DRAFT PROGRAMMATIC ENVIRONMENTAL ASSESSMENT

for

Candidate Conservation Agreement with Assurances (Agreement) and Associated Permit for Arctic Grayling in the Centennial Valley, Montana

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EXECUTIVE SUMMARY

The purpose of this Environmental Assessment (EA) is to determine whether there would be significant impacts to the human environment as a result of the implementation of a 20-year programmatic Candidate Conservation Agreement with Assurances (CCAA or Agreement) for Arctic grayling in the Centennial Valley, Montana. Through the National Environmental Policy Act (NEPA) process, the US Fish and Wildlife Service (USFWS or Service) will decide whether to issue Montana Fish, Wildlife and Parks (FWP) a Section 10(a)(1)(A) Enhancement of Survival permit (Permit). Montana FWP will decide through Montana Environmental Policy Act (MEPA) analysis whether to implement the Agreement. A No Action alternative is compared to the Proposed Action alternative to assess whether the proposed action causes significant effects to the human environment in the proposed Project Area (Figure 1).

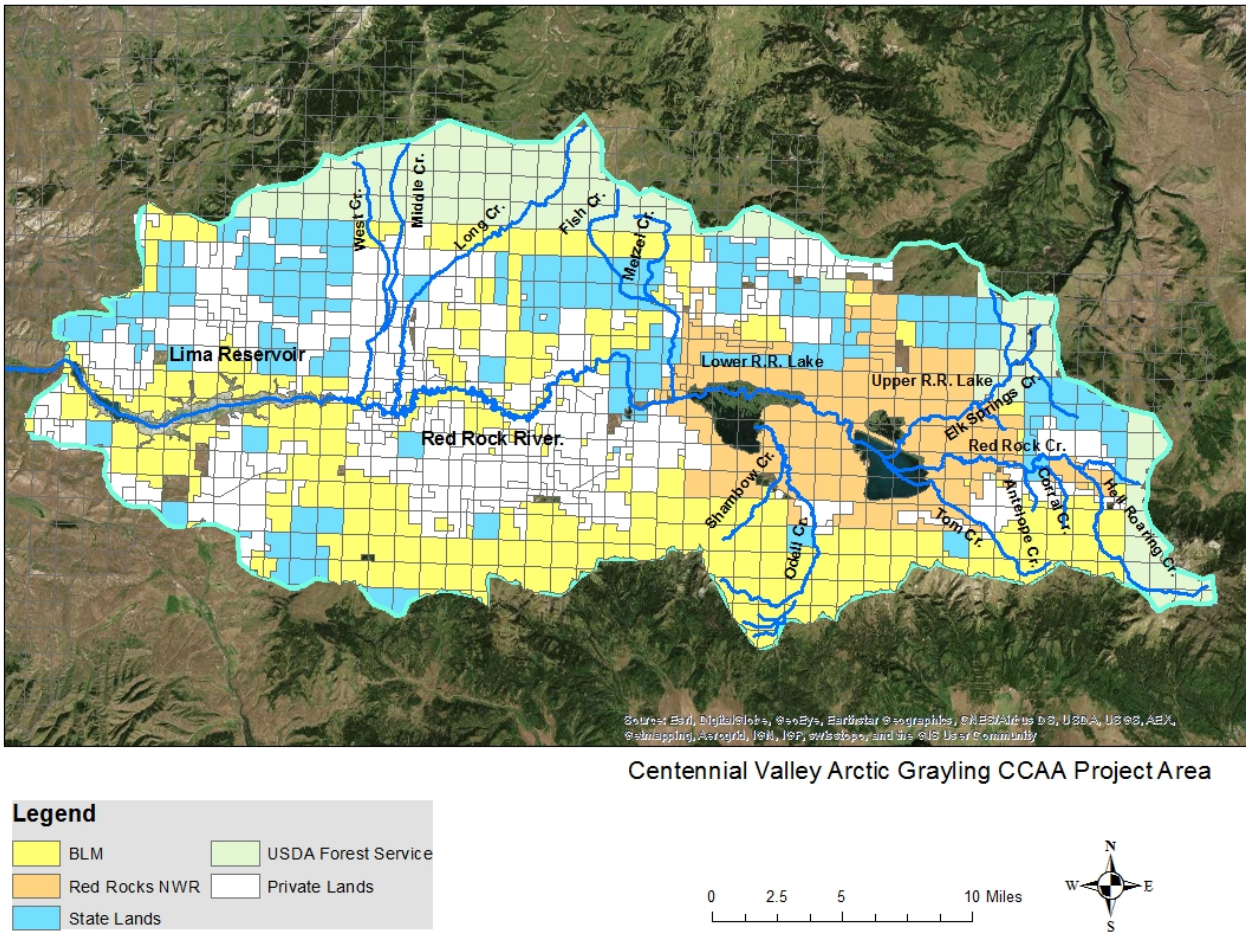

Figure 1. Centennial Valley Arctic Grayling CCAA proposed Project Area, with land ownership and major hydrologic features. The proposed Project Area includes non-Federal lands upstream of Lima Dam and includes the mainstem Red Rock River, West Creek, Middle Creek, Long Creek, Metzel Creek, Odell Creek, Shambow Creek, Tom Creek, Corral Creek, Antelope Creek, Red Rock Creek and Hell Roaring Creek.

The majority of the Centennial Valley population of Arctic grayling occupies Federal land, specifically Red Rock Lakes National Wildlife Refuge (Refuge). On August 20, 2014, the Service determined in their 12-month finding that the Upper Missouri River Distinct Population Segment (DPS) of Arctic grayling was not warranted for listing as threatened or endangered under the Endangered Species Act (ESA) (USFWS 2014; 79 FR 49384). The Service concluded that the threats to the Centennial Valley population of Arctic grayling had been sufficiently minimized, due in large part to collaborative State and Federal conservation efforts and adequate regulatory mechanisms on Federal land. However, the Service recognizes some potential limiting factors to Arctic grayling on non-Federal land in the Centennial Valley. Although the Service determined that these potential limiting factors on non-Federal land were not acting at the population or DPS level, the Service hypothesized they may be precluding expansion of the Centennial Valley Arctic grayling population into some historical habitat on non-Federal land.

This programmatic Agreement describes specific land and water-use activities and conservation practices that would be implemented to provide a net conservation benefit to improve the status of Arctic grayling on non-Federal lands in the Centennial Valley. In exchange for volunteering to implement beneficial practices for Arctic grayling, the Participating Landowners would be granted authorization to incidentally take Arctic grayling under the Permit and receive assurances that the Service would not impose additional conservation measures or land, water, or resource use restrictions, beyond those voluntarily agreed to and described in the Agreement if the species becomes listed under the ESA. The Permit would become effective if the Arctic grayling was subsequently federally listed, and would then authorize a level of take for each enrolled landowner. Take is defined as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct."

This CCAA represents an opportunity to conserve and restore Arctic grayling habitat on 52 stream miles on non-Federal lands in the Centennial Valley. Initial meetings with non-Federal landowners in the Centennial Valley have been positive, with most landowners interested in enrolling in a CCAA (FWP and USFWS 2016).

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 in the Centennial Valley would not receive any future incidental take authorization or assurances for future management of their lands should Federal listing of the Arctic grayling occur. Some beneficial conservation measures such as riparian fencing, irrigation withdrawal reductions and grazing plans may be implemented under this alternative as FWP and the Service's Partners for Fish and Wildlife would continue to collaborate on conservation of Arctic grayling. Non-federal landowners, watershed groups or other interested parties may also implement habitat conservation projects. The Natural Resources Conservation Service (NRCS) may continue with the Environmental Quality Incentives Program (EQIP), which provides funding for conservation projects on non-Federal land, depending on agency funding and producer interest. However, these individual actions would not be expected to 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 that meets the Permit issuance criteria under the CCAA program would be developed and a Permit would be issued to FWP. The proposed Project Area would cover approximately 165,550 acres of non-federal land in the Centennial Valley. Participating landowners would sign up under the Agreement and issued a Certificate of Inclusion that would convey take authorization under the Permit. The conservation goal of the Agreement has been adopted from the Upper Missouri River Drainage Arctic Grayling Conservation and Restoration Plan (Montana Arctic Grayling Plan). This goal is to ensure the long-term, self-sustaining persistence of Arctic grayling in the Upper Missouri River Basin.

Multiple conservation objectives have been identified that, when attained, are expected to lead to achievement of long-term, self-sustaining persistence of Arctic grayling in the Centennial Valley. These objectives have been adopted, in part, from the Centennial Valley Arctic Grayling Adaptive Management Plan (Adaptive Management Plan; see below in Integration of CCAA and existing conservation plans) and include:

1) Conserve existing Centennial Valley Arctic grayling genetic diversity,
2) Establish or maintain Arctic grayling spawning or refugia in at least two tributaries up and downstream of Upper Red Rock Lake and connectivity among tributaries, and
3) Increase or maintain suitable habitat for all life history stages for the Centennial Valley Arctic grayling population.

The conservation objectives of the CCAA 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
4) Remove barriers to 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 restrictions or conservation commitments would be required if Federal listing occurs. These activities would include agriculture and ranching-related activities such as irrigation or stockwater withdrawals, maintenance of physical structures that block fish migration, and livestock grazing in the riparian zone. Not all conservation measures may need to be implemented on every enrolled property.

I. PURPOSE AND NEED FOR TAKING ACTION

A. INTRODUCTION

This Environmental Assessment (EA) is being prepared to address the impacts of (1) issuing an Endangered Species Act (ESA) section 10(a)(1)(A) Enhancement of Survival Permit (Permit) to Montana Fish, Wildlife and Parks (FWP) and (2) execution of a programmatic Candidate Conservation Agreement with Assurances (Agreement) for Arctic grayling (*Thymallus arcticus*) by FWP in the Centennial Valley, Montana. The U.S. Fish and Wildlife Service (USFWS or Service) received the completed Permit application on March 6, 2017. Issuance of the Permit and execution of the Agreement are Federal actions subject to the National Environmental Policy Act (NEPA, 42, U.S.C. §4321 et. seq.).

The purpose of this EA is to determine whether there would be significant impacts to the human environment as a result of the proposed action or its alternatives. After public review, the Service will determine if additional environmental analysis is required pursuant to NEPA or if a Finding of No Significant Impact can be made pursuant to the Council on Environmental Quality regulations and applicable guidance. 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 Service. The EA presents an analysis of the impacts of implementing either the No Action and Proposed Action alternatives to the physical and human environment.

The draft Agreement has been prepared by the Service and FWP. Under the Agreement, FWP would hold the Permit and enroll Participating Landowners into the Agreement by issuing Certificates of Inclusion (CI). Enrollment by CI requires development of a Site-Specific Plan (SSP) that describes the conservation measures to be implemented on the enrolled property. The Service and FWP develop these SSPs cooperatively with the Participating Landowners. Landowner enrollment and continued participation in the Agreement are voluntary. By participating in the Agreement, landowners will receive authorization of potential incidental take associated with the activities covered in the Agreement and receive assurances that land and water use restrictions or conservation commitments additional to those described and agreed to in SSPs would not be required should the Arctic grayling become listed under the ESA.

Montana Environmental Protection Act Process

FWP's decision to implement the Agreement is subject to the Montana Environmental Policy Act (MEPA, 75-1-101, Montana Codes Annotated, et seq.). In addition to information and analysis mandated by NEPA, MEPA also requires 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 and FWP determined that no taking or damaging implications result from the implementation of the proposed action.

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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.

The MEPA 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)). For the reasons mentioned above, FWP therefore concludes that an EIS is not required for analysis of the proposed action under MEPA and, further, a sufficient level of analysis is provided by this EA.

B. PURPOSE AND NEED

The purpose of this Agreement is to fulfill our conservation obligations under the CCAA program and Section 10(a)(1)(A) of the ESA. The conservation obligations include creating an agreement that will incentivize non-Federal landowners to voluntarily participate and implement habitat conservation measures to provide a net conservation benefit to improve the status of the Arctic grayling on non-Federal land in the Centennial Valley in Beaverhead County, Montana.

The need of this Agreement is to authorize any associated incidental take so that participants in the CCAA would not be in violation of Section 9 of the ESA if Arctic grayling become listed in the future.

C. DECISION TO BE MADE BY THE SERVICE AND FWP

The Service's 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 or to deny the permit application and not approve the Agreement. To issue the Permit, the Service must find that: (1) the taking of 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 Candidate Conservation Agreement with Assurances 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) FWP has shown capability for and commitment to implement all the terms of the Agreement. To approve and execute a CCAA, the Service must determine that the benefits of the conservation measures implemented by a property owner under a CCAA will reasonably be expected to provide a net conservation benefit and to improve the status of the covered species. Net conservation benefit for species covered by a CCAA is defined as the cumulative benefits of the CCAA's specific conservation measures designed to improve the status of a covered species by removing or minimizing threats so that populations are stabilized, the number of individuals is increased, or habitat is improved (81 FR 95164).

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Issuance of the Enhancement of Survival Permit and execution of a CCAA are Federal actions subject to NEPA. The U.S. Fish and Wildlife Service's Director for Region 6 or their 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 environmental impact statement (EIS) if a determination is made that the preferred alternative would significantly impact the human environment.

FWP's decision is whether or not to implement the Agreement. The State's decision is subject to MEPA and will be based on a finding of whether or not there would be a significant impact on the quality of the human environment. FWP's Region 3 Supervisor is responsible for FWP's implementation decision. Once a determination is made on whether or not to implement the Agreement, FWP would issue a Decision Notice.

D. FACTORS CONSIDERED DURING PLANNING

Factors 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) potential effects of climate change, (4) interactions with non-native salmonids, and (5) Lima Dam/Reservoir operations. A brief description of each follows:

(1) The proposed Agreement is intended to be a collaboration among Participating Landowners, FWP and the Service. FWP agreed to serve as the applicant for the 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, enrolling landowners under CIs, developing SSPs and monitoring compliance and effectiveness for the Agreement. The Service has agreed to provide technical and field assistance in the development and implementation of SSPs, and maintains an oversight role in the approval of SSPs and compliance with applicable Federal laws.

