-specific plans. The Agencies have committed to removing all man-made barriers on enrolled lands within 5 years of finalizing a site-specific plan. Therefore, little or no take of grayling from fish barriers is expected in years 6-20 of the Agreement.

Take of grayling also occurs from livestock entering riparian areas. This practice has the following negative effects, including but not limited to--1) direct trampling of habitat and streambanks; 2) sedimentation of streams; 3) removal of riparian vegetation; and 4) providing a pathway for animal wastes to enter streams and promote nutrient loading. The stressor (i.e., livestock grazing) causing take from riparian habitat degradation will be removed during the early years of the Agreement's implementation. Although it may take years for the riparian habitat to recover to "sustainability" as defined by NRCS assessment methods, actual incidental take should cease once the stressor is removed. Under this Agreement, all riparian areas on enrolled lands will be restored to or maintained at "sustainable." Therefore, take will only occur until the measures in the rapid assessment and site-specific plan, which detail prescribed grazing plans or other actions to protect riparian habitats, are implemented. By years 6-20 of the Agreement, little actual take should result from livestock entering riparian areas.

B. Covered Activities – Restoration and Monitoring

Take in the form of harm may result from restoration and monitoring activities required under this Agreement. These activities may include construction activities or active restoration projects required to implement the conservation measures. Installation of fish screens, replacement or installation of irrigation diversion structures (headgates), and riparian restoration projects such as construction of livestock exclusion fences or willow planting may result in temporary sediment input to adjacent and downstream aquatic habitat used by grayling. These effects on water quality and grayling habitat are expected to be small in magnitude, emphemeral, and occur primarily in the first 5 years of the Agreement. Effects will be minimized by utilizing expert personnel wherever conservation measures require construction or ground-disturbing activities, and by scheduling the work when streamflow and environmental conditions are suitable to reduce site impacts and sediment input. Channel restoration projects pose a similar risk to grayling, and may pose additional risks of harm from physical contact with equipment or movement of stream substrates (cobbles and boulders). However, active restoration projects are anticipated to be infrequent and passive restoration will be the primary method for stream channel restoration.

Take could result from biological monitoring of grayling populations as stipulated in this Agreement. Grayling monitoring and entrainment surveys may result in harm or direct mortality of grayling from tissue or skeletal injury or acute stress. Additional practices that involve the capture and handling of grayling by MFWP include, but are not limited to--1) the collection of gametes for brood stock management; 2) the collection of genetic material from Big Hole River grayling; and 3) translocation of fish. The MFWP anticipates that no more than 15 individual grayling per year would die as a result of its biological monitoring program, and the actual number will probably be much less. The risk of take for these ongoing and long-term activities will be minimized by having professional fishery biologists familiar with grayling oversee surveys, providing proper training to supporting personnel, anesthetizing and handling grayling under approved protocols (MFWP, Electrofishing and Fish Handling Policy, undated) so that injury and stress to grayling are minimized, and curtailing or suspending monitoring surveys when environmental conditions are stressful (e.g., high water temperature or low flow).

Overall, the Agreement and site-specific plans will provide a net conservation benefit toward the conservation goal of increasing the abundance and distribution of grayling in historic waters within the Big Hole River watershed even with the anticipated effects of the covered activities. The USFWS will estimate take of grayling resulting from issuance of the Permit and implementation of the Agreement in a Biological Opinion, pursuant to section 7 of the ESA.

C. Notification of Incidental Take

The Participating Landowner shall give MFWP and USFWS reasonable advance notice (at least 30 days) of when he or she expects to incidentally take any listed species (i.e., grayling) covered under the Permit and Certificate of Inclusion. Such notification will provide MFWP and USFWS with the opportunity to relocate affected individuals of the species, if possible and appropriate. The same notification requirement will be in effect for grayling even if they are not listed.

XIV. TAKE, REGULATORY ASSURANCES, CHANGED AND UNFORESEEN CIRCUMSTANCES

TAKE

The Permit issued to MFWP will authorize MFWP, and Participating Landowners holding a Certificate of Inclusion, to take grayling while performing certain activities. Specifically for this Agreement, the Permit will authorize take of grayling by Participating Landowners (who hold a Certificate of Inclusion) as a result of otherwise-lawful agricultural and ranching activities on the enrolled lands (Appendix F). Take coverage also shall be extended to restoration and monitoring activities necessary for the implementation of the Agreement as described in Appendix F. The level of take associated with the aforementioned activities is described in Part XIII. Take coverage shall not extend to non-enrolled lands or to activities not specified in the Agreement and site-specific plans. Take coverage is only effective if and when grayling are listed under the ESA.

Should grayling be listed, take coverage for the implementation of conservation measures or restoration and monitoring activities not specifically described in this Agreement but subsequently implemented by MFWP or MDNRC would require an agreement between the USFWS and the State of Montana under section 6 of the ESA.

ASSURANCES

The Permit provides Participating Landowners holding Certificates of Inclusion with the ESA regulatory assurances found at 50 CFR §§ 17.22(d)(5) and 17.32(d)(5) that will be in place when the USFWS approves the final site-specific plan and initiates Phase III of this Agreement's implementation. Consistent with the USFWS Candidate Conservation Agreement with Assurances Final Policy (64 FR 32706, June 17, 1999), conservation measures and land, water, or resource use restrictions in addition to the measures and restrictions described in this Agreement and the site-specific plans will not be imposed with respect to the specified covered activities on the Participating Landowner's enrolled land should grayling of the upper Missouri River DPS become listed under the ESA in the future and if Participating Landowners are properly implementing their site-specific plans (i.e., Phase III of this Agreement). These assurances are authorized by the Permit issued under section 10(a)(1)(A) of the ESA for the enrolled lands identified in the site-specific plans. Regulatory assurances are only effective if and when grayling are listed under the ESA. However, arrangements to reduce irrigation withdrawals and water conservation plans developed in any or all phases of this Agreement do not supersede the prior appropriations doctrine under Montana water law. This Agreement recognizes the Participating Landowners have claimed water rights and shall not be interpreted as transfer of the Participating Landowners' use and enjoyment of these water rights to the public or any State or Federal agency.

CHANGED AND UNFORESEEN CIRCUMSTANCES

The regulatory assurances provided by the Permit are linked to the existence of changed circumstances and unforeseen circumstances. "*Changed circumstances* means changes in circumstances affecting a species or geographic area covered by a conservation plan or agreement that can reasonably be anticipated by plan or agreement developers and the Service [USFWS] and that can be planned for (e.g., the listing of new species, or a fire or other natural catastrophic event in areas prone to such events)" 50 CFR 17.3. "*Unforeseen circumstances* means changes in circumstances affecting a species or geographic area covered by a conservation plan or agreement that could not reasonably have been anticipated by plan or agreement developers and the Service [USFWS] at the time of the conservation plan's or agreement's negotiation and development, and that result in a substantial and adverse change in the status of the covered species" 50 CFR 17.3. In the event of changed and unforeseen circumstances the Agencies are committed to working with the Participating Landowners to implement measures that limit the level of authorized take of grayling and allow the Participating Landowner to continue to implement their site-specific plan in compliance with this Agreement and the Permit.

Drought, wildfire, floods, adjudication of water rights, and invasion of nonnative species are changed circumstances which may affect grayling in the Project Area. Should any or all of these events occur and pose a threat to grayling or its habitat which can be addressed by actions on enrolled lands, then the Participating Landowners and the Agencies will work in good faith to develop and implement conservation measures to minimize or reverse the detrimental effects.

CHANGED CIRCUMSTANCES PROVIDED FOR IN THE AGREEMENT

Effects of drought are mitigated, to some extent, by the Agreement's existing conservation measures. However, additional conservation measures may be warranted to address special situations such as extreme or extended drought or unanticipated effects of drought. In the circumstance that extreme or extended drought is reducing the abundance and distribution of grayling below current levels, the Agencies will pursue all available options, both within (enrolled landowners) and outside the Agreement (non-enrolled landowners), to address the consequences of extreme or extended drought and help achieve the flow targets at the frequency expected given the status of Agreement implementation at that time. These options may include, but are not limited to, seeking additional Agreement participants (if enrollment is still open), seeking participants in additional conservation planning efforts, compensation for additional reductions in irrigation diversions or water use, additional negotiated reductions in irrigation diversions or water use, water leases, and organization of hay banks to feed livestock so that irrigation diversions can be reduced.

Wildfire is presumed to be a low frequency event on enrolled lands, because such properties will primarily be riparian habitats or agricultural lands. However, more frequent wildfire in adjacent uplands and mountains may indirectly affect grayling. For example, mountain fires followed by heavy precipitation may cause excessive sediment input from headwater streams, causing fine sediment deposition at grayling spawning sites adjacent to enrolled lands. In the event of a large-scale fire in the watershed or an intense localized fire in a sub-watershed containing grayling, the Agencies will assess whether debris flows pose a significant risk for grayling in specific river reaches or tributaries, and if rescue operations or any other protective actions are warranted to forestall potential extirpation of those population units. The MFWP and FWS will collaborate on any rescue efforts, and Participating Landowners will provide necessary access to their property to assist these efforts.

Floods have been infrequent in the Project Area during the current drought, which began in 1999, but are nonetheless anticipated to occur during the term of the Agreement. Floods may displace grayling of all ages, causing injury, death, or stranding them in inhospitable habitats (e.g., irrigation ditches, depressions in agricultural fields). Late spring floods also can scour spawning beds, causing mortality to developing grayling embryos. Floods also may compromise the effectiveness of structures installed or upgraded under the Agreement's conservation measures. In the event of a 5-year flood event (i.e., magnitude of a flood with a 5-year occurrence interval), the Agencies and Participating Landowners shall conduct an assessment of all physical structures installed or maintained as a provision of this Agreement to ensure they are in proper working order. A 5-year flood event at the Wisdom Bridge, for example, would represent a flow of approximately 3,000 cfs (or over 18 times the minimum spring target flow at that location) and would probably move significant amounts of sediment in the more disturbed

management segments (e.g., Management Segments B and C). Sediment movement or the sheer force of the flood event may affect physical structures operated under the Agreement. Such structures to be inspected following a 5-year flood event may include, but are not limited to, diversion structures, fish ladders, fish screens, irrigation ditches, and riparian zone fences. Damaged or destroyed structures will be noted and a prioritization list developed to implement repairs as soon as possible.

The adjudication of water rights in the Big Hole River system may result in widespread effects to irrigation and stream flow patterns. The adjudication process will likely be completed during the term of the Agreement. After the adjudication process has been completed, the Agencies shall evaluate whether the changes in water rights in the Project Area negatively affect the Agreement's conservation strategy with respect to instream flows and whether they render obsolete any element of the Agreement (e.g., minimum flow targets). The Agencies and Participating Landowners shall amend, modify, and/or revise the Agreement or any site-specific plan, as necessary, if adjudication negatively affects the ability of the Agreement or site-specific plan to recover grayling in the Project Area. Even if adjudication does not affect the Agreement's overall conservation strategy, it may still be necessary to amend or revise site-specific plans to ensure consistency between the Montana Water Law and the provisions of the site-specific plan. Participating Landowners and the Agencies shall amend or modify interim diversion reduction arrangements and/or site-specific plans to account for situations where the adjudication process reduces the rate of water legally diverted and this adjudicated amount is less than that specified under terms of the Participating Landowner's interim diversion reduction arrangement or site-specific plan. Revising a Participating Landowner's irrigation diversion reduction arrangement and site-specific plan to reflect decrees issued by the Montana Water Court will remove any potential confusion over the implementation of the Agreement's conservation measures and ensure the conservation measures conform to State water law.

Encroachment by nonnative species is probable in the Project Area, but the specific species involved (apart from nonnative trout) and the precise consequences for grayling are not known at this time. Negative effects are predicted, for example, where nonnative plant species invade and alter the structure and function of existing riparian habitats on enrolled lands. Negative effects also might be predicted where invasion by exotic aquatic or terrestrial microorganisms, invertebrates, or vertebrate animals degrades aquatic habitat, increases the incidence of disease, or competes with and/or preys on grayling. The technical committee to be established as a requirement of this Agreement will advise the Agencies on strategies to deal with nonnative trout in the Project Area. Any effects of other nonnative species on grayling may be detected through MFWP's ongoing monitoring program for grayling, the additional grayling monitoring provisions outlined in the Agreement, and the synthesis of data collected while developing and implementing site-specific plans. Identified population-level threats to grayling will be addressed by the collective efforts of the Agencies and Participating Landowners.

UNFORESEEN CIRCUMSTANCES

If additional conservation measures are necessary to respond to unforeseen circumstances, the Director [of the USFWS] may require additional measures of MFWP and the Participating Landowner, but only if such measures are limited to modifications within the Agreement's conservation strategy for the affected species, and only if those measures maintain the original terms of the Agreement to the maximum extent possible. Additional conservation measures will not involve the commitment of additional land, water, or financial compensation, or additional restrictions on the use of land, water, or other natural resources available for development or use under the original terms of the Agreement without the consent of the Participating Landowner and the Agencies.

The USFWS will have the burden of demonstrating that unforeseen circumstances exist, using the best scientific and commercial data available. These findings must be clearly documented and based upon reliable technical information regarding the status and habitat requirements of grayling. The USFWS will consider, but not be limited to, the following factors related to grayling--1) size of the current range; 2) percentage of range adversely affected by the Agreement; 3) percentage of range conserved by the Agreement; 4) ecological significance of that portion of the range affected by the Agreement; 5) level of knowledge about grayling and the degree of specificity of the conservation program under the Agreement; and 6) whether failure to adopt additional conservation measures would appreciably reduce the likelihood of survival and recovery of grayling in the upper Missouri River basin.

XV. PUBLIC INVOLVEMENT

This Agreement will be circulated for public review and comment, and comments received will be considered and, if appropriate, incorporated into the Agreement prior to the USFWS making a decision on execution of the Agreement and issuance of the Permit to MFWP.

XVI. TERMS AND CONDITIONS OF THE AGREEMENT

A. Modifications of the Agreement. Any party may propose modifications to this Agreement by providing written notice to the other parties. Such notice shall include a statement of the proposed modification and the reason for the modification. The parties will attempt to respond to proposed modifications within 30 days of receipt of such notice consistent with applicable laws. Proposed modifications will become effective upon all parties' written approval and completion of any necessary environmental analysis as required by the National Environmental Policy Act, ESA, or any applicable Federal or State laws.

B. Amendment of the Permit. The permit may be amended to accommodate changed circumstances in accordance with all applicable legal requirements, including but not limited to the ESA, the National Environmental Policy Act, and the USFWS permit regulations at 50 CFR 13 and 50 CFR 17. The party proposing the amendment shall provide a statement describing the proposed amendment and the reasons for it.

C. Permit Suspension or Revocation. The USFWS may suspend or revoke the Permit for cause in accordance with the laws and regulations in force at the time of such suspension or revocation (50 CFR 13.28(a)). As a last resort, the USFWS also may revoke the permit if continuation of permitted activities would likely result in jeopardy to covered species (50 CFR 17.22/32(d)(7)). The USFWS will revoke the Permit because of jeopardy concerns only after first implementing all practicable measures to remedy the situation.

D. Remedies. Each party shall have all remedies otherwise available to enforce the terms of this Agreement and the permit, except that no party shall be liable in damages for any breach of this Agreement, any performance or failure to perform an obligation under this Agreement or any other cause of action arising from this Agreement.

E. Dispute Resolution. The parties agree to work together in good faith to resolve any disputes, using dispute resolution procedures agreed upon by all parties.

F. Availability of Funds. Implementation of this Agreement is subject to the requirements of the Anti-Deficiency Act and the availability of appropriated funds. Nothing in this Agreement will be construed by the parties to require the obligation, appropriation, or expenditure of any money from the U.S. Treasury. The parties acknowledge that the USFWS and NRCS will not be required under this Agreement to expend any Federal agency's appropriated funds unless and until an authorized official of those agencies affirmatively acts to commit to such expenditures as evidenced in writing. Further, all partners to this Agreement agree and understand that the implementation of the Agreement is dependent upon the lawful appropriation, authorization, and allocation of funds. This Agreement does not obligate the appropriation or expenditure of State funding. All expenditures by State agencies must comply with all applicable statutes and regulations, and must be independently authorized by legislative appropriation and any appropriate statutory authorities.

G. No Third-party Beneficiaries. This Agreement does not create any new right or interest in any member of the public as a third-party beneficiary, nor shall it authorize anyone not a party to this Agreement to maintain a suit for personal injuries or damages pursuant to the provisions of this Agreement. The duties, obligations, and responsibilities of the parties to this Agreement with respect to third parties shall remain as imposed under existing law.

H. Relationship to Authorities. The terms of this Agreement shall be governed by and construed in accordance with applicable State and Federal law. Nothing in this Agreement is intended to limit the authority of MFWP and USFWS to fulfill their responsibilities under State and Federal laws. All activities undertaken pursuant to this Agreement or the permit must be in compliance with all applicable State and Federal laws and regulations.

I. Succession and Transfer of the Permit and Certificates of Inclusion. This Agreement shall be binding on and shall inure to the benefit of the parties and their respective successors and assigns in accordance with applicable regulations (50 CFR 13.24 and 13.25). The 10(a)(1)(A) permit issued in association with this Agreement can be transferred in accordance with applicable regulations (50 CFR 13.25). Should any non-Federal property owner who is participating in this Agreement transfer any interest in his/her property, the non-Federal property

owner will notify MFWP at least 60 days prior to any transfer. The MFWP, or at the request of MFWP, the USFWS, will contact the new owner to explain the responsibilities applicable to the property to determine if there is interest in participation in the Agreement. The MFWP will notify the USFWS of transfer of ownership of enrolled lands and the results of contacts with new property owners. The responsibilities of an existing executed site-specific plan and its associated Certificate of Inclusion may be transferred to a new landowner or entity holding an interest in the land (e.g., lessee) if the proposed landowner agrees in writing to implement all the commitments of the site-specific plan and to comply with the terms of the 10(a)(1)(A) permit.

J. Relationship to Other Agreements. Should grayling be listed, take coverage for the implementation of conservation measures or restoration and monitoring activities not specifically described in this Agreement but subsequently implemented by MFWP or MDNRC may require an agreement between the USFWS and the State of Montana under Section 6 of the ESA.

K. Notices and Reports. Any notices or reports required by this Agreement shall be delivered in writing to:

Supervisor, Montana Field Office
U.S. Fish and Wildlife Service
100 North Park, Suite 320
Helena, Montana 59601
406-449-5225 (Telephone)
406-449-5339 (Fax)

Fisheries Management Bureau Chief
Montana Department of Fish, Wildlife and Parks
P.O. Box 200701
Helena, Montana 59620
406-444-7409 (Telephone)
406-444-4952 (Fax)

Water Resources Division
Department of Natural Resources and Conservation
P.O. Box 201601
Helena, Montana 59620-1601
406-444-2074 (Telephone)
406-444-2684 (Fax)

State Conservationist
Natural Resources Conservation Service
10 East Babcock Street
Federal Building, Room 443
Bozeman, Montana 59715-4704
406-587-6813 (Telephone)
406-587-6761 (Fax)

IN WITNESS WHEREOF THE PARTIES HERETO have executed this Agreement to be in effect as of the date that the USFWS issues the permit.

Montana Fish, Wildlife and Parks	**Date**
Montana Department of Natural Resources and Conservation	**Date**
USDA Natural Resources Conservation Service	**Date**
U.S. Fish and Wildlife Service	Date

APPENDIX A.

The NRCS Planning Process in Development of Site-Specific Plans

The NRCS Planning Process in Development of Site-Specific Plans

The NRCS planning process, as defined in the National Planning Procedures Handbook (NRCS 2000), will be utilized to develop part of the site-specific plan. This part of the site-specific plan will be developed to the Resource Management System (RMS) level where practicable. An RMS is a combination of practices that, when installed, will meet or exceed established quality criteria for identified soil, water, air, plants, and animal resource problems for sustainability. A variance will be required for any practices that will not achieve quality criteria. Practices that cannot achieve quality criteria will result in an improvement to and an upward trend for the resource concerned. The implementation of the planned practices will provide long-term conservation, protection, and/or improvement of the resource base. This approach will allow for careful examination of the entire agricultural operation and will allow the Participating Landowner to have a comprehensive plan that is compatible with a sustainable agriculture operation.

Goals and objectives will vary slightly among specific Participating Landowners' plans depending on Participating Landowner preference, site conditions, and conservation opportunities present. However, all site-specific plans will have the following, where applicable:

Maintenance or Establishment of Functioning Riparian Habitat

Degradation and loss of riparian habitat, in conjunction with other factors, is believed to play a major role in the decline of grayling in the Big Hole River. Grayling tend to be associated with high quality pool habitat (Lamothe and Magee 2003). These important habitats exist most often in stream reaches with high quality riparian buffers. Unfortunately, the loss of riparian vegetation in the watershed has been accelerated in recent decades through poor land-use practices and direct removal of vegetation (Upper Big Hole TMDL 2003; Lamothe and Magee 2004b).

The guidelines for riparian conservation in this Agreement are to maintain and restore sustainability to all riparian habitats on enrolled lands. General conservation measures to achieve these guidelines include maintaining existing high-quality riparian habitats, implementing active restoration actions to replace lost riparian habitat, or permitting passive recovery of degraded riparian habitat through land use actions. Specific conservation measures include, but are not limited to, development of prescribed grazing practices that detail the timing, intensity and duration of livestock use to promote healthy, sustainable riparian plant communities (e.g., using NRCS Prescribed Grazing guidelines); installing and maintaining fences which exclude or manage cattle within the riparian zone; installing and maintaining off-stream livestock watering facilities; replanting or transplanting native riparian vegetation such as willows; and curtailing or relocating any ranching activities which degrade riparian habitats.

The NRCS' Riparian Assessment Method will be used to determine the present condition of riparian habitats, and monitor progress toward the riparian conservation guidelines outlined in the Agreement and in any site-specific plan. The NRCS' Riparian Assessment Method categorizes riparian zone condition as--1) sustainable, 2) at risk, or 3) not sustainable based on a

numerical score from 10 assessment questions (NRCS 2004). Under the NRCS protocol, the desired condition of riparian habitats under the Agreement is a score of at least 80 percent. Participating Landowners will coordinate with the Agencies and any mutually agreed upon parties to assess riparian habitats on enrolled lands, and this information will serve as the basis for specific conservation measures to implement under the site-specific plan.

Irrigation Water Application and Efficient Delivery of Stock Water

Control of irrigation water application and diversion is a necessity to achieve increased flows in the Big Hole River system. Currently, the majority of lands included in this Agreement are irrigated through uncontrolled surface water (flood) irrigation techniques. To improve irrigation efficiency on enrolled lands, a comprehensive assessment will be performed detailing topographic features, water availability, diversion points, crop needs, soils, etc. From the assessment, several options will be developed to improve the overall application of irrigation water on the enrolled lands which will lead to reduced irrigation water requirements for irrigation purposes and may reduce the amount of water diverted thus improving instream flows.

Irrigation Water Management (IWM) and/or water spreading plans will specify irrigation practices to be developed on enrolled lands. Land smoothing*, borders, ditches, diversions are examples of projects that could be implemented to achieve the desired irrigation savings. The Participating Landowner would agree to leave all water saved through irrigation improvements in the source from which the irrigation water was withdrawn. This means that the Participating Landowner can only withdraw the allotted irrigation volume minus the amount saved by the irrigation improvements and that the saved water cannot be used elsewhere on land controlled by the participant. This action will benefit instream flows by preventing "excess" diversions for irrigation purposes.

Diversions for livestock water also are a significant concern in some areas of the Big Hole watershed. There are many areas where water is diverted several miles for livestock consumption. Stock water uses will be analyzed on a site-specific basis and alternatives developed to reduce withdrawals from the river and tributaries. Many opportunities exist to supply stock water via wells, pipelines, and troughs instead of surface water diversions. If surface water is the viable alternative, the plan will detail the measures needed to deliver the water to livestock as efficiently as possible. The Participating Landowner agrees to leave all water saved through stock water improvements in the source from which the stock water was withdrawn regardless of environmental conditions such as drought status. This means that if stock water is provided wholly by ground water developments, then no surface water shall be diverted for stock water needs. If conveyance systems are improved (i.e., pipelines, ditch lining, etc.), the surface water diversion will be reduced by the amount currently diverted for stock water minus the amount saved through conveyance efficiencies.

* Land Smoothing: Removing irregularities on the land surface to improve surface drainage, provide for more uniform cultivation, and improve equipment operation and efficiency (NRCS Field Office Technical Guide 466).

Proper Nutrient Management And Fertilizer Application

Nutrients from animal waste and commercial fertilizers pose a potential threat to water quality. Participating Landowners will implement a Nutrient Management plan ensuring proper management of all nutrients in their control. Nutrient sources may include, but are not limited to, agro-chemicals (fertilizers) and livestock wastes, which may directly or indirectly affect aquatic habitat conditions. Nutrient plans will be based on soil tests and phosphorus and nitrogen indexes, and will be closely linked to the Prescribed Grazing and Irrigation Water Management practices.

