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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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).

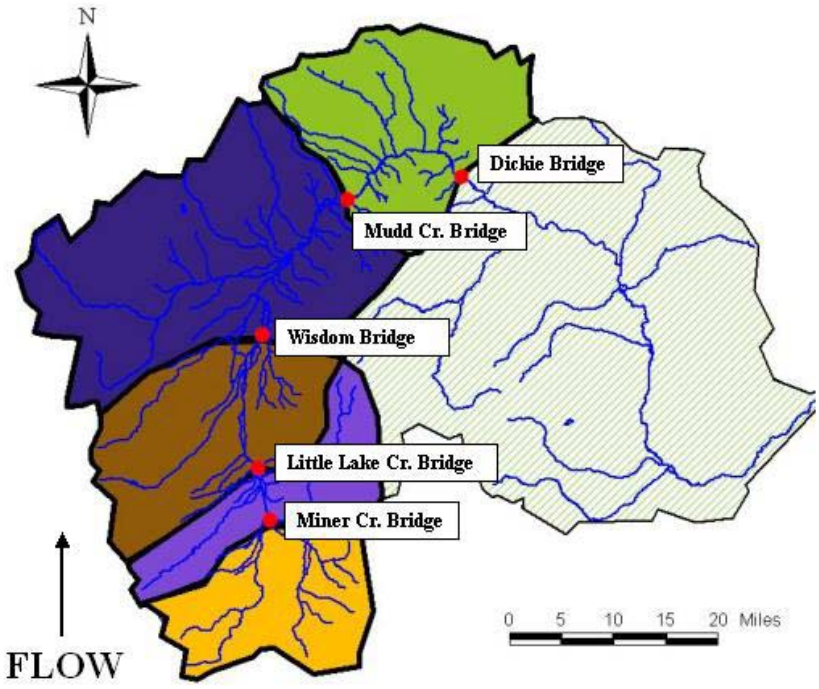

Figure 1. Big Hole River watershed in southwestern Montana. The proposed project area contains portions of the watershed upstream from Dickie Bridge that contains most of the habitat occupied by fluvial Arctic grayling in the watershed.

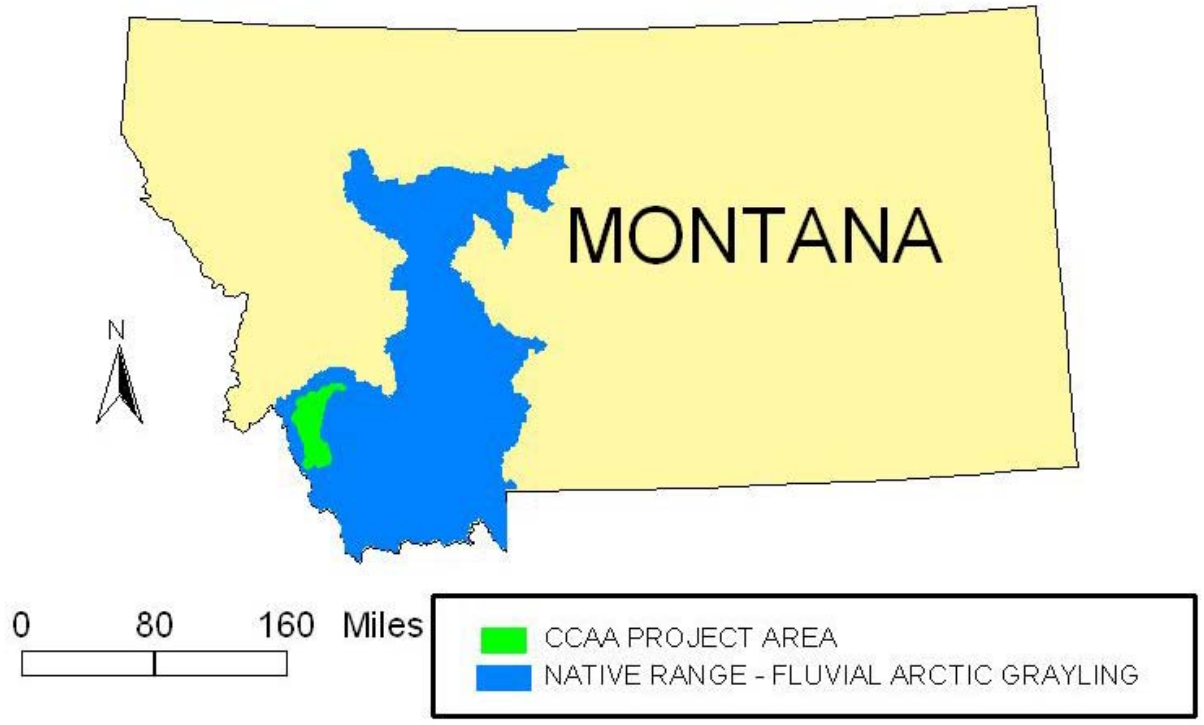

Figure 2. Location of the proposed project area in the Big Hole River in relation to the native range of fluvial Arctic grayling.