(2) Approximately 165,550 acres of non-Federal land (13 landowners) are eligible to be enrolled under this CCAA. In 2014, FWP and the Service discussed the concept of developing the Centennial Valley CCAA with non-Federal owners of lands that comprise the majority of the proposed Project Area. The landowners expressed interest in development of this program and meeting again to explore the potential of enrolling and implementing conservation measures to benefit Arctic grayling.

(3) The effects of climate change are predicted to influence many of the basic physical and biological processes in aquatic systems (e.g., hydrology, water temperature). A discussion of the possible effects of climate change can be found in Section II.B. The conclusion was that the primary effect of climate change would be changes in water temperature. However, changes in channel shape and riparian vegetation from conservation efforts are expected to reduce water temperatures and help buffer any potential increases in water temperature due to climate change. This conclusion is

consistent with the best available science used in the Not Warranted 12-month Finding for the Upper Missouri River Distinct Population Segment (DPS) of Arctic grayling (USFWS 2014; 79 FR 49384).

(4) Interactions among native and nonnative fish species often results in competition or predation. A discussion of the possible effects of interactions among native and nonnative fish can be found in Section II.B. The conclusion was that although interactions between Arctic grayling and non-native fish species may occur in some areas, they are not expected to compromise the conservation objectives of the CCAA. This conclusion is consistent with the best available science used in the Not Warranted 12-month Finding for the Upper Missouri River Distinct Population Segment (DPS) of Arctic grayling (USFWS 2014; 79 FR 49384). If interactions with nonnative trout limit the ability of Arctic grayling to respond to improved habitat conditions as a result of this CCAA, other conservation strategies (e.g., Montana Arctic Grayling Plan, Adaptive Management Plan) are in place to address this issue.

(5) Lima Reservoir is located at the lower end of the CCAA proposed Project Area (Figure 1). The reservoir is managed by the Red Rock Water Users Association with the primary purpose of supplying irrigation water to downstream water users. Operations of Lima Dam have the potential to affect Arctic grayling using Lima Reservoir for overwintering habitat or other life history needs. A discussion of the possible effects of the management of Lima Reservoir can be found in Section II.B. If preventive maintenance or alternative management is needed to maintain Lima Dam as an upstream fish barrier or to improve habitat for Arctic grayling in Lima Reservoir, FWP and the Service are committed to working with stake holders and water users to address issues that are of mutual concern.

II. ALTERNATIVES INCLUDING THE PROPOSED ACTION

Two alternatives have been developed for analysis in this draft EA; a “no action” alternative and a proposed action alternative.

A. ALTERNATIVE A - “NO ACTION”

Under the “No Action” alternative, the proposed Agreement would not be developed and a Permit would not be issued to FWP. Thus, landowners in the Centennial Valley would not be able to enroll in a programmatic CCAA to receive regulatory assurances from the Service and CIs for incidental take authorization under a single permit while implementing conservation measures for the Arctic grayling. If landowners wanted to volunteer to conserve the Arctic grayling and receive such assurances, each one would have to develop their own CCAA and apply to the Service for their own permit. Each permit application process would require preparation of a draft CCAA and draft NEPA analysis document, providing the public at least 30 days to comment on the draft CCAA and draft NEPA analysis document, and the Service’s completion of other analysis and decision documents. Landowners are less likely to have the

resources or time to develop their own CCAA and apply for a permit without the benefits of a programmatic CCAA and single permit for streamlining landowner enrollment.

Under this alternative, agricultural and ranching activities would continue within the Centennial Valley in accordance with applicable laws. Many conservation activities (e.g., riparian fencing, stream restoration, culvert replacements) would likely continue to occur sporadically and not in a coordinated and strategic manner. Various State (FWP), Federal (Service or NRCS), and non-Federal (TNC) groups have been involved in projects to improve habitat conditions for Arctic grayling in the Centennial Valley, but such projects have generally not been coordinated or systematically implemented on a large scale. Thus, implementation of strategic, comprehensive conservation by non-Federal landowners to benefit Arctic grayling in the Centennial Valley is not likely to occur.

B. ALTERNATIVE B (PREFERRED ALTERNATIVE) —"PROPOSED ACTION"

Under the proposed action alternative, a CCAA would be approved for a proposed Project Area of approximately 165,550 acres. The Service would issue FWP an ESA section 10(a)(1)(A) Permit. Thereupon, FWP would issue Certificates of Inclusion (CI) under the Permit to non-Federal property owners within the proposed Project Area who volunteer to comply with all of the stipulations of the Agreement, allow the development of an approved Site-Specific Plan (SSP), and implement conservation measures identified for the enrolled property. The CI provides the landowner with authorization of incidental take associated with the Agreement's covered activities and conservation measures on the enrolled property. Each enrolled landowner also receives assurances from the Service that no further land or water use restrictions or conservation commitments would be required of the landowner should the Arctic grayling become listed under the ESA. See the draft Agreement for details on its conservation measures and other requirements. Initial outreach and coordination by the Agencies indicate that about 13 landowners in the Centennial Valley are interested in participating in the proposed Agreement.

Successful conservation of Arctic grayling in the proposed Project Area would require the active participation of non-Federal landowners willing to implement conservation measures. Without cooperation from these landowners and development of SSPs, the prospects for increasing distribution and abundance of Arctic grayling on non-Federal lands in the Centennial Valley would remain low.

SSPs are conservation plans that are specific to a property and designed to meet the conservation needs of Arctic grayling as well as the needs of the property owner. An interdisciplinary technical team representing FWP, the Service, and other agencies as needed (collectively, the Agencies) would collaborate with each interested landowner to develop the SSPs. Each SSP would be completed within 30 months after baseline data collection for each property.

Because this is a programmatic approach, public review is necessary only once for the proposed Agreement and the draft EA. The Service would need to prepare only one set of analysis and decision documents under section 7 and 10 and NEPA for the programmatic Agreement and

Permit issuance. Subsequently, FWP's enrollment of each landowner and issuance of each CI would not require individual public review. The duration of the proposed Agreement is 20 years after its execution. Each CI is effective for 10 years or until expiration of the Agreement, whichever is earlier.

To approve a CCAA and issue a permit, the Service must determine that all permit issuance criteria are met and that the CCAA would provide a net conservation benefit that improves the status of the covered species. Net conservation benefit for species covered by a CCAA is defined as the cumulative benefits of the CCAA's specific conservation measures designed to improve the status of a covered species by removing or minimizing threats so that populations are stabilized, the number of individuals is increased, or habitat is improved (81 FR 95164).

The proposed Agreement's goal is to achieve long-term, self-sustaining persistence of Arctic grayling in the Centennial Valley through multiple conservation objectives. These objectives have been adopted, in part, from the Centennial Valley Arctic Grayling Adaptive Management Plan (Adaptive Management Plan; see in Integration of CCAA and existing conservation plans).

The conservation objectives of the CCAA would be met by implementing conservation measures that:

1) Improve streamflows
2) Improve and protect the function of riparian habitats
3) Remove barriers to Arctic grayling migration
4) Identify and reduce or eliminate entrainment.

Examples of specific actions under each of the general measures are listed below (Table 1).

1. *Improve streamflows*. Specific actions include, but are not limited to: (1) improving irrigation management; (2) compliance with water rights; (3) developing alternative sources of stock water; (4) making changes to water rights; and (5) developing an Instream Flow Conservation Plan.

2. *Improve and protect the function of riparian habitats.* Specific actions include, but are not limited to: (1) prescribing grazing practices; (2) installing and maintaining fences that manage livestock within or exclude livestock from the riparian zones; (3) installing alternative stockwater facilities; (4) stream restoration; and (5) developing weed management plans.

3. *Remove barriers to Arctic grayling movement.* Specific actions include, but are not limited to: (1) installation of fish ladders; (2) installation of grade control irrigation diversions; (3) replacement of perched or non-functioning culverts; (4) removal of beaver dams or log jams; and (5) enhancement of stream flows in dewatered reaches.

4. *Identify and reduce or eliminate entrainment.* Specific actions include, but are not limited to: (1) entrainment surveys; (2) Arctic grayling rescue operations; (3) modification of points of diversion; (4) modification of timing or amount of diverted water; and (5) installation of fish screens or other exclusion devices.

The Agencies have established a programmatic conservation framework in the proposed CCAA to benefit Arctic grayling in the Centennial Valley and would work with non-Federal landowners to comprehensively implement conservation measures across a large area. This approach is expected to generate greater collective support and participation from non-Federal landowners, provide a more holistic way to develop and implement basin-wide conservation, and provide the Agencies with a coordinated and efficient approach to ensure that landowners in the Centennial Valley would be able to fully participate in the conservation of Arctic grayling. Not all conservation measures may need to be implemented on every enrolled property.

Under this alternative, a programmatic Agreement would be initiated over a proposed Project Area of approximately 165,550 acres and could involve up to 13 non-Federal property owners. Arctic grayling may annually move many miles. The Agencies determined that a coordinated conservation effort involving all possible interested landowners would be the most effective strategy to reduce or eliminate limiting factors to Arctic grayling at a scale large enough to be meaningful to the species. Providing Participating Landowners with ESA regulatory assurances would provide more certainty to landowners if listing occurs and enhance landowner cooperation in Arctic grayling conservation efforts. Thus, under Alternative B, the proposed action, conservation measures would be implemented such that 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 Arctic grayling in the Centennial Valley.

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Table 1. Summary of limiting factors, conservation measures, implementation timeline and monitoring protocol for conservation actions implemented under the Centennial Valley Candidate Conservation Agreement with Assurances (Alternative B). Not all conservation measures may be needed in each site-specific plan.

				Monitoring		
Limiting Factor	**Conservation Measure**	**Conservation Measure Description**	**Implementation Timeline**	**Type**	**Interval**	**Responsibility**
Reduced streamflows	Irrigation Management	Improved infrastructure	Completed w/i 5 years of SSP approval	Project Performance	As needed	FWP/Service
	Water Rights Management and Compliance	Measuring diversions	Annually beginning at Enrollment	Management\Compliance Management\Compliance	Weekly Every two weeks	Landowner FWP
	Instream Flow Conservation Plan	Reduced diversion flows when flow triggers are met	Annually beginning at Enrollment	Habitat (streamflow) Habitat (temperature)	Intermittent Annually	FWP
	Alternative Stockwater	Wells, pipelines, troughs, lined ditches	Completed w/i 5 years of SSP approval	Project Performance	As needed	FWP/Service
	Water Rights Changes	Conversion of water rights	20 years	-	-	-
Degraded Riparian Habitat	Riparian Management Plan	Sustainable grazing system	Initiated w/i 1 year of SSP Approval	Habitat	Riparian Assessments Every 5 years	FWP/Service/Landowner
	Riparian Pasture Fence	Fence riparian areas, sustainable grazing system	Completed w/i 5 years of SSP approval	Project Performance	As needed	FWP/ Service
	Alternative Stockwater	Wells, pipelines, troughs, lined ditches	Completed w/i 5 years of SSP approval	Project Performance	As needed	FWP/ Service
	Stream Restoration	Active restoration	Designed w/i 10 years, completed w/i 20 years	Project Performance	As needed	FWP/ Service
	Weed Management	Spraying or other appropriate method	Initiated w/i 1 year of SSP Approval	-	-	FWP/ Service
Barriers	Fish Ladders	Ladders for pin-and-plank diversions	Completed w/i 5 years of SSP approval	Project Performance	As needed	FWP/ Service
	Grade Control Diversions	Alternative to pin-and-plank diversions	Completed w/i 5 years of SSP approval	Project Performance	As needed	FWP/ Service
	Replace Perched Culverts	Replace with appropriate culvert or bridge	Completed w/i 5 years of SSP approval	Project Performance	As needed	FWP/ Service
	Remove Natural Barriers	Beaverdams, logjams	Evaluate annually	Project Performance	As needed	FWP/ Service
Entrainment	Entrainment surveys	Electrofishing or visual	Completed w/i 1 year	Biological	Arctic grayling	FWP

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		survey of ditches	of SSP approval		present = every 2 years. No Arctic grayling present = every 5 years	
	Rescue Operations	Electrofishing/netting operations	As identified	Biological	As needed	FWP
	Modify PODs	Modify location or angle	Completed w/i 5 years of SSP approval	Project Performance	As needed	FWP/ Service
	Modify Timing/Amount of Diversion	Diversion reductions when grayling are present	Completed w/i 5 years of SSP approval	Habitat	As needed	FWP
	Fish Screens	Install screens or other exclusion devices	Completed w/i 10 years of SSP approval	Project Performance	As needed	FWP/ Service

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C. ALTERNATIVES ELIMINATED FROM CONSIDERATION

The Agencies considered an alternative to draft individual CCAAs for each landowner and issue individual Permits to each landowner interested in Arctic grayling conservation across the same project area described in the Proposed Action. The regulatory assurances and types of conservation measures implemented would be the same as those described in the Proposed Action. The landowner-by-landowner alternative was removed from consideration because the Service does not currently have the resources to develop and process multiple CCAAs in this manner. Furthermore, the cumulative conservation benefits to Arctic grayling would likely be less than in the Proposed Action's programmatic approach, because developing and implementing multiple CCAAs comprehensively and strategically for conservation would be difficult, if not impossible in a timely manner. The landowner-by-landowner alternative would require the Service to develop, approve and implement up to 13 individual plans (i.e., current number of non-Federal landowners in the proposed 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 a programmatic Agreement. The time required to process up to 13 individual applications would likely discourage landowner participation and ultimately slow the actual implementation of conservation measures that are needed to improve Arctic grayling status on non-Federal land in the Centennial Valley. The Service dismissed this alternative, because implementation of a piecemeal landowner-by-landowner approach would not result in strategic and comprehensive conservation planning, may discourage full landowner participation, may require more resources than the Agencies would have available, and ultimately result in fewer conservation benefits to Arctic grayling than the proposed approach.