The parts of the site-specific plan developed and implemented by NRCS will adhere to NRCS format to include timelines for implementation and will contain fully developed specifications and job sheets for each conservation measure or practice required. Details on the guidelines and protocols to be used above, including RMS, National Planning Procedures Handbook (NPPH), Riparian Assessment, and Field Office Technical Guides for Irrigation Water Management (FOTG 449), Prescribed Grazing (FOTG 528A), and Nutrient Management (FOTG 590) can be accessed through the NRCS Montana website at >http://www.mt.nrcs.usda.gov<.

APPENDIX B.

Derivation of Instream Flow Targets and Description of Hydrologic Conditions

Derivation of Instream Flow Targets and Description of Hydrologic Conditions Experienced at USGS Streamflow Gages at Wisdom and Mudd Creek Bridge

FRAMEWORK FOR DEVELOPING STREAMFLOW TARGETS – THE WETTED PERIMETER INFLECTION POINT

One of the key conservation strategy of this Agreement is to maintain streamflows that promote stream ecosystem function and benefit grayling. This strategy should generally consist of three components--1) facilitating adequate seasonal high-flow events; 2) maintaining adequate baseflow conditions; and 3) eliminating human-caused dewatering events. Declines in grayling abundance coincident with drought and irrigation demands strongly suggest that hydrologic alterations in the Big Hole River watershed periodically cause streamflows to drop below optimum levels for providing maximum habitat availability. In addition, high-flow events, which typically result from snowmelt runoff, also have been attenuated by drought and irrigation. These high flows are critical in the establishment and maintenance of channel form, thus creating and maintaining habitat; and also may serve as a spawning cue for grayling in the river. The maintenance of base flows throughout the rest of the year is equally important. This Agreement seeks to provide base flows that are sufficient to provide grayling suitable habitat conditions, maintain a healthy thermal regime, and allow for suitable foraging conditions (stream productivity). Through this Agreement, streamflow targets to maintain minimum flows necessary for grayling have been based on the wetted perimeter inflection point method (Leathe and Nelson 1989).

The wetted perimeter inflection point method has been widely applied to Montana rivers including the Big Hole River (MFWP 1989), where it also is described as a habitat retention method (Leathe and Nelson 1989). This method examines a stream's hydraulic characteristics at various flows, and attempts to identify abrupt changes in the wetted perimeter-discharge relationship (i.e., inflection points) that can be subsequently used to make minimum flow recommendations. For a sensitive species such as grayling, the minimum flows should be based on the upper inflection point (Leathe and Nelson 1989). Leathe and Nelson (1989) describe the upper inflection point as the point at which the stream is approaching its maximum width and begins to move up the bank as flows increase. Thus, large increases in flow above the upper inflection point provide only nominal increases in wetted perimeter. The ecological rationale behind this method is to keep the main river channel full to maximize primary and secondary production in (primarily) riffle habitat (Leathe and Nelson 1989; Jowett 1997). In order to take into account the hydrological realities that occur within the Project Area, the Agreement will utilize the upper inflection point as a minimum flow target during spring (April-June) and the lower inflection point as the minimum flow target during summer and fall (July-October) for each Management Segment.

HYDROLOGIC CONDITIONS AT WISDOM IN RELATION TO FLOW TARGETS

While the wetted perimeter method represents guidelines for biologic needs, the hydrologic reality is such that these minimum flows may not be met during water years with flow less than normal (based on the period of record) even with the implementation of conservation measures, especially at the Wisdom location (CCAA Management Segment C). For example, based on the

17-year period of record at the Wisdom gage, a median of 82 days per irrigation season fall below 60 cfs flow, which is the minimum instream flow target for summer. The implementation of conservation measures will likely reduce the occurrence of these low flows. However, based on historical data, they will not eliminate them altogether (Table B1). Factors unique to this gage, such as "losing" conditions in late summer and large irrigation diversions immediately upstream of the gage versus the associated return flows re-entering the river downstream of the gage, likely makes the Wisdom location the "worst case scenario" among the management segments in terms of not meeting flow guidelines.

Table B1. Predicted number of days with streamflows less than 60 cfs at the Wisdom gage during May 1-October 1 in relation to estimated increases in irrigation system efficiencies. May 1-October 1 (153 days) represents a typical period of use and includes effects of water diversion for pasture irrigation.

May 1-October 1			**Percent Increase on Top of Present System Efficiency & Corresponding Days <60 cfs at Wisdom Gage****			
Water Year Exceedance (%)*	Equivalent To	No Changes	10%	20%	30%	40%
5 (wet)	1 in 20 years	0	0	0	0	0
30		26	26	26	25	25
50 (median)		82	79	74	71	67
70	1 in 20 years	88	80	74	69	63
90 (dry)		112	109	105	104	101

*Based on Wisdom gage flow data (1988-2004).
**Assumes percent efficiency increase equals percent increase in flows for entire irrigation season.

Further evidence shows that basin inflows (above irrigation diversions) in August of 2002, 2003, and 2004 were on the scale of 70 to 90 cfs (MDNRC unpublished data). Even if conservation measures had been implemented during those years it is unlikely flows would have resulted in 60 cfs at the Wisdom Bridge. This leads to the conclusion that due to cumulative drought and natural hydrologic variability, some management segment targets may not be attainable in some years regardless of water conservation efforts implemented through the Agreement.

USING EXISTING USGS STREAMFLOW DATA TO ESTIMATE FREQUENCY OF MEETING FLOW TARGETS

There are existing real-time flow monitoring stations located at only two of the five CCAA Management Segments--Management Segment C (Wisdom) and Management Segment D (Mudd Creek Bridge). The Wisdom gage has been maintained since 1988, whereas the Mudd Creek Bridge gage has been operated since 1998. Data from these stations was used to tabulate the frequency with which the minimum flows exceeded the minimum flow targets at these locations during 1998-2004.

Location (Management Segment)	Spring Minimum Flow Exceedance	Summer/Fall Minimum Flow Exceedance
Wisdom (Segment C	69x	31x
Mudd Creek Bridge (Segment D)	93x	72x

Based on the available data during 1998-2004, flows at Wisdom exceeded the minimum CCAA Management Segment targets 69 percent and 31 percent of the time during spring and summer/fall, respectively. During the same time period, flows at the Mudd Creek Bridge exceeded the targets 93 percent and 72 percent of the time during spring and summer/fall, respectively. This brief summary again highlights that conditions at Wisdom likely represent a "worst case" scenario for flows among the five management segments.

DATA TABLE: FLOW TARGETS AND GRAYLING POPULATION MONITORING AT WISDOM

Table B2. Streamflow characteristics in the Big Hole River at Wisdom during 1988-2004 in relation to the proposed CCAA minimum instream flow targets for spring and summer/fall periods (160 and 60 cfs, respectively) and an index of grayling abundance 1991-2003 estimated by catch-per-unit electrofishing conducted by MFWP. Grayling index of abundance data are presented graphically in Figure 11.

FREQUENCY OF AVERAGE DAILY DISCHARGE MEETING PROPOSED MANAGEMENT SEGMENT FLOW TARGETS AT WISDOM

YEAR	April–June (n=91 days)	July–September (n=92 days)	CPUE of Grayling (total all age classes) Near Wisdom
1988	78%	0%	*
1989	74%	25%	*
1990	52%	35%	*
1991	100%	41%	19
1992	43%	38%	4
1993	97%	100%	8
1994	48%	0%	14
1995	99%	65%	20
1996	100%	61%	11
1997	100%	100%	18
1998	100%	79%	16
1999	98%	28%	12
2000	54%	0%	1
2001	52%	2%	0
2002	80%	18%	1
2003	91%	0%	7
2004	13%	46%	Data not yet compiled

* Data specifically from the Wisdom reach during 1988-90 were not included in MFWP monitoring reports.

APPENDIX C.

Possible Funding Sources to Implement the Agreement

Description of Possible Funding Sources Available to Implement the Agreement's Conservation Measures

While no funding is allocated specifically for the implementation of this Agreement or private landowners site-specific plans, the cooperating agencies have multiple funding options that they may utilize and/or pursue to assist in implementing this Agreement and any site-specific plan. A list of applicable programs and a general description of each is contained below. This is not intended to be an exhaustive list of possible funding sources. Interested landowners should contact the local Agency representative for further information, program details, and application requirements. The cooperating Agencies have already obligated staff to conduct the rapid assessment surveys required at Phase I of the Agreement.

NRCS

Environmental Quality Incentives Program - The Environmental Quality Incentives Program (EQIP) was reauthorized in the Farm Security and Rural Investment Act of 2002 (Farm Bill) to provide a voluntary conservation program for farmers and ranchers that promotes agricultural production and environmental quality as compatible national goals. The EQIP offers financial and technical help to assist eligible participants install or implement structural and management practices on eligible agricultural land.

The EQIP offers contracts with a minimum term that ends 1 year after the implementation of the last scheduled practices and a maximum term of 10 years. These contracts provide incentive payments and cost-shares to implement conservation practices. Persons who are engaged in livestock or agricultural production on eligible land may participate in the EQIP program. The EQIP activities are carried out according to an EQIP plan of operations developed in conjunction with the producer that identifies the appropriate conservation practice or practices to address the resource concerns. The practices are subject to NRCS technical standards adapted for local conditions. The local conservation district approves the plan.

The EQIP may cost-share up to 75 percent of the costs of certain conservation practices. Incentive payments may be provided for up to 3 years to encourage producers to carry out management practices they may not otherwise use without the incentive. However, limited resource producers and beginning farmers and ranchers may be eligible for cost-shares up to 90 percent. Farmers and ranchers may elect to use a certified third-party provider for technical assistance. An individual or entity may not receive, directly or indirectly, cost-share or incentive payments that, in the aggregate, exceed $450,000 for all EQIP contracts entered during the term of the Farm Bill.

Special initiative EQIP programs have already been used to promote fluvial Arctic grayling conservation in the upper Big Hole River. In 2004, NRCS spent over $700,000 to provide technical and financial assistance to producers willing to shorten their irrigation seasons and implement alternate stock-water methods to provide instream flows for grayling. This program resulted in 14,491 acres of deferred irrigation and construction of 12 off-channel stock-watering facilities. In 2005, NRCS committed $500,000 to provide technical and financial assistance to producers in the upper Big Hole River watershed upstream of Dickie Bridge who install

conservation practices in a continuing effort to benefit fluvial Arctic grayling habitat. The 2005 EQIP program focuses primarily on improving the management of irrigation water through the installation of water control structures and measuring devices, and providing grayling passage past irrigation diversion structures.

Wildlife Habitat Incentives Program - The Wildlife Habitat Incentives Program (WHIP) is a voluntary program for people who want to develop and improve wildlife habitat primarily on private land. Through WHIP, the NRCS provides both technical assistance and up to 75 percent cost-share assistance to establish and improve fish and wildlife habitat. The WHIP agreements between NRCS and the participant generally last from 5 to 10 years from the date the agreement is signed.

The WHIP has proven to be a highly effective and widely accepted program across the country. By targeting wildlife habitat projects on all lands and aquatic areas, WHIP provides assistance to conservation-minded landowners who are unable to meet the specific eligibility requirements of other USDA conservation programs.

The Farm Security and Rural Investment Act of 2002 reauthorized WHIP as a voluntary approach to improving wildlife habitat in our Nation. Program administration of WHIP is provided under NRCS.

Wetland Reserve Program - The Wetland Reserve Program (WRP) is a voluntary program offering landowners the opportunity to protect, restore, and enhance wetlands on their property. The NRCS provides technical and financial support to help landowners with their wetland restoration efforts. The NRCS goal is to achieve the greatest wetland functions and values, along with optimum wildlife habitat, on every acre enrolled in the program. This program offers landowners an opportunity to establish long-term conservation and wildlife practices and protection. Options offered under WRP include perpetual conservation easements and 100 percent cost-share for wetland restoration projects, 30-year conservation easements and 75 percent cost-share for wetland restoration projects, and 10-year restoration only (non-easement) cost share assistance.

Conservation Security Program - The Conservation Security Program (CSP) is a voluntary program that provides financial and technical assistance to promote the conservation and improvement of soil, water, air, energy, plant and animal life, and other conservation purposes on Tribal and private working lands. Working lands include cropland, grassland, prairie land, improved pasture, and rangeland, as well as forested land that are an incidental part of an agriculture operation. The program is available in all 50 States, the Caribbean Area, and the Pacific Basin area. The program provides equitable access to benefits to all producers, regardless of size of operation, crops produced, or geographic location.

The Farm Security and Rural Investment Act of 2002 (2002 Farm Bill) (Pub. L. 107-171) amended the Food Security Act of 1985 to authorize the program. The CSP is administered by NRCS.

Grassland Reserve Program - The Grassland Reserve Program (GRP) is a voluntary program offering landowners the opportunity to protect, restore, and enhance grasslands on their property. Section 2401 of the Farm Security and Rural Investment Act of 2002 (Pub. L. 107-171) amended the Food Security Act of 1985 to authorize this program. The NRCS, Farm Service Agency, and Forest Service are coordinating implementation of GRP, which helps landowners restore and protect grassland, rangeland, pastureland, shrubland and certain other lands and provides assistance for rehabilitating grasslands. The program will conserve vulnerable grasslands from conversion to cropland or other uses and conserve valuable grasslands by helping maintain viable ranching operations.

"Grasslands provide critical ecological benefits and play a key role in environmental quality, as well as contributing to the economies of many rural areas," said Secretary of Agriculture Ann Veneman. "This voluntary program helps protect valuable grasslands from conversion to other land uses, thus helping to ensure this national resource is available to future generations."

Grasslands make up the largest land cover on America's private lands. Privately-owned grasslands and shrublands cover more than 525 million acres in the United States. For the first time, the USDA will direct financial resources and technical expertise to help landowners protect and restore these lands.

Farm and Ranchland Protection Program - The Farm and Ranch Land Protection Program provides matching funds to help purchase development rights to keep productive farm and ranchland in agricultural uses. Working through existing programs, USDA partners with State, Tribal, or local governments and non-governmental organizations to acquire conservation easements or other interests in land from landowners. The USDA provides up to 50 percent of the fair market easement value.

To qualify, farmland must--be part of a pending offer from a State, Tribe, or local farmland protection program; be privately-owned; have a conservation plan for highly erodible land; be large enough to sustain agricultural production; be accessible to markets for what the land produces; have adequate infrastructure and agricultural support services; and have surrounding parcels of land that can support long-term agricultural production. Depending on funding availability, proposals must be submitted by the eligible entities to the appropriate NRCS State Office during the application window.

Conservation Technical Assistance - The Conservation Technical Assistance program provides voluntary conservation technical assistance to land-users, communities, units of State and local government, and other Federal agencies in planning and implementing conservation systems. This assistance is for planning and implementing conservation practices that address natural resource issues. It helps people voluntarily conserve, improve and sustain natural resources.

MFWP

Future Fisheries Improvement Program - The MFWP currently has nearly a million dollars a year available to fish habitat improvement projects through Future Fisheries Improvement Program (FFIP). Projects are funded through a competitive review process. Preference is given

to projects that restore habitats for native fishes. Potential projects that FFIP may provide funding for include--1) improvements to fish passage; 2) restore naturally functioning stream banks; 3) prevention of loss of fish into diversions; and 4) projects that enhance stream flows in dewatered areas.

Landowner Incentive Program: The USFWS' Landowner Incentive Program (LIP) provides funding to States to establish or supplement landowner incentive programs that protect and restore habitats on private lands, to benefit federally-listed, proposed or candidate species, or other species determined to be at-risk. The MFWP has secured an $180,000 Tier I LIP grant through 2006 to fund a fisheries biologist to identify habitat restoration opportunities and implement corrective actions in the Project Area. The MFWP plans on continuing this position beyond 2006. The MFWP is currently seeking a $700,000 Tier II LIP grant to implement the conservation measures identified in the Agreement.

USFWS

The USFWS' Montana Partners for Fish and Wildlife program receives and annual project allocation to implement conservation projects with private landowners in the Big Hole River watershed. Typically, this allocation averages $30,000 per year and a portion of this funding may be used to implement conservation measures identified in the Agreement.

APPENDIX D.

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APPENDIX E.

Template Forms for Phase I of Agreement

LANDOWNER ENROLLMENT

GRAYLING ECOLOGY INFORMATION PAMPHLET

CHECKLIST OF POTENTIAL THREATS TO GRAYLING

RAPID ASSESSMENT

INTERIM IRRIGATION DIVERSION REDUCTION ARRANGEMENT

DRAFT ENTRAINMENT SURVEY PROTOCOL

Application to enter (enroll) into the Candidate Conservation Agreement with Assurances (Agreement) for fluvial Arctic grayling in the Big Hole River, Montana--

LANDOWNER ENROLLMENT

Participating Landowner's name, address, phone #, etc:

_____

_____

_____

_____

Ranch Name:_____

Ranch Manager and phone # (if different than Participating Landowner):

_____

_____

Property Information

Entire property to be Enrolled in Agreement?

___ Yes: Legal description (and/or map) and acreage

___ No: Legal Description (and/or map) showing location of enrolled lands and acreage

Resources to Implement Conservation Measures

Are you interested in cost share for implementing projects (if available)? Yes__ No__

Participating Landowner must adhere to the following conditions under Phase I of the Agreement:

- Compliance with all water rights on enrolled lands (a **water right** describes the point of diversion, period of use, place of use, and the maximum flow rate of water).
- Allow access to enrolled lands and necessary properties for Agency personnel (i.e., MFWP, USFWS, NRCS, or MDNRC) or representatives of the Agencies for the purposes of:

    - Validating Participating Landowner compliance with water rights.
    - Performing a "Rapid Assessment" to identify immediate and other threats to fluvial Arctic grayling on enrolled lands no later than 90 days after the date of the last signature below.
    - Conducting a survey of fishes present in irrigation ditches and other irrigation structures (entrainment surveys) to determine the presence of fluvial Arctic grayling and salvage any entrained grayling.

- Read Montana Fish, Wildlife and Parks' information pamphlet "Fluvial Arctic Grayling in the Big Hole Valley."
- Identify and take corrective action to address any of the potential "immediate threats" that are applicable on enrolled lands using the accompanying "Checklist of threats" that will form the basis of the Rapid Assessment surveys to be conducted during Phase I of the Agreement.
- Negotiate and implement an interim irrigation withdrawal reduction arrangement, as necessary, to improve instream flow conditions to benefit grayling (see accompanying template form – Interim Diversion Reduction Arrangement [Phases I and II]).

WHAT YOU CAN DO

Conserve Water

✓ If you don't need the water, turn it back into the river.
✓ Close diversions that are not being used.
✓ Maintain properly functioning headgates.
✓ Coordinate irrigation efforts with your neighbors.
✓ Contact cooperating agencies about measuring devices and headgates.

Ensure Grayling Migration

✓ Ensure fish can migrate upstream or downstream through irrigation diversions.
✓ Leave a gap in or board out of the diversion for fish passage.
✓ Contact cooperating agencies with questions about barriers.

Protect Riparian Health

✓ Rest stressed areas to promote healthy willow and other vegetation growth on stream banks.
✓ Locate stock water wells away from streams and rivers.
✓ Place mineral/salt blocks away from streams and rivers.
✓ Remove feedlots and calving areas from stream and river bottoms.
✓ Contact cooperating agencies for assistance with riparian grazing plans.

Keep Grayling Out of Ditches

✓ Leave a gap in or board out of the diversion to allow fish to stay in the stream.
✓ Contact agency personnel to assess and quantify fish in diversions.

Please document your efforts.

For more information, contact:

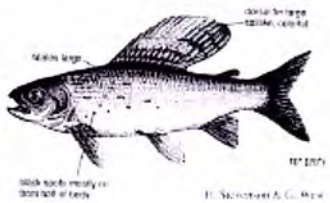
Jim Magee, FWP Fisheries Biologist
Peter Lamothe, FWP Fisheries Biologist

Montana Fish, Wildlife and Parks
Dillon Fisheries Office
730 N. Montana Street
Dillon, MT 59725
Phone: 406-683-2675
Email: plamothe@mt.gov

Montana Fish, Wildlife & Parks

Fluvial Arctic Grayling in the Big Hole Valley

GRAYLING FACTS



In Montana, the fluvial or river-dwelling Arctic grayling was once widespread throughout the upper Missouri River drainage upstream of Great Falls. Today, however, the upper Big Hole River population is now the last remnant of this native fluvial fish.

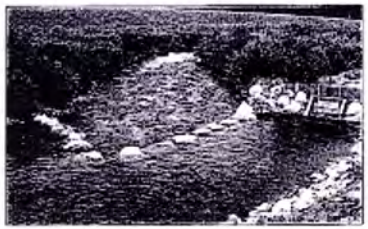
Big Hole River grayling spawn in late April and early May. They do not build redds like trout, but deposit adhesive eggs over clean, freshly scoured gravels in the mainstem, side channels, and tributaries.

Grayling fry are very small and fragile when they emerge from the gravels in mid-May. The fry need slower backwaters and stream margin habitats to survive and grow. They grow rapidly (4-6 inches by the first fall), reaching spawning maturity at age three. Mature grayling move extensively in the Big Hole and its tributaries to find spawning, summer, and winter habitats. They are aggressive feeders with a diet consisting primarily of aquatic insects. Big Hole River grayling typically grow to 13-15 inches and live 5-6 years.

GRAYLING NEEDS

Adequate Flows Throughout the Year
Grayling need adequate stream flows that maintain pool habitats for feeding, resting, and cover; provide for up and downstream movement; maximize spawning habitat; provide slower velocity backwater and stream margin habitats for juveniles; and accommodate production of aquatic insects for food.

Unimpeded Migration
Grayling in the Big Hole River migrate up to 60 miles between seasons to find essential habitats. Barriers, such as irrigation diversions or dewatered channels, block migration and limit fish distribution and access to seasonal habitats. Grayling may also be flushed or move into irrigation diversions, disrupting migration patterns and increasing mortality.



Cold Water
Arctic grayling require cold summer water temperatures of 45-65° F to maximize reproduction, growth, and survival.

Healthy Riparian Habitat
Healthy vegetation along streams maintains channel width, depth, and bank stability, which is essential for productive fisheries. Healthy vegetation includes willows that provide stream shading, decrease water temperatures, create deep pools, and provide cover and protection.

CHECKLIST OF POTENTIAL THREATS TO GRAYLING

Checklist of potential threats to grayling to be addressed by Participating Landowners during Phases I and II of the Agreement. This form serves as a partial template for the Rapid Assessment survey.

YES	NO	UNK	DESCRIPTION OF POTENTIAL THREATS	CORRECTIVE ACTION
WATER QUANTITY				
			No flow measuring device (e.g., flumes) on some or all irrigation ditches	
			Headgates on some or all irrigation ditches leak when closed	
HABITAT FRAGMENTATION				
			Cross channel diversion or other physical obstruction blocking fish passage	
			Entrainment in irrigation ditches	
			Unused diversions on property	
			Unscreened siphoning or pumping from irrigation ditches	
RIPARIAN-STREAM CHANNEL-LIVESTOCK INTERACTIONS				
			No documented grazing plan to protect riparian habitats	
			Livestock watering in active stream channels	
			Livestock feeding, holding, or husbandry within 50 ft of active stream channel	
			Livestock grazing within 50 ft of active stream channel	
			Livestock crossing active stream channel	
WATER QUALITY				
			Effluent or discharge into the stream or river from agricultural or ranch-related activities	
			Manure piles in or adjacent to stream channels	
			Fertilizers applied to active pastures adjacent to stream channels	
			Debris, trash, or other non-natural items in stream channel	
			Mineral or salt blocks for livestock	
GENERAL RANCH OPERATIONS				
			Driving farm equipment through active channels	
MISCELLANEOUS (DESCRIBE)				

IN WITNESS WHEREOF THE PARTIES HERETO have executed this application to enter into the Agreement and begin the development of a site-specific plan.

Participating Landowner	**Date**

Montana Fish, Wildlife and Parks	**Date**

RAPID ASSESSMENT

Phase I Rapid Assessment Survey to Identify Threats to Grayling on Enrolled Lands--

Participating Landowner's name, address, phone #, etc:

_____

_____

_____

_____

Ranch Name:_____

CCAA Management Segment:_____

Survey Date:_____

Survey Crew (agency or affiliation):_____

Results of Survey:

- Items from "Threats checklist" and other threats to grayling as identified
- Location, GPS coordinates, and condition of irrigation diversion structures and barriers
- Summary of habitat conditions on the property including riparian (bankline) vegetation condition, land use in riparian zone, channel characteristics and condition, in-stream habitat conditions, etc.
- Maps or sketch of property showing location of pertinent natural or physical features

Measures to be implemented by the Participating Landowner during Phase II of the Agreement to address threats to grayling identified during the Rapid Assessment Survey:

- List of conservation measures and implementation schedule to address the threats to grayling identified during the Rapid Assessment. This list may consist of an annotated version of the "Threats checklist" or a summary or outline which contains the equivalent information.
- Participating Landowner shall implement these measures beginning in Phase II of the Agreement and shall continue to implement these measures unless they are modified or supplanted by those described in the final site-specific plan.
- This list will be submitted to USFWS who will review and provide concurrence/non-concurrence with the rapid assessment measures and counter-sign the Certificate of Inclusion.