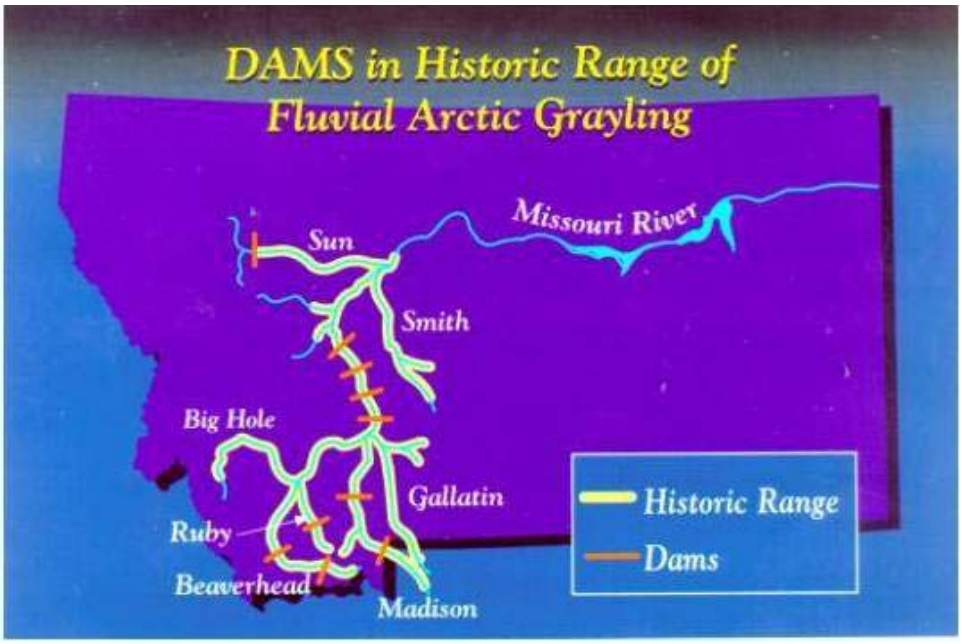

Figure 3. Historic range of fluvial Arctic grayling in the Missouri River above the Great Falls. The current range of fluvial Arctic grayling is restricted to the Big Hole River (map courtesy of Montana FWP).

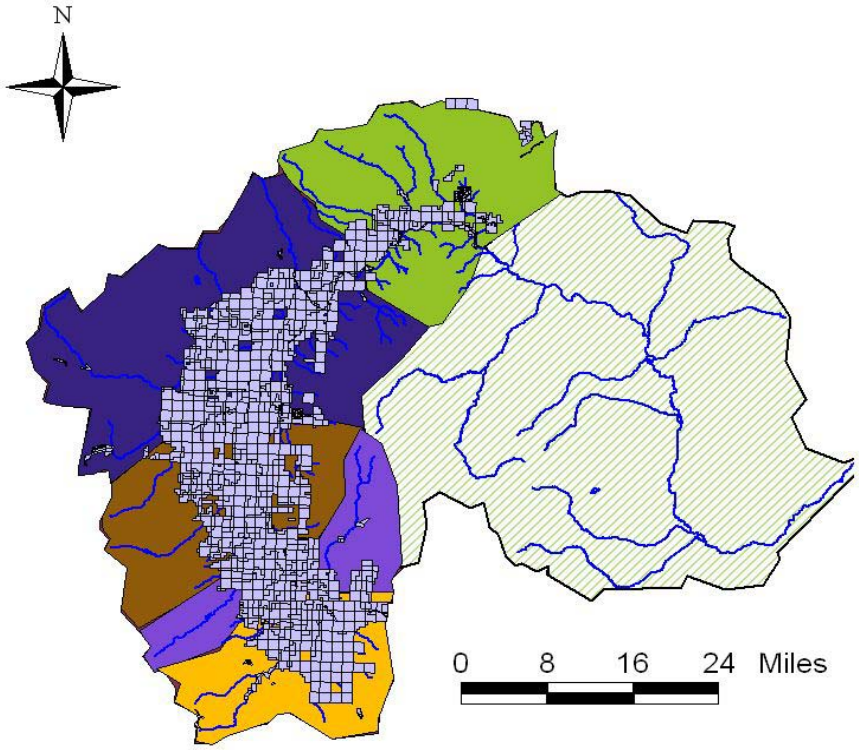

Figure 4. Distribution of private, non-Federal lands (light blue parcels) representing the 380,000-acre proposed project area in the upper Big Hole River drainage. The lower watershed (at right) is denoted by cross-hatched shading.