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III. AFFECTED ENVIRONMENT

A. INTRODUCTION

The lands to be included in the proposed action and for analysis in this EA include the Centennial Valley in Beaverhead County in southwestern Montana (Figures 1 and 3). The entire Centennial Valley is 357,267 acres. The proposed Project Area is 165,550 acres of non-federal lands, comprised of 105,178 acres of non-Federal lands and 59,832 acres of lands owned by Montana Department of Natural Resources and Conservation (DNRC). 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 Centennial Valley of southwestern Montana is a high-elevation (~6600 feet) valley dominated by sagebrush steppe. The valley is bounded on the north by Gravelly and Snowcrest mountain ranges and on the south by Centennial Mountains. Extensive wetlands exist throughout the Centennial Valley, including a large shallow lake/wetland complex encompassed by the Red Rock Lakes National Wildlife Refuge (Refuge; Figure 1). The complex comprises Upper and Lower Lake, Swan Lake, and associated palustrine emergent marsh dominated by seasonally flooded sedge (*Carex spp.*).

Elevations within the proposed Project Area range from 6,520 feet to over 10,203 feet and annual precipitation within the watershed varies from less than 12" in the lower elevations to greater than 30” in the higher country. Because of the diverse landscape and vegetation within the watershed assessment area, it provides habitat for an abundance of wildlife.

The proposed Project Area consists of streams that Arctic grayling historically occupied upstream of Lima Reservoir, including the mainstem Red Rock River and West, Middle, Long, Metzel, Odell, Shambow, Tom, Corral, Antelope, Red Rock, and Hell Roaring creeks (Figure 1). The non-Federal land within the proposed Project Area is located primarily on the valley bottom. The surrounding uplands are owned primarily by the U.S. Forest Service, Bureau of Land Management, and State of Montana (Figure 1). The Refuge is located near the center of the Centennial Valley and encompasses approximately 48,955 acres. The project boundary on each stream would extend from the mouth to a point where the gradient increases above that typically used by Arctic grayling or at the boundary of Federal lands. Of the 52 stream miles in the proposed Project Area, approximately 40 stream miles are on non-Federal land and 12 stream miles are on property owned by the State of Montana’s Department of Natural Resources Conservation (DNRC; Figure 1). The proposed Project Area has 13 non-Federal property owners.

<u>Integration of CCAA and Existing Conservation Plans</u>

Contemporary management of the Centennial Valley Arctic grayling population is primarily guided by the Centennial Valley Arctic Grayling Adaptive Management Plan (AM Plan; Warren et al. 2017) and the Upper Missouri River Arctic Grayling Conservation Plan (Cayer et al., in

press). The Upper Missouri River Arctic Grayling Conservation Plan describes range-wide population goals and drainage specific objectives that will result in their achievement. The AM Plan describes an approach to assess what management actions will most effectively achieve Centennial Valley specific conservation objectives, and ultimately, range-wide population goals. As such, the AM Plan is a tool intended to facilitate achievement of Centennial Valley grayling management and conservation goals in perpetuity. The conservation goal for Montana Arctic grayling is described in the Upper Missouri River Arctic Grayling Conservation Plan (Cayer et al., in press) as follows:

> *Ensure the long-term, self-sustaining persistence of Arctic Grayling in the upper Missouri River Basin.*

Accordingly, the Centennial Valley Arctic grayling working group, comprising agencies and NGOs with direct fish or land management responsibility, developed the following objectives to meet the species-wide population goal within the Centennial Valley:

1) Conserve existing Centennial Valley Arctic grayling genetic diversity.
2) Establish or maintain Arctic grayling spawning or refugia in at least two tributaries up and downstream of Upper Red Rock Lake and connectivity among tributaries.
3) Increase suitable conditions for the Upper Red Rock Lake Arctic grayling population.

Implementation of the Centennial Valley CCAA has been identified as a management alternative that is likely to achieve conservation objectives and goals identified in the Upper Missouri River Arctic Grayling Conservation Plan and the AM Plan.

B. ECOLOGY OF ARCTIC GRAYLING

Introduction

Arctic grayling have a primarily holarctic distribution, occurring in northern freshwater habitats from the western edge of Hudson's Bay, west across north/north-central Canada, throughout Alaska, and into northern Eurasia (Scott and Crossman 1973). In North America, two disjunct populations of Arctic grayling, representing stocks isolated during Pleistocene glaciation, have been recorded outside of Canada and Alaska (Vincent 1962). The first was found in streams and

rivers of the Great Lakes region of northern Michigan, but these Arctic grayling were extirpated in the 1930s (Scott and Crossman 1973). The second isolated population historically inhabited the upper Missouri River basin above Great Falls, Montana. The Centennial Valley represent the southern-most distribution of Arctic grayling of the upper Missouri River basin and are the conservation focus of this Agreement.

Centennial Valley Historical and Present Distribution

Arctic grayling were historically distributed among at least a dozen Centennial Valley streams and three lakes (Nelson 1954). Distribution appeared to decline sometime between the 1950s and mid-1990s, but has since improved (Table 2). Currently, Arctic grayling occupy about half of the streams that were historically occupied on non-Federal land outside the Refuge in the Centennial Valley (M. Jaeger, FWP, personal communication , 2014).

Table 2. Distribution of Arctic grayling in the Centennial Valley, by waterbody for four periods of time (1950s – 2010s). X's denote Arctic grayling presence, blank spaces denote Arctic grayling absence, dashes (-) denote no sampling was conducted, and asterisks denote a stream that is no longer present in the historic channel.

Waterbody	**1950s**	**1970s**	**1990s**	**2010s**
Red Rock Creek	X	X	X	X
Hell Roaring Creek	X	-		
Corral Creek	X	-	X	X
Antelope Creek	X	-	X	
Battle Creek	X	-	*	*
Elk Springs Creek	X			X
Picnic Creek	X			X
Tom Creek	X	X		X
East Shambow Creek	-		X	
Arctic grayling Creek	-			
O'Dell Creek	X	X	X	X
Metzel Creek	X	-	-	
Long Creek	X		-	X
West Creek	X	-	-	X
Narrows Creek	X	X		
Elk Lake	X	X		X

Upper Red Rock Lake	X	X	X	X
Lower Red Rock Lake	X	X	X	-
Lima Reservoir	X			X

Life History/Biology

Many Arctic grayling reside in Upper Lake for most of the year, likely only leaving in the spring to spawn in Red Rock Creek, then returning to the lake. However, recent electrofishing and radio-telemetry work indicates some Arctic grayling reside yearlong in Red Rock Creek (M. Jaeger, FWP, personal communication , 2014). In addition, Arctic grayling sampled in late summer in Long Creek appear to be fluvial, based on the timing of their occurrence in the stream and the distance to the nearest adfluvial habitat.

Arctic grayling in the Centennial Valley spawn from early May to mid-June by depositing adhesive eggs over sand and gravel without excavating a redd or nest (Kaya 1990; Mogen 1996, Paterson 2013). Eggs develop and hatch within a few weeks with rate of egg development and subsequent hatching times being positively correlated with water temperature. Arctic grayling in the Centennial Valley typically reach maturity in their third year of life, and seldom live beyond age 6 (Mogen 1996). Arctic grayling of all ages feed opportunistically on invertebrates (Hughes 1992, 1998; K. Cutting, USFWS, unpublished data).

Current Population Status

Currently, the majority of the Centennial Valley Arctic grayling population resides in Upper Lake and Red Rock Creek on the Refuge. Abundance of spawning-aged Arctic grayling using Red Rock Creek has fluctuated through time (Figure 2). In general, abundance of spawners in a monitored portion of Red Rock Creek has increased since the mid-1990s and recently decreased in 2016 (Figure 2). The recent decline in Arctic grayling is likely attributable to low dissolved oxygen throughout much of Upper Red Rock Lake during the 2015-2016 and 2016-2017 winters and overwinter conditions in Upper Red Rock Lake may be a driver of Arctic grayling abundance in the Centennial Valley (Warren et al. 2017). Centennial Valley Arctic grayling are also monitored using genetic metrics such as effective population size (Ne) and effective number of breeders (Nb). N_b is the number of breeding adults that contributed genetics to a sample of offspring from a given population and N_e is a theoretical size of a population that would result in the same level of inbreeding or genetic drift as that of the population under study. Nb for the 2013 cohort in Red Rock Creek was 679 (214-inf. 95% CI; Whitely and Leary 2017) and in 2012 N_e was 166 (106-272, 95% CI; DeHaan et al. 2014, pp. 39-40), which is consistent with demographic monitoring data. Number of breeders (N_b) has increased over the past 18 years (DeHaan et al. 2014, p. 39) and N_e has remained relatively stable over the same time period (DeHaan et al. 2014, p. 40).

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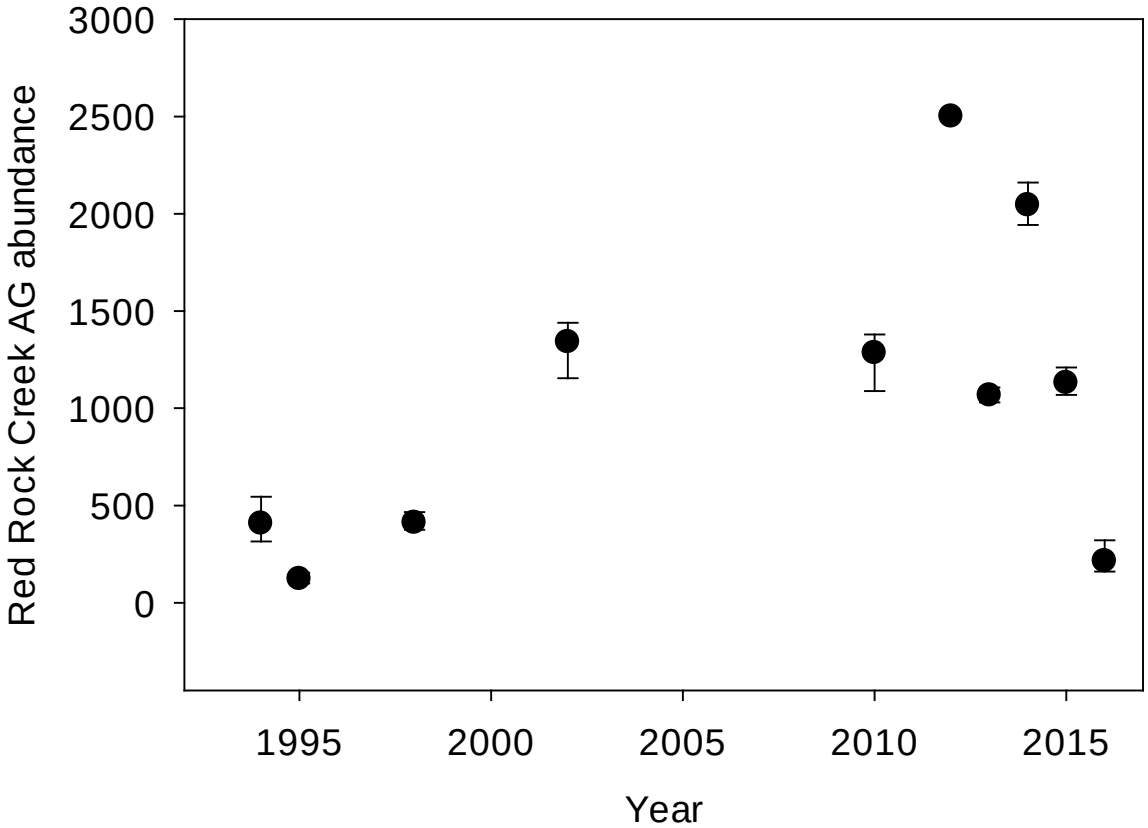

Figure 2. Abundance of Arctic grayling spawners in the monitored portion of Red Rock Creek, 1995-2016.

Two population parameters that influence population viability are N_b (the number of breeding adults that contributed genetics to a sample of offspring from a given population) and N_e (a theoretical size of a population that would result in the same level of inbreeding or genetic drift as that of the population under study). In 2012, N_b and N_e were estimated at 458 (253-1802, 95% CI) and 166 (106-272, 95% CI; DeHaan et al. 2014, pp. 39-40), respectively, for the portion of the Arctic grayling population using the monitored section of Red Rock Creek for spawning. Number of breeders (N_b) has increased over the past 18 years (DeHaan et al. 2014, p. 39) and N_e has remained relatively stable over the same time period (DeHaan et al. 2014, p. 40).

Odell Creek, a tributary to Lower Red Rock Lake (Lower Lake), is also a spawning tributary for Arctic grayling, although with fewer spawning adults than Red Rock Creek. It is unknown whether Arctic grayling are spawning in any other tributaries in the Centennial Valley at this time.

The Centennial Valley Arctic grayling population appears to be panmictic (a population that exhibits random intermixing among individuals, with no detectable genetic structuring; DeHaan et al. 2014, Leary 2014, p. 15). While genetic differences do exist within the Centennial Valley Arctic grayling population (e.g., Long Creek vs. Upper Lake), it is unclear whether these

differences represent diverging populations or a source-sink dynamic (Leary 2014, p. 21). Genetic diversity of the Centennial Valley Arctic grayling population is relatively high, compared to other Arctic grayling populations in the Upper Missouri River basin (DeHaan et al. 2014, p. 39, Leary 2014, p. 19).

Additional Management and Research

The National Wildlife Refuge System Improvement Act requires the Service to develop a Comprehensive Conservation Plan (CCP) to provide a foundation for the management and use of the Refuge (USFWS 2009) in the Centennial Valley. The Refuge CCP prioritizes conservation of Arctic grayling and has guided numerous habitat conservation and restoration projects to benefit Arctic grayling, including: active riparian restoration to reconnect Red Rock Creek to a historical channel, replacement of four culverts to allow for natural tributary migration across alluvial fans, and removal of an earthen dam on Elk Springs Creek (B. West, USFWS, personal communication, 2014. Currently, FWP and the Service are collaborating on efforts to re-establish an Arctic grayling spawning run in Elk Springs Creek (B. West, USFWS, personal communication, 2014; M. Jaeger, FWP, personal communication, 2014) and a brood reserve in Elk and Handkerchief lakes.

In 1994, concern over the effects of angling on Arctic grayling led FWP to implement catch-and-release regulations for Arctic grayling captured in streams and rivers within its native range, and those regulations remain in effect today (FWP 2017). Angling is not permitted in either of the Red Rock Lakes in the Centennial Valley to protect breeding trumpeter swans (*Cygnus buccinator*) and other waterfowl (USFWS 2009, p. 147). Additionally, angling is closed in Red Rock Creek during the Arctic grayling spawning period, May 15 to June 14 (FWP 2017).