INTERIM IRRIGATION DIVERSION REDUCTION ARRANGEMENT

PHASES I AND II

Template Agreement Form for voluntary water conservation measures prior to the completion of the site-specific plans--

The purpose of this arrangement is to provide suitable streamflows for fluvial Arctic grayling in the upper Big Hole River and its tributaries during the development of the site-specific plan. During the development of the site-specific plan the landowner **[insert name]** will limit irrigation withdrawals into irrigation ditch **[insert irrigation ditch name and associated water right identification number]** from **[insert start date]** until **[insert completion date]**. Irrigation withdrawals at this point of diversion will not exceed [**insert percentage of the associated water right**] of [**insert authorized amount of irrigation withdrawal or other similar language**] during the agreed-upon period. The headgate at the point of diversion will be regulated on a daily basis by [**insert either landowner name, agency name, or name of water commissioner**] to ensure that irrigation withdrawals do not exceed the agreed-upon amount in this agreement.

_____

[Signature of Landowner] **[Date]**

_____

[Signature of MFWP representative] **[Date]**

DRAFT ENTRAINMENT SURVEY PROTOCOL

Big Hole River Arctic Grayling Entrainment Surveys

Purpose: To assess entrainment of Arctic grayling in irrigation diversions and ditches on enrolled lands in the upper Big Hole River. Objectives are to:

1) Determine the presence and or absence of Arctic grayling in irrigation diversions

2) Determine relative abundance of Arctic grayling in irrigation diversions

3) Determine distribution of Arctic grayling in irrigation diversions

4) Determine size distribution of Arctic grayling in irrigation diversions

Protocol:

1) Diversion surveys will be prioritized by CCAA landowner ranking and potential to entrain grayling (i.e., located near know spawning, rearing, summering habitats, size and location of diversion etc.)
2) Montana Fish, Wildlife and Parks will schedule surveys and contact landowners.
3) Total length of the diversion will be determined on the ground, beginning and ending points will be located and UTM coordinates collected.
4) One-pass electrofishing surveys will be conducted on 50 percent of the total length of diversion*. To spatially assess distribution and relative abundance of Arctic grayling, surveys will be broken down into three equal reaches (approximately 16 percent of the total length each) encompassing upper, middle and lower sections of the diversion. The upper reach will began at the point of diversion, the middle reach will be located half way between the point of diversion and the end of the diversion, and the lower section will be located near the end of the diversion.
5) Surveys will be conducted with backpack shocker or mobile anode electrofishing system mounted on a crawdad boat.
6) All grayling will be weighed, measured, tagged with Visible Implant tags (VI) and held in a live well until transported and released in the nearest tributary or the mainstem Big Hole River. Release locations must allow grayling to access the Big Hole River. The UTM coordinates will be taken at all release locations.
7) Presence of all other species will be recorded and classified as abundant, common, rare or absent as defined by Montana Fisheries Information System.
8) Continuous GPS locations and water temperature will be collected for each reach within the diversion.
9) Data will be entered into Excel Spreadsheet.

* Where practicable, the entire length of ditches on an enrolled property will be surveyed.

APPENDIX F.

Template Forms for Phases II and III of Agreement

TEMPLATE CERTIFICATE OF INCLUSION

REQUEST FOR EXTENSION TO COMPLETE PHASE II – DEVELOPMENT OF SITE-SPECIFIC PLAN

COVERED ACTIVITIES

TEMPLATE SITE-SPECIFIC PLAN

DRAFT EXAMPLE --- This certificate would be executed by the parties after the rapid assessment survey is completed and provided to the USFWS; MFWP would sign last and would send a copy to the Participating Landowner.

Participating Landowner Certificate of Inclusion
for the
Candidate Conservation Agreement with Assurances for Fluvial Arctic Grayling
in the Upper Big Hole River

This certifies that the property described in Attachment 1 to this Certificate of Inclusion [list **certificate number**], owned by [**Participating Landowner's Name**], is included within the scope of Permit No. [list number], issued by the U.S. Fish and Wildlife Service to the State of Montana Fish, Wildlife and Parks (MFWP) under the authority of 10(a)(1)(A) of the Endangered Species Act of 1973, as amended, 16 U.S.C. 1539(A)(1)(A). Such Permit authorized certain activities by Participating Landowners as part of a Candidate Conservation Agreement with Assurances for the fluvial Arctic grayling in the upper Big Hole River (Grayling CCAA).

Pursuant to that Permit and this Certificate of Inclusion, the holder of this Certificate will have incidental take coverage in association with certain activities if the holder implements MFWP's List of Rapid Assessment Measures and Interim Diversion Reduction Arrangement, if a landowner has developed a reduction plan. The incidental take coverage is extended after the Phase III site specific plan once it has been developed and is being implemented by the holder. Incidental take coverage extends to activities that may result in a take of grayling, to include the activities listed in Appendix F of the Grayling CCAA on the above-described property. Incidental take shall not exceed that resulting from the covered activities described in the attached site-specific plan. The take coverage is subject to the terms and conditions of--(1) the Permit identified above, and (2) the terms and conditions of the Candidate Conservation Agreement with Assurances, and (3) any and all Phase II conservation measures and Phase III site-specific plans for the property that have been executed with MFWP, USFWS, MDNRC, and NRCS.

Regulatory Assurances

Upon execution by Participating Landowner, USFWS, and MFWP of a Phase III Site-Specific Plan, as described in the Grayling CCAA, Participating Landowner shall have the assurances that are described in the Grayling CCAA.

//

//

When MFWP receives this signed Certificate of Inclusion, coverage for incidental take under the Permit(s) will be provided. The MFWP will return a copy of the dated certificate to the Participating Landowner for his/her records.

_____
_____
_____
_____
Address

_____
Phone

_____
Signature of Landowner

_____
Signature of MFWP

Received by the MFWP:_____
Date

_____
Signature of USFWS

REQUEST FOR EXTENSION OF PHASE II IMPLEMENTATION OF THE AGREEMENT

Date:

Landowner name:

Certificate of Inclusion #:

Enrolled lands, etc:

Original date of Phase II completion:

Extension request to complete phase II: [xx days or months]

Revised date of Phase II completion:

An extension (maximum of 24 months) to the standard 30-month duration to complete Phase II implementation of the Agreement (implementation of rapid assessment measures and development of the site-specific plan) can be granted by USFWS provided the Participating Landowner and the Agencies meet the following conditions:

1. The Participating Landowner has complied fully with the provisions outlined during Phase I and II of the Agreement.
2. a) The Participating Landowner and Agencies are actively engaged and making progress in the development of the site-specific plan and must provide an estimate by when it will

be completed; ***or*** b) the Participating Landowner and the Agencies are not actively developing a site-specific plan and must justify why this is the case.

For 2a, the Agencies must provide a summary of the progress in completing the site-specific plan and an estimated completion date. For 2b, the Agencies must provide a justification why they are not actively working with the Participating Landowner. This justification must be based on the relative ranking of a Participating Landowner using the Agreement's habitat ranking criteria for grayling (Part IX, Figure 22) and/or prioritization of Agency resources given progress on site-specific plans on higher-priority habitats. In either case, the USFWS must determine that granting the extension to complete Phase II will not unduly delay the conservation of fluvial Arctic grayling.

DETAILS:

Participating Landowner	**Date**
Montana Fish, Wildlife and Parks	**Date**
U.S. Fish and Wildlife Service	**Date**

COVERED ACTIVITIES

The following paragraphs summarize and describe activities which are covered by the Permit and regulatory assurances that are part of the Permit under the terms of this Agreement (covered activities). These covered activities can be generally grouped into agriculture and ranching, restoration and monitoring. These examples are representative, not exhaustive; not every activity listed below will be applicable on every property and some specific covered activities may not be included below. In general, covered activities are those activities implemented through the Agreement's conservation measures to reduce threats to grayling from habitat fragmentation and loss resulting from irrigation diversions, degradation of riparian habitats, entrainment in irrigation ditches, and barriers to movement. Actions not related to these threats are outside the scope of this Agreement and not considered covered activities. Participating Landowners will be primarily interested in the covered activities related to agriculture and ranching.

AGRICULTURAL AND RANCHING ACTIVITIES – Normal and accustomed agricultural and ranching activities or those specified by or consistent with the terms of the Agreement or site-specific plan that are being modified by Participating Landowners under the Agreement so that they reduce or eliminate threats to grayling as described in the Agreement are considered covered activities. In general, these activities involve the diversion and application of irrigation water, grazing and livestock management, and any legal associated activities that are specified in or are consistent with the Agreement and a landowner's site-specific plan. Examples of covered activities include water diversion for irrigating hay fields, pastures, or livestock; ground water pumping for watering livestock; prescribed grazing plans; harvest of hay or livestock forage; and actions necessary to accomplish the preceding.

For a practical example, a covered activity would be the legal diversion of an amount of water specified under NRCS' irrigation water management plan or a prescribed grazing plan implemented to recover a non-functional riparian habitat. Diverting water in excess of the agreed-upon amount or grazing livestock beyond that specified in the prescribed grazing plan would not be a covered activity. For another example, mining on enrolled lands would not be considered a covered activity because this Agreement addresses threats to grayling from land use associated with agriculture and ranching. It will not be possible to list each and every covered activity at the time the site-specific plan is being developed. Instead, the indicator for a covered activity will be that which is being agreed to or modified (i.e., conservation measures and supporting activities), in the context of the Agreement, to reduce or eliminate any of the threats to grayling described in the Agreement and the Certificate of Inclusion.

RESTORATION ACTIVITIES – Restoration activities include those actions generally described as "conservation measures" that are being implemented to benefit grayling but may result in take of grayling through short-term impacts. Restoration activities may be implemented entirely by Participating Landowner, entirely by one of the Agencies, or by collaboration between the Participating Landowners and the Agencies. Representative examples of restoration activities include:

- ☐ Replace or repair headgates
- ☐ Replace or repair diversion and flow-regulation structures
- ☐ Install flow monitoring devices
- ☐ Install off-channel livestock watering facilities
- ☐ Install ground water wells to supply off-channel livestock watering facilities
- ☐ Ditch lining or modification of existing irrigation conveyance
- ☐ Construction of irrigation canals or field ditches
- ☐ Land leveling or smoothing to facilitate efficient irrigation water application
- ☐ Install piping for irrigation or stock water transport
- ☐ Install fish passage structures (e.g., ladders) in existing or re-designed diversions
- ☐ Remove barriers to grayling migration
- ☐ Re-design and install "fish-friendly" irrigation diversion structures
- ☐ Install fencing to control livestock access to riparian zones
- ☐ Re-planting willows & natural vegetation (channel bank vegetation) in riparian zones
- ☐ Remove manure piles present in riparian zones
- ☐ ~~Relocation of ranch structures~~ posing a threat to grayling habitat
- ☐ Change fields or pastures to crop composition that uses less water
- ☐ Install fish screens on irrigation diversion structures
- ☐ Active in-stream restoration projects including pool excavation, bank stabilization, and channel stabilization
- ☐ Capture of grayling for collection of gametes or translocation
- ☐ Release free-swimming juvenile grayling
- ☐ Raise fertilized grayling eggs in Remote Site Incubators

MONITORING ACTIVITIES – Monitoring activities include mostly actions by the Agencies, especially MFWP, to measure the condition of grayling habitat and grayling population status in the Project Area. Some of these activities may result in take of grayling, but such take is anticipated to be minimal and the monitoring is necessary to determine the effectiveness of the Agreement's conservation measures. Representative examples of monitoring activities include:

- ☐ Capture and handling of grayling by various techniques including trapping, netting, electrofishing and angling
- ☐ Tagging of grayling to measure survival and movement
- ☐ Measurement of aquatic physical habitat, including, but not limited to channel cross sections, habitat unit mapping, riparian zone surveys, stream temperatures, etc.
- ☐ Ongoing operation of flow-monitoring devices (aqua rods, etc.)

OUTLINE AND TEMPLATE FOR SITE-SPECIFIC PLAN

Outline:

I. **INVOLVED PARTNERS**

II. **ENROLLED LANDS**

III. **DESCRIPTION OF EXISTING CONDITIONS (BENCHMARK DATA)**

IV. **CONSERVATION MEASURES AND EXPECTED RESULTS**

V. **ADAPTIVE MANAGEMENT PLAN**

VI. **MONITORING**

VII. **STATUS REPORT**

VIII. **SITE-SPECIFIC PLAN DURATION**

IX. **COVERED ACTIVITIES**

X. **LANDOWNER AND AGENCY RESPONSIBILITIES**

XI. **IMPLEMENTATION AND COMPLIANCE MONITORING SCHEDULE**

XII. **TERMS AND CONDITIONS**

XIII. **SIGNATURES**

Template which summarizes the information to be presented in each site-specific plan:

I. **INVOLVED PARTNERS** – names the parties (individuals and agencies) involved in the development, approval and implementation of the site-specific plan.

II. **ENROLLED LANDS** – defines the lands enrolled in the Agreement and site-specific plan.

- **a.** Location – legal description, size (acreage) and map of enrolled lands.
- **b.** Access – stipulations to permit agency personnel or other agreed-to parties access to enrolled lands and properties necessary to implement the site-specific plan.

III. **DESCRIPTION OF EXISTING CONDITIONS**

- **a. Land Unit Description** – describes the land use and management on enrolled properties (e.g., location and area of hay production, pasture, etc.).
- **b. Population Status of Grayling** – description or summary of fishery resources, especially grayling, in or adjacent to enrolled lands.
- **c. Previous Actions Taken to Benefit Grayling** – description and date of any previous or ongoing actions taken on enrolled lands to benefit grayling (e.g., voluntary irrigation reductions, riparian or other habitat restoration projects, etc.).
- **d. Immediate Threats to Grayling** – summary of immediate threats to grayling that were identified ~~during~~ the Agencies' Rapid Assessment of enrolled lands during Phase I of the Agreement.
- **e. Water Rights** – summary of Participating Landowner compliance with water rights during Phases I and II of the Agreement; detailed description of existing water rights on enrolled lands (ID, date, period of use, purpose, amount/rate, place of use).
- **f. Water Control Structures (Irrigation Infrastructure)** – summary of NRCS' (Irrigation Water Management) and Agencies' assessment of the irrigation system including location, condition, and performance of diversion structures and flow measuring devices, irrigation ditches, and stock watering facilities.
- **g. Migration Barriers** – summary of any physical or man-made structures that potentially impede movement by grayling with a determination of whether these structures must be modified or removed to benefit grayling.
- **h. Grayling Entrainment** – detailed summary of entrainment surveys conducted in irrigation ditches on enrolled lands. Information will include, but is not limited to: survey crew, date of survey, sampling technique, length/area and location of ditches surveyed, species composition and abundance, length-weight or age-class data, and disposition of captured fishes (left in ditch, returned to natural stream channel, removed, etc.).
- **i. Riparian Conditions and Grazing Land Health** – assessment of riparian conditions (sustainable, at risk, not sustainable) by land use area (hay, pasture, etc.) using NRCS' riparian assessment protocol.
- **j. Stream Morphology and In-Stream Habitat** – detailed description of channel type and conditions, channel morphology, streambank conditions, habitat characteristics (pool-riffle sequences, beaver ponds, woody debris, etc.), width:depth ratios, substrate conditions, etc based on assessment by fishery biologists. Identification of deficiencies and conservation/restoration opportunities.

IV. **CONSERVATION MEASURES AND EXPECTED BENEFITS** – specific list of actions taken to address immediate and long-term threats to grayling on enrolled properties and their expected benefit to grayling.

a. **Actions Take t Eliminate Immediate Threats** – summary of actions implemented by Participating Landowner during Phases I and II of the Agreement.

b. **Water Use and Infrastructure**

   i. **Control of Water** – description of irrigation system upgrades to improve control, measurement and delivery of diverted water.

   ii. **Compliance with Water Rights**

   iii. **Diversion Reductions** – plan that outlines the irrigation withdrawals on enrolled lands and how they have been modified to improve instream flows to benefit grayling.

      1. **Reduced Diversion Arrangements** – updates or supersedes the arrangement implemented during phases I and II.

      2. **Irrigation Water Management** – NRCS' plan [under Field Office Technical Guide (FOTG) 449] for efficient water use to meet Participating Landowner's needs; defines amount of water needed and provides an application schedule.

   iv. **Migration Barriers** – describes the installation (or timeline for installation) of any fish ladders or removal of any barriers to facilitate passage of grayling.

   v. **Entrainment** – describes any short- or long-term solutions to address entrainment problems identified in Part III and a schedule for re-surveying ditches.

c. **Land Use**

   i. **Riparian Health and Grazing Management** – describes in detail any practices, such as Prescribed Grazing plans (under NRCS FOTG 528A) or construction of fences along riparian zones, recommended by NRCS or the Agencies to improve riparian conditions on enrolled lands; describes a timeline for implementation and a monitoring schedule.

   ii. **Nutrient Management** – describes the utilization of NRCS FOTG 590 to address any threats to water quality from application of commercial fertilizers and livestock waste.

d. **Expected Benefits** – summarizes the expected benefits to grayling habitat and grayling populations from implementing the conservation measures on enrolled lands and the anticipated timeline over which those benefits will accrue.

V. **ADAPTIVE MANAGEMENT PLAN** – describes the parameters under which the Agencies and Participating Landowner will revisit and modify portions of the site-specific plan if conservation measures on enrolled lands are not adequately addressing streamflows, entrainment, migration barriers, riparian zone condition, and channel morphology or any element that threatens grayling on enrolled lands; defines anticipated modifications to the site-specific plan, where possible.

VI. **MONITORING** – describes measurements, timeline, and responsibilities (Agency or Landowner) for determining the effectiveness of conservation measures being implemented on enrolled lands.

VII. **STATUS REPORT** – describes the frequency with which Participating Landowner will provide required monitoring data or compliance information to MFWP, and the guidelines for periodic spot checks by the Agencies to document compliance with Agreement and site-specific plan provisions.

VIII. **SITE-SPECIFIC PLAN DURATION** – minimum duration is 10 years.

IX. **COVERED ACTIVITIES** – describes in explicit detail the specific activities on enrolled land that will receive regulatory assurances and incidental take coverage; activities not specifically listed in this section will not be considered "covered activities."

X. **LANDOWNER AND AGENCY RESPONSIBILITIES** – summarizes the obligations for implementation and monitoring of the provisions of the site-specific plan on the enrolled lands.

XI. **IMPLEMENTATION AND MONITORING SCHEDULE** – table or summary of the implementation and monitoring of the site-specific plan.

XII. **TERMS AND CONDITIONS** – summarizes the same terms and conditions the site-specific plan is subject to based on the Agreement as well as any additional provisions required under the site-specific plan (These are detailed in Appendix G).

XIII. **SIGNATURES**

IN WITNESS WHEREOF THE PARTIES HERETO have executed this site-specific plan to be in effect on the date of the last signature below.

Participating Landowner	**Date**
Montana Fish, Wildlife and Parks	**Date**
U.S. Fish and Wildlife Service	**Date**

APPENDIX G.

Example of Fluvial Arctic Grayling Site-Specific Plan

EXAMPLE OF A SITE-SPECIFIC PLAN

Fluvial Arctic Grayling Site Specific Plan

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EXAMPLE OF A SITE-SPECIFIC PLAN

Fluvial Arctic Grayling Site Specific Plan

I. INVOLVED PARTNERS

This Site-Specific Fluvial Arctic Grayling Conservation Plan (site-specific plan), effective and binding on the date of the last signature below, between the Montana Fish, Wildlife and Parks (MFWP) and the U.S. Fish and Wildlife Service (USFWS); and **[insert landowner's name]** (Participating Landowner), is intended to conserve and enhance populations of fluvial Arctic grayling in the Big Hole River by implementing conservation measures on lands owned by the Participating Landowner. Approval of this site-specific plan by the Participating Landowner, MFWP, and USFWS is a prerequisite for obtaining regulatory assurances as described in the CCAA and continued incidental take authority through the Certificate of Inclusion.

II. ENROLLED LANDS

LOCATION

This site-specific plan pertains to 2,042 acres of land enrolled by Landowner "A" (i.e., enrolled lands) that are contained entirely within CCAA Management Segment B (Figure 1G). The enrolled lands are contained within **[enter legal description TRS]** and border the town of XXXXX, Montana (Figure 2G). Approximately 2.75 miles of stream "X" flow through the enrolled lands.

ACCESS

The Participating Landowner agrees to allow the Agencies, or any mutually agreed upon parties, reasonable access to his or her property for the purposes of assessing resource condition, monitoring implementation of conservation measures, and conducting compliance and biological monitoring. The Agencies will coordinate with the Participating Landowner to avoid unnecessary inconvenience and disruption of the Landowner's property use. The Agencies will notify the Participating Landowner in advance with their intent to enter their property and will further describe the activities and duration of the scheduled visit. The Participating Landowner shall not unreasonably withhold permission for such entry.

III. DESCRIPTION OF EXISTING CONDITIONS (Benchmark Data)

LAND UNIT DESCRIPTION

The enrolled lands currently contain a total of 2,042 acres, of which 4 acres are headquarters, 492 acres are hay land, 985 acres are irrigated pasture, and 561 acres are rangelands comprised primarily of native (Figure 2G). The ranch is fenced into three main management units and as such, combines several of the land uses into each unit (i.e., pasture and range land is fenced in with hay land). There are five water diversions on the ranch that provide irrigation water and one water diversion (#6) that provides water solely for livestock drinking water.

POPULATION STATUS OF GRAYLING

In April 2004, MFWP conducted grayling population monitoring efforts within a 1-mile section of Stream "X" flowing through the enrolled lands. The stream reach was surveyed by a 3-person electrofishing crew using a mobile-anode DC system mounted on a Coleman Crawdad boat. The results of the survey were:

SPECIES CAPTURED	# CAPTURED	LENGTH (range in.)	WEIGHT (range lbs)
grayling	27	6.7 - 12.4	0.28 - 0.81
brook trout	105	5.2 - 14.1	0.23 - 0.94
mountain whitefish	8	6.8 - 11.0	0.21 - 0.78

The results of this recent effort show that Stream "X" is an important component of grayling life-history patterns in the Big Hole watershed, and makes the conservation measures described in this plan a priority for the agencies to implement.

PREVIOUS ACTIONS TAKEN TO BENEFIT GRAYLING

There have been no documented conservation measures taken by the landowner that have lead to benefits for the grayling population within the project area.

IMMEDIATE THREATS TO GRAYLING

On May 2, 2005 a 2-person team (MFWP) assessed the enrolled land for "immediate threats" to grayling. The team identified 10 car batteries in Stream "X." The Landowner was contacted and the batteries were removed by the Participating Landowner by May 9.

WATER RIGHTS

On May 6, 2005, the irrigation withdrawals were measured using an electronic flow meter to ensure flow rate and point of diversion compliance with the associated water rights for the enrolled land. The MDNRC hydrologist monitoring water rights compliance found the landowner to be in compliance on that date with all water rights associated with the enrolled lands. Continued monitoring will be necessary to ensure continued flow rate, period of use, and place of use compliance.

SUMMARY OF WATER RIGHTS FOR THE ENROLLED LANDS

Water Right ID	Priority Date	Period Of Use	Purpose	Flow Rate(cfs)	Max Acres
41DXXXX	1890-10-05	04-15 – 09-01	IRRIG	20	XX
41DXXXX	1895-06-30	04-15 – 09-01	IRRIG	25	XX
41DXXXX	1895-04-15	05-01 – 07-15	IRRIG	15	XX
41DXXXX	1900-08-18	05-01 – 08-01	IRRIG	10	XX
41DXXXX	1900-08-20	05-01 – 08-15	IRRIG	15	XX
41DXXXX	1901-09-15	04-01 – 10-01	STOCK	2	XX

All water rights associated with the enrolled lands are associated with Stream "X" as the source. Stream "X" is a unadjudicated system. There is no water commissioner for this stream.

EXISTING MIGRATION BARRIERS

There are six legal points of diversion and each point of diversion has a headgate that was installed in the 1960s. The diversions structures currently consist of gravel piled across the stream channel (Photo 3G). The landowner currently has a long-term (10-year) maintenance agreement to maintain these "structures" associated with a 310 Permit (Montana Stream Protection Act). Gravel type diversions require the landowner to frequently excavate and pile gravel from the streambed to divert water into the ditch.

The existing irrigation diversion structures are potentially acting as barriers to grayling movement during low flow conditions. At the time of the assessment (May 6, 2005) there was no evidence that these structures were acting as barriers. Upgrading the existing diversion structures on the enrolled lands has the potential to better meet the needs of both the Participating Landowner and the grayling, so these structures will be improved or replaced. No other potential barriers were identified during the visual survey.