C. Decision to be Made by the Responsible Official Error! 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.

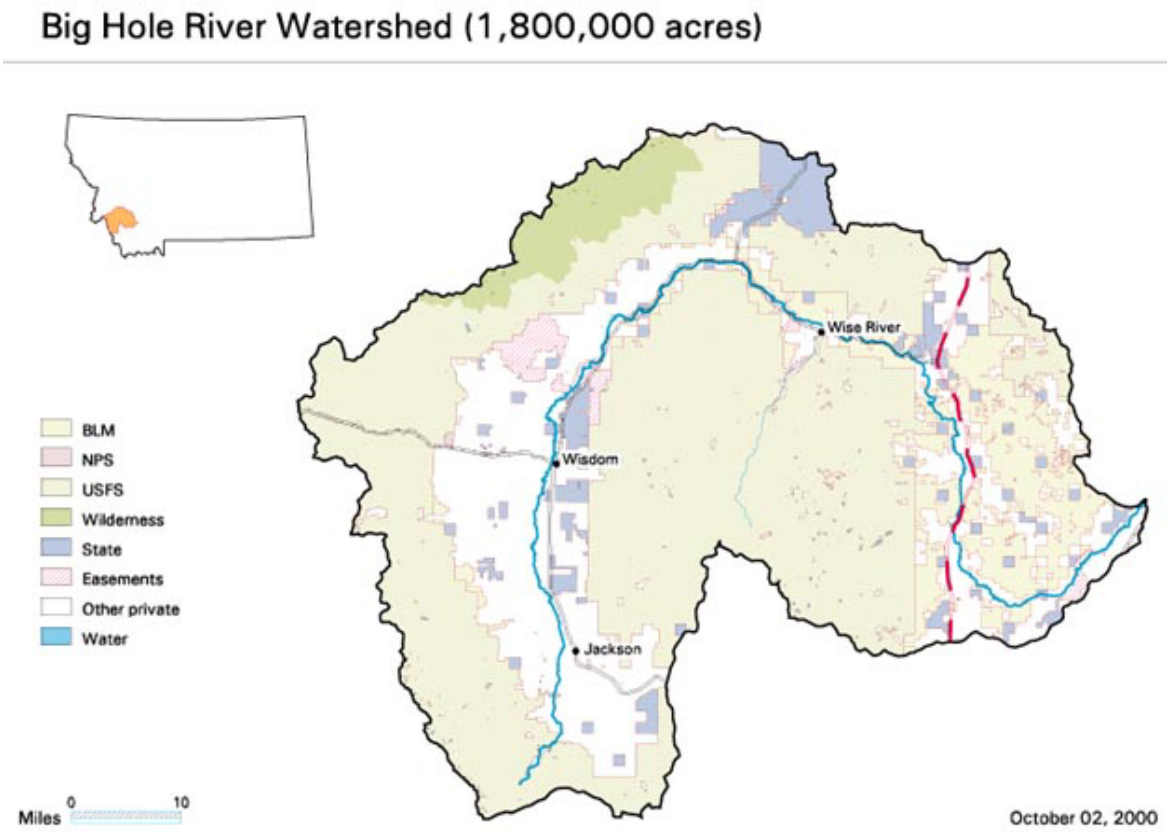

Figure 5. The Big Hole River watershed in southwestern Montana, with headwaters situated at bottom left of map. Map courtesy of the USFWS' Montana Partners (>http://montanapartners.fws.gov/images/bh1.jpg<).

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^{o}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).

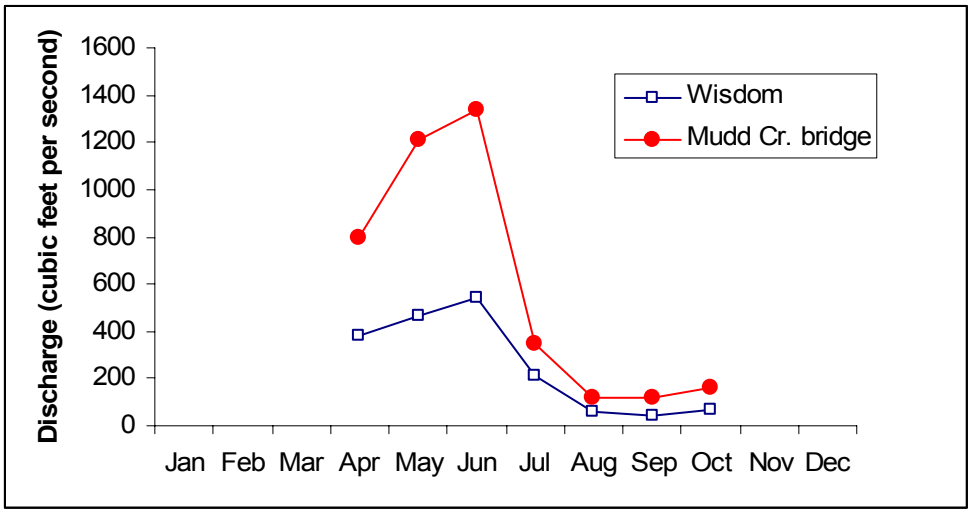

Figure 6. Hydrograph for two locations in the upper Big Hole River watershed. Points are the mean monthly discharge at Wisdom (1998-2004) and at the Mudd Creek Bridge (1998-2004). Gages are operated only during the months of April-October.

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.

	ACRES IN OWNERSHIP OR DESIGNATION (% OF TOTAL)	
OWNER	**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.

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VIII. LIST OF 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.

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.

Appendix 5. Private Property Act assessment checklist for compliance with Chapter 462, Laws of Montana (1995).

Appendix 6. National Environmental Policy Act Federal activities checklist (Form 3-2185) used by the U.S. Fish and Wildlife Service.