Multiple research projects have investigated life history aspects and potential limiting factors to Arctic grayling in the Centennial Valley. The Centennial Valley Adaptive Management Plan will allow identification of factors limiting Arctic grayling in the upper Red Rock Lake population (Warren and Jaeger 2017). Research in the Centennial Valley has included status and biology of spawning populations (Lund 1974; Mogen 1996), winter habitat and distribution (Gangloff 1996; Davis 2015), predation (Katzman 1998), effects of beaver dams on Arctic grayling migrations (Levine, 2011, University of Montana, unpublished data), abundance and survival estimation (Paterson 2013), Arctic grayling diet (K. Cutting, USFWS, unpublished data), and fry migratory behavior in Elk Springs Creek (Levine, 2013, University of Montana, unpublished data).

CCAA Potential limiting factors to Centennial Valley Arctic grayling

On August 20, 2014, the Service determined that listing of the Upper Missouri River Distinct Population Segment (DPS) of Arctic grayling was not warranted (79 FR 49384). The majority of the Centennial Valley population of Arctic grayling resides on Federal land, namely Red Rock Lakes National Wildlife Refuge (Refuge). The Service concluded that the historic threats to the Centennial Valley population of Arctic grayling had been sufficiently minimized, due in large part to collaborative State and Federal conservation efforts and adequate regulatory mechanisms on Federal land. However, some potential limiting factors to Arctic grayling remain on non-

Federal land in the Centennial Valley. Although the Service determined that these potential limiting factors on non-Federal land were not acting at the population or DPS level, it was hypothesized they may be precluding expansion of the Centennial Valley Arctic grayling population into some historical habitat on non-Federal land (FWP and USFWS, 2016). Montana Fish, Wildlife and Parks considers Arctic grayling a "Species of Special Concern", but this designation does not confer any particular protection for the species. The Agencies remain committed to conservation of the species by addressing limiting factors in the system.

These conservation measures and regulatory mechanisms are expected to persist into the future and maintain the integrity of the habitat on Federal land (79 FR 49384). Addressing limiting factors on non-Federal land in the Centennial Valley is expected to increase distribution and abundance of Arctic grayling in the proposed Project Area and lead to attainment of the conservation goal of the Agreement. Limiting factors to Arctic grayling on non-Federal land in the Centennial Valley are:

1) Reduced streamflows
2) Degraded and non-functioning riparian habitats
3) Barriers to Arctic grayling movement; and
4) Arctic grayling entrainment in irrigation ditches

These habitat-related limiting factors (i.e., 1-4 above) can be directly addressed by conservation measures implemented or allowed by landowners participating in the Agreement (Table 1).

Reduced Stream Flows

Demand for irrigation water in combination with drought in the semi-arid upper Missouri River basin historically dewatered many rivers formerly or currently occupied by Arctic grayling. Dewatering likely influenced distribution, abundance, and life history strategies of Arctic grayling throughout the basin (Vincent 1962, Randall 1978) by reducing connectivity and available habitat.

In the Centennial Valley, dewatering of streams may be a limiting factor to Arctic grayling on non-Federal land. Non-Federal landowners within the Centennial Valley have the right to withdraw water from the Red Rock River and its tributaries for irrigation and stock watering purposes. The right to use this water is regulated by location of diversion, period of use, the amount of water removed from the source, and location where the water is used. However, the impact of irrigation diversion in the Upper and Lower Lake tributaries has been greatly reduced through the establishment of minimum instream flow reservations (FWP 1989, Kaeding and Boltz 1999), a compact settlement between the Montana Reserved Water Rights Compact Commission and the Refuge (Montana Reserved Water Rights Compact Commission and USFWS 2002) acquisition of private lands by the Refuge, and changes in management practices on non-Federal lands.

The complexity of the Red Rock Water Compact, water use, water rights and water conveyance for agricultural purposes in the Centennial Valley requires an approach where the majority of water users and landowners are engaged in basin-wide solutions to land and water uses that

affect Arctic grayling. For example, changes in the operations of one water user may affect the operations of one or more neighboring landowners making coordination among landowners essential. Such coordination requires significant personal attention and communication among both water users and Agency personnel to foster the collaboration needed to enhance Arctic grayling habitat in the Centennial Valley.

Degraded and Non-functioning Riparian Habitats

Riparian corridors are important for maintaining ecological function of aquatic systems (Gregory et al. 1991). Riparian corridors 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). These processes are necessary for creating and maintaining necessary physical habitat features (i.e., pools, riffles, and scour areas) used by Arctic grayling to meet its life-history requirements (Lamothe and Magee 2004, pp. 21-22; Hughes 1992). Thus, healthy riparian corridors are vital for maintaining instream habitat for Arctic grayling in the Centennial Valley.

In the Centennial Valley, historical land use practices both within the Refuge and on adjacent non-Federal lands impacted riparian conditions on tributaries to the Red Rock Lakes (Mogen 1996, pp. 75-77; Gillin 2001, pp. 3-12, 3-14). Stream surveys by FWP and the Service completed in 2011 and 2012 identified degraded areas on non-federal properties in most streams in the proposed Project Area.

Some stream reaches within the proposed Project Area are incised (streams or rivers that have cut downward through the streambed) and have lost connection with the floodplain and ground water (USFWS 2012). These reaches lack riparian vegetation and channel habitat necessary to support Arctic grayling (USFWS 2012) and would consequently be focus areas for restoring riparian areas and suitable Arctic grayling habitat.

Barriers to Arctic grayling Movement

The majority of the historic range of the upper Missouri River Arctic grayling has been altered by the construction of dams and reservoirs that created barriers obstructing migrations to spawning, wintering or feeding areas; inundated Arctic grayling habitat; and impacted the historical hydrology of river systems (Kaya 1990).

Habitat fragmentation is considered one of the most significant threats to the survival to salmonid fishes in the western U.S. (Behnke 2002). Barriers to fish passage can fragment habitat by blocking access to spawning, rearing and refuge habitats under all or some flow conditions. In the Centennial Valley, the construction of Lima Dam in 1909 (and reconstruction in 1934) (Unthank 1989, p. 9) blocked Arctic grayling movement and connectivity with downstream reaches. Other barriers on non-Federal lands like irrigation diversions, poorly designed or degraded culverts, or beaver dams may prevent fish passage and limit Arctic grayling access to

desired habitats. Stream dewatering can also act as a migration barrier and prevent Arctic grayling movement to seasonal habitats.

Entrainment

Entrainment (inadvertent capture of fish into an irrigation ditch) can permanently remove individual fish from a population and strand them when irrigation headgates are closed, resulting in mortality of entrained Arctic grayling. In the Centennial Valley, entrainment was likely a historical threat for Arctic grayling at some locations (Unthank 1989, p. 10; Gillin 2001, pp. 2-4, 3-18, 3-25). Irrigation ditches are currently present on non-Federal lands in the Centennial Valley; however, there is currently no information about entrainment of Arctic grayling in those ditches.

Other Factors

Climate Change: The effects of climate change are predicted to influence many of the basic physical and biological processes in aquatic systems (e.g., hydrology, water temperature). Observations on flow timing in Red Rock Creek in the Centennial Valley indicate a tendency toward earlier snowmelt runoff (DeHaan et al. 2014, p. 41). However, abundance of spawning Arctic grayling in Red Rock Creek has increased in recent years, despite earlier runoff (Paterson 2013, DeHaan et al. 2014, p. 17), suggesting that altered hydrology is not likely driving populations dynamics in this system. The effect of warming water from increased air temperatures due to climate change could affect survival or optimal growth for Arctic grayling (Selong et al. 2001, p. 1032); however, the transfer of heat from air to water (i.e., convection) is a relatively small proportion of the energy exchange that occurs (Johnson 2003, p. 497). A larger factor influencing water temperature is likely solar radiation (Johnson 2003, p. 497; Cassie 2006, p. 1393). Changes in channel morphology (reducing width-to-depth ratios) and riparian vegetation (shading) resulting from the conservation actions being implemented for Arctic grayling are expected to reduce water temperatures by blocking some solar radiation and reducing surface area that solar radiation can interact with. In other similar systems in Montana (e.g., Big Hole River, Blackfoot River) where riparian areas and narrower channels are being restored, substantial reductions in water temperature have been observed (79 FR 49384; Pierce et al. 2013, p. 72). These reductions in water temperature are expected to buffer any potential increases in water temperature from increased air temperatures due to climate change.

Interactions with Nonnative Salmonids: Interactions among native and nonnative fish species often results in competition or predation. However, strength of competition and predation can be very difficult to measure in wild trout populations (Fausch 1988, pp. 2238, 2243; 1998, pp. 220, 227). In the Centennial Valley, Arctic grayling have coexisted with brook trout and hybrid Yellowstone cutthroat trout for over 60 years. Recent increases in Arctic grayling abundance occurred concurrently with increases in hybrid cutthroat trout abundance. This may indicate predation or competition by hybrid cutthroat trout is not a limiting factor to Arctic grayling in the Centennial Valley. This Agreement does not propose direct measures for Participating

Landowners to limit interactions between Arctic grayling and nonnative salmonids in the proposed Project Area. These interactions are not a direct result of landowner activities and subsequently are not the responsibility of landowners. However, if interactions with nonnative trout limit the ability of Arctic grayling to respond to improved habitat conditions as a result of this CCAA, other conservation strategies (e.g., Montana Arctic Grayling Plan, Adaptive Management Plan) are already in place to address this issue.

Lima Dam/Reservoir: Lima Reservoir is located at the lower end of the CCAA proposed Project Area (Figure 1). The reservoir is managed by the Red Rock Water Users Association with the primary purpose of supplying irrigation water to downstream water users. Prior to the construction of Lima Dam, some Arctic grayling used the Red Rock River as a migratory corridor to access the Centennial Valley. However, the construction of Lima Dam in 1909 created an upstream fish passage barrier. Despite the presence of Lima Dam, Arctic grayling persisted upstream of the dam but no longer migrated from below the dam into the Centennial Valley (Vincent 1962, p. 116). While Lima Dam fragmented grayling habitat, it also prevented upstream migrations of non-native trout (e.g., brown trout) into the Centennial Valley, thereby mitigating potential impacts between Arctic grayling and brown trout.

Lima Reservoir extends approximately 12 miles upstream from Lima Dam and provides habitat for Arctic grayling. Arctic grayling have been captured in recent years in Lima Reservoir (M. Jaeger, FWP, personal communication, 2014); however, little is known about Arctic grayling use of Lima Reservoir. The Agencies recognize the historical role of Lima Dam as a migration barrier to Arctic grayling and its contemporary importance as a barrier to brown trout. If preventive maintenance or alternative management is needed to maintain Lima Dam as an upstream fish barrier or to improve grayling habitat in Lima Reservoir, FWP and the Service are committed to working with stake holders and water users to address these issues.

C. HYDROLOGY (Including water quality and quantity)

Red Rock River, Lima Reservoir and Red Rock Lakes are the major surface water features in Centennial Valley. Red Rock River originates as Hell Roaring Creek at the east end of the valley emerging from the Centennial Range into the Alaska Basin. A dominant hydrologic feature on the other end of the Centennial Valley is Lima Reservoir formed by the construction of Lima Dam in 1893 (Giles et al. 2006). In 1908 the dam was raised to 40 feet, storing approximately 50,000 acre-feet (Metlen 1921) and was again raised in 1934 to its present elevation (Gilbert 1982). The dam was rehabilitated in 1992. At its mean sea level elevation, 6,581 feet, the reservoir holds 75,180 acre-feet at full capacity (USBR 2006). The reservoir floods a portion of the Red Rock River and its historic floodplain.

High gradient mountain streams flow out of the Centennial Mountains on the south side of the valley, and as these streams enter the valley bottom their character changes. Streams on the north side of the valley flow from the south flanks of the Gravelly and Snowcrest Ranges. Most of these streams are used for irrigation. The low gradient valley streams and associated floodplains developed in glacial materials and are maintained by sediments transported from the mountain streams. Streamflow varies substantially by season, with the largest flows generally occur during spring or early summer because of snow melt and rainstorms. Streams that enter

the Centennial Valley lower elevations are degraded as a result of historic land and water practices. Few streams actually flow continuously from the mountains into Red Rock River. (K. Cutting, USFWS, personal communication, 2016). Irrigation water is imported into Long Creek from Divide Creek in the headwaters of the Ruby River. In the past irrigation water was imported into Metzel Creek from the West Fork Madison River.

The Centennial Valley contains vast wetland resources. Red Rock Lakes, which are located within the Refuge, are important to the hydrology of the valley and contain approximately 25,000 acres of wetlands. Lower Red Rock Lake historically was impounded by a low-head dam storing an additional 6,313 acre-feet. The dam was rebuilt and raised in 1988 impounding an additional 12,727 (USFWS 1987b). Water was stored during the winter months with water being released after May 15 to lower lake elevations to improve vegetative growth (USFWS 1987a). Water is no longer stored above elevation 6607.5 feet above mean sea level (msl), 1.5 feet lower than the sill of the 1988 dam. (USFWS 2009).

Flow alterations and dewatering have been implicated in the poor reproductive success of Arctic grayling in the Centennial Valley. These alterations to the natural system may 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 coincided with reduced abundance of Arctic grayling in the upper Big Hole River (Magee and Lamothe 2003, 2004), although it is unknown if the same level of effect occurs in the Centennial Valley. Thermal and stream flow conditions stressful to salmonid fishes such as Arctic grayling commonly occur in parts of the Centennial Valley during summer months .

Flood irrigation techniques used in the proposed Project Area are relatively inefficient resulting in over-irrigation of many fields and pastures. The proposed Agreement generally concludes that reducing the magnitude or modifying the timing of these diversions would improve overall hydrologic conditions and benefit Arctic grayling. There is some evidence that ground-water recharge and return flows from these irrigation practices influence streamflow from late summer through the winter in some locations (DNRC 2016). Moreover, some irrigation return flows may result in thermal or nutrient loading. The current weight of the evidence indicates that some Centennial valley streams experience chronic dewatering and that maintaining minimum instream flows would improve habitat conditions for 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 Arctic grayling on non-Federal lands.