EXISTING LEVEL OF GRAYLING ENTRAINMENT

On May 7 and 8, 2005, two 2-person teams surveyed the irrigation ditches contained on the enrolled land to quantify the level of grayling entrainment within these structures with backpack electro fishing units. A single-pass survey was conducted over the entire length of the six irrigation ditches associated with the six points of diversion for the enrolled land. The results of the entrainment survey were:

Ditch ID	Survey Length (mi)	Species Captured	# Captured Length (range in.)	Length (range in.)	Weight (range lbs.)
A	1.0	grayling	5	7.0 – 12.3	0.28 – 0.72
"	"	brook trout	10	4.0 – 13.4	0.18 – 0.82
B	0.8	brook trout	12	4.5 – 11.1	0.24 – 0.61
C	0.7	brook trout	8	6.5 – 12.1	0.34 – 0.71
D	1.0	brook trout	20	5.0 – 14.0	0.26 – 0.98
E	1.0	brook trout	1	10.1	0.58
F	2.0	mountain whitefish	2	6.4 – 12.0	0.45 – 0.61
"	"	brook trout	7	6.4 – 12.0	0.31 – 0.75

The five Arctic grayling and the two mountain whitefish captured during the survey were tagged with VI tags, transported to Big Hole River and released. Landowner "A" was contacted about the results of the entrainment survey on May 10, 2005. The initial assessment of the enrolled land suggests that grayling are moving upstream past the property in the spring to spawn and some individuals are becoming entrained within the landowner's irrigation ditches as they move downstream and return to the Big Hole River.

STATUS OF WATER CONTROL STRUCTURES

There are six legal points of diversion and 6.5 miles of irrigation ditches that provide irrigation and stock water for the enrolled land (Figure 2G). Each point of diversion has a headgate that was installed in the 1960s. Headgates consisted of a concrete foundation with angle iron formed to insert wooden planks for regulation of irrigation withdrawals from Stream "X" (Photo 2G). An assessment team (NRCS) found all diversions had cracked, boiled, or were in need of some repair. With diversions completely shut off 0.5 to 1.5 cfs was measured "leaking" through each headgate. The initial assessment suggests that each of these structures will need to be replaced. Five of the ditches (A-E) had functioning Parshall Flumes for measuring irrigation withdrawals. One of the ditches (F) had no flow measuring device.

The diversions structures currently consist of gravel piled across the stream channel (Photo 3G). The landowner currently has a long-term (10-year) maintenance agreement to maintain these "structures" associated with a 310 Permit (Montana Stream Protection Act). Gravel type diversions require the landowner to frequently excavate and pile gravel from the streambed to divert water into the ditch.

EXISTING RIPARIAN CONDITION AND GRAZING LAND HEALTH

Riparian assessments were performed on May 6, 2005 (NRCS) in three reaches along stream "X", by assessing 0.25-mile long transects in each reach. The first assessment reach consisted of the riparian area associated with Field 8, the second evaluated riparian area in Field 6, and the third evaluated riparian habitat contained in Field 4 (Figure 2G). The results of the evaluations are listed below:

REACH	FIELD	LAND USE	SCORE %	CATEGORY
1	8	Pasture	52	AT RISK
2	6	Hay	60	AT RISK
3	4	Pasture	52	AT RISK

All riparian habitats on this property are currently functioning "at risk." Each area has mature willows present and is lacking other age classes as well as adequate vegetation (kind and amount) needed to stabilize the banks (primarily sedge species). The existing woody vegetation is attempting to re-vegetate; however, unrestricted livestock access has led to excessive browsing and reduced recruitment of young willows and herbaceous vegetation. The loss of stability and woody vegetation has apparently led to an increased channel width and decreased pool frequency in each reach. Restoration of this riparian corridor will be accomplished through implementation of the prescribed grazing plan which will change the duration, timing and intensity of grazing within the riparian corridor.

STREAM MORPHOLOGY AND IN-STREAM HABITAT

An assessment of stream morphology on the enrolled land by a USFWS and MFWP team on May 15-17, 2005, concludes that the reach of Stream "X" flowing through the enrolled land is a "C4" channel type under Rosgen classification system. Permanent cross-sectional (Figure 4G)

and longitudinal profile were generated for the stream channel on the enrolled property and compared with reference reaches located upstream. Sections of the stream on the enrolled property had high width-depth ratios indicating a widened channel from loss of riparian vegetation. Pool quality also has degraded due to increased sediment inputs from eroding streambanks and the reduced frequency of bankfull discharge events facilitated by the persistent drought currently plaguing southwest Montana and the unregulated early season irrigation withdrawals occurring within the system. The assessment team concluded that grayling habitat within Stream "X" would see significant improvements in overall quality simply through passive restoration techniques to enhance the riparian vegetative health, namely through the reduction of stock pressure through the implementation of a prescribed grazing plan, and through increased instream flow.

IV. CONSERVATION MEASURES AND EXPECTED RESULTS

ELIMINATE IMMEDIATE THREATS

The Rapid Assessment team identified 10 car batteries in Stream "X" and contacted the Landowner so he was aware of the situation. The Landowner, in consultation with Beaverhead County disposal experts, removed and properly disposed of the batteries.

IRRIGATION INFRASTRUCTURE

Migration Barriers and Water Control

The initial assessment suggests that each of the irrigation diversions is a potential migration barriers. All diversions, with the exception of #6, will be upgraded to permanent rock cross vane structures (Photo 4G). Upgrading diversions will ensure fish passage. Maintenance will decrease with permanent rock structures, therefore reducing streambed disturbance and effectively providing irrigation water to meet the needs of the landowner and the conservation measures of this agreement. Diversion #6, associated with ditch F, will be abandoned altogether as the ditches sole use is to provide livestock water and will be replaced through a deep well and stock tank.

The Participating Landowner agrees to repair or replace all the existing headgates to prevent unneeded leakage into the irrigation ditches. Installing new structures will lead to significant improvements (> 5 cfs) in stream flow conditions, particularly in early spring and fall (prior to and after the period of use associated with the landowner's water rights). These improvements also will assist the landowner to remain in compliance with both this Agreement and his water rights.

Entrainment

For the remainder of the calendar year, the landowner will close the headgate on Ditch A to prevent further entrainment of grayling on the enrolled lands. The Agencies and landowner have committed to upgrade the irrigation structure associated with this ditch within 6 months to include a fish screen that will prevent grayling entrainment.

ADDITIONAL REDUCTION OF IRRIGATION DIVERSION

The Participating Landowners and the Agencies agree to implement the following irrigation withdrawal arrangements to maximize the benefits of this site-specific plan to the streamflow conditions of Stream "X." This arrangement reflects the potential improvements to the existing irrigation system and irrigation management strategy, as well as the Participating Landowner's production needs.

From May 1 - July 15:

If discharge in Stream "X" is ≥ 200 cfs then the combined irrigation withdrawals for the enrolled land will be ≤ 35 cfs.

If discharge in Stream "X" is ≥ 150 to 200 cfs then the combined irrigation withdrawals for the enrolled land will be ≤ 30 cfs.

If discharge in Stream "X" is ≤ 150 cfs then the combined irrigation withdrawals for the enrolled land will be ≤ 20 cfs.

July 15 – September 1:

Regardless of discharge in Stream "X" the combined withdrawals for the enrolled land will not exceed 20 cfs.

After September 1:

All irrigation withdrawals from Stream "X" for the enrolled land will cease, per the associated periods of use for the Participating Landowner's water rights, including withdrawals for stock water.

IRRIGATION WATER MANAGEMENT

The proposed contour ditch flood system is designed to provide adequate water for maximum growth for grass hay and pasture grass during the peak water use period of the year. This period generally occurs in July and August when plant use will average about 0.15 inch of water per day. Peak rates will be as high as 0.17 inch per day. Effective precipitation and unusual temperature and wind conditions will affect the water use.

The design is based on the water holding capacity of the soils and the rooting depth of the plants. The soils and associated total Available Water Holding Capacities (AWHC) are indicated in Table 1G, and the distribution of soil types on the enrolled land are presented in Figure 4G. For soil groups that are a complex of several soils, the soil with the least AWHC that comprises at least 20 percent of the area is used for water management. You may choose to manage for the soil that has the least AWHC; however, the set times and contour ditch spacing required will make management very difficult for the increased production. An effective rooting depth of 3 feet is used for grass. If soil features such as coarse sand and gravel are less than 3 feet deep, the AWHC and effective rooting depths are adjusted accordingly. To ensure peak production

and reduce plant stress, you should ensure you irrigate when no more than 50 percent of the AWHC is depleted from the soil profile. This is referred to as the Management Allowed Deficit (MAD) and is usually measured in inches of water.

The irrigation frequency or time between irrigations, during the peak use period can be determined by dividing the MAD by the expected water use in inches per day. It will take grass approximately 13 days to utilize the 2 inches available water during the peak water use period.

The water use efficiency of the Participating Landowner's contour ditch system will be dependent on soil type, land slope and topography, as well as your management skills. The system irrigation efficiencies expected are indicated in Table 1G. If the system irrigation efficiency is 35 percent and a net irrigation of 2 inches is planned, a gross water application of 5.7 inches is required.

An average flow rate of approximately 34.4 cfs will be needed to meet the peak daily water use by the crop. This is based on the net peak daily use rate and the estimated system irrigation efficiency (Table 1G, Appendix G).

During water-short years ~~it will~~ be important to have the soil profile filled entering the peak water use period, or entering periods when water availability is less than demand. The moisture stored during periods of low water use will help offset water demands when stream flows are low. A soil moisture budgeting procedure that tracks soil moisture conditions, crop water use, and effective rainfall will assist the irrigator in proper irrigation scheduling.

Yearly net irrigation requirements will vary due to weather, crop conditions, and crop type. The total seasonal net irrigation requirement for grass is approximately 11.1 inches. A gross water application of 31.7 inches will be needed to satisfy a net irrigation requirement of 11.1 inches if the system irrigation efficiency is 35 percent.

The recommended irrigation set times and distance between contour ditches will depend on soil types, the net irrigation required, field slope, and field topography. Table 1G provides the recommended contour ditch spacing and set times for each condition. If more water is applied than the soil can hold, the excess will percolate through the soil profile and below the normal root zone. This is an inefficient use of water and labor. The deep percolation also may transmit contaminants to the groundwater.

Soil, water, and crop data, as well as recommended set times and ditch spacing, for various irrigation conditions are shown in Table 1G. The attached guides will help in scheduling irrigation for optimum crop production and good water management:

1) Specific soils information for your fields
2) Irrigation Water Requirements-Crop Summary Data
3) Scheduling Worksheet for Flood Irrigation
4) Feel and Appearance Method of Estimating Soil Moisture
5) Mont guide: Irrigation Water Management-When and How Much to Irrigate

6) Irrigation Water Management Self Certification Form (Required for those receiving incentive payments for IWM)
7) The Montana Irrigator's Pocket Guide

RIPARIAN HEALTH AND GRAZING MANAGEMENT

Prescribed Grazing

The ranch is currently operated as a cow-calf operation and runs 130 cow-calf pairs and 21 replacement heifers annually. It is fenced into three main management units and as such, combines several of the land uses into each unit (i.e. pasture and range land is fenced in with hay land). This has greatly limited management options and also has led to decreased resource conditions. The existing two grazing units (fields 4 for Unit 1 and fields 3, 7, 8, and 9 for Unit 2) are utilized as season long (spring-fall) pasture and Unit 3 (fields 1, 2, and 6) is utilized in the fall, after hay is processed, through spring (Figure 2G). Livestock are provided unrestricted access to riparian areas in all units. This practice has led to overutilization of range and riparian areas and has significantly reduced the productivity and available fish and wildlife habitat of the ranch.

To meet the riparian conditions required in the CCAA, as well as meet the landowners' objectives to maintain livestock numbers, a comprehensive grazing plan was developed using NRCS prescribed grazing guidelines. This plan utilizes rotational grazing to achieve livestock feed and forage balance, variation in season of use, managed livestock access to water, and improved livestock distribution. Supplemental livestock (5 bulls and 2 horses) and known wildlife (4 moose reside on the ranch year round and 20 head of elk winter on the ranch from December–March) also were calculated into the forage demand. The resulting plan will ensure riparian area recovery and will maximize the production of the ranch for the desired livestock.

The existing operation is producing well below the potential for the given soils, slope, climate, etc. For example, the range units are producing 25 to 65 percent of the potential with the majority only producing at 25 percent of potential in terms of species composition and productivity. This translates into the loss of Blue bunch wheatgrass, which is the most productive and drought tolerant species possible. The pasture and hay land also are producing below the potential and currently produce 65 percent of the potential.

To maximize the productivity of the ranch and improve the riparian conditions several changes are planned in the infrastructure (livestock water and fences) and management of the livestock. The ranch will be divided into 16 management units (1 is the headquarters) by fencing and will include 7 riparian pastures (Figure 3G).

The benchmark UNIT 1 will be divided into four units and will be used to sustain the replacement heifers. These units will be utilized in the spring-fall and will be operated on a short duration (6-day) rotation to encourage riparian area recovery and maximize available forage. Off-site livestock water will be piped to a stock tank with water originating from an existing well located in the headquarters field.

The benchmark UNIT 2 will be divided into four units and will be used, along with new units from the original Unit 3, to sustain the remainder of the cow herd during spring-fall. The riparian area was separated from the hay fields in order to create a riparian pasture (field 12) and will eliminate the concentration of livestock in the riparian area during winter (when significant damage can occur on willows). Livestock will be wintered and fed hay on the hay fields (fields 2 and 18). Winterized livestock water will be provided through the addition of two stock tanks located at the fence lines separating the hayfields with the riparian pasture. These tanks also will serve as supplemental water for the riparian pasture when it is utilized in the rotation. Another benefit of this plan is that unit 3/4 also was separated from the hay fields and can now be utilized earlier in the year without any negative effects to the hay crops. Livestock water will be provided by the irrigation ditches that transect this unit. The grazing units (unit 3/4 and 12) will be utilized in the spring-fall, along with fall use of the hay aftermath (units 2 and 18) and will be operated on a short 6-day rotation to encourage riparian area recovery and maximize available forage.

The benchmark UNIT 3 will be divided into seven units and will be used in rotation with the previously described units. All units will be operated on a 6-day rotation and will have off-site livestock water provided to the riparian units from a tank centrally located. Livestock water in Unit 15 also will be provided through a stock tank and will replace the original irrigation diversion that historically provided the rangeland with water.

FACILITATING PRACTICES

To implement the prescribed grazing plan, several changes are needed with regards to infrastructure on the ranch. The installation of 8.9 miles of fence, five livestock watering facilities, and 2.6 miles of pipeline will be required for the implementation of this site-specific plan.

CHANNEL MORPHOLOGY

The Agencies and the Participating Landowners agree that the combination of improved riparian health and stream flows will lead to significant improvements in channel morphology and function within 15 years, which is related to the habitat quality and complexity for grayling in the system. While no specific agreement needs to be reached at this time between the Agencies and the Participating Landowner it is critical to state the significance of compliance with the prescribed grazing plan and the management plan for irrigation withdrawals in terms of improving channel morphology and function. The Agencies and the Participating Landowner agree to monitor the channel morphology (including channel cross section and longitudinal profiles) on the enrolled property every 3 years for the life of the Agreement (Figure 4G).

V. ADAPTIVE MANAGEMENT PLAN

STREAMFLOWS

The Agencies and the Participating Landowner agree to revisit this agreement if--1) production and / or conservation goals are not being achieved, or 2) the landowner is meeting production goals with less water diversion allowed in this plan. Modification to the agreement must be in writing and agreed to by all parties, per the Terms and Conditions in this Site Specific Plan.

ENTRAINMENT

Should entrainment of grayling be identified as a population level threat, the Agencies and the Participating Landowner shall investigate alternative methods to prevent entrainment, as identified in the Agreement.

MIGRATION BARRIERS

The Participating Landowner shall consult with the Agencies prior to installing any structure that potentially may act as a migration barrier to grayling on the enrolled lands.

RIPARIAN HEALTH

The Agencies and the Participating Landowner shall revisit the grazing plan if--1) production and/or conservation goals are not being achieved, or 2) the riparian health is not improving as indicated by the assessment model used by NRCS to evaluate riparian health. Modification to the grazing plan must be in writing and agreed to by all parties.

CHANNEL MORPHOLOGY

If after 5 years the channel morphology of Stream "X' flowing through the enrolled lands has not improved or has continued to degrade the Agencies and the Participating Landowner agree to investigate conservation options that will lead to improvements. These options may include active stream restoration techniques such as physically restoring the channel to its "ideal" condition and/or accelerating vegetation community health by planting mature or sapling willow species.

VI. MONITORING

IRRIGATION

The landowner will document bi-weekly the amount of water diverted at each diversion structure and provide the data to MFWP every 6 months (i.e., frequency stated under Part XII of the Agreement – Compliance monitoring).

GRAZING

All grazing monitoring shall follow approved NRCS methodology and provided by NRCS to MFWP each year. Minimum grazing land monitoring documentation includes grazing use records outlining grazing periods and livestock numbers in each grazing unit. Monitoring data shall be used to make adjustments to grazing management as needed.

RIPARIAN HEALTH

Reference photo plots (two) will be established and maintained for each pasture; one where the stream enters the pasture (photo looking downstream) and one where the stream leaves the pasture (photo looking upstream). A photo will be taken at least once per year at each site to compare with reference (initial) conditions. The NRCS shall conduct Riparian Assessments every 5 years for the life of the agreement to monitor long-term trend of the riparian area.

STRUCTURE MAINTENANCE

The Participating Landowner will be responsible for inspecting and maintaining each diversion dam and headgate on enrolled lands to ensure they are functioning properly. The Participating Landowner will remove any sediment, debris, or blockage that restricts the flow; and will immediately repair any damage caused by vandalism, livestock, vehicles, or high flows. Normal wear to the structure due to weathering also must be repaired. Repair any areas around the structures that show signs of erosion to prevent further damage. The headgate will be shut off at the end of irrigation season to prevent water from entering the canal and to maintain stream flows.

VII. COMPLIANCE AND REPORTING

The Participating Landowner is responsible for providing copies of all required monitoring documentation to MFWP for inclusion in the Agreement's annual report

VIII. SITE-SPECIFIC PLAN DURATION

The Agencies and the Participating Landowner shall comply with the components of this site-specific plan for 10 years beginning on October 1, 2005. The regulatory assurances and the incidental take coverage provided by the Permit issued by MFWP are linked to compliance with this site-specific plan.

IX. COVERED ACTIVITIES

This site-specific plan covers the grazing, range management, irrigation, stock watering, and crop production activities as described in this site-specific plan. Coverage also is provided for activities associated with implementation of the conservation measures as described in or required by the site-specific plan. The assurances and incidental take authority provided under the Permit do not extend to incidental take resulting from changes in land-use not specified in the Site-Specific Plan.

X. LANDOWNER AND AGENCY RESPONSIBILITIES

PARTICIPATING LANDOWNER

1) Permit the Agencies to conduct assessment of baseline environmental conditions and land use practices leading to the cooperative development of a site-specific plan for their enrolled lands.

2) Implement this site-specific plan consistent with the Agreement, including water conservation measures to improve streamflows, eliminate migration barriers, reduce entrainment, improve riparian habitat, and reduce impairments to water quality.

3) Allow Agency access to enrolled lands, with prior notification from agencies, to assess environmental conditions, monitor success of conservation practices, and ensure compliance.

4) Comply with the specific conservation measures agreed upon within this site-specific plan.

MONTANA FISH, WILDLIFE, AND PARKS

1) Carry out responsibilities for implementing conservation measures as outlined in the Implementation Schedule of this agreement.

2) Actively pursue funding to assist the landowner with implementation of the conservation measures; however, this site-specific plan does not guarantee funding assistance to the participating landowner.

3) If needed, translocate grayling gametes into suitable unoccupied habitat on the enrolled lands project area to meet restoration targets for distribution and abundance of grayling.

4) Carry out responsibilities for biological monitoring and compliance as outlined in this site-specific plan and/or in the CCAA.

5) Suspend or revoke Certificate of Inclusion if the landowner is in non-compliance of the site-specific plan.

USDA NATURAL RESOURCES CONSERVATION SERVICE

1) Carry out responsibilities for prescribed grazing and riparian health monitoring as outlined in the umbrella CCAA Agreement and this site-specific plan.

2) Carry out responsibilities for designing and implementing conservation measures as outlined in the Implementation Schedule (Section VIII) of this Agreement.

3) Actively pursue funding to assist the landowner with implementation of the conservation measures; however, this site-specific plan does not guarantee funding assistance to the participating landowner.

XI. IMPLEMENTATION SCHEDULE

Every effort will be made to implement the conservation measures as soon as possible to provide maximum immediate benefit to grayling and minimize authorized take under this Agreement. At a minimum, the implementation of conservation measures in this site-specific plan will meet the Agreement's timeline to reduce the threats to grayling on the enrolled property (see Table 5 in Agreement).

XII. COMPLIANCE MONITORING

Monitoring of compliance will occur at a minimum of every 6 months for the duration of the site-specific plan. As part of the compliance monitoring process the Participating Landowner will provide MFWP documentation of the amount and timing of irrigation on a monthly basis. Irrigation withdrawals must be recorded for each irrigation ditch a minimum of twice a month (i.e., once every 2 weeks).

XIII. TERMS AND CONDITIONS OF THE SITE-SPECIFIC PLAN

This site-specific plan is subject to all the Terms and Conditions described in the Agreement (**Part XVI**). It also is subject to the following additional Terms and Conditions:

A. MODIFICATIONS OF THE SITE-SPECIFIC PLAN.

Any party may propose modifications to this site-specific plan by providing written notice to the other parties. Such notice shall include a statement of the proposed modification and the reason for the modification. The parties will attempt to respond to proposed modifications within 30 days of receipt of such notice. Proposed modifications will become effective upon all parties' written approval and completion of any necessary environmental analysis as required by the National Environmental Policy Act, ESA, or any applicable Federal or State laws.

B. CERTIFICATE OF INCLUSION SUSPENSION OR REVOCATION IN CASES OF NON-COMPLIANCE.

The MFWP and USFWS may suspend or revoke, in whole or in part, the Certificate of Inclusion for cause in accordance with the laws and regulations in force at the time of such suspension or revocation (50 CFR 13.28(a)). Participating Landowners will be given written notice, by MFWP and/or USFWS, of documented non-compliance with requirements of the Agreement and their site-specific plan.

C. Termination of the Site-Specific Plan.

As provided for in Part 8 of the USFWS' CCAA Policy (64 FR 32726, June 17, 1999), the Participating Landowner may, for good cause, terminate implementation of the site-specific plan's voluntary management actions prior to the plan's expiration date, even if the expected benefits have not been realized. However, if the site-specific plan is terminated without good cause, the Property Owner is required to surrender the enhancement of survival permit at termination, thus relinquishing his or her take authority (if the species has become listed) and the assurances granted by the permit. The Property Owner is required to give [90] days written notice to the other Parties of its intent to terminate the site-specific plan, and must give the USFWS an opportunity to relocate affected species within [90] days of the notice.

D. Succession and Transfer of Property.

This site-specific plan shall be binding on and shall inure to the benefit of the Parties and their respective successors and transferees, (i.e., new owners) in accordance with applicable regulations (50 CFR 13.24 and 13.25). Should any non-Federal property owner who is participating in this CCAA transfer any interest in his/her property, the non-Federal property owner will notify MFWP at least 60 days prior to any transfer. The MFWP, or at the request of MFWP, the USFWS, will contact the new owner to explain the responsibilities applicable to the property to determine if there is interest in participation in the Agreement. The MFWP will notify the USFWS of transfer of ownership of enrolled lands and the results of contacts with new property owners. The responsibilities of an existing executed site-specific plan and its associated Certificate of Inclusion may be transferred to a new landowner or entity holding an interest in the land (e.g., lessee) if the proposed landowner agrees in writing to implement all the commitments of the site-specific plan and to comply with the terms of the 10(a)(1)(A) permit. Assignment or transfer of the site-specific plan shall be governed by USFWS regulations in force at the time.

E. Regulatory Assurances.

The USFWS provides the Participating Landowner the ESA regulatory assurances found at 50 CFR §§ 17.22(d)(5), 17.32(d)(5) and in the Agreement.

F. Remedies.

Each party shall have all remedies otherwise available to enforce the terms of this site-specific plan, except that no party shall be liable in damages for any breach of this site-specific plan, any performance or failure to perform an obligation under this site-specific plan, or any other cause of action arising from this site-specific plan.

G. Dispute Resolution.

The parties agree to work together in good faith to resolve any disputes, using dispute resolution procedures agreed to by all parties.

H. AVAILABILITY OF FUNDS.

Implementation of this site-specific plan is subject to the requirements of the Anti-Deficiency Act and the availability of appropriated funds. Nothing in this site-specific plan will be construed by the partners to require the obligation, appropriation, or expenditure of any money from the U.S. Treasury. The partners acknowledge that the USFWS and NRCS will not be required under this site-specific plan to expend any Federal agency's appropriated funds unless and until an authorized official of these agencies affirmatively acts to commit to such expenditures as evidenced in writing. Further, all partners to this Agreement agree and understand that the implementation of the Agreement is dependent upon the lawful appropriation, authorization, and allocation of funds. This Agreement does not obligate the appropriation or expenditure of State funding. All expenditures by State agencies must comply with all applicable statutes and regulations, and must be independently authorized by legislative appropriation and any appropriate statutory authorities.