Collectively, the hydrological template of parts of the Centennial Valley have 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 irrigation diversions, degradation of riparian zone communities by livestock or direct human manipulation, and systemic incisement and floodplain disconnection.

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D. VEGETATION

Vegetation in the Centennial Valley is somewhat typical of higher-elevation locations of the Rocky Mountain ecoregion (Table 3). The predominant vegetation type is sagebrush/shrub/steppe. Forest and woodland habitats are found at higher elevations. Dominant forest types include primarily Douglas fir, as well as spruce fir, and lodgepole pine. 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 (FWP and USFWS, 2005). Sagebrush reduction through aerial spraying is routinely conducted to reduce sagebrush cover and increase grass cover. (K. Cutting, USFWS, personal communication, 2016). The proposed Project Area is on non-Federal lands which are primarily the valley bottoms or lowlands adjacent to the rivers and streams.

Average annual precipitation within the watershed varies from about 12 inches in the Lima Reservoir allotment to 32 inches on the high mountain slopes in the Centennial Mountains on the Montana-Idaho state boundary, giving way to a diversity of vegetation types. (BLM 2015). Vegetation varies from wetland vegetation including *Carex sp.* and *Juncus sp.*, to black greasewood *(Sarcobatus vermiculatus)* and inland salt grass *(Distichlis stricta)*, or low sage *(Artemesia arbusluca)* and needle-and thread grass *(Hesperostipa comata)* in the valley bottom to three-tip sagebrush *(Artemesia tripartita)*, mountain big sagebrush *(Artemesia vayseana)*, Idaho fescue *(Festuca idahoensis)* and bluebunch wheatgrass *(Agropyron spicatum)* on the foothills; and as the elevation goes up, transitioning into aspen, *(Populus lremuloides)*, Douglas-fir *(Pseudotsuga menziesii)* forests, then to lodgepole pine *(Pinus conlorta)*, subalpine fir *(Abies lasiocarpa)* and/or whitebark pine *(Pinus albicaulis)* forests along the continental divide.

Invasive cheat grass is present, and is likely to increase over time. Cheat grass is limited primarily to south facing ridgelines at elevations less than 7500 feet, and along roadways (K. Cutting, USFWS, personal communication, 2016).

Table 3. Land cover categories for the 357,267acre Centennial watershed based on satellite imagery. Adopted from BLM Centennial Watershed Assessment Report, Dillon Field Office, P. 16, January 22, 2015.

Land Use*	% of Total
Forested	17
Grasslands	8
Sagebrush/Shrub/Steppe	53
Riparian/Mesic Shrubs	16
Aspen/Mixed Aspen Stands	<1
Other/Agriculture	2

Water	3
TOTALS	100

A number of Montana Species of Concern plant species occur in the proposed Project Area (Table 4). These species include one federal candidate species, whitebark pine, and one federally threatened species, Ute ladies tresses.

Table 4. List of selected sensitive and threatened plant species present in the proposed Project Area.

Common and scientific name	Montana SOC[1]	Endangered Species Act (ESA) status[2]	USDA Forest Service status[3]	US Bure Manager
PLANTS				
Fendlers Cateye (*Cryptantha fendleri)*	Yes	-	-	Se
Idaho Painted Milkvetch (*Astragalus ceramicus var. apus)*	Yes	-	-	Se
Lemhi Beardtongue (*Penstemon lemhiensis*)	Yes	-	Sensitive	
Pale evening primrose (*Oenothera pallida ssp. Pallida)*	Yes	-	-	
Sand Wilde Rye (*Elymus flavescens)*	Yes	-	-	Se
Ute Ladies Tresses (*Spiranthes diluvialis*)	Yes	Threatened	Threatened	Thre
Whitebark Pine (*Pinus albicaulis*)	Yes	Candidate	Sensitive	Se

[1] *Montana Natural Heritage Program (http://mtnhp.org/SpeciesOfConcern/?AorP=p), March 9, 2016*
[2] *USFWS IPaC (https://ecos.fws.gov/ipac/), December 22, 2015*).
[3] USDA Forest Service Sensitive Species 2011, http://www.fs.usda.gov/detail/r1/plants-animals/?cid=stelprdb5130525

Because whitebark pine occurs at elevations higher than in the proposed Project Area, any actions included in this proposal are not likely to affect the species (Montana Field Guide, Montana Natural Heritage Program, http://fieldguide.mt.gov/speciesDetail.aspx?elcode=PGPIN04010). Thus, effects to whitebark pine within the Project Area are excluded from further analysis.

E. WETLANDS

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 Centennial Valley contains vast wetland resources. According to National Wetland Inventory (NWI) data, there are 47,526 acres of wetlands in the Centennial Valley (NOW USFWS website, http://www.fws.gov/wetlands/). Of those acres, 3,784 acres occur on public land administered by the BLM (BLM 2015). Red Rocks Lake National Wildlife Refuge encompasses approximately 25,000 acres of natural, enhanced, and created wetlands, the largest wetland complex in the Greater Yellowstone Ecosystem (USFWS 2009, Page 41).

Interpretation of the NWI data coverage in the valley indicates that wetlands are vigorous (intact hydrological functions, representative native plant communities, outstanding wildlife values, and/or rare plant and animal species) where there is sufficient water available. Some examples are the extensive emergent palustrine wetland complexes located in the Curlew and Lima Reservoir BLM Allotments along the north shore just above and east of Lima Dam (BLM 2015).

F. FISHERIES AND OTHER AQUATIC SPECIES

The Centennial Valley contains primarily native fish species but also contains four introduced species (Table 5). Native species known or believed to occupy waters in the proposed Project Area include two species of sucker (longnose, and white), Rocky Mountain sculpin, longnose dace (a minnow), burbot (ling), and salmonids (Westslope cutthroat trout, Arctic grayling, and mountain whitefish). Lake trout are native to the watershed, but only occur in Elk Lake within the proposed Project Area. Introduced fish include Utah chub (Elk Lake only), brook trout, Yellowstone cutthroat Trout x Westslope cutthroat trout hybrids and Yellowstone cutthroat x rainbow trout hybrids.

Westslope cutthroat trout are native to the watershed and considered a Species of Special Concern by the State of Montana (Table 5 (http://mtnhp.org/SpeciesOfConcern/?AorP=a&OpenFolders=S&Species=Fish). They are found in several streams in the proposed Project Area but are generally rare (Montana Fisheries Information System – MFISH, Montana Natural Resources Information System and Montana Fisheries, Wildlife and Parks; http://fwp.mt.gov/fishing/mFish/). As described earlier, Arctic grayling are a species of special concern by the State of Montana including the Centennial Valley Arctic grayling population (Table 6).

Introduced salmonid species support recreational fishing in the Centennial Valley. Hybridized cutthroat trout are most abundant, followed by brook trout. Introduced rainbow trout and Yellowstone cutthroat trout have hybridized with native Westslope cutthroat trout at some locations in the watershed (Table 5).

Table 5. Fish species occurrence in the Centennial Valley in Beaverhead County, Montana.

Family	Species Name	Native or Introduced	Believed Present in Proposed Project Area
Catostomidae	Longnose Sucker (*Catostomus catostomus*)	N	P
Catostomidae	White Sucker (*Catostomus commersoni*)	N	P

Cottidae	Rocky Mountain Sculpin (*Cottus bondi*)	N	P
Cyprinidae	Longnose Dace (*Rhinichthys cataractae*)	N	P
Cyprinidae	Utah Chub (*Gila atraria*)	I (*USGS site*)	Elk Lake only
Gadidae	Burbot (*Lota lota*)	N	P
Salmonidae	Arctic Grayling (*Thymallus arcticus*)	N	P
Salmonidae	Brook Trout (*Salvelinus fontinalis*)	I	P
Salmonidae	Lake Trout (*Salvelinus namaycush*)	N	Elk Lake only
Salmonidae	Mountain Whitefish (*Prosopium williamsoni*)	N	P
Salmonidae	Westslope Cutthroat Trout (*Oncorhynchus clarki lewisi*)	N	P
Salmonidae	Yellowstone Cutthroat Trout (Oncorhynchus clarki bouvieri)X Rainbow trout hybrid[2]	I	P
Salmonidae	Yellowstone Cutthroat Trout X Westslope Cutthroat trout hybrid[2]	I	P

[1]*Data from Montana Fisheries Information System – MFISH: http://fwp.mt.gov/fishing/mFish/ and Montana Natural Heritage Program - http://mtnhp.org/*
[2]*MTNFH lists both Rainbow Trout and Yellowstone Cutthroat Trout as occurring in the proposed Project Area. However, most are likely hybrids so not listed here (M. Jaeger, FWP, personal communication, 2016).*

The boreal chorus frog (*Pseudacris maculata*), Columbia spotted frog (*Rana luteiventris*), western tiger salamander (*Ambystoma mavortium*) and western toad (*Anaxyrus boreas*) are present in the Centennial Valley. The western toad is a Montana Species of Concern. (Montana Natural Heritage Program - http://mtnhp.org/).

Table 6. List of sensitive and threatened aquatic species present in the proposed Project Area.

Common and scientific name	Montana SOC[1]	Endangered Species Act (ESA) status[2]	USDA Forest Service status[3]	US Bur Manager
ANIMALS (AMPHIBIANS)				
Western Toad (*Anaxyrus boreas)*	Yes	-	Sensitive	Se
ANIMALS (FISH)				
Arctic Grayling - Upper Missouri River (*Thymallus arcticus*)	Yes	-	Sensitive	Se
Lake Trout (*Salvelinus namaycush)*	Yes (Elk Lake only)	-	-	
Westslope Cutthroat Trout (*Oncorhynchus clarki lewisi*)	Yes	-	Sensitive	Se
ANIMALS (INVERTEBRATE:MOLLUSKS)				
Western Pearlshell *(Margaritifera falcate)*	Yes	-	Sensitive	Se

[1] *Montana Natural Heritage Program (http://mtnhp.org/SpeciesOfConcern/?AorP=p), March 9, 2016*
[2] *USFWS IPaC (https://ecos.fws.gov/ipac/), December 22, 2015).*
[3] USDA Forest Service Sensitive Species 2011, http://www.fs.usda.gov/detail/r1/plants-animals/?cid=stelprdb5130525

G. WILDLIFE

Sensitive At-Risk Wildlife Species

The Montana Natural Heritage Program database indicates that two ESA-listed wildlife species, grizzly bear and Canada lynx, as well as a number of sensitive bird species may be present in the proposed Project Area (Tables 7 and 8).

The area surrounding the Centennial Watershed has been identified as occupied habitat for grizzly bear distribution outside the Yellowstone Recovery Zone. Public lands in the Centennial Valley provide secure linkage habitat and protection for grizzly bears moving between recovery zones (BLM 2015). The sage steppe habitat is frequently used by grizzly bears and provides important connectivity between forested mountain ranges (USFWS 2016a). Riparian zones within the sage steppe are important for grizzly bear travel, foraging and cover. As the grizzly bear population expands to the edge of the Greater Yellowstone Ecosystem (GYE) more bears are moving into the Centennial Valley (Bjornlie *et al.* 2014, p. 185). The estimated GYE population increased from 136 in 1975 to between 600 and 747 in 2014 (USFWS 2016b).

Canada lynx may occur in the Centennial Valley, but generally prefer higher-elevation, forested montane habitats (McKelvey et al. 2000). The Montana Natural Heritage Program database search of at-risk wildlife species indicates no recent sightings of lynx in the proposed Project Area, and such occurrences seem unlikely or infrequent because the majority of the proposed Project Area is grassland or rangeland.

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Table 7. List of sensitive and threatened invertebrate and mammalian species present in the proposed Project Area. Not all species listed here are considered Species of Concern in Montana, but have variable status under different listing authorities.

Common and scientific name	Montana SOC[1]	Endangered Species Act (ESA) status[2]	USDA Forest Service status[3]	US Bure Manager
INVERTEBRATE:INSECTS				
Frigga Fritillary (*Boloria Frigga)*	Yes	-	-	
Gillette's Checkerspot (*Euphydryas gillettii)*	Yes	-	-	
Headless Ladybird Beetle[5]	-	-	-	
Saint Anthony Tiger Beetle (*Cicindela arenicola)*	Yes	-	-	
MAMMALS				
Canada lynx (*Lynx canadensis*)	Yes	Threatened	Threatened	Thre
Dwarf Shrew (*Sorex nanus)*	Yes	-	-	
Fringed Myotis (*Myotis thysanodes)*	Yes	-	-	Se
Great Basin Pocket Mouse (*Perognathus parvus)*	Yes	-	Sensitive	
Grizzly Bear (*Ursus arctos horribilis*)	Yes	Threatened	Threatened	Thre (Se
Hoary Bat (*Lasiurus cinereus)*	Yes	-	-	
Little Brown Myotis (*Myotis lucifugus)*	Yes	-	-	
Merriam's Shrew (*Sorex merriami)*	Yes	-	-	
North American wolverine *(Gulo gulo luscus)*	Yes	-	Sensitive	Se
Preble's Shrew (*Sorex preblei)*	Yes	-	-	
Pygmy Rabbit (*Brachylagus idahoensis)*	Yes	-	Sensitive	Se
Spotted Bat (*Euderma maculatum)*	Yes	-	Sensitive	Se
Townsend's Big-eared Bat (*Corynorhinus townsendii)*	Yes	-	Sensitive	Se

[1] *Montana Natural Heritage Program (http://mtnhp.org/SpeciesOfConcern/?AorP=p), March 9, 2016*
[2] *USFWS IPaC (https://ecos.fws.gov/ipac/), December 22, 2015*).
[3] USDA Forest Service Sensitive Species 2011, http://www.fs.usda.gov/detail/r1/plants-animals/?cid=stelprdb5130525
[5] Only one ever collected in Montana in 2009. http://www.reuters.com/article/us-usa-nature-ladybug-idUSBRE89O06I20121025

Birds

Bald eagles and golden eagles are not listed but are protected under the Bald and Golden Eagle Protection Act as well as the Migratory Bird Treaty Act. Both are occasionally sighted in the proposed Project Area. Service records indicate two bald eagle nests in the proposed Project Area (USFWS 2015).

Sensitive bird species in the proposed Project Area include burrowing owl, greater sage grouse, northern goshawk, great gray owl, red knot, black rosy-finch, Brewer's sparrow, Cassin's finch,

ferruginous hawk, golden eagle, green-tailed towhee, long-billed curlew, McCown's longspur, peregrine falcon, and sage thrasher (Table 8).

Other bird species found in the proposed Project Area include osprey, white pelicans, great blue heron, and belted kingfisher. Upland game bird species that likely occur in the proposed Project Area include spruce grouse, ruffed grouse, and Hungarian (gray) partridge.

Table 8. List of sensitive and threatened bird species present in the proposed Project Area.

Common and scientific name	Montana SOC[1]	Endangered Species Act (ESA) or BCC status[2,3]	USDA Forest Service status[4]	US Bure Manager
ANIMALS (BIRDS)[3]				
American Bittern (*Botaurus lentiginosus)*	Yes	BCC	-	Se
Bald Eagle (*Haliaeetus leucocephalus*)[5]	Special Status Species	BCC, DM	Sensitive	Se
Black Rosy-finch (*Leucosticte atrata)*	Yes	BCC	-	
Black-backed woodpecker (*Picoides arcticus*)	Yes	-	Sensitive	Se
Black-crowned Night-Heron (*Nycticorax nycticorax)*	Yes	BCC	-	
Bobolink (*Dolichonyx oryzivorus)*	Yes	BCC	-	
Brewer's Sparrow (*Spizella breweri)*	Yes	BCC	-	Se
Brown Creeper (*Certhia Americana)*	Yes	-	-	
Burrowing Owl (*Athene cunicularia)*	Yes	BCC	Sensitive	Se
Cassin's Finch (*Haemorhous cassinii)*	Yes	BCC	-	
Clark's Nutcracker (*Nucifraga Columbiana)*	Yes	-	-	
Evening Grosbeak (*Coccothraustes vespertinus)*	Yes	-	-	
Ferruginous Hawk (*Buteo regalis)*	Yes	BCC	-	Se
Flammulated owl **(***Otus flammeolus)*	Yes	BCC	Sensitive	Se
Forster's Tern (*Sterna forsteri)*	Yes	-	-	Se
Franklin's Gull (*Leucophaeus pipixcan)*	Yes	-	-	Se
Golden Eagle (*Aquila chrysaetos)*[5]	Yes	BCC	-	Se
Great Blue Heron (*Ardea herodias)*	Yes	-	-	
Great Gray Owl (*Strix nebulosa*)	Yes	-	-	Se
Greater Sage-grouse (*Centrocercus urophasianus*)	Yes	BCC	Sensitive	Se
Green-tailed Towhee (*Pipilo chlorurus)*	Yes	BCC	-	
Loggerhead Shrike (*Lanius ludovicianus)*	Yes	BCC	-	Se
Long-billed Curlew (*Numenius americanus)*	Yes	BCC	-	Se
McCown's Longspur (*Rhynchophanes mccownii)*	Yes	BCC	-	Se

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Common and scientific name	Montana SOC[1]	Endangered Species Act (ESA) or BCC status[2,3]	USDA Forest Service status[4]	US Bure Manager
Northern Goshawk (*Accipiter gentiles*)	Yes	BCC	-	
Pacific Wren (*Troglodytes pacificus)*	Yes	-	-	
Peregrine Falcon (*Falco peregrinus anatum)*	Yes	BCC, DM[6]	Sensitive	Se
Red Knot (*Calidris canutus rufa)*	Special Status Species	Threatened	Threatened	Threater S
Sage Thrasher (*Oreoscoptes montanus)*	Yes	BCC	-	Se
Sagebrush Sparrow (*Artemisiospiza nevadensis)*	Yes	-	-	Se
Trumpeter Swan (*Cygnus buccinator)*	Yes	-	Sensitive	Se
Veery (*Catharus fuscescens)*	Yes	BCC	-	Se
White-faced Ibis (*Plegadis chihi)*	Yes	-	-	Se

[1] *Montana Natural Heritage Program (http:// http://mtnhp.org/SpeciesOfConcern/?AorP=a), March 9, 2016*
[2] *USFWS IPaC (https://ecos.fws.gov/ipac/), December 22, 2015*).
[3] **BCC** = Birds of Conservation Concern. U.S. Fish and Wildlife Service. 2008. Birds of Conservation Concern 2008. United States Department of Interior, Fish and Wildlife Service, Division of Migratory Bird Management, Arlington, Virginia. 85 pp. [Online version available at http://www.fws.gov/migratorybirds/pdf/management/BCC2008.pdf]
[4] USDA Forest Service Sensitive Species 2011, http://www.fs.usda.gov/detail/r1/plants-animals/?cid=stelprdb5130525
[5] Protected under The Bald and Golden Eagle Protection Act of 1940
[6] **DM =** Recovered, delisted, and being monitored

Trumpeter Swans

Trumpeter swans are an iconic species in the Centennial Valley. Historically, management of trumpeter swans focused on protecting and enhancing the population at the Refuge. President Franklin D. Roosevelt established Red Rock Lakes Migratory Waterfowl Refuge (later named Red Rock Lakes National Wildlife Refuge) under Executive Order 7023, signed on April 22, 1935, "as a refuge and breeding ground for wild birds and animals." In the 1930s, the Refuge and surrounding area was the last known breeding location for trumpeter swans. Service efforts to protect and expand the population included winter feeding, transferring swans to other suitable habitats, managing wetland habitats for breeding swans, and minimizing illegal harvest and disturbance (especially during breeding).

Today, swans actively breed and nest on and adjacent to the Refuge and are the core of the U.S. nesting population. Intensive population enhancement efforts such as winter feeding and translocations are no longer necessary or appropriate for species conservation, and have been phased out. Trumpeter swan management on the Refuge is currently focused on providing productive and undisturbed wetland habitats during critical breeding, staging, and migrating periods. This has resulted in a steady increase in the number of trumpeter swans in the Centennial Valley since the mid-1990s. The Refuge will continue to use the "Pacific Flyway

Plan for the Rocky Mountain Population of Trumpeter Swans" to determine Refuge management objectives for trumpeter swans.

The Trumpeter Swan Society initiated and funded an effort in 2011 in partnership with the Centennial Valley Association (CVA) to describe and evaluate Trumpeter Swan habitat conditions in the Centennial Valley outside of the Refuge (Roscoe 2011). The Centennial Valley, downstream from the Refuge, has received relatively little management attention although it is a nesting area of importance for Trumpeter Swans. The Service's Partners for Wildlife Program is working on projects to improve management of swan nest sites on non-Federal lands. Thirty-two historical nest sites have been identified west of the Refuge (Roscoe 2011). Those trumpeter swan nests in the Centennial Valley are part of the metapopulation that includes swans nesting at Refuge. All nest sites identified west of the Refuge either border the Red Rock River or are south of the Red Rock River (Roscoe 2011).

Non-Sensitive Game and Non-Game Wildlife

The proposed 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 proposed Project Area include mule deer, pronghorn, elk, moose, and grey wolf (distribution inferred from species-specific hunting areas from Montana Fish, Wildlife and Parks "Plan a Hunt" database, http://fwp.mt.gov/hunting/planahunt/).

Carnivorous mammals including coyote, red fox, bobcat, marten, and mountain lion may inhabit or occasionally enter portions of the proposed Project Area (Montana Natural Heritage Animal Field Guide, fieldguide.mt.gov, 2016; C. Gower, FWP, personal communication, 2015). Mammal species associated with aquatic habitats, such as beaver, muskrat, mink, northern river otter, and a variety of vole species (Family *Muridae*) may occur in the proposed Project Area.

H. SOCIAL CONSIDERATIONS

1. Cultural and historical resources

The Centennial Valley is known to contain significant sites of archaeological, cultural and historic significance. For example, Native Americans historically inhabited the area, leaving material traces of procurement, processing, habitation, and vision quest activities; the dilapidated homesteads of early Euro-American settlers remain extant on the landscape; the fading remnants of an early stage stop and route used to deliver tourists and supplies to the west side of Yellowstone National Park linger on the valley floor; and Red Rock Lakes National Wildlife Refuge stewards a Depression-era Works Progress Administration (WPA)-built Headquarters Complex designed with a unique, rustic architectural style. The Service consulted with the Montana State Historic Preservation Office (SHPO) in an attempt to characterize sites that may be present in the proposed 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 Centennial Valley for logistical simplicity given the structure of the Montana Cultural Resource Information System (CRIS) database. Thus, the database search was

conducted over the 357,267-acre watershed within Beaverhead County. The proposed Project Area represents about 46 percent (165,550 acres) of this area. This search returned nearly 300 historic or archaeological sites (Table 9), but 76 percent of these sites were on Federal lands and would be outside the purview of the proposed Agreement. Approximately 31 sites (10.4 percent of total) potentially affected by the proposed Agreement were identified on non-Federal lands if they were located within the project footprint (Table 10). Approximately 14 sites (4.7 percent of total) potentially affected by the proposed Agreement were identified on State owned lands if they were located within the project footprint (Table 11).

Table 9. Results of a Montana SHPO search of previously recorded historic or archaeological sites within the 357,267-acre (558 mi^2) Centennial Valley within Beaverhead and Madison Counties, Montana. The Project Area of the proposed action is about 46 percent (165,550 acres) of the search area.

Ownership*	Number of Sites	Percent by Ownership
US Bureau of Indian Affairs (BIA)	1	0.3
US Bureau of Land Management (BLM)	174	58.2
BLM and Other	19	6.4
Combination	10	3.3
US Forest Service	22	7.4
Montana Department of Transportation	1	0.3
No Data	8	2.7
Other	7	2.3
Non-Federal	31	10.4
State Owned	14	4.7
US Fish & Wildlife Service	12	4.0
Total	**299**	**100**

[*Data from the Montana Cultural Resource Information System (CRIS) provided by the Montana SHPO*]

* The Montana CRIS database exclusively designates original site ownership at the time of initial site documentation; as such, it is possible that site ownership has changed in the intervening timeframe.

The 31 resources located on non-Federal lands include a variety of sites related to Native American culture, including lithic scatters, campsites, quarries, and processing areas, as well as Euro-American settlement, including homesteads and other historic sites. At least two of these sites represent multiple components, defined by the occurrence of material elements of past human activity from at least two discrete temporal and/or cultural periods (Table 10). 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 SSP would require an individual SHPO consultation and/or survey (as necessary) to ensure compliance with applicable State and Federal regulations (i.e., National Historic Preservation Act).

Table 10. Recorded historical or archaeological sites (N=31) identified by the SHPO as being located on non-Federal lands within the 357,267-acre Centennial Valley, Montana.

Primary Site Type	Secondary Site Type	MC*	Number
Historic Homestead/Farmstead	Null		1

Historic Site	Null		2
Lithic Material Concentration	Buffalo Pound		1
Lithic Material Concentration	Firehearths or Roasting Pits, FCR		2
Lithic Material Concentration	Historic Homestead/Farmstead	X	1
Lithic Material Concentration	Historic Outbuildings	X	1
Lithic Material Concentration	Null/Lithic Material Concentration		17
Lithic Material Concentration	Processing Area		1
Processing Area	Buffalo Jump		1
Surface Stone Quarry	Lithic Material Concentration		2
Surface Stone Quarry	Null		1

* MC: A marked 'X' delineates a known multicomponent site.

The 14 resources located on State-owned lands include a variety of sites related to Native American culture, including lithic scatters and trails, as well as Euro-American settlement, including a homestead, a school, a stage route, and a historic residence; a rock pile site of indeterminate age and cultural affiliation has also been documented on State-owned lands. Additionally, at least three of these sites represent multiple components (Table 11). 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 SSP would require an individual SHPO consultation and/or survey (as necessary) to ensure compliance with applicable State and Federal regulations (i.e., National Historic Preservation Act).

Table 11. Recorded historical or archaeological sites (N=14) identified by the SHPO as being located on State owned lands within the 357,267 acre Centennial Valley, Montana.

Primary Site Type	Secondary Site Type	MC*	Number
Historic Homestead/Farmstead	Null		1
Historic School	Null		1
Historic Stage Route	Historic Site		1
Lithic Material Concentration	Historic Residence	X	1
Lithic Material Concentration	Null/Lithic Material Concentration	X (n=1)	8
Lithic Material Concentration	Trail	X	1
Rock Pile(s)	Null		1

* MC: A marked 'X' delineates a known multicomponent site.

2. Local communities and their economies

The proposed Project Area is rural, with an economy, lifestyle and culture centered on traditional ranching. Of Montana's 56 counties, Beaverhead County is the largest livestock producer. The USDA 2012 Census of Agriculture Inventory (http://www.agcensus.usda.gov/publications/2012) indicated that there were 153,665 head of cattle and calves and beef cattle in the county. Beaverhead County was also fourth in sheep production with 16,191sheep and lambs inventoried. Very few grain-fed cattle were produced. The focus is on calves and feeder steers along with beef cows or breeding stock. This type of ranching requires large expanses of grazing land (BLM 2015).

Population density in the Centennial Valley and proposed Project Area is very low. Beaverhead County has a population density of 1.66 people per square mile [data from 2010 Census, Montana Census and Economic Indicator Center (CEIC), http://ceic.mt.gov/]. A little more than

9,000 people inhabit Beaverhead County (Table 12), and fewer than 1,000 inhabit the Centennial Valley. Lakeview is the only community in the proposed Project Area. It is unincorporated and has a very small population and was not counted separately in the most recent CEIC census. It is a gateway for Red Rock Lakes National Wildlife Refuge.

Table 12. Human Population for Beaverhead County

Criterion	Beaverhead County
Rural Farm Population	816 (17.6% of rural population)
Rural Nonfarm Population	3,821 (82.4% of rural population)
***Total** Rural Population*	*4, 637 (50.1%)*
Urban Population	*4,609 (49.9%)*
Total Population	**9,246**

(*Data from https://www.census.gov/geo/reference/ua/urban-rural-2010.html*)

The rural nature of the proposed Project Area is also indicative of conditions in the constituent county. Over half of Beaverhead County is considered rural. About 39 percent of the total land area in Beaverhead County is classified as being used for agriculture (Table 13). Farms are large, averaging 3,211 acres in the Beaverhead County (Table 13), and the majority of these agricultural lands are used for livestock grazing. For example, 211 of the 430 farms in listed in Beaverhead County are involved in beef cattle production (Montana Department of Labor and Industry, http://dli.mt.gov/). Beaverhead County was Montana's top beef cow producing county in 2012, ranking fifth in the country with 77,087 beef cows (USDA Final 2012 Ag Census Report, http://www.agcensus.usda.gov/publications/201). The importance of ranching in the proposed Project Area is supported 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.