I. NO THIRD-PARTY BENEFICIARIES.

This site-specific plan does not create any new right or interest in any member of the public as a third-party beneficiary, nor shall it authorize anyone not a party to this site-specific plan to maintain a suit for personal injuries or damages pursuant to the provisions of this site-specific plan. The duties, obligations, and responsibilities of the partners to this site-specific plan with respect to third parties shall remain as imposed under existing law.

J. RELATIONSHIP TO AUTHORITIES.

The terms of this site-specific plan shall be governed by and construed in accordance with applicable State and Federal laws. Nothing in this site-specific plan is intended to limit the authority of the MFWP and USFWS to fulfill its responsibilities under State and Federal laws. All activities undertaken pursuant to this site-specific plan or the permit must be in compliance with all applicable State and Federal laws and regulations.

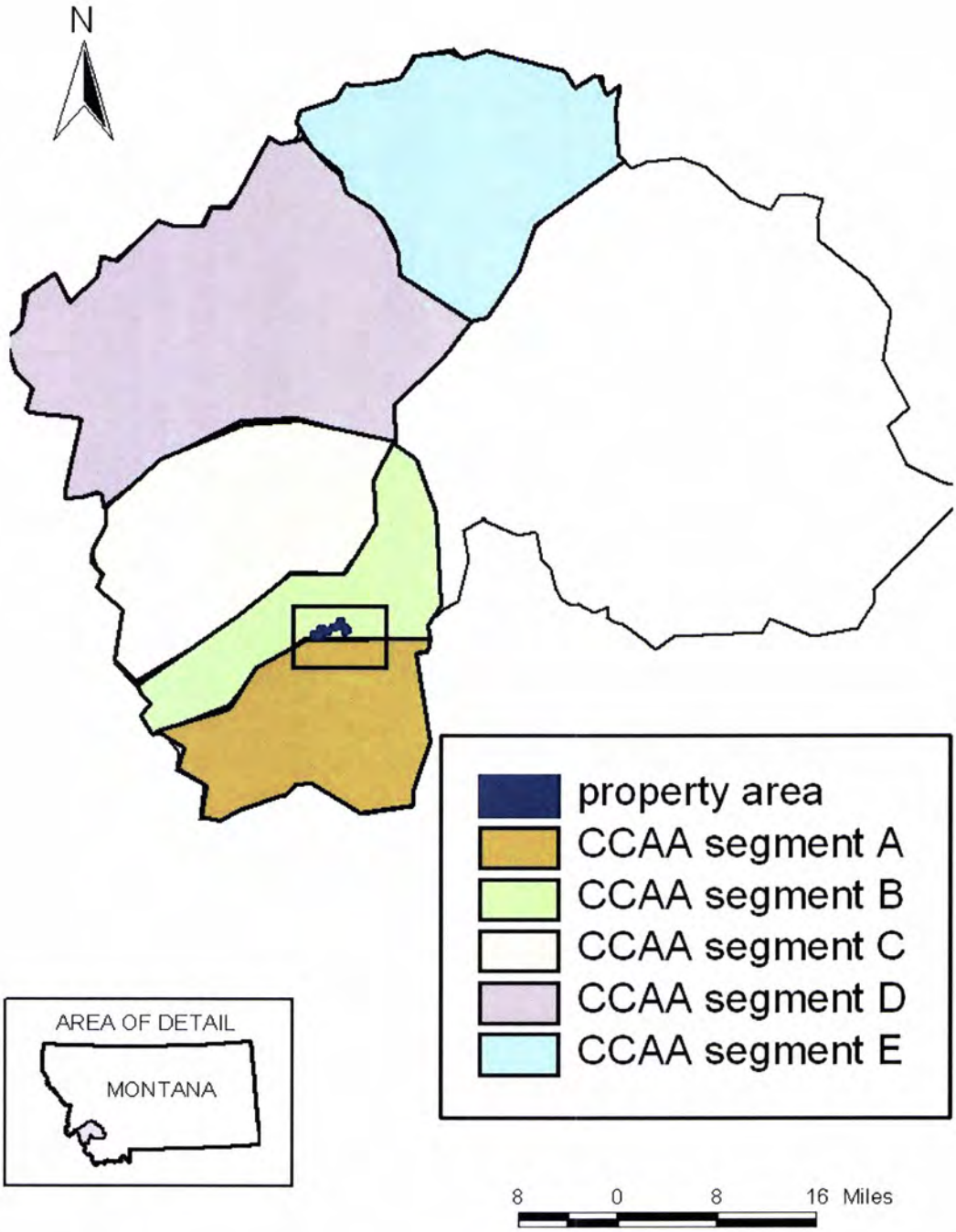

Figure 1G. The location of enrolled land for Landowner "A" in relation to the CCAA management segments.

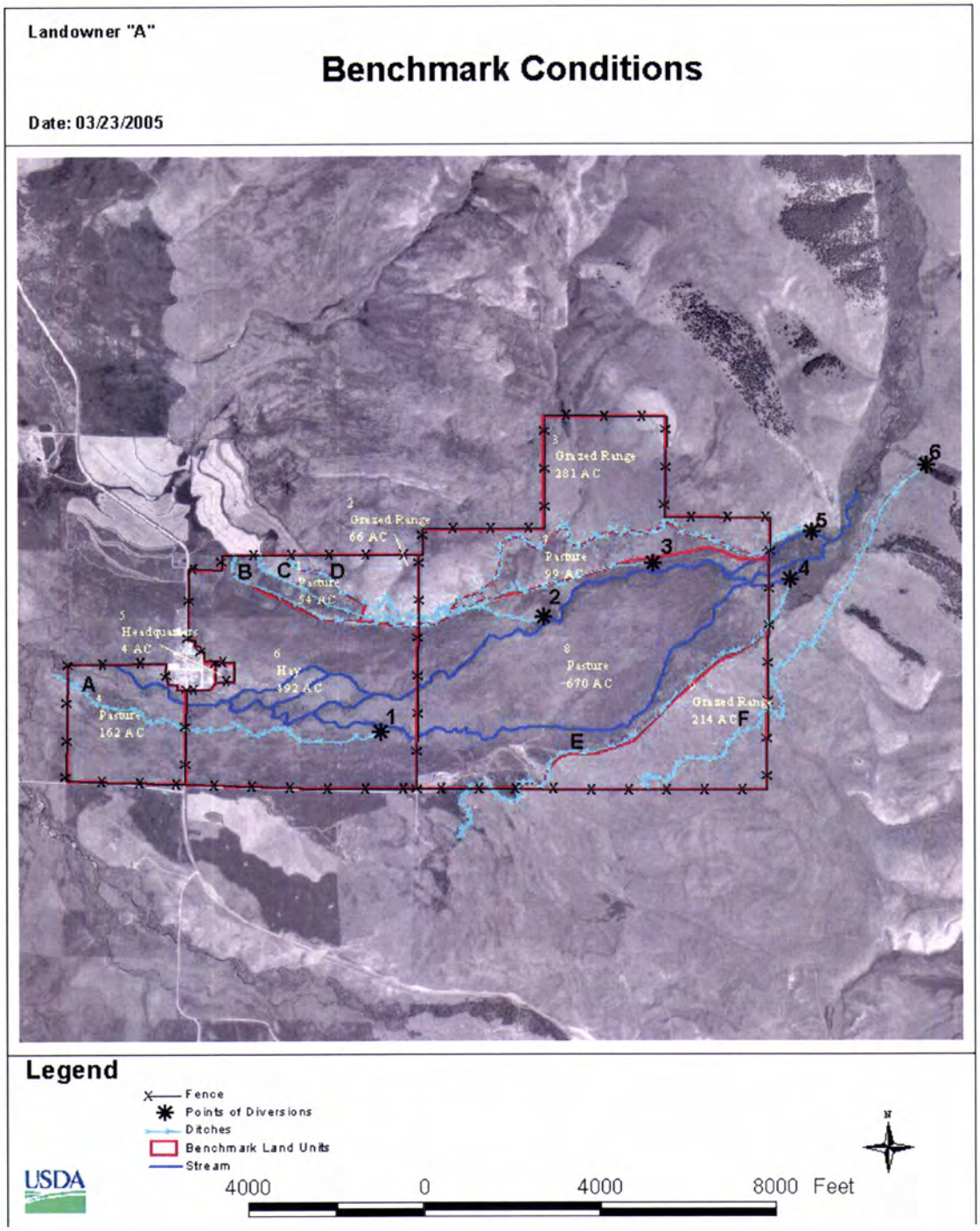

Figure 2G. The location and existing land management structures on the enrolled land for Landowner "A."

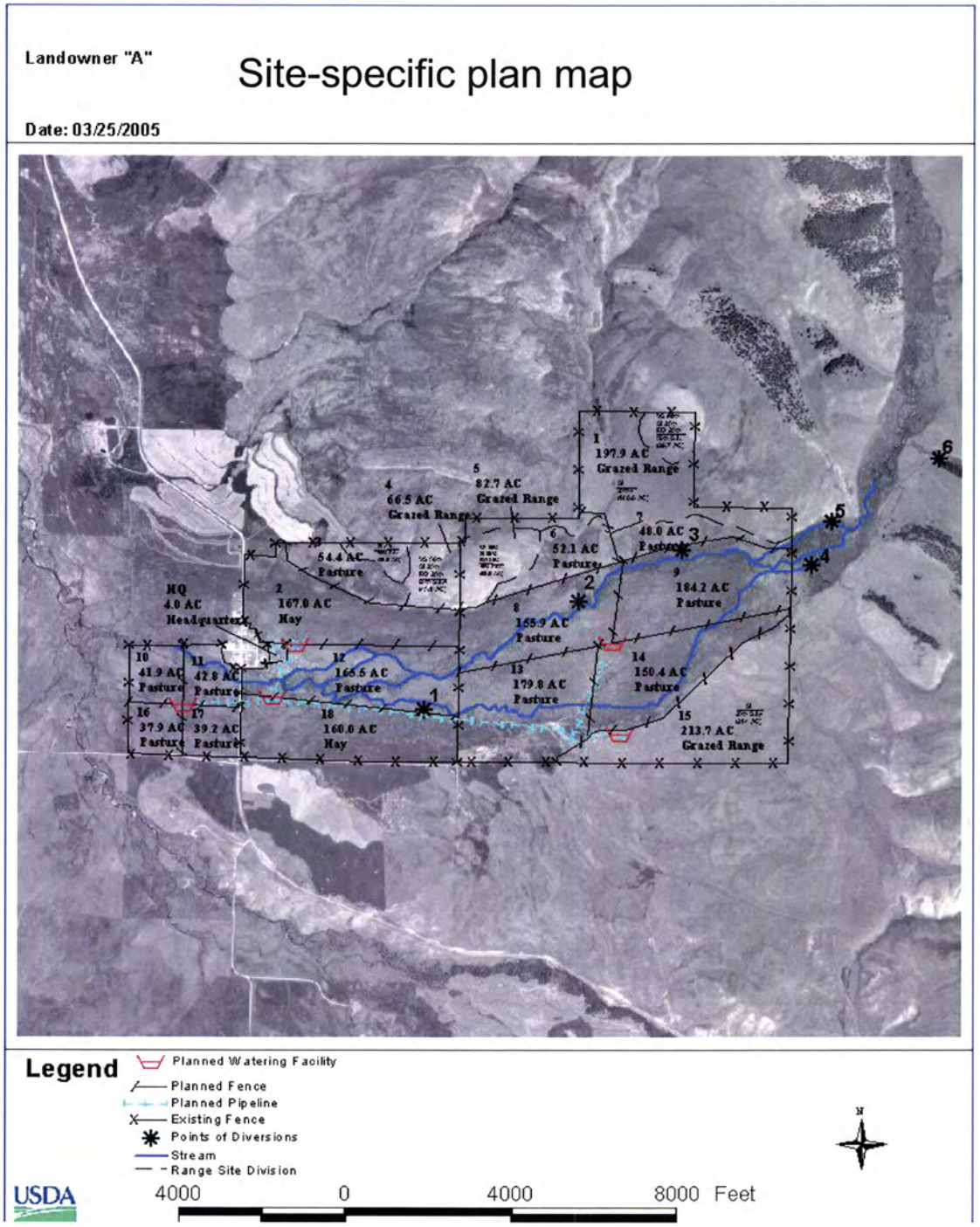

Figure 3G. The planned land use for the enrolled land of Landowner "A" and overview of structures needed to implement the site-specific plan.

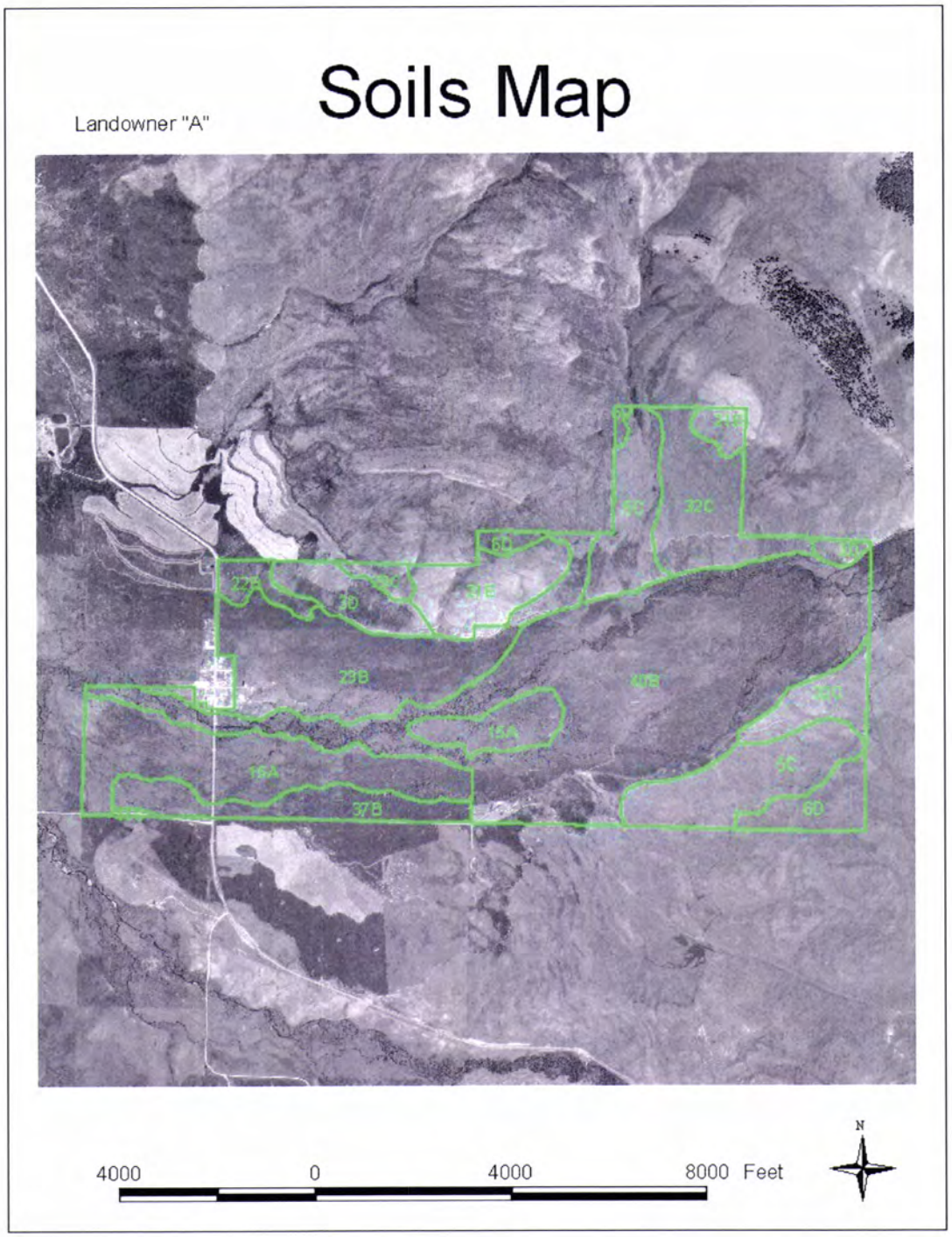

Figure 4G. Distribution of soil mapping units on enrolled lands of Landowner "A" used to implement the landowner's irrigation water management plan. Soil types were used to derive the irrigation water management plan guidelines presented in Table 1G.

Photo 1G. Riparian and stream bank "trouble spot" along Stream "X."

Photo 2G. The current condition of a headgate on the enrolled land of Landowner "A."

Photo 3G. The current condition of diversion structures on the enrolled land of Landowner "A." The current diversion is called a "push up" diversion, that is maintained by redistributing (pushing up) streambed gravels with heavy equipment.

Photo 4G. The proposed diversion structure to replace and improve the current push up diversion structures found on the enrolled land of Landowner "A." This "rock-vane" diversion is self-sustaining (no streambed disturbance apart from installation) and allows fish passage.

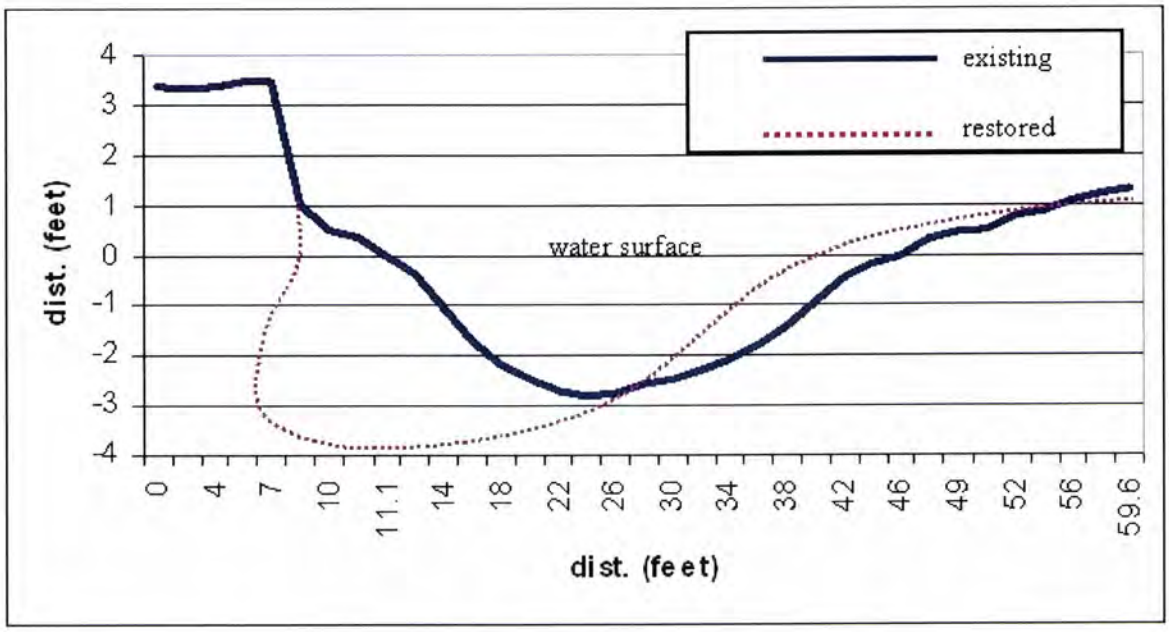

Figure 4G. Cross-sectional profile of Stream "X" showing the existing and expected restored morphology.

Table 1G. Irrigation Water Management Plan under the example site-specific plan. Gross irrigation requirements assume water is available when needed. The location of the specific irrigation requirements by soil type is presented in Figure 4G.

Soil Mapping Unit	Soil Name	Total Available Waterholding Capacity in Top 3 feet of Soil[1] (inches)	Management Allowable Deficit[2] (net irrigation reqd inches)	Estimated System Irrigation Efficiency[3] (%)	Gross Water Application per Irrigation[4] (inches)	Estimated Number of Irrigations per Year for Grass[5]	Gross Irrigation Reqd per Year for Grass[6] (inches)	Acres Irrigated	Water Diverted per Year[7] (est acre-feet)	Flow Reqd During Peak Use Period (est cfs)	Recommended Contour Ditch Spacing[8] (feet)	Recommended Set Time to Apply Mgmt Allowed Deficit[9] (hours)
3D	Libeg Stony Monad	4	2	28.1	7.1	5 to 6	39.5	44	145	1.1	90	15
5C	Hairpin Silt Loam	6.1	3	38.7	10.4	3 to 4	38.7	590	1902	14.7	125	30
15A	Fox Gulch Copperbasin Wisdom	4.6	2.3	40.7	5.6	5	27.3	59	134	1	250	19
23B	Wisdom Sheweg Mooseflat	2.8	1.4	32.9	4.2	8	33.7	296	831	6.4	175	10
32C	Philipsburg Silt Loam	6	3	27.1	11.1	3 to 4	40.9	44	150	1.2	125	15
37B	Wisdom-Big Hole	4.6	2.3	28.9	7.9	5	38.4	148	473	3.7	175	19
40B	Moose Flat Loam	2.8	1.4	33.8	4.1	8	32.8	296	809	6.3	175	10
								TOTAL	**4444**	**34.4**		
									Average = 3.0			

[1] Based on a 3-foot effective rooting depth for grass (Reference Table 3.2 and 3.4 Montana Irrigation Manual and soils limitations).
[2] Based on 50% allowable depletion of Total Available Waterholding Capacity (Reference Montana Irrigation Manual Table 3.2 and 3.3).
[3] Based on soils, field slope, topography, management factors, etc. (Reference Montana Irrigation Manual Table 6.5 and Farm Irrigation Rating Index).
[4] Management Allowed Deficit (or Net Irrigation Required) divided by System Irrigation Efficiency.
[5] Seasonal Net Irrigation Requirement for Crop divided by Management Allowable Deficit (or Net Irrigation Required).
[6] Net Irrigation Requirement for the season divided by System Irrigation Efficiency (Reference Irrigation Water Requirements software).
[7] Acre-feet per acre needed times acres.
[8] Based on Soil Intake Family, Net Irrigation Required, Field Slope, and Topography (Reference Montana Irrigation Guide Table 6.4).
[9] Based on Soil Intake Family and Land Slope (Reference Montana Irrigation Guide Table 6.4).

IN WITNESS WHEREOF THE PARTIES HERETO have executed this site-specific plan to be in effect on the date of the last signature below.

Participating Landowner	**Date**
Montana Fish, Wildlife and Parks	**Date**
U.S. Fish and Wildlife Service	**Date**

DRAFT EA APPENDICES

Appendix 1. Draft Candidate Conservation Agreement with Assurances for fluvial Arctic grayling in the upper Big Hole River

Appendix 2. Montana Fish, Wildlife and Parks electrofishing and fish handling protocols

A. ELECTROFISHING METHODS POLICY

INTRODUCTION

The growing interest in and use of Montana's fisheries resources by the public places ever increasing demands for obtaining information about our fish populations. Electrofishing has been a common fisheries sampling tool for over thirty years in Montana and it continues to be an important method for sampling fish populations today. Electrofishing is one of the few methods that allows fishery professionals to quantitatively sample fish populations for assessment of, among others, population dynamics, age and growth, and movement.

Over the years, injury to fish and other organisms as a result of electrofishing was known to occur but was generally considered to be of a minor and inconsequential nature. However, in 1988 a publication by Sharber and Carathers documented serious injury to large rainbow trout captured by electrofishing. The resulting publicity caused many agencies, including the Montana Department of Fish, Wildlife and Parks (MDFWP), to examine their own electrofishing practices.

Since 1989, MDFWP has tested a variety of electrofishing systems on a number of fish species (Fredenberg, W., 1992. *Evaluation of electrofishing-induced spinal injuries resulting from field electrofishing surveys in Montana.* Montana Department of Fish, Wildlife and Parks, Helena. Unpublished report. 43 p.) The study demonstrated a significant rate of injury to certain fish species with particular electrofishing gear. These results prompted a re-evaluation of previously accepted electrofishing practices and the development of guidelines for acceptable equipment type and use.

Electrofishing may result in adverse consequences for affected fish of a variety of species and life history stages. The presence of injuries under some circumstances dictates a conservative policy until more specific data are available. Injury should be assumed to occur unless information indicates otherwise. It is therefore the determination of the Fisheries Division that all electrofishing by any entity operating in the waters of the State of Montana conform to the following policy. Modification of this policy may be adopted as additional information becomes available.

POLICY

It is the policy of the MDFWP that all electrofishing conducted in the waters of the State of Montana conform to the following standards to minimize injury to aquatic life. This policy shall apply to employees of MDFWP, other state and federal agencies and those entities operating under the authority of a collector's permit issued by MDFWP. The only exceptions to this policy are for permanent collections where all fish sampled are killed, or for experimental purposes. Exceptions must be approved by the Fisheries Division Administrator and such requests must be submitted with written justification at least sixty (60) days in advance. No other electrofishing may be conducted. Any violation of this policy will be referred to the Administrator of the Fisheries Division for corrective action.

STANDARDS

1. Each electrofishing effort should be preceded by an analysis weighing anticipated negative impacts on aquatic life against benefits to be gained from the data collected. Other methods of data collection should be considered in this analysis.
2. Electrofishing over spawning areas containing eggs or larvae will be conducted only when eggs are needed for government hatcheries or the data to be collected are critical to the well being of the fish population as determined by the regional fisheries manager.

3. The use of electrofishing gear in waters containing Species of Special Concern should be minimized. Prior approval must be given by the regional fisheries manager before electrofishing in these waters.
4. Electrofishing in areas where threatened or endangered aquatic species may be encountered is restricted to situations in which electrofishing gear and methodology have been shown to be of minimal impact to that species or a recovery team has determined that electrofishing will be in the best interest of the threatened and endangered species. Authorization for "take" from the U.S. Fish and Wildlife Service must be obtained before electrofishing in waters that contain federally listed threatened or endangered species.
5. Electrofishing units which produce only 60 HZ pulsed DC waveforms are prohibited (e.g., Coffelt VVP2C, VVP2E, etc.). Settings on units that provide rectified sine, capacitor discharge or AC waveforms may not be used.
6. Settings on electrofishing units that produce pulse rates in excess of 30 HZ per second are not allowed in waters containing self-sustaining salmonid populations. The use of higher pulse rates for collection of warm/coolwater species should occur only after consideration has been given to the effect of this electrical form on these species and prior approval has been received by the regional fisheries manager.

PRACTICES

The following guideline table should be consulted before selecting and operating electrofishing equipment. The mention of specific brands and models of equipment is based solely on the electrical characteristics specified above. Other brands and models are excluded from this table due to lack of information. The MDFWP does not endorse any specific brand or model of electrofishing equipment.

Questions or comments on this policy should be directed to Fisheries Division, MFWP, PO Box 200701, Helena MT 59620-0701.

MONTANA ELECTROFISHING GUIDELINES

PARAMETER	*RECOMMEND*	*AVOID*
Pulse Rate	30 Hz or less	Over 30 Hz
Pulse Duration	*5 milliseconds*	*10 milliseconds or >*
Pulse Shape	*Smooth DC – Best* *CPS – Second Choice* *Square – Third Choice*	*Rectified Sine* *Capacitor Discharge* *AC*
Voltage	*High Conductivity= use low voltage* *Low Conductivity = use high voltage*	
Shocker Box	*Coffelt Mark 22M* *Coffelt Mark 22 CPS* *Coffelt VVP 15 (smooth DC or low pulse rates)* *Leach/Fisher (smooth DC only)*	*Coffelt VVP2C* *Coffelt VVP2E* *Leach/Fisher Pulse*
Generator	*Low Conductivity (<200 umhos/cm 2,500 W or >)* *High Conductivity (>200 umhos/cm) 5,000 W or >)*	*Inadequate power supply/generator*
Electrode	*Bigger is Better – Always use largest possible anode except in highest conductivity water (800 umhos/cm or >)* *Always maximize cathode size, in metal boats use the boat.*	*Small point anodes such as a single dropper.* *Never use small cathode.*
Method	*Mobile Anode – Best*	*Never allow fish to lie in field*
Intensity	*Turn power down to the lowest effective level*	*Excessive current*
Brands	*Look for brands. If numerous, turn power down.*	*Branded fish are an indicator of spinal injury.*

MONTANA ELECTROFISHING GUIDELINES

PARAMETER	***RECOMMEND***	***AVOID***
Fish Species	*Most susceptible to spinal injury –* *Rainbow Trout* *Cutthroat Trout* *Brown Trout* *Less Susceptible* *Arctic Grayling* *Unknown Susceptibility* *Warmwater Spp.*	*Never assume fish are not being injured based only on external appearance.*
Fish Size	*Exercise caution with large fish.*	*Do not assume small fish are immune to spinal injury.*
Environmental Variables	*Record water temperature and conductivity and adjust methods accordingly.*	*Do not ignore water conditions.*
Eggs	*Assume eggs in redds have potential to be damaged.*	*Avoid shocking spawning females and areas with redds.*
Crew	*Use trained crews.*	*Avoid multiple-dipping into the field and other factors that will stress fish.*

B. ELECTROFISHING SAFETY POLICY & GUIDELINES

All electrofishing operations will be conducted in accordance with Montana Department of Fish, Wildlife and Parks electrofishing guidelines, using only trained electrofishing crew members. All equipment must be constructed and operated according to approved electrofishing guidelines.

General Electrofishing Guidelines

Electrofishing guidelines are set up to provide the groundwork for electrofishing crews to safely and efficiently perform their work duties. There are several factors affecting a safe, efficient electrofishing operation; primary among these are experienced personnel, safe equipment, and updated training.

I. Experienced Personnel – All electrofishing crews must be led by a crew leader who has taken a Fish, Wildlife and Parks safety standards course.

   a. Crew leader – Must receive formal training in water safety, electrofishing theory and electrical safety.

   b. Crew member – Must receive some form of water safety instruction and be instructed by the crew leader in current electrofishing safety techniques for expected electrofishing type and water conditions.

II. Safe Equipment – Electrofishing equipment must be maintained in good working order. It must be constructed and operated according to Fish, Wildlife and Parks safety standards. The crew must be trained in its safe operation and maintenance.

III. Guidelines for Specific Electrofishing Operations – Each type of electrofishing has its own specific operational and safety procedures, which the crew leader is responsible for implementing.

IV. Continued Safety Training – Safety training of all electrofishing crews will be updated with new equipment and safety procedures as they become available.

Specific Electrofishing Guidelines

I. Experienced Personnel

A. All fisheries personnel that use electrofishing equipment as a management tool will be familiar with equipment and its safe operation.
B. At least one member of each electrofishing crew (crew leader) will have taken the Montana Department of Fish, Wildlife and Parks electrofishing safety course. All other crew members must take a standard one day electrofishing safety and training course taught by a trained crew leader which will include equipment and safety checklists and a "dry run" with no electricity in the water.
C. All electrofishing crew members must be able to swim 25 yards with a personal flotation device (life jacket) and waders on.
D. At least two members of every electrofishing crew must have current certification in CPR (Cardio-Pulmonary Resuscitation).
E. All crew members must be physically fit and must report known health problems to their supervisor.

II. Safe Equipment

A. Personal Equipment
    1. All personnel on the electrofishing crew must be equipped with waterproof footwear that is free of leaks. Belted chest-high waders or neoprene waders with slip-resistant soles are generally recommended for most electrofishing to provide adequate boot height to prevent body contact with the water. Neoprene waders are available for cold weather electrofishing.
    2. All personnel on the electrofishing crew must wear waterproof rubberized gloves that are free of leaks.
    3. The wearing of polarized sunglasses is recommended to increase in-water visibility (safety) and the effective retrieval of fish.
    4. At the crew leader's discretion (with the exception of boom shocking on large rivers or in lakes), crew members will wear a personal flotation device.
    5. All electrofishing boats must carry a first aid kit. Spare clothing and fire-starter supplies, packed in a waterproof storage bag, are also recommended.

B. General operational safety procedures

1. The anode should never touch the cathode or any other metal equipment.
2. All equipment will be given a thorough inspection before use.
3. Electrofishing will not be conducted if climatic or water conditions are such as to pose safety problems beyond those normally expected.
4. If any person feels an electric shock, even minor, the electrofishing operation must be shut down and repaired. A report on the incident must be given to the regional fisheries manager or your immediate supervisor.
5. "Dip" net handles that have metal cores will be covered with a non-conductive material and then frequently inspected for cracks. Rubber butt-caps must be in place.

III. Guidelines for Various Types of Electrofishing

A. Large River Fixed-Electrode (boom) Electrofishing; generally jet-boat propulsion but may also be rowed.

1. A minimum crew of two personnel, of which at least one must be a trained crew leader.
2. Only crew members experienced in motorized river boat operation may drive the electrofishing boat. Untrained boat operators may drive the boat only under the direct supervision of the trained personnel by their side.
3. The electrofishing boat can be constructed of either metal or nonmetal, and when it is of metal construction, the hull of the boat should be used as a cathode.
    a. All internal metal equipment must be grounded to the boat.
    b. Skid-proof decking is required on the netting platform.
4. There should be a guard rail 36-48 inches above the netting platform to protect "dip" netters from falling out of the boat during electrofishing operation.
5. "Positive" kill switches for the electrofishing circuit must be installed, with one switch in easy reach of boat operator and one for the dip netter(s). It is recommended that a "positive" kill be installed for the boat operator that will also shut off the generator.
6. Crew leader should have a good knowledge of the water hazards present in each of his electrofishing sections. All new sections must be "run" in the boat prior to electrofishing.
7. A functional fire extinguisher must be carried in a readily-accessible location in the boat.
8. A first-aid kit must be carried in the boat.
9. Crew members must wear some form of personal flotation device at all times.
10. An extra change of clothing and dry matches are recommended for crew members, if space is available.
11. Wearing of hearing protection devices is optional but recommended.
12. Night electrofishing
    a. Primary lighting must be a 12-volt system to avoid blackouts if the generator malfunctions. A 110- or 220-volt lighting system is recommended as a secondary or accessory system.

b. The electrofishing boat must carry a fully charged spare 12-volt battery and a flashlight.
c. The boat must be equipped with a 12-volt spotlight hand-held by the driver and used to navigate boating hazards. The 12-volt system must be semi-permanently grounded to prevent possible blackouts from circuit disruption (not alligator clips).
d. All lighting should be equipped with in-line switches rather than using a battery terminal disconnect.
e. Night electrofishing will be conducted only after the reach or body of water has been thoroughly scouted and preferably electrofished during daylight hours first.
f. Electrofishing boats should be equipped with internal lighting sufficient to light the deck and the area behind the deck around the fish holding tank.
g. On large or remote lakes or streams it may be advisable to carry an extra motor. At a bare minimum, night shocking crews should have sufficient gear to spend the night out if a breakdown occurs.

13. Electrofishing observers
Untrained observers will be allowed as a secondary dipnetter only after a thorough briefing on the safety aspects of the operation, and only when accompanied on the netting platform by a trained crew member (primary dipnetter).

B. Drift Mobile or Boom Electrofishing (no motor)
This refers to an electrofishing operation where two people remain in the boat and one person in the water controls the boat, generally small or medium-sized rivers.

1. A minimum crew of two personnel of which one must be a trained crew leader, with only experienced personnel handling the boat.
2. Electrofishing boat must be constructed of a non-conductive material with all internal metal equipment having a common ground, but not grounded to the external cathode.
    a. Skid-proof decking is required on the netting platform.
    b. Only plastic gas containers may be used.
3. There must be a 36-48 inch guardrail to protect netters from falling out of the boat during the electrofishing operation.
4. Mobile anode handles must be made of a non-conductive material and electric cord frequently inspected for weak spots.
5. "Positive" kill switches must be installed in the electrofishing circuit, with one located near boat operator and one near "dip" netters and anode operator. It is recommended that the rear kill switch also be installed so that it will kill the generator.
6. Crew leader should have a good knowledge of water hazards present in each shocking section.
7. Wearing of hearing protection is optional, but is recommended.
8. A functional fire extinguisher must be carried in the boat, mounted in a readily accessible location.
9. Crew members must wear some form of personal flotation device unless the crew leader designates it optional on a particular water.

10. It is recommended that crew members should have an extra change of clothes and dry matches, if space in the boat is available, especially during cold weather shocking.
11. No observers will be allowed in the electrofishing boat. They must either observe from the bank or from another boat.

C. Portable Drift Electrofishing

This type of electrofishing is a hybrid of drift and bank shocking where a boat is used to carry the generator and other shocking equipment, but electrofishing personnel do not normally ride in the boat (Crawdad shocking).

1. A minimum crew of three personnel of which one must be a trained crew leader, with only experienced personnel handling the boat and shocker unit.
2. The electrofishing boat must be constructed of a non-conductive material with all internal metal having a common ground, but not grounded to the external cathode. Only plastic gas cans can be carried in the boat.
3. Mobile anode handles must be made of a non-conductive material and electric cord frequently inspected for weak spots.
4. "Positive" kill switches must be installed in the electrofishing circuit, with one located near the boat operator.
5. Crew leader should have a good knowledge of water hazards present in each shocking section.
6. Wearing of hearing protection is optional.
7. A fire extinguisher must be carried in the boat.
8. Crew members must wear some form of personal flotation device unless the crew leader designates it optional on a particular water.
9. It is advisable that crew members have an extra change of clothing and dry matches.
10. No observers will be allowed in the immediate vicinity of the electrofishing operation.
11. In deep water the anode operator may sit (not stand) on the foredeck of the boat. The dipnetter may not ride in the boat under any circumstances while the electrofishing operation is under way.

D. Backpack Electrofishing

1. A minimum crew of two personnel of which one member must be a trained crew leader.
2. The backpack unit must be equipped with a quick release belt.
3. When battery-powered units are used, a gel-cell leak-proof battery should be used to minimize acid burn possibilities.
4. An "excessive tilt" electrical shutoff for electric current will be installed on the backpack unit.
5. Mobile anode must contain a "deadman" type switch in the handle to break the electrical current. The handle must be constructed on a non-conductive material. Taping down the deadman switch is a serious safety hazard, and is prohibited.
6. Observers may be used in this type of electrofishing operation, but only as a secondary dipnetter or to transport fish up or downstream to "livecars".

E. Bank Electrofishing

This refers to the method of placing a generator on the bank and running a cord upstream or downstream. Due to the safety implications this method should be avoided unless absolutely necessary.

1. A minimum crew of two personnel of which one member must be a trained crew leader.
2. The bank electrofishing unit (generator and electrofishing box) must have a common ground to earth to reduce shock hazard.
3. The bank electrofisher must have a "positive" kill switch for both the electrode operator and the dip netter. These positive kill switches must be either made waterproof or operate off of a 12 volt safety circuit.
4. Observers must remain on the stream bank and not enter the steram during the electrofishing operation.

Montana Fish, Wildlife & Parks

Fisheries Division
Gill Netting Guidelines
2002

Gill nets are a standard management tool, widely used within the Fisheries Division. They are also potentially lethal to personnel who utilize them. The following suggestions on conditions for use of gill nets have been developed by the Electrofishing/Water Safety Committee to provide guidance for safe working conditions for those new to gill net use, and as a reminder for more experienced personnel.

1. Never, ever, work alone! Gill nets have a deadly affinity for zippers, pull tabs, buttons, rings, and fingers. Entanglement in a net can be impossible to escape without assistance. Do not set or pull gill nets by yourself.
2. Dress for success. Minimize exposed clothing with buttons, zippers, etc. that are prone to tangling. Some raincoats, hooded sweatshirts, etc. are well-adapted to this operation. Remove rings, watches, nose rings, or earrings, before handling nets.
3. Life Preservers. Wear them always, preferably under smooth external clothing.
4. Boats. Use enough boat for the water you are on! Float tubes, inflatable vinyl rafts, etc. will not do the job. The boat must be sufficient to handle the worst-case scenario, which includes hung up nets or bad weather. Use great care with motors. An entangled motor will stall, causing the boat to turn stern toward the waves and swamp in rough water.
5. Weather. Check the forecast! A boat suitable for setting nets in light water may be totally unsafe for rough water retrieval. If the nets cannot be safely pulled, let them fish until the weather improves. Better the fish die than you.
6. Net Loss. No one wants a lost net. They fish for a long time. Use adequate anchors and strong buoy lines. Be sure that both ends are marked with brightly-colored buoys and identified with DFWP lettering. Floating nets should be marked in several places along their length.
7. Helicopter Netting. This is an irreplaceable but inherently dangerous technique for sampling mountain lakes. Always wear a life preserver. A lifeline may be useful. Never throw anything; the rotors are unforgiving. The pilot cannot help you so be extremely cautious.
8. Non-target Catches. Make maximum use of buoys to warn away swimmers, divers, and boaters. Talk to people on the lake and tell them nets are out. The potential for fatalities is real. Avoidance of areas and times of heavy public use helps reduce risk. There are major legal and emotional consequences to an accident. Don't be the first!

Appendix 3. Environmental Evaluation instructions and worksheet (NRCS-CP-52) used by USDA Natural Resources Conservation Service

Instructions for Completing Form NRCS-CPA-52, "Environmental Evaluation Worksheet"

COMPLETING THE FORM: The form NRCS-CPA-52 is the instrument used to summarize the effects of conservation practices and systems. It also provides summary documentation of the environmental evaluation (EE) of the planned actions. The EE is "a concurrent part of the planning process in which the potential long-term and short-term impacts of an action on people, their physical surroundings, and nature are evaluated and alternative actions explored" (NPPH-Amendment 3 January 2000). The EE applies to all assistance provided by NRCS (GM190 Part 410.5).

The following are instructions for completing form NRCS-CPA-52:

A Record the client's name.

B Enter the conservation plan identification number.

C Enter the conservation management unit to which this evaluation applies. This may be done by field, pasture, tract, landuse (i.e., cropland, rangeland, woodland, etc.), by resource area (i.e., riparian corridor or wetland area), or any other suitable geographic division.

D Briefly summarize the client's objective(s).

E Briefly identify the purpose and need for action. Reference the resource concern(s) to be addressed.

F, G Use the provided resource, economic, and social considerations or list considerations identified during scoping or by any existing area wide, watershed or other resource document appropriate for the planning area. The list of considerations may be expanded by listing subcategories, such as wind erosion, sheet erosion, gully erosion, etc. Refer to the applicable quality criteria.

H, I Briefly summarize the practice/system of practices being proposed, as well as any alternatives being considered Document the effects of the proposed action for the considerations listed in Sections **E** and **F**. Reference applicable quality criteria, information in the CPPE, and quantify effects whenever possible. Consider both long-term and short-term effects. Consider any effects, which may be individually minor but cumulatively significant at a larger scale or over an extended time period. At the request of the client, additional alternatives may be developed and their effects evaluated. This may be done in order to more fully inform the client about the decision to be made. In these cases, briefly describe alternatives to the proposed action, including the "no action" alternative. The no action alternative is the predicted future condition if no action is taken. Clearly define the differences between proposed action, no action, and the other alternatives if applicable.

J, K See the Special Environmental Concerns Evaluation Procedure Guide Sheets in Appendix 610.70 of the National the National Environmental Compliance Handbook. Completion of Help Sheets is not required, but may provide additional documentation that the appropriate processes have been followed. Complete Section **J** by documenting the effects of each alternative on the special environmental concerns listed in Section **I**. Quantify effects whenever possible. Consider both long-term and short-term effects. Consider any effects, which may be individually minor but cumulatively significant at a larger scale or over an extended time period.

L List any necessary easements, permissions, or permits (i.e., 404, ESA Section 10, state, county, or tribal permits or requirements).

M Describe mitigation to be applied that will offset any adverse impacts. Attach documentation from other agencies.

N The individual responsible for completing the CPA-52 must sign and date the form indicating they have used the best available information. This signature is particularly important when a TSP is completing the CPA-52 or when NRCS is providing technical assistance on behalf of another agency.

O Document contact and communications with USFWS, NOAA Fisheries, COE, EPA, NRCS state biologist, state environmental agencies, or any others consulted. Include public participation activities, if applicable.

P Check the applicable finding being made.

Q Explain the reasons for making the finding identified in Section **P**. Cite any references, analysis, data, or documents, which support the finding. Add additional pages as necessary. To find that an action has been sufficiently analyzed in an existing NRCS environmental document, the document must cover the area in which the action is being implemented.

R NRCS responsible official must sign and date for NRCS actions. The FSA or other federal agency responsible official must sign and date for FSA or other agency funded activities.

CRITERIA FOR IDENTIFYING EXTRAORDINARY CIRCUMSTANCES. Extraordinary circumstances usually involve impacts on environmental concerns such as wetlands, floodplains, or cultural resources. The circumstances that may lead to a determination of extraordinary circumstances are the same factors used to make determinations of significance and include:

1. Impacts that may be both beneficial and adverse and that significantly affect the quality of the human environment.
2. The degree to which the proposed action affects public health or safety.
3. Unique characteristics of the area, such as proximity to historic or cultural resources, parklands, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas.
4. The degree to which the effects on the quality of the human environment are likely to be controversial.
5. The degree to which the possible effects on the quality of the human environment are highly uncertain or involve unique or unknown risks.
6. The degree to which the action may establish a precedent for future actions with significant effects or represent a decision in principle about a future consideration.
7. Individually insignificant but cumulatively significant activities that have not been analyzed on a broader level, such as on a program-wide or priority area basis.
8. Adverse effects on areas listed in or eligible for listing in the National Register of Historic Places, or that may result in loss or destruction of significant scientific, cultural, or historical resources.
9. Adverse effects on an endangered or threatened species or its designated critical habitat.
10. Circumstances threatening the violation of federal, state, tribal, or local law or requirements imposed for the protection of the environment.

If one or more extraordinary circumstances are found to apply to the proposed action, determine whether the proposal can be modified to mitigate the adverse effects and prevent the extraordinary circumstances. If this can be done and the client agrees to the change, then the proposed action may be modified and categorically excluded. If the proposed action cannot be modified or the client refuses to accept a proposed change, prepare an EA or EIS as indicated above.

If none of the extraordinary circumstances are determined to apply to the proposed action (or modified action), then it may be categorically excluded. Document the rationale for the determination in Section **Q**.

U.S. Department of Agriculture
Natural Resources Conservation Service

NRCS-CPA-52
10/03

Environmental Evaluation Worksheet

A. Client:

B. Plan ID No:

C. CMU/Fields:

D. Client's Objective

E. Purpose and Need for Action

F. Resource Considerations	**H.** Alternatives and Effects (ATTACH ADDITIONAL PAGES AS NECESSARY)			
	Proposed Action	No Action	Alt 1	Alt 2
SOIL				
Erosion				
Condition				
Deposition				
WATER				
Quantity				
Quality				
AIR				
Quality				
Condition				
PLANT				
Suitability				
Condition				
Management				
ANIMAL				
Habitat				
Management				

G. Economic and Social Considerations	**I.** Effects			
	Proposed Action	No Action	Alt 1	Alt 2
Land use				
Capital				
Labor				
Management level				
Profitability				
Risk				

J. Special Environmental Concerns (See "Evaluation Procedure Guide Sheets") Section 610.71 of National Environmental Compliance Handbook	**K.** Effects			
	Proposed Action	No Action	Alt 1	Alt 2
Clean Water Act/Waters of the U.S				
*Coastal Zone Management Areas				
Coral Reefs				
*Cultural Resources				
*Endangered and Threatened Species				
Environmental Justice				
*Essential Fish Habitat				
*Fish and Wildlife Coordination				
Floodplain Management				
Invasive Species				
Migratory Birds				
Natural Areas				
Prime and Unique Farmlands				
Riparian Area				
Scenic Beauty				
Wetlands				
*Wild and Scenic Rivers				

* These items may require consultation or coordination between the lead agency/RFO and another governmental unit.

L. Easements, permissions, or permits _____

M. Mitigation _____

_____

N. The information recorded above is based on the best available information:

_____ _____ _____
Signature Title Date

O. Agencies, persons, and references consulted _____

P. Findings. Indicate which of the alternatives from Section **H** is the preferred alternative. _____

I have considered the effects of this action and the alternatives on the Resource, Economic, and Social Considerations; the Special Environmental Concerns; and the extraordinary circumstances criteria in the instructions for form NRCS-CPA-52. I find, for the reasons stated in Section **Q** below, that the selected alternative:

_____ is **not a federal action**. No additional analysis is required.

_____ is **categorically excluded** from further environmental analysis and there are no extraordinary circumstances. No additional analysis is required.

_____ has been **sufficiently analyzed** in an existing NRCS environmental document. No additional analysis is required.

_____ may require preparation of an EA or EIS. The action will be referred to the state office.

Q. Rationale supporting the finding_____

_____

_____

R. _____ _____
District Conservationist Signature Date

Appendix 4. Administrative Rules of Montana (ARM) for implementation of the Montana Environmental Protection Act (MEPA) by Montana Fish, Wildlife and Parks

ADMINISTRATIVE RULES OF MONTANA

*** THIS DOCUMENT IS CURRENT THROUGH MARCH 31, 2005 ***

TITLE 12: DEPARTMENT OF FISH, WILDLIFE AND PARKS
CHAPTER 2: OVERALL DEPARTMENT RULES
SUB-CHAPTER 4: RULES IMPLEMENTING THE MONTANA ENVIRONMENTAL POLICY ACT

12.2.428 POLICY STATEMENT CONCERNING MEPA RULES

The purpose of these rules is to implement Title 75, chapter 1, MCA, the Montana Environmental Policy Act (MEPA), through the establishment of administrative procedures. MEPA requires that state agencies comply with its terms "to the fullest extent possible." In order to fulfill the stated policy of that act, the agency shall conform to the following rules prior to reaching a final decision on proposed actions covered by MEPA.

(History: Sec. 2-3-103, 2-4-201, MCA; IMP, Sec. 2-3-104, 75-1-201, MCA; NEW, 1988 MAR p. 2692, Eff. 12/23/88.)

12.2.429 DEFINITIONS

1) "Action" means a project, program or activity directly undertaken by the agency; a project or activity supported through a contract, grant, subsidy, loan or other form of funding assistance from the agency, either singly or in combination with one or more other state agencies; or a project or activity involving the issuance of a lease, permit, license, certificate, or other entitlement for use or permission to act by the agency, either singly or in combination with other state agencies.