Table 13. Agricultural Lands in Beaverhead County, Montana.

	Beaverhead County
Number of Farms	**430**
Land in Farms (Acres) and percent of total land area	**1,380,888** (39%)
Average Farm Size (Acres)	**3,211**
Total Land Area (Acres)	3,547,076

(*Data from USDA Ag Census 2012, http://www.agcensus.usda.gov/publications/201*)

As mentioned earlier, much of the watershed is under public ownership. Approximately 54% percent of the Beaverhead County is owned by the Federal government (23.3 percent Bureau of Land Management, 13.7 percent U.S. Fish and Wildlife Service, 12.4 percent US Forest Service,

and 4.4 percent USDA Agricultural Research Service) and 16.8 percent is owned by the State of Montana. The remaining 29.4 percent is privately owned (Table 14).

Table 14. Land ownership or designation for Centennial Valley, Montana

Owner	Acres in ownership or designation	% of Total
Montana DNRC	59,832	16.8%
Non-Federal	105,178	29.4%
USDA ARS	15,538	4.4%
USDA Forest Service	44,122	12.4%
USDI Bureau of Land Management	83,102	23.3%
USDI Fish and Wildlife Service	48,955	13.7%
TOTAL	**357,267**	**100%**

(*Data from BLM 2015 and USFWS 2009*)

In 2014 Beaverhead had a per capita personal income of $38,297, which ranked 33rd (out of 56 counties) in the State, was 96 percent of the State average of $39,903, and 83 percent of the national average, $46,049 (data from U.S. Department of Commerce, Bureau of Economic Analysis , http://www.bea.gov/). In February 2016, the unemployment rate for Beaverhead County was 4.3 percent which ranked 16th in the state, tied with three other counties (Data from Montana Department of Labor and Industry, http://dli.mt.gov/news/56).

3. Recreation

The large areas of public lands coupled with abundant fishery and wildlife resources make the Centennial Valley a popular recreational destination. Much of this recreation, however, is dispersed and generally includes fishing, hunting, camping, hiking, horseback riding, off-highway vehicle riding (all seasons), snowshoeing, cross-country skiing and wildlife viewing. These activities occur throughout the basin on lands managed by the U.S., Fish and Wildlife Service, Beaverhead-Deerlodge National Forest, State of Montana, and U.S. Bureau of Land Management. Because the proposed 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 (Montana Code Annotated 23-2-312).

The Centennial Valley supports unique and diverse fisheries for trout and Arctic grayling. Recreational angling does occur in the waters of the proposed Project Area, but use is low relative to water bodies occurring on public lands. (M. Jaeger, FWP, personal communication, 2016).

Big game hunting, especially for elk, is a popular fall activity and occurs on public and private lands in the proposed Project Area. The Red Rock Lakes National Wildlife Refuge, located

outside the proposed Project Area, is perhaps the single-most popular tourist destination in the upper Centennial Valley, drawing up to 13,000 annual visitors (Red Rock Lakes CCP, p. 25).

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IV. ENVIRONMENTAL CONSEQUENCES

A. GENERAL DIFFERENCES BETWEEN THE ALTERNATIVES

Under Alternative A, no efforts or mechanisms are foreseen for coordinating conservation and restoration projects in a strategic and comprehensive manner for Arctic grayling in the Centennial Valley. Habitat conditions may improve or certain limiting factors 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 as limiting factors to Arctic grayling on non-Federal land in the Centennial Valley. The proposed Agreement under Alternative B provides a comprehensive and coordinated conservation approach where the Agencies would assist in systematic implementation of conservation measures.

The alternatives are expected to affect, to varying extents, the following environmental attributes: Arctic grayling, hydrology, vegetation, wetlands, fishes, wildlife, cultural resources, local communities and economies, and recreation. None of the alternatives are anticipated to affect the local climate, air quality, geologic or topographic features, general land use, or aesthetics. Overall, Alternative B is expected to positively affect Arctic grayling, hydrology, vegetation, wetlands, fishes, wildlife, cultural resources, local communities and economies, and recreation. Alternative A would maintain the status quo for Arctic grayling, hydrology, vegetation, fishes, wildlife and recreation. The effects of each alternative are analyzed in the following sections.

B. ECOLOGY OF ARCTIC GRAYLING

Alternative A (No Action)

Under Alternative A, with little or no implementation of conservation measures, some ongoing negative effects to the Arctic grayling associated with historic land and water use practices would continue in the Centennial Valley. However, some conservation measures may be implemented to reduce those effects (e.g., Table 1), but the overall benefits to the Arctic grayling are likely to be less than the expected level for Alternative B and may not result in a net conservation benefit. This lower level of benefits is expected under Alternative A due the lack of incentives in the form of a streamlined process and receiving regulatory assurances for participating. In some instances, a lack of regulatory assurances may be an incentive for some landowners to avoid contributing to Arctic grayling conservation in order to reduce the probability that species would occupy waters adjacent to their property, because they fear land and water use restrictions should the species become listed.

Under Alternative A, Arctic grayling would continue to remain at low abundance on non-Federal lands and the limiting factors affecting those populations would likely persist. While any projects implemented under Alternative A may improve local conditions for Arctic grayling, it is uncertain whether they would be implemented at a scale necessary to increase the abundance and distribution of Arctic grayling on non-Federal lands.

Alternative B (Proposed Action)

Alternative B would result in a net conservation benefit for the Arctic grayling in the Centennial Valley through an increase in abundance and distribution. This alternative would involve the implementation of conservation measures on up to 165,550 acres of non-Federal land adjacent to or in proximity to the known or believed historical distribution of Arctic grayling in the upper Centennial Valley. Existing land and water use, primarily related to cattle ranching and associated irrigation diversions, would be modified on enrolled lands to reduce limiting factors to Arctic grayling associated primarily with habitat degradation and fragmentation resulting from reduced instream flows, non-functioning riparian habitats, physical barriers to Arctic grayling movement, and entrainment in irrigation ditches. Site-Specific Plans (SSPs), describing how to implement the conservation measures in the Agreement, would be developed for each individual enrolled property.

Incentives associated with Alternative B would result in a much greater probability than Alternative A that landowners would implement conservation measures for the Arctic grayling population. These incentives include a streamlined process for enrollment to receive take authorization and regulatory assurances from the Service that no additional land or water use restrictions or conservation commitments would be required if the Arctic grayling becomes listed under the ESA. Another incentive Alternative B provides, that Alternative A does not, is help from Agencies to prepare SSPs for each landowner. Furthermore, approximately 13 non-Federal landowners who own and manage the majority of the 165,550 acres of non-federal lands in the proposed 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 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 Arctic grayling movement and address entrainment. Flow alterations and dewatering have been implicated in the poor reproductive success of Arctic grayling in the Centennial Valley. These alterations to the natural system may reduce the survival and growth of all age classes of Arctic grayling by limiting their ability to move between necessary habitats and by causing acute or chronic thermal stress. Increased streamflows produced by implementation of Alternative B should be beneficial for Arctic grayling in the proposed Project Area, because low streamflows and potential dewatering as a result of irrigation diversions and overirrigation are likely limiting factors to Arctic grayling. The Agreement proposes to improve streamflows through: (1) control of water at points of diversion by redesigning, upgrading and installing physical diversion structures (e.g., headgates or the appropriate alternative) and flow measuring devices (e.g., flumes and weirs); (2) facilitating landowner compliance with water rights; (3) maintaining off-stream livestock watering facilities; (4) potential changes to water rights that convert an irrigation right to an instream flow right; and (5) implementation of an Instream Flow Conservation Plan under which Participating Landowners would agree to reduce irrigation or stockwater diversions at certain times of the year to maintain flow targets within streams from which water was being diverted.

The net result of these actions should be greater and more consistent instream flows throughout the proposed Project Area compared to recent conditions. Greater and more consistent streamflows are expected to improve growth, survival and reproduction of Arctic grayling by enhancing spawning, rearing, thermal refugia habitats and connectivity between the seasonal habitats.

The conservation and restoration of riparian habitats proposed under Alternative B should be beneficial for Arctic grayling in the proposed 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). Some of the riparian area in the Centennial Valley 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. Alternative B proposes to conserve and restore riparian habitats through implementation of prescribed grazing plans, exclusion fencing with more active livestock management, installation of alternative stockwater facilities, stream restoration projects, and development of weed management plans. The net result should be improved riparian conditions that would improve 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 Arctic grayling by improving spawning success, increasing survival and recruitment of juvenile grayling and increased survival of adult grayling.

The removal of physical barriers to Arctic grayling migration as proposed under Alternative B would benefit Arctic grayling in the proposed Project Area. The removal of migration barriers under Alternative B would allow Arctic grayling access to a greater portion of the watershed and increase access to seasonally important habitats for spawning, feeding, wintering, and refuge. Arctic grayling should respond, if previously blocked from these necessary habitats, with greater reproductive success and increased survival and growth of all age classes.

The rescue of Arctic grayling entrained in irrigation ditches as proposed under Alternative B would benefit Arctic grayling in the proposed Project Area by reducing or eliminating mortality. Rescue efforts, installation of fish screens at diversions determined to limit Arctic grayling movement, and improvements to irrigation structures is expected to reduce entrainment of Arctic grayling in irrigation ditches. Reducing or eliminating entrainment would lead to a direct increase in the number of 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 (see Table 1) and the handling of Arctic grayling. Short-term negative effects to Arctic grayling from disturbances may occur in some situations. Installation of fish screens, new headgates, fish ladders, riparian fence construction and active riparian and channel restoration, and removal of fish barriers may result in temporary soil and

substrate disturbance in or near streams. These sediment inputs may negatively affect the growth, survival and reproduction of Arctic grayling in adjacent habitats by displacing grayling into non-preferred and less productive habitats. Disturbances are expected to be short in duration and localized to the project area so would impact only small numbers of individual Arctic grayling. Project disturbances are a necessary consequence of implementing conservation measures that would lead to long-term improvement to habitat conditions. The overall impact to Arctic grayling from this type of disturbance is expected to be far less than if the conservation measures themselves were not implemented. Moreover, the draft Agreement states, "The effects from removing barriers 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," (FWP and USFWS 2016, p. 27).

Handling Arctic grayling during entrainment rescue efforts and monitoring activities including electrofishing, trapping, or netting required under Alternative B has the potential to harm some Arctic grayling. The FWP's use of electrofishing and fish handling protocols and the experience of the biologists involved in these actions are expected to ensure minimal injury or mortality. Under Alternative B, any minor negative effects to Arctic grayling from the small loss of individuals from handling are expected to be more than offset by the positive effects of the conservation measures for Artic grayling in the Project Area, resulting in a net conservation benefit to Arctic grayling.

Given the climate of the intermountain West, drought has been and will continue to be a natural occurrence. The negative effects of drought on Arctic grayling populations, such as reduced connectivity among habitats or increased water temperatures at or above physiological thresholds for growth and survival, are expected to be minimized with the implementation of the Agreement. Conservation measures to decrease irrigation withdrawals will reduce impacts of lower stream flows and higher water temperatures during drought periods, thus improving riparian habitats and fish passage.

Nonnative fish often prey on native fish or compete for food and habitat. However, impacts of competition and predation can be very difficult to measure in wild trout populations (Fausch 1988, pp. 2238, 2243; 1998, pp. 220, 227). 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, abundance of nonnative trout populations may also increase in the proposed Project Area. Given the long history of Arctic grayling co-occurring with non-native trout in the Centennial Valley, we have no evidence that an increase in non-native trout abundance would impede Arctic grayling conservation in the Centennial Valley.

Under the proposed action (Alternative B), impacts to Arctic grayling from land and water use activities related to livestock ranching would be reduced at a large scale through the implementation of conservation measures described in the Agreement. The regulatory assurances provided to landowners and the apparent landowner interest in the proposed action indicate a high probability of implementation and thus improved habitat conditions for Arctic

grayling. Alternative B should be beneficial to Arctic grayling, producing an increase in the abundance and distribution of Arctic grayling across the proposed Project Area.

Summary

In order of beneficial effects to Arctic grayling, the two alternatives would be ranked as follows: (1) Alternative B (proposed action) (2) Alternative A (No Action). Alternative B would improve physical habitat conditions for Arctic grayling across much of its current distribution in the Centennial Valley, providing a net conservation benefit to the species by improving its status. Alternative A may improve local conditions for Arctic grayling; however, it is uncertain whether they would be implemented at a scale necessary to increase the abundance and distribution of Arctic grayling on non-Federal lands.

C. HYDROLOGY (Including water quality and quantity)

Aside from the effect of variable climatic conditions on streamflows, the most important influence on hydrologic conditions on non-federal land in the Centennial Valley is the diversion and application of irrigation water. The hydrologic consequences under each alternative would depend primarily on the extent to which they modify existing irrigation practices, but would also be affected by changes in riparian habitats.

Alternative A (No Action)

Under Alternative A, most existing hydrological conditions are likely to continue. Many of these conditions are negatively impacting water quantity and quality through reduced surface water flows. Flood irrigation techniques are used to divert large volumes of water from streams and their tributaries to water pastures or livestock approximately May-September. These irrigation techniques have been used in the basin for more than a century. The stream energy that would influence basic fluvial processes of erosion and deposition is dissipated by these diversions, altering the physical template of the hydrologic system. Few historical data are available on the actual volumes of water diverted, but recent information indicates that the flood irrigation techniques used in the Centennial Valley 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, thereby changing the system's natural hydrology. The Centennial Valley aquatic environment is considered impaired by sedimentation, siltation, and thermal alterations under the State of Montana's 303(d) list (MT DEQ, 2016. http://deq.mt.gov/Water/WQPB/cwaic/reports). Stream temperatures in certain locations in the Centennial Valley frequently exceed levels considered stressful for cool-water salmonid fishes like 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 Centennial Valley, 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.