(2)(a) "Alternative" means:

(i) an alternate approach or course of action that would appreciably accomplish the same objectives or results as the proposed action;

(ii) design parameters, mitigation, or controls other than those incorporated into a proposed action by an applicant or by an agency prior to preparation of an EA or draft EIS;

(iii) no action or denial; and

(iv) for agency-initiated actions, a different program or series of activities that would accomplish other objectives or a different use of resources than the proposed program or series of activities.

(b) The agency is required to consider only alternatives that are realistic, technologically available, and that represent a course of action that bears a logical relationship to the proposal being evaluated.

(3) "The agency" means the Montana department of fish, wildlife, and parks.

(4) "Applicant" means a person or any other entity who applies to the agency for a grant, loan, subsidy, or other funding assistance, or for a lease, permit, license, certificate, or other entitlement for use or permission to act.

(5) "Categorical exclusion" refers to a type of action which does not individually, collectively, or cumulatively require an EA or EIS, as determined by rulemaking or programmatic review adopted by the agency, unless extraordinary circumstances, as defined by rulemaking or programmatic review, occur.

(6) "Compensation" means the replacement or provision of substitute resources or environments to offset an impact on the quality of the human environment. The agency may not consider compensation for purposes of determining the significance of impacts (see ARM 12.2.430(4)).

(7) "Cumulative impact" means the collective impacts on the human environment of the proposed action when considered in conjunction with other past and present actions related to the proposed action by location or generic type. Related future actions must also be considered when these actions are under concurrent consideration by any state agency through pre-impact statement studies, separate impact statement evaluation, or permit processing procedures.

(8) "Emergency actions" include, but are not limited to:

(a) projects undertaken, carried out, or approved by the agency to repair or restore property or facilities damaged or destroyed as a result of a disaster when a disaster has been declared by the governor or other appropriate government entity;

(b) emergency repairs to public service facilities necessary to maintain service; and

(c) projects, whether public or private, undertaken to prevent or mitigate immediate threats to public health, safety, welfare, or the environment.

(9) "Environmental assessment" (EA) means a written analysis of a proposed action to determine whether an EIS is required or to serve one or more of the other purposes described in ARM 12.2.430(2).

(10) "Environmental impact statement" (EIS) means the detailed written statement required by section 75-1-201, MCA, which may take several forms:

(a) "Draft environmental impact statement" means a detailed written statement prepared to the fullest extent possible in accordance with 75-1-201(1)(b)(iii), MCA, and these rules;

(b) "Final environmental impact statement" means a written statement prepared to the fullest extent possible in accordance with 75-1-201, MCA, and ARM 12.2.437 or 12.2.438 and which responds to substantive comments received on the draft environmental impact statement;

(c) "Joint environmental impact statement" means an EIS prepared jointly by more than one agency, either state or federal, when the agencies are involved in the same or a closely related proposed action.

(11) "Environmental quality council" (EQC) means the council established pursuant to Title 75, chapter 1, MCA, and 5-16-101, MCA.

(12) "Human environment" includes, but is not limited to biological, physical, social, economic, cultural, and aesthetic factors that interrelate to form the environment. As the term applies to the agency's determination of whether an EIS is necessary (see ARM 12.2.430(1)), economic and social impacts do not by themselves require an EIS. However, whenever an EIS is prepared, economic and social impacts and their relationship to biological, physical, cultural and aesthetic impacts must be discussed.

(13) "Lead agency" means the state agency that has primary authority for committing the government to a course of action or the agency designated by the governor to supervise the preparation of a joint environmental impact statement or environmental assessment.

(14) "Mitigation" means:

(a) avoiding an impact by not taking a certain action or parts of an action;

(b) minimizing impacts by limiting the degree or magnitude of an action and its implementation;

(c) rectifying an impact by repairing, rehabilitating, or restoring the affected environment; or

(d) reducing or eliminating an impact over time by preservation and maintenance operations during the life of an action or the time period thereafter that an impact continues.

(15) "Programmatic review" means an analysis (EIS or EA) of the impacts on the quality of the human environment of related actions, programs, or policies.

(16) "Residual impact" means an impact that is not eliminated by mitigation.

(17) "Scope" means the range of reasonable alternatives, mitigation, issues, and potential impacts to be considered in an environmental assessment or an environmental impact statement.

(18) "Secondary impact" means a further impact to the human environment that may be stimulated or induced by or otherwise result from a direct impact of the action.

(19) "State agency", means an office, commission, committee, board, department, council, division, bureau, or section of the executive branch of state government.

(History: Sec. 2-3-103, 2-4-201, MCA; IMP, Sec. 2-3-104, 75-1-201, MCA; NEW, 1988 MAR p. 2692, Eff. 12/23/88.)

12.2.430 GENERAL REQUIREMENTS OF THE ENVIRONMENTAL REVIEW PROCESS

Section 75-1-201, MCA, requires state agencies to integrate use of the natural and social sciences and the environmental design arts in planning and in decision-making, and to prepare a detailed statement (an EIS) on each proposal for projects, programs, legislation, and other major actions of state government significantly affecting the quality of the human environment. In order to determine the level of environmental review for each proposed action that is necessary to comply with 75-1-201, MCA, the agency shall apply the following criteria:

(1) The agency shall prepare an EIS as follows:

(a) whenever an EA indicates that an EIS is necessary; or

(b) whenever, based on the criteria in ARM 12.2.431, the proposed action is a major action of state government significantly affecting the quality of the human environment.

(2) An EA may serve any of the following purposes:

(a) to ensure that the agency uses the natural and social sciences and the environmental design arts in planning and decision-making. An EA may be used independently or in conjunction with other agency planning and decision-making procedures;

(b) to assist in the evaluation of reasonable alternatives and the development of conditions, stipulations or modifications to be made a part of a proposed action;

(c) to determine the need to prepare an EIS through an initial evaluation and determination of the significance of impacts associated with a proposed action;

(d) to ensure the fullest appropriate opportunity for public review and comment on proposed actions, including alternatives and planned mitigation, where the residual impacts do not warrant the preparation of an EIS; and

(e) to examine and document the effects of a proposed action on the quality of the human environment, and to provide the basis for public review and comment, whenever statutory requirements do not allow sufficient time for an agency to prepare an EIS. The agency shall determine whether sufficient time is available to prepare an EIS by comparing statutory requirements that establish when the agency must make its decision on the proposed action with the time required by ARM 12.2.439 to obtain public review of an EIS plus a reasonable period to prepare a draft EIS and, if required, a final EIS.

(3) The agency shall prepare an EA whenever:

(a) the action is not excluded under (5) and it is not clear without preparation of an EA whether the proposed action is a major one significantly affecting the quality of the human environment;

(b) the action is not excluded under (5) and although an EIS is not warranted, the agency has not otherwise implemented the interdisciplinary analysis and public review purposes listed in (2) (a) and (d) through a similar planning and decision-making process; or

(c) statutory requirements do not allow sufficient time for the agency to prepare an EIS.

(4) The agency may, as an alternative to preparing an EIS, prepare an EA whenever the action is one that might normally require an EIS, but effects which might otherwise be deemed significant appear to be mitigable below the level of significance through design, or enforceable controls or stipulations or both imposed by the agency or other government agencies. For an EA to suffice in this instance, the agency must determine that all of the impacts of the proposed action have been accurately identified, that they will be mitigated below the level of significance, and that no significant impact is likely to occur. The agency may not consider compensation for purposes of determining that impacts have been mitigated below the level of significance.

(5) The agency is not required to prepare an EA or an EIS for the following categories of action:

(a) actions that qualify for a categorical exclusion as defined by rule or justified by a programmatic review. In the rule or programmatic review, the agency shall identify any extraordinary circumstances in which a normally excluded action an EA or EIS;

(b) administrative actions: routine, clerical or similar functions of a department, including but not limited to administrative procurement, contracts for consulting services, and personnel actions;

(c) minor repairs, operations, or maintenance of existing equipment or facilities;

(d) investigation and enforcement: data collection, inspection of facilities or enforcement of environmental standards;

(e) ministerial actions: actions in which the agency exercises no discretion, but rather acts upon a given state of facts in a prescribed manner; and

(f) actions that are primarily social or economic in nature and that do not otherwise affect the human environment.

(History: Sec. 2-3-103, 2-4-201, MCA; IMP, Sec. 2-3-104, 75-1-201, MCA; NEW, 1988 MAR p. 2692, Eff. 12/23/88.)

12.2.431 DETERMINING THE SIGNIFICANCE OF IMPACTS 1) In order to implement 75-1-201, MCA, the agency shall determine the significance of impacts associated with a proposed action. This determination is the basis of the agency's decision concerning the need to prepare an EIS and also refers to the agency's evaluation of individual and cumulative impacts in either EAs or EISs. The agency shall consider the following criteria in determining the significance of each impact on the quality of the human environment:

(a) the severity, duration, geographic extent, and frequency of occurrence of the impact;

(b) the probability that the impact will occur if the proposed action occurs; or conversely, reasonable assurance in keeping with the potential severity of an impact that the impact will not occur;

(c) growth-inducing or growth-inhibiting aspects of the impact, including the relationship or contribution of the impact to cumulative impacts;

(d) the quantity and quality of each environmental resource or value that would be affected, including the uniqueness and fragility of those resources or values;

(e) the importance to the state and to society of each environmental resource or value that would be affected;

(f) any precedent that would be set as a result of an impact of the proposed action that would commit the department to future actions with significant impacts or a decision in principle about such future actions; and

(g) potential conflict with local, state, or federal laws, requirements, or formal plans.

(2) An impact may be adverse, beneficial, or both. If none of the adverse effects of the impact are significant, an EIS is not required. An EIS is required if an impact has a significant adverse effect, even if the agency believes that the effect on balance will be beneficial.

(History: Sec. 2-3-103, 2-4-201, MCA; IMP, Sec. 2-3-104, 75-1-201, MCA; NEW, 1988 MAR p. 2692, Eff. 12/23/88.)

12.2.432 PREPARATION AND CONTENTS OF ENVIRONMENTAL ASSESSMENTS 1) The agency shall prepare an EA, regardless of its length or the depth of analysis, in a manner which utilizes an interdisciplinary approach. The agency may initiate a process to determine the scope of issues to be addressed in an EA. Whenever the agency elects to initiate this process, it shall follow the procedures contained in ARM 12.2.434.

(2) For a routine action with limited environmental impact, the contents of an EA may be reflected on a standard checklist format. At the other extreme, whenever an action is one that might normally require an EIS, but effects that otherwise might be deemed significant are mitigated in project design or by controls imposed by the agency, the analysis, format, and content must all be more substantial. The agency shall prepare the evaluations and present the information described in section (3) as applicable and in a level of detail appropriate to the following considerations:

(a) the complexity of the proposed action;

(b) the environmental sensitivity of the area affected by the proposed action;

(c) the degree of uncertainty that the proposed action will have a significant impact on the quality of the human environment;

(d) the need for and complexity of mitigation required to avoid the presence of significant impacts.

(3) To the degree required in (2) above, an EA must include:

(a) a description of the proposed action, including maps and graphs;

(b) a description of the benefits and purpose of the proposed action. If the agency prepares a cost/benefit analysis before completion of the EA, the EA must contain the cost/benefit analysis or a reference to it;

(c) a listing of any state, local, or federal agencies that have overlapping or additional jurisdiction or environmental review responsibility for the proposed action and the permits, licenses, and other authorizations required;

(d) an evaluation of the impacts, including cumulative and secondary impacts, on the physical environment. This evaluation may take the form of an environmental checklist and/or, as appropriate, a narrative containing more detailed analysis of topics and impacts that are potentially significant, including, where appropriate: terrestrial and aquatic life and habitats; water quality, quantity, and distribution; geology; soil quality, stability, and moisture; vegetation cover, quantity and quality; aesthetics; air quality; unique, endangered, fragile, or limited environmental resources; historical and archaeological sites; and demands on environmental resources of land, water, air and energy;

(e) an evaluation of the impacts, including cumulative and secondary impacts, on the human population in the area to be affected by the proposed action. This evaluation may take the form of an environmental checklist and/or, as appropriate, a narrative containing more detailed analysis of topics and impacts that are potentially significant, including where appropriate, social structures and mores; cultural uniqueness and diversity; access to and quality of recreational and wilderness activities; local and state tax base and tax revenues; agricultural or industrial production; human health; quantity and distribution of employment; distribution and density of population and housing; demands for government services; industrial and commercial activity; locally adopted environmental plans and goals; and other appropriate social and economic circumstances;

(f) a description and analysis of reasonable alternatives to a proposed action whenever alternatives are reasonably available and prudent to consider and a discussion of how the alternative would be implemented;

(g) a listing and appropriate evaluation of mitigation, stipulations, and other controls enforceable by the agency or another government agency;

(h) a listing of other agencies or groups that have been contacted or have contributed information;

(i) the names of persons responsible for preparation of the EA; and

(j) a finding on the need for an EIS and, if appropriate, an explanation of the reasons for preparing the EA. If an EIS is not required, the EA must describe the reasons the EA is an appropriate level of analysis.

(History: Sec. 2-3-103, 2-4-201, MCA; IMP, Sec. 2-3-104, 75-1-201, MCA; NEW, 1988 MAR p. 2692, Eff. 12/23/88.)

12.2.433 PUBLIC REVIEW OF ENVIRONMENTAL ASSESSMENTS 1) The level of analysis in an EA will vary with the complexity and seriousness of environmental issues associated with a proposed action. The level of public interest will also vary. The agency is responsible for adjusting public review to match these factors.

(2) An EA is a public document and may be inspected upon request. Any person may obtain a copy of an EA by making a request to the agency. If the document is out-of-print, a copying charge may be levied.

(3) The agency is responsible for providing additional opportunities for public review consistent with the seriousness and complexity of the environmental issues associated with a proposed action and the level of public interest. Methods of accomplishing public review include publishing a news release or legal notice to announce the availability of an EA, summarizing its content and soliciting public comment; holding public meetings or hearings; maintaining mailing lists of persons interested in a particular action or type of action and notifying them of the availability of EAs on such actions; and distributing copies of EAs for review and comment.

(4) For an action with limited environmental impact and little public interest, no further public review may be warranted. However, where an action is one that normally requires an EIS, but effects that otherwise might be deemed significant are mitigated in the project proposal or by controls imposed by the agency, public involvement must include the opportunity for public comment, a public meeting or hearing, and adequate notice. The agency is responsible for determining appropriate methods to ensure adequate public review on a case by case basis.

(5) The agency shall maintain a log of all EAs completed by the agency and shall submit a list of any new EAs completed to the office of the governor and the environmental quality council on a quarterly basis. In addition, the agency shall submit a copy of each completed EA to the EQC.

(6) The agency shall consider the substantive comments received in response to an EA and proceed in accordance with one of the following steps, as appropriate:

(a) determine that an EIS is necessary;

(b) determine that the EA did not adequately reflect the issues raised by the proposed action and issue a revised document; or

(c) determine that an EIS is not necessary and make a final decision on the proposed action, with appropriate modification resulting from the analysis in the EA and analysis of public comment.

(History: Sec. 2-3-103, 2-4-201, MCA; IMP, Sec. 2-3-104, 75-1-201, MCA; NEW, 1988 MAR p. 2692, Eff. 12/23/88.)

12.2.434 DETERMINING THE SCOPE OF AN EIS 1) Prior to the preparation of an EIS, the agency shall initiate a process to determine the scope of the EIS.

(2) To identify the scope of an EIS, the agency shall:

(a) invite the participation of affected federal, state, and local government agencies, Indian tribes, the applicant, if any, and interested persons or groups;

(b) identify the issues related to the proposed action that are likely to involve significant impacts and that will be analyzed in depth in the EIS;

(c) identify the issues that are not likely to involve significant impacts, thereby indicating that unless unanticipated effects are discovered during the preparation of the EIS, the discussion of these issues in the EIS will be limited to a brief presentation of the reasons they will not significantly affect the quality of the human environment; and

(d) identify those issues that have been adequately addressed by prior environmental review, thereby indicating that the discussion of these issues in the EIS will be limited to a summary and reference to their coverage elsewhere; and

(e) identify possible alternatives to be considered.

(History: Sec. 2-3-103, 2-4-201, MCA; IMP, Sec. 2-3-104, 75-1-201, MCA; NEW, 1988 MAR p. 2692, Eff. 12/23/88.)

12.2.435 ENVIRONMENTAL IMPACT STATEMENTS--GENERAL REQUIREMENTS

The following apply to the design and preparation of EISs:

(1) The agency shall prepare EISs that are analytic rather than encyclopedic.

(2) The agency shall discuss the impacts of a proposed action in a level of detail that is proportionate to their significance. For other than significant issues, an EIS need only include enough discussion to show why more study is not warranted.

(3) The agency shall prepare with each draft and final EIS a brief summary that is available for distribution separate from the EIS. The summary must describe:

(a) the proposed action being evaluated by the EIS, the impacts, and the alternatives;

(b) areas of controversy and major conclusions;

(c) the tradeoffs among the alternatives; and

(d) the agency's preferred alternative, if any.

(History: Sec. 2-3-103, 2-4-201, MCA; IMP, Sec. 2-3-104, 75-1-201, MCA; NEW, 1988 MAR p. 2692, Eff. 12/23/88.)

12.2.436 PREPARATION AND CONTENTS OF DRAFT ENVIRONMENTAL IMPACT STATEMENTS

If required by these rules, the agency shall prepare a draft environmental impact statement using an interdisciplinary approach and containing the following:

(1) a description of the proposed action, including its purpose and benefits;

(2) a listing of any state, local, or federal agencies that have overlapping or additional jurisdiction and a description of their responsibility for the proposed action;

(3) a description of the current environmental conditions in the area affected by the proposed action or alternatives, including maps and charts, whenever appropriate. The description must be no longer than is necessary to understand the effects of the action and alternatives. Data analysis must be commensurate with the importance of the impact with less important material summarized, consolidated, or simply referenced;

(4) a description of the impacts on the quality of the human environment of the proposed action including:

(a) the factors listed in (3)(d) and (e) of ARM 12.2.432, whenever appropriate;

(b) primary, secondary, and cumulative impacts;

(c) potential growth-inducing or growth-inhibiting impacts;

(d) irreversible and irretrievable commitments of environmental resources, including land, air, water and energy;

(e) economic and environmental benefits and costs of the proposed action; and

(f) the relationship between local short-term uses of man's environment and the effect on maintenance and enhancement of the long-term productivity of the environment. Where a cost-benefit analysis is prepared by the agency prior to the preparation of the draft EIS, it shall be incorporated by reference in or appended to the EIS;

(5) an analysis of reasonable alternatives to the proposed action, including the alternative of no action and other reasonable alternatives that may or may not be within the jurisdiction of the agency to implement, if any;

(6) a discussion of mitigation, stipulations, or other controls committed to and enforceable by the agency or other government agency;

(7) a discussion of any compensation related to impacts stemming from the proposed action;

(8) an explanation of the tradeoffs among the reasonable alternatives;

(9) the agency's preferred alternative, if any, and its reasons for the preference;

(10) a section on consultation and preparation of the draft EIS that includes the following:

(a) the names of those individuals or groups responsible for preparing the EIS;

(b) a listing of other agencies, groups, or individuals who were contacted or contributed information; and

(c) a summary list of source materials used in the preparation of the draft EIS;

(11) a summary of the draft EIS as required in ARM 12.2.435; and

(12) other sections that may be required by other statutes in a comprehensive evaluation of the proposed action, or by the National Environmental Policy Act or other federal statutes governing a cooperating federal agency.

(History: Sec. 2-3-103, 2-4-201, MCA; IMP, Sec. 2-3-104, 75-1-201, MCA; NEW, 1988 MAR p. 2692, Eff. 12/23/88.)

12.2.437 ADOPTION OF DRAFT ENVIRONMENTAL IMPACT STATEMENT AS FINAL 1) Depending upon the substantive comments received in response to the draft EIS, the draft statement may suffice. The agency shall determine whether to adopt the draft EIS within 30 days of the close of the comment period on the draft EIS.

(2) In the event the agency determines to adopt the draft EIS, the agency shall notify the governor, the Environmental Quality Council, the applicant, if any, and all commenters of its decision and provide a statement

describing its proposed course of action. This notification must be accompanied by a copy of all comments or a summary of a representative sample of comments received in response to the draft statement, together with, at minimum, an explanation of why the issues raised do not warrant the preparation of a final EIS.

(3) The agency shall provide public notice of its decision to adopt the draft EIS as a final.

(4) If the agency decides to adopt the draft EIS as the final EIS, it may make a final decision on the proposed action no sooner than 15 days after complying with subsections (1) through (3) above.

(History: Sec. 2-3-103, 2-4-201, MCA; IMP, Sec. 2-3-104, 75-1-201, MCA; NEW, 1988 MAR p. 2692, Eff. 12/23/88.)

12.2.438 PREPARATION AND CONTENTS OF FINAL ENVIRONMENTAL IMPACT STATEMENT

Except as provided in ARM 12.2.437, a final environmental impact statement must include:

(1) a summary of major conclusions and supporting information from the draft EIS and the responses to substantive comments received on the draft EIS, stating specifically where such conclusions and information were changed from those which appeared in the draft;

(2) a list of all sources of written and oral comments on the draft EIS, including those obtained at public hearings, and, unless impractical, the text of comments received by the agency (in all cases, a representative sample of comments must be included);

(3) the agency's responses to substantive comments, including an evaluation of the comments received and disposition of the issues involved;

(4) data, information, and explanations obtained subsequent to circulation of the draft; and

(5) the agency's recommendation, preferred alternative, or proposed decision together with an explanation of the reasons therefor.

(History: Sec. 2-3-103, 2-4-201, MCA; IMP, Sec. 2-3-104, 75-1-201, MCA; NEW, 1988 MAR p. 2692, Eff. 12/23/88.)

12.2.439 TIME LIMITS AND DISTRIBUTION OF ENVIRONMENTAL IMPACT STATEMENTS 1) Following preparation of a draft EIS, the agency shall distribute copies to the governor, EQC, appropriate state and federal agencies, the applicant, if any, and persons who have requested copies.

(2) The listed transmittal date to the governor and the EQC must not be earlier than the date that the draft EIS is mailed to other agencies, organizations, and individuals. The agency shall allow 30 days for reply, provided that the agency may extend this period up to an additional 30 days at its discretion or upon application of any person for good cause. When preparing a joint EIS with a federal agency or agencies, the agency may also extend this period in accordance with time periods specified in regulations that implement the National Environmental Policy Act. However, no extension which is otherwise prohibited by law may be granted.

(3) In cases involving an applicant, after the period for comment on the draft EIS has expired, the agency shall send to the applicant a copy of all written comments that were received. The agency shall advise the applicant that he has a reasonable time to respond in writing to the comments received by the agency on the draft EIS and that the applicant's written response must be received before a final EIS can be prepared and circulated. The applicant may waive his right to respond to the comments on the draft EIS.

(4) Following preparation of a final EIS, the agency shall distribute copies to the governor, EQC, appropriate state and federal agencies, the applicant, if any, persons who submitted comments on or received a copy of the draft EIS, and other members of the public upon request.

(5) Except as provided by ARM 12.2.437(4), a final decision must not be made on the proposed action being evaluated in a final EIS until 15 days have expired from the date of transmittal of the final EIS to the governor and EQC. The listed transmittal date to the governor and EQC must not be earlier than the date that the final EIS is mailed to other agencies, organizations, and individuals.

(6) All written comments received on an EIS, including written responses received from the applicant, must be made available to the public upon request.

(7) Until the agency reaches its final decision on the proposed action, no action concerning the proposal may be taken that would:

(a) have an adverse environmental impact; or

(b) limit the choice of reasonable alternatives, including the no-action alternative.

(History: Sec. 2-3-103, 2-4-201, MCA; IMP, Sec. 2-3-104, 75-1-201, MCA; NEW, 1988 MAR p. 2692, Eff. 12/23/88.)

12.2.440 SUPPLEMENTS TO ENVIRONMENTAL IMPACT STATEMENTS 1) The agency shall prepare supplements to either draft or final environmental impact statements whenever:

(a) the agency or the applicant makes a substantial change in a proposed action;

(b) there are significant new circumstances, discovered prior to final agency decision, including information bearing on the proposed action or its impacts that change the basis for the decision; or

(c) following preparation of a draft EIS and prior to completion of a final EIS, the agency determines that there is a need for substantial, additional information to evaluate the impacts of a proposed action or reasonable alternatives.

(2) A supplement must include, but is not limited to, a description of the following:

(a) an explanation of the need for the supplement;

(b) the proposed action; and

(c) any impacts, alternatives or other items required by ARM 12.2.436 for a draft EIS or ARM 12.2.438 for a final EIS that were either not covered in the original statement or that must be revised based on new information or circumstances concerning the proposed action.

(3) The same time periods applicable to draft and final EISs apply to the circulation and review of supplements.

(History: Sec. 2-3-103, 2-4-201, MCA; IMP, Sec. 2-3-104, 75-1-201, MCA; NEW, 1988 MAR p. 2692, Eff. 12/23/88.)

12.2.441 ADOPTION OF AN EXISTING EIS 1) The agency shall adopt as part of a draft EIS all or any part of the information, conclusions, comments, and responses to comments contained in an existing EIS that has been previously or is being concurrently prepared pursuant to MEPA or the National Environmental Policy Act if the agency determines:

(a) that the existing EIS covers an action paralleling or closely related to the action proposed by the agency or the applicant;

(b) on the basis of its own independent evaluation, that the information contained in the existing EIS has been accurately presented; and

(c) that the information contained in the existing EIS is applicable to the action currently being considered.

(2) A summary of the existing EIS or the portion adopted and a list of places where the full text is available must be circulated as a part of the EIS and treated as part of the EIS for all purposes, including, if required, preparation of a final EIS.

(3) Adoption of all or part of an existing EIS does not relieve the agency of the duty to comply with ARM 12.2.436.

(4) The same time periods applicable to draft and final EISs apply to the circulation and review of EISs that include material adopted from an existing EIS.

(5) The agency shall take full responsibility for the portions of a previous EIS adopted. If the agency disagrees with certain adopted portions of the previous EIS, it shall specifically discuss the points of disagreement.

(6) No material may be adopted unless it is reasonably available for inspection by interested persons within the time allowed for comment.

(7) Whenever part of an existing EIS or concurrently prepared EIS is adopted, the part adopted must include sufficient material to allow the part adopted to be considered in the context in which it was presented in the original EIS.

(History: Sec. 2-3-103, 2-4-201, MCA; IMP, Sec. 2-3-104, 75-1-201, MCA; NEW, 1988 MAR p. 2692, Eff. 12/23/88.)

12.2.442 INTERAGENCY COOPERATION 1) Whenever it is the lead agency responsible for preparation of an EIS, the agency may:

(a) request the participation of other governmental agencies which have special expertise in areas that should be addressed in the EIS;

(b) allocate assignments, as appropriate, for the preparation of the EIS among other participating agencies; and

(c) coordinate the efforts of all affected agencies.

(2) Whenever participation of the agency is requested by a lead agency, the agency shall make a good-faith effort to participate in the EIS as requested, with its expenses for participation in the EIS paid by the lead agency or other agency collecting the EIS fee if one is collected.

(History: Sec. 2-3-103, 2-4-201, MCA; IMP, Sec. 2-3-104, 75-1-201, MCA; NEW, 1988 MAR p. 2692, Eff. 12/23/88.)

12.2.443 JOINT ENVIRONMENTAL IMPACT STATEMENTS AND EA'S 1) Whenever the agency and one or more other state agencies have jurisdiction over an applicant's proposal or major state actions that individually, collectively, or cumulatively require an EIS and another agency is clearly the lead agency, the agency shall cooperate with the lead agency in the preparation of a joint EIS. Whenever it is clearly the lead agency, the agency shall coordinate the preparation of the EIS as required by this rule. Whenever the agency and one or more agencies have jurisdiction over an applicant's proposal or major state actions and lead agency status cannot be resolved, the agency shall request a determination from the governor.

(2) The agency shall cooperate with federal and local agencies in preparing EISs when the jurisdiction of the agency is involved. This cooperation may include, but is not limited to: joint environmental research studies, a joint process to determine the scope of an EIS, joint public hearings, joint EISs, and, whenever appropriate, joint issuance of a record of decision.

(3) Whenever the agency proposes or participates in an action that requires preparation of an EIS under both the National Environmental Policy Act and MEPA, the EIS must be prepared in compliance with both statutes and associated rules and regulations. The agency may, if required by a cooperating federal agency, accede to and follow more stringent requirements, such as additional content or public review periods, but in no case may it accede to less than is provided for in these rules.

(4) The same general provisions for cooperation and joint issuance of documents provided for in this rule in connection with EISs also apply to EAs.

(History: Sec. 2-3-103, 2-4-201, MCA; IMP, Sec. 2-3-104, 75-1-201, MCA; NEW, 1988 MAR p. 2692, Eff. 12/23/88.)

12.2.444 PREPARATION, CONTENT, AND DISTRIBUTION OF A PROGRAMMATIC REVIEW 1) Whenever the agency is contemplating a series of agency-initiated actions, programs, or policies which in part or in total may constitute a major state action significantly affecting the human environment, it shall prepare a programmatic review discussing the impacts of the series of actions.

(2) The agency may also prepare a programmatic review whenever required by statute, whenever a series of actions under the jurisdiction of the agency warrant such an analysis as determined by the agency, or whenever prepared as a joint effort with a federal agency requiring a programmatic review.

(3) The agency shall determine whether the programmatic review takes the form of an EA or an EIS in accordance with the provisions of ARM 12.2.430 and 12.2.431, unless otherwise provided by statute.

(4) A programmatic review must include, as a minimum, a concise, analytical discussion of alternatives and the cumulative environmental effects of these alternatives on the human environment. In addition programmatic reviews must contain the information specified in ARM 12.2.436 for EISs or ARM 12.2.432 for EAs, as applicable.

(5) The agency shall adhere to the time limits specified for distribution and public comment on EISs or EAs, whichever is applicable.

(6) While work on a programmatic review is in progress, the agency may not take major state actions covered by the program in that interim period unless such action:

(a) is part of an ongoing program;

(b) is justified independently of the program; or

(c) will not prejudice the ultimate decision on the program. Interim action prejudices the ultimate decision on the program if it tends to determine subsequent development or foreclose reasonable alternatives.

(7) Actions taken under subsection (6) must be accompanied by an EA or an EIS, if required.

(History: Sec. 2-3-103, 2-4-201, MCA; IMP, Sec. 2-3-104, 75-1-201, MCA; NEW, 1988 MAR p. 2692, Eff. 12/23/88.)

12.2.445 RECORD OF DECISION FOR ACTIONS REQUIRING POLICY ACT ENVIRONMENTAL IMPACT STATEMENTS 1) At the time of its decision concerning a proposed action for which an EIS was prepared, the agency shall prepare a concise public record of decision. The record, which may be integrated into any other documentation of the decision that is prepared by the agency, is a public notice of what the decision is, the reasons for the decision, and any special conditions surrounding the decision or its implementation.

(2) The agency may include in the final EIS, in addition to a statement of its proposed decision, preferred alternative, or recommendation on the proposed action, the other items required by (1), and additional explanation as provided for in (3) below. If the final decision and the reasons for that final decision are the same as set forth in the final EIS, the agency may comply with (1) by preparing a public notice of what the decision is and adopting by reference the information contained in the final EIS that addresses the items required by (1). If the final decision or any of the items required by (1) are different from what was presented in the final EIS, the agency is responsible for preparing a separate record of decision.

(3) There is no prescribed format for a record of decision, except that it must include the items listed in (1). The record may include the following items as appropriate:

(a) brief description of the context of the decision;

(b) the alternatives considered;

(c) advantages and disadvantages of the alternatives;

(d) the alternative or alternatives considered environmentally preferable;

(e) short and long-term effects of the decision;

(f) policy considerations that were balanced and considered in making the decision;

(g) whether all practical means to avoid or minimize environmental harm were adopted, and if not, why not; and

(h) a summary of implementation plans, including monitoring and enforcement procedures for mitigation, if any.

(4) This rule does not define or affect the statutory decision making authority of the agency.

(History: Sec. 2-3-103, 2-4-201, MCA; IMP, Sec. 2-3-104, 75-1-201, MCA; NEW, 1988 MAR p. 2692, Eff. 12/23/88.)

12.2.446 EMERGENCIES 1) The agency may take or permit action having a significant impact on the quality of the human environment in an emergency situation without preparing an EIS. Within 30 days following initiation of the action, the agency shall notify the governor and the EQC as to the need for the action and the impacts and results of it. Emergency actions must be limited to those actions immediately necessary to control the impacts of the emergency.

(History: Sec. 2-3-103, 2-4-201, MCA; IMP, Sec. 2-3-104, 75-1-201, MCA; NEW, 1988 MAR p. 2692, Eff. 12/23/88.)

12.2.447 CONFIDENTIALITY 1) Information declared confidential by state law or by an order of a court must be excluded from an EA and EIS. The agency shall briefly state the general topic of the confidential information excluded.

(History: Sec. 2-3-103, 2-4-201, MCA; IMP, Sec. 2-3-104, 75-1-201, MCA; NEW, 1988 MAR p. 2692, Eff. 12/23/88.)

12.2.448 RESOLUTION OF STATUTORY CONFLICTS 1) Whenever a conflicting provision of another state law prevents the agency from fully complying with these rules the agency shall notify the governor and the EQC of the nature of the conflict and shall suggest a proposed course of action that will enable the agency to comply to the fullest extent possible with the provisions of MEPA. This notification must be made as soon as practical after the agency recognizes that a conflict exists, and no later than 30 days following such recognition.

(2) The agency has a continuing responsibility to review its programs and activities to evaluate known or anticipated conflicts between these rules and other statutory or regulatory requirements. It shall make such adjustments or recommendations as may be required to ensure maximum compliance with MEPA and these rules.

(History: Sec. 2-3-103, 2-4-201, MCA; IMP, Sec. 2-3-104, 75-1-201, MCA; NEW, 1988 MAR p. 2692, Eff. 12/23/88.)

12.2.449 CONTRACTS AND DISCLOSURE 1) The agency may contract for preparation of an EIS or portions thereof. Whenever an EIS or portion thereof is prepared by a contractor, the agency shall furnish guidance and participate in the preparation, independently evaluate the statement or portion thereof prior to its approval, and take responsibility for its scope and content.

(2) A person contracting with the agency in the preparation of an EIS must execute a disclosure statement, in affidavit form prepared by the agency, specifying that he has no financial or other interest in the outcome of the proposed action other than a contract with the agency.

(History: Sec. 2-3-103, 2-4-201, MCA; IMP Sec. 2-3-104, 75-1-201, MCA; NEW, 1988 MAR p. 2692, Eff. 12/23/88.)

12.2.450 PUBLIC HEARINGS 1) Whenever a public hearing is held on an EIS or an EA, the agency shall issue a news release legal notice to newspapers of general circulation in the area to be affected by the proposed action prior to the hearing. The news release or legal notice must advise the public of the nature of testimony the agency wishes to receive at the hearing. The hearing must be held after the draft EIS has been circulated and prior to preparation of the final EIS. A hearing involving an action for which an EA was prepared must be held after the EA has been circulated and prior to any final agency determinations concerning the proposed action. In cases involving an applicant, the agency shall allow an applicant a reasonable time to respond in writing to comments made at a public hearing, notwithstanding the time limits contained in ARM 12.2.439. The applicant may waive his right to respond to comments made at a hearing.

(2) In addition to the procedure in (1) above, the agency shall take such other steps as are reasonable and appropriate to promote the awareness by interested parties of a scheduled hearing.

(3) The agency shall hold a public hearing whenever requested within 20 days of issuance of the draft EIS by either:

(a) 10% or 25, whichever is less, of the persons who will be directly affected by the proposed action;

(b) by another agency which has jurisdiction over the action;

(c) an association having not less than 25 members who will be directly affected by the proposed action; or

(d) the applicant, if any.

(4) In determining whether a sufficient number of persons have requested a hearing as required by subsection (3), the agency shall resolve instances of doubt in favor of holding a public hearing.

(5) No person may give testimony at the hearing as a representative of a participating agency. Such a representative may, however, at the discretion of the hearing officer, give a statement regarding his or her agency's authority or procedures and answer questions from the public.

(6) Public meetings may be held in lieu of formal hearings as a means of soliciting public comment on an EIS where no hearing is requested under (3) above. However, the agency shall provide adequate advance notice of the meeting; and, other than the degree of formality surrounding the proceedings, the objectives of such a meeting are essentially the same as those for a hearing.

(History: Sec. 2-3-103, 2-4-201, MCA; IMP, Sec. 2-3-104, 75-1-201, MCA; NEW, 1988 MAR p. 2692, Eff. 12/23/88.)

12.2.451 FEES: DETERMINATION OF AUTHORITY TO IMPOSE 1) Whenever an application for a lease, permit, contract, license or certificate is expected to result in the agency incurring expenses in excess of $ 2,500 to compile an EIS, the applicant is required to pay a fee in an amount the agency reasonably estimates, as set forth in this rule, will be expended to gather information and data necessary to compile an EIS.

(2) The agency shall determine within 30 days after a completed application is filed whether it will be necessary to compile an EIS and assess a fee as prescribed by this rule. If it is determined that an EIS is necessary, the agency shall make a preliminary estimate of its costs. This estimate must include a summary of the data and information needs and the itemized costs of acquiring the data and information, including salaries, equipment costs and any other expense associated with the collection of data and information for the EIS.

(3) Whenever the preliminary estimated costs of acquiring the data and information to prepare an EIS total more than $ 2,500, the agency shall notify the applicant that a fee must be paid and submit an itemized preliminary estimate of the cost of acquiring the data and information necessary to compile an EIS. The agency shall also notify the applicant to prepare and submit a notarized and detailed estimate of the cost of the project being reviewed in the EIS within 15 days. In addition, the agency shall request the applicant to describe the data and information available or being prepared by the applicant which can possibly be used in the EIS. The applicant may indicate which of the agency's estimated costs of acquiring data and information for the EIS would be duplicative or excessive. The applicant must be granted, upon request, an extension of the 15-day period for submission of an estimate of the project's cost and a critique of the agency's preliminary EIS data and information accumulation cost assessment.

(History: Sec. 75-1-202, MCA; IMP, Sec. 75-1-202, 203, 205, 206 and 207, MCA; NEW, 1988 MAR p. 2692, Eff. 12/23/88.)

12.2.452 FEES: DETERMINATION OF AMOUNT 1) After receipt of the applicant's estimated cost of the project and analysis of an agency's preliminary estimate of the cost of acquiring information and data for the EIS, the agency shall notify the applicant within 15 days of the final amount of the fee to be assessed. The fee assessed must be based on the projected cost of acquiring all of the information and data needed for the EIS. If the applicant has gathered or is in the process of gathering information and data that can be used in the EIS, the agency shall only use that portion of the fee that is needed to verify the information and data. Any unused portion of the fee assessed may be returned to the applicant within a reasonable time after the information and data have been collected or the information and data submitted by the applicant have been verified, but in no event later than the deadline specified in these rules. The agency may extend the 15-day period provided for review of the applicant's submittal but not to exceed 45 days if it believes that the project cost estimate submitted is inaccurate or additional information must be obtained to verify the accuracy of the project cost estimate. The fee assessed must not exceed the limitations provided in 75-1-203(2), MCA.

(2) If an applicant believes that the fee assessed is excessive or does not conform to the requirements of this rule or Title 75, chapter 1, part 2, MCA, the applicant may request a hearing pursuant to the contested case provisions of the Montana Administrative Procedure Act. If a hearing is held on the fee assessed as authorized by this subsection, the agency shall proceed with its analysis of the project wherever possible. The fact that a hearing has been requested is not

grounds for delaying consideration of an application except to the extent that the portion of the fee in question affects the ability of the department to collect the data and information necessary for the EIS.

(History: Sec. 75-1-202 MCA; IMP, Sec. 75-1-202, 75- 1-203, 75-1-205, 75-1-206 and 75-1-207 MCA; NEW, 1988 MAR p. 2692, Eff. 12/23/88.)

12.2.453 USE OF FEE 1) The fee assessed hereunder may only be used to gather data and information necessary to compile an EIS. No fee may be assessed if an agency intends only to compile an EA or a programmatic review. If a department collects a fee and later determines that additional data and information must be collected or that data and information supplied by the applicant and relied upon by the agency are inaccurate or invalid, an additional fee may be assessed under the procedures outlined in these rules if the maximum fee has not been collected.

(2) Whenever the agency has completed work on the EIS, it shall submit to the applicant a complete accounting of how any fee was expended. If the money expended is less than the fee collected, the remainder of the fee shall be refunded to the applicant without interest within 45 days after work has been completed on the final EIS.

(History: Sec. 75-1-202 MCA; IMP, Sec. 75-1-202, 75-1-203, 75-1-205, 75-1-206 and 75-1-207 MCA; NEW, 1988 MAR p. 2692, Eff. 12/23/88.)

12.2.454 ACTIONS THAT QUALIFY FOR A CATEGORICAL EXCLUSION 1) The following types of actions do not individually, collectively, or cumulatively require the preparation of an environmental assessment or an environmental impact statement unless the action involves one or more of the extraordinary circumstances stated in (2) below:

(a) construction of riparian fences to protect streambanks;

(b) minor improvements in fish habitat by placement of habitat improvement structures;

(c) removal or modification of man-made obstructions in stream channels to provide or improve fish passage or to prevent loss of fish into diversions;

(d) clean up of trash or debris in the river corridor;

(e) vegetative bank stabilization projects;

(f) spawning channel development to provide additional habitat for reproduction;

(g) inventory, survey or engineering activities for design or development of plans for river restoration and future fisheries improvement program projects;

(h) maintenance or repair of existing river restoration and future fisheries improvement program projects;

(i) improvement in fish habitat in lakes or reservoirs that do not pose a hazard to navigation.

(2) The preparation of an environmental assessment or an environmental impact statement will be required if the project involves any of the following:

(a) significant impacts to publicly owned parklands, recreation areas, wildlife refuges or significant historic sites;

(b) disturbance to a streambed that is significant enough to require a temporary exemption from water quality standards for turbidity;

(c) significant impact on air, noise, or water quality;

(d) significant impact on the human environment that may result in relocations of persons or business;

(e) substantial controversy on environmental grounds;

(f) any other kind of significant environmental impact, including cumulative or secondary impacts.

(History: Sec. 2-3-103, 2-4-201 MCA; IMP, Sec. 2-3-104, 75-1-201 MCA; NEW, 1994 MAR p. 2129, Eff. 8/12/94; AMD, 1996 MAR p.153, Eff. 1/12/96.)

Appendix 5. Private Property Act assessment checklist for compliance with Chapter 462, Laws of Montana (1995).

PRIVATE PROPERTY ASSESSMENT ACT CHECKLIST

The 54th Legislature enacted the Private Property Assessment Act, Chapter 462, Laws of Montana (1995). The intent of the legislation is to establish an orderly and consistent process by which state agencies evaluate their proposed actions under the "Takings Clauses" of the United States and Montana Constitutions. The Takings Clause of the Fifth Amendment of the United States Constitution provides: "nor shall private property be taken for public use, without just compensation." Similarly, Article II, Section 29 of the Montana Constitution provides: "Private property shall not be taken or damaged for public use without just compensation..."

The Private Property Assessment Act applies to proposed agency actions pertaining to land or water management or to some other environmental matter that, if adopted and enforced without compensation, would constitute a deprivation of private property in violation of the United States or Montana Constitutions.

The Montana State Attorney General's Office has developed guidelines for use by state agency to assess the impact of a proposed agency action on private property. The assessment process includes a careful review of all issues identified in the Attorney General's guidance document (Montana Department of Justice 1997). If the use of the guidelines and checklist indicates that a proposed agency action has taking or damaging implications, the agency must prepare an impact assessment in accordance with Section 5 of the Private Property Assessment Act. For the purposes of this EA, the questions on the following checklist refer to the following required stipulation(s):

(LIST ANY MITIGATION OR STIPALTIONS REQUIRED, OR NOTE "NONE")

None

DOES THE PROPOSED AGENCY ACTION HAVE TAKINGS IMPLICATIONS UNDER THE PRIVATE PROPERTY ASSESSMENT ACT?

YES	NO	
_____	X	1. Does the action pertain to land or water management or environmental regulation affecting private real property or water rights?
_____	X	2. Does the action result in either a permanent or indefinite physical occupation of private property?
_____	X	3. Does the action deprive the owner of all economically viable uses of the property?
_____	X	4. Does the action deny a fundamental attribute of ownership?

_____	X	5. Does the action require a property owner to dedicate a portion of property or to grant an easement? [If the answer is **NO**, skip questions 5a and 5b and continue with question 6.]
_____	_____	5a. Is there a reasonable, specific connection between the government requirement and legitimate state interests?
_____	_____	5b. Is the government requirement roughly proportional to the impact of the proposed use of the property?
_____	X	6. Does the action have a severe impact on the value of the property?
_____	X	7. Does the action damage the property by causing some physical disturbance with respect to the property in excess of that sustained by the public generally? [If the answer is **NO**, do not answer questions 7a-7c.]
_____	_____	7a. Is the impact of government action direct, peculiar, and significant?
_____	_____	7b. Has government action resulted in the property becoming practically inaccessible, waterlogged, or flooded?
_____	_____	7c. Has government action diminished property values by more than 30% and necessitated the physical taking of adjacent property or property across a public way from the property in question?

Taking or damaging implications exist if **YES** is checked in response to question 1 and also to any one or more of the following questions: 2, 3, 4, 6, 7a, 7b, 7c; or if **NO** is checked in response to questions 5a or 5b.

If taking or damaging implications exist, the agency must comply with Section 5 of the Private Property Assessment Act, to include the preparation of a taking or damaging impact assessment. Normally, the preparation of an impact assessment will require consultation with agency legal staff.

Appendix 6. National Environmental Policy Act (NEPA) federal activities checklist (Form 3-2185) used by the US Fish and Wildlife Service

NEPA COMPLIANCE CHECKLIST

State: **Federal Financial Assistance Grant/Agreement/Amendment Number:**
Grant/Project Name:

This proposal ☐ is; ☐ is not completely covered by categorical exclusion _____ in 516 DM 2, Appendix _____; and/or 516 DM 6, Appendix _____.
(check (✓) one) (Review proposed activities. An appropriate categorical exclusion must be identified before completing the remainder of the Checklist. If a categorical exclusion cannot be identified, or the proposal cannot meet the qualifying criteria in the categorical exclusion, or an extraordinary circumstance applies (see below), an EA must be prepared.)

Extraordinary Circumstances:
Will This Proposal *(check (✓) yes or no for each item below)*:

Yes	No		
☐	☐	1.	Have significant adverse effects on public health or safety.
☐	☐	2.	Have significant adverse effects on such natural resources and unique geographic characteristics as historic or cultural resources; park, recreation or refuge lands; wilderness areas; wild or scenic rivers; national natural landmarks; sole or principal drinking water aquifers; prime farmlands; wetlands (Executive Order 11990); floodplains (Executive Order 11988); national monuments; migratory birds (Executive Order 13186); and other ecologically significant or critical areas under Federal ownership or jurisdiction.
☐	☐	3.	Have highly controversial environmental effects or involve unresolved conflicts concerning alternative uses of available resources [NEPA Section 102(2)(E)].
☐	☐	4.	Have highly uncertain and potentially significant environmental effects or involve unique or unknown environmental risks.
☐	☐	5.	Have a precedent for future action or represent a decision in principle about future actions with potentially significant environmental effects.
☐	☐	6.	Have a direct relationship to other actions with individually insignificant but cumulatively significant environmental effects.
☐	☐	7.	Have significant adverse effects on properties listed or eligible for listing on the National Register of Historic Places as determined by either the bureau or office, the State Historic Preservation Officer, the Tribal Historic Preservation Officer, the Advisory Council on Historic Preservation, or a consulting party under 36 CFR 800.
☐	☐	8.	Have significant adverse effects on species listed, or proposed to be listed, on the List of Endangered or Threatened Species, or have significant adverse effects on designated Critical Habitat for these species.
☐	☐	9.	Have the possibility of violating a Federal law, or a State, local, or tribal law or requirement imposed for the protection of the environment.
☐	☐	10.	Have the possibility for a disproportionately high and adverse effect on low income or minority populations (Executive Order 12898).
☐	☐	11.	Have the possibility to limit access to and ceremonial use of Indian sacred sites on Federal lands by Indian religious practitioners or significantly adversely affect the physical integrity of such sacred sites (Executive Order 13007).
☐	☐	12.	Have the possibility to significantly contribute to the introduction, continued existence, or spread of noxious weeds or non-native invasive species known to occur in the area or actions that may promote the introduction, growth, or expansion of the range of such species (Federal Noxious Weed Control Act and Executive Order 13112).

(If any of the above extraordinary circumstances receive a ☐Yes☐ check (✓), an EA must be prepared.)
☐ Yes ☐ No This grant/project includes additional information supporting the Checklist.

Concurrences/Approvals:
Project Leader: _____ Date: _____

State Authority Concurrence: _____ Date: _____
(with financial assistance signature authority, if applicable)

Within the spirit and intent of the Council of Environmental Quality's regulations for implementing the National Environmental Policy Act (NEPA) and other statutes, orders, and policies that protect fish and wildlife resources, I have established the following administrative record and have determined that the grant/agreement/amendment:

- ☐ **is a categorical exclusion as provided by 516 DM 6, Appendix 1 and/or 516 DM 2, Appendix 1. No further NEPA documentation will therefore be made.**
- ☐ **is not completely covered by the categorical exclusion as provided by 516 DM 6, Appendix 1 and/or 516 DM 2, Appendix 1. An EA must be prepared.**

Service signature approval:

RO or WO Environmental Coordinator: _____ Date: _____
Staff Specialist, Division of Federal Assistance: _____ Date: _____
(or authorized Service representative with financial assistance signature authority)