Overall, reduced instream flows coincided with reduced abundance of Arctic grayling in the upper Big Hole River (Magee and Lamothe 2003, 2004), although it is unknown if the same level of effect occurs in the Centennial Valley. Thermal and stream flow conditions stressful to salmonid fishes such as Arctic grayling commonly occur in parts of the Centennial Valley during summer months .

Collectively, the hydrological template of parts of the Centennial Valley have 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 irrigation diversions, degradation of riparian zone communities by livestock or direct human manipulation, and systemic incisement and floodplain disconnection.

Some conservation measures to improve hydrological conditions may improve local conditions for Arctic grayling, however, it is uncertain whether they would be implemented at a scale necessary to increase the abundance and distribution of Arctic grayling on non-Federal lands. The best available data indicate that Alternative A would result in the continued alteration of hydrologic conditions in the Centennial Valley.

Alternative B (Proposed Action)

Alternative B includes 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. Alternative B includes 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. Alternative B also includes measures to conserve and restore riparian habitats, which may also improve hydrologic function relative to the no action alternative. Conservation measures would be implemented along contiguous stream and river segments. The positive cumulative effect of these measures would reduce the negative effects on streamflows from irrigation diversions on non-enrolled lands. Further, irrigators on Odell and Tom Creeks and Red Rock Creek and its

tributaries are subject to agreements under the Service's Red Rock Lakes Compact limiting their use of water to that prescribed in the Agreement.

The overall benefits to hydrologic function from irrigation return flows in the upper basin will likely vary considerably across time and space. Underlying geology of watersheds will likely dictate the amount of irrigation return flow to the stream, if any. In addition, diverted irrigation water may be more likely to return to the stream, at least in part, during wetter years or wetter portions of a given year (i.e., spring) when soils are already saturated. Although it is possible that irrigation return flows envisioned under Alternative A may provide benefits to hydrologic function, 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 improve 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 two alternatives would be ranked as follows: (1) Alternative B, the proposed action and (2) Alternative A, No Action. Alternative B would improve hydrological processes and instream water quantity and quality across the proposed Project Area.

D. VEGETATION

The non-Federal lands considered in the analysis are almost exclusively agricultural and ranchlands. The land use would not change under any of the alternatives; however, some specific practices, methods or minor infrastructure implemented in Alternative B may result in changes to the vegetation communities in the proposed Project Area. Changes to the vegetation communities on non-Federal lands in the Centennial Valley can be categorized by their effects on the three dominant land use or cover types: non-irrigated rangeland, irrigated pasture, and riparian zones.

Alternative A (No Action)

Effects to vegetation under the Alternative A, the no action alternative would be similar to current conditions. Existing land and water use practices are likely to lead to continued degradation of native vegetation on non-irrigated rangelands and riparian zones and the proliferation of invasive species and noxious weeds. Some conservation measures implemented under Alternative A to improve vegetation may improve local conditions, however, it is uncertain whether they would be implemented at a scale necessary to increase the abundance and distribution of Arctic grayling on non-Federal lands.

Ute ladies' tresses are located on sites that accentuate the species' susceptibility to hydrologic changes and weed invasion. Large areas of habitat have been converted to agricultural uses.

Livestock grazing is also a common use of these habitats. Two populations occur along highway right-of-ways. Most populations occur on non-Federal lands and only one occurrence is currently provided some potential protection or management for its conservation value. Maintaining current land practices under Alternative A would likely perpetuate limiting factors to the species on non-Federal lands (Montana Field Guide, Montana Natural Heritage Program, http://fieldguide.mt.gov/speciesDetail.aspx?elcode=PMORC2B100).

Idaho sedge, a US Forest Service and Bureau of Land Management sensitive plant species is found in the proposed Project Area. Idaho sedge is typically found at the transition between wet meadow and sagebrush steppe habitat, and can be impacted by heavy livestock grazing, competition with exotic species, hydrologic alterations, agricultural development and road construction and maintenance (Montana Field Guide, Montana Natural Heritage Program, http://fieldguide.mt.gov/speciesDetail.aspx?elcode=PMCYP036E0). The available information on the proposed 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. Its primary threats are encroachment by spotted knapweed and changes in wildfire frequency but heavy livestock grazing, such as would continue to occur under Alternative A, also negatively impact the species. (Montana Field Guide, Montana Natural Heritage Program, http://fieldguide.mt.gov/speciesDetail.aspx?elcode=PDSCR1L3N0).

Alternative B (Proposed Action)

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, 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 (FWP et al. 2006). Changes are expected where hydrophytic plants, such as sedges, occupy higher ground because irrigation on these areas would likely be reduced under irrigation water management plans. 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 plants should benefit where conservation measures reduce grazing pressure and reduce hydrologic alterations. Compliance with State and Federal regulations are expected to limit any impacts on sensitive plant species from restoration activities implemented under the Agreement (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. Landowners and Agencies would work together to identify and treat all noxious weeds which can compete with native species and degrade range and riparian health. Overall, the proposed action should result in beneficial effects for native plant species and communities.

Summary

In order of net beneficial effects to the plant communities in the Centennial Valley, the two alternatives would be ranked as follows: (1) Alternative B, Proposed Action and (2) 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 and riparian zones. In contrast, the conservation measures to be implemented under Alternative B would be expected to benefit the native plant communities in these habitats by returning them to a species composition more representative of historical conditions.

E. WETLANDS

The proposed action (Alternative B) proposes 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 Alternative B is 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 those maintained by flood irrigation.

Alternative A (No Action)

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 Arctic grayling would need to be implemented in light of any applicable State or Federal regulations protecting wetlands. Irrigation is practiced across thousands of acres in the Centennial Valley (Montana Natural Resource Information System, http://nris.msl.mt.gov/), but the Service 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 (Proposed Action)

Under Alternative B, the proposed action alternative, there should be no significant impact to natural wetlands, but some incidental wetlands (those maintained by flood irrigation) 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 irrigation 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. Any changes to incidentally created or maintained wetlands under the proposed action, however, would appear to promote habitat conditions more characteristic of the

natural topography and hydrology at those locations. As noted under Alternative A, any projects that would be potentially undertaken to benefit Arctic grayling would need to be implemented in light of any applicable State or Federal regulations protecting wetlands.

Summary

In order of net beneficial effects to wetlands in the Centennial Valley, the two alternatives would be ranked as follows: (1) Alternative B, Proposed Action and (2) Alternative A, No Action. Alternative A, No Action, represents the status quo whereby no changes to wetlands are expected relative to current conditions. Alternative B, Proposed Action, should not affect natural wetlands habitats. However, activities implemented under Alternative B may affect some incidental wetlands habitats that have been created or maintained in atypical locations because of irrigation. However, waterfowl species native to the area are highly mobile, so should 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 proposed Project Area which probably, over time, provide more benefits to wetland-dependent species. Specific projects would need to address effects and mitigation for these species.

F. FISHERIES

The general effect of the two alternative actions on the fishes residing in the proposed Project Area should be roughly similar to that described for Arctic grayling (see Part B above), based on the assumption that the abiotic conditions that are currently affecting the Arctic grayling on non-Federal land (i.e., reduced streamflows, degraded and non-functioning riparian habitats, barriers to fish movement, entrainment) are also influencing and in some cases regulating populations of other naturalized fishes. While at least 13 species of native and introduced fishes are known or believed to be present in the proposed Project Area (see Table 5), 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 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 (No Action)

The effect of Alternative A (No Action) would appear to maintain the status quo, 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 Centennial Valley. 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 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). All of these species can move many miles (e.g., Lamothe and Magee 2003), which highlights the importance of maintaining connection between riverine habitats throughout the watershed. The current fishery resources and community structure would likely remain at current levels or decline in response to limiting factors.

Under the status quo, which assumes habitat conditions stay the same, an expected outcome would be similar abundance and distribution of existing species relative to current condition. Little information is available on the population status of native non-game fish species in the proposed Project Area (e.g., suckers, sculpin, and dace).

As was described in the environmental analysis for Arctic grayling, (Page 41, Section IV. B.), there are a suite of projects that could be implemented to address some of the instream flow and habitat degradation issues which affect Arctic grayling and likely other resident species as well, but the certainty that they would be systematically implemented is low under Alternative A. Any actions taken to benefit Arctic grayling would likely accrue some benefit for most, if not all resident fishes in the proposed Project Area. However with the exception of westslope cutthroat trout (existing CCAA already in place), conservation actions taken to specifically benefit fishes other than Arctic grayling appears highly unlikely given the social, biological and technical challenges to Arctic grayling conservation in the watershed.

Alternative B (Proposed Action)

The effect of Alternative B (Proposed Action) should be positive for most of the native and nonnative fishes present in the proposed Project Area. The conservation measures of the Agreement are designed to help Arctic grayling by improving instream flows, conserving or restoring riparian habitats, removing or mitigating for physical barriers to movement and addressing entrainment. Increasing instream flows and improving the function of instream and riparian habitats, 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 aquatic environment in the proposed Project Area has been highly altered by land and water use, and the proposed action seeks to reverse some of this alteration. Actions that remedy degraded habitat conditions, and attempt to restore abiotic and biotic elements of a functional river ecosystem, are likely to have direct positive outcomes for a native resident fish species. Similar positive effects are expected for nonnative fish species in the proposed Project Area, especially for brook 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 may also benefit where conservation measures are implemented to reduce entrainment of Arctic grayling. Installation of fish screens or other exclusion devices to benefit Arctic grayling would also keep many native fishes out of irrigation ditches, where their growth and survival would presumably be less compared within a natural stream channel.

The removal or mitigation of physical barriers to Arctic grayling movement may have both positive and negative effects on other fishes, depending upon the ecological context of the

particular barrier. In general, removal of any barriers to Arctic grayling movement in the proposed 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. Barrier removal may have a negative effect on Arctic grayling in instances where the barrier is precluding invasion of non-native fishes. 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 Arctic grayling would thus be in direct opposition to management of another fish species of concern. Given the current distributions of Arctic grayling and cutthroat trout in the system (cutthroat trout in headwater streams, 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 on a site by site basis prior to making a decision to remove any barrier.

Indirect effects of nonnative trout on native fish species are also possible as a consequence of Alternative B. Alternative B is anticipated to result in changes in habitat conditions that would be beneficial to all species, including nonnative trout. As a result of habitat improvements, it is reasonable to assume that the abundance and distribution of nonnative trout would increase in the Centennial Valley. Given that Arctic grayling have co-occurred in the Centennial Valley with several non-native species for greater than 60 years, increased abundance and distribution of non-native fishes is not expected to preclude Arctic grayling conservation under this Alternative.

Summary

In order of net beneficial effects to the fishes present in the Centennial Valley, the two alternatives would be ranked as follows: (1) Alternative B, Proposed Action and (2) 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 B may also be beneficial to nonnative species, 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 non-Federal 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 (No Action)

Effects to other wildlife species, including sensitive species, under 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. Some conservation measures to improve habitat for wildlife may be implemented under Alternative A

Alternative B (Proposed Action)

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 resulting from the implementation of 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.

Conservation of sensitive wildlife species other than 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. Two bald eagles have been observed in the proposed Project Area, and any actions taken in the area of the nests would take into account timing of breeding and other factors. Bald eagles are most likely foraging for fish in the proposed 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 proposed Project Area). No adverse effects are anticipated for other raptors such as Northern goshawk and Great Gray owl. The proposed action should not affect Canada lynx, as they infrequently occur in the proposed 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 proposed Project Area is unlikely to be affected by the proposed action, which focuses on rangeland, agricultural lands, and riparian zones. 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 or degradation of sage habitat. Any actions taken in the area of the sage grouse leks or nests would take into account timing of breeding and other factors.

As noted earlier, some incidental wetlands created by irrigation practices may be negatively affected by proposed changes under the Agreement, so wetland-dependent species (e.g., waterfowl such as Trumpeter swans, 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 proposed Project Area which probably, over time, provide more benefits to wetland-dependent species. Specific projects would need to address effects and mitigation for these

species. Natural wetlands which occupy lower-lying areas would not be altered by the Agreement.

Trumpeter Swans

All trumpeter swan nest sites identified west of the Red Rock Lakes National Wildlife Refuge (Refuge) either border the Red Rock River or are located south of the Red Rock River (Roscoe 2011). There is no evidence that streams joining the Red Rock River from the south (and west of the Refuge) were historically occupied by Arctic grayling. Also, natural wetlands which occupy lower-lying areas would not be altered by the Agreement. Thus, it is expected that projects undertaken to benefit Arctic grayling would most likely not affect trumpeter swans. If trumpeter swans may be affected by projects undertaken to benefit Arctic grayling, either project activities would not occur during the nesting and fledging season or appropriate minimization measures would be implemented to minimize disturbance to nesting swans (e.g., ¼ mile buffer around nests).

Summary

In order of net beneficial effects to wildlife in the Centennial Valley, the two alternatives would be ranked as follows: (1) Alternative B, Proposed Action and (2) Alternative A, No Action. In general, there should be no significant negative effects to wildlife species for Alternative B, the proposed action. Alternative B should be beneficial for many species compared to the No Action Alternative A. Under Alternative B, the many wildlife species that use riparian habitats should benefit where conservation measures to help 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 B may have minor negative effects on some wildlife species, especially waterfowl, which use incidental wetlands created by irrigation. However, these effects should be temporary and not significant because the affected species are highly mobile and would likely utilize alternate (natural) wetlands in the proposed 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 two alternatives may include actions or practices (see Table 9) that can potentially impact the type of cultural and historic resources present in the proposed Project Area (Tables 10 and 11). If such activities are conducted under the jurisdiction or authority of the FWP or Service or with their funding, the agencies must comply with applicable State and Federal regulations, including the Montana Environmental Protection Act (MEPA), NEPA, and the National Historic Preservation Act (NHPA) (54 U.S.C. 300101 et seq.)

Alternative A (No Action)

Under Alternative A, there would be no impacts to previously identified cultural and historic sites that would require NHPA compliance at this time, because in the absence of an Agreement there would be no action by the Service requiring landowners to implement ground-disturbing measures.. Alternative A represents the status quo, so the existing agricultural and ranching activities would largely continue unchanged in the proposed Project Area. To the extent that non-Federal landowners are already aware of the previously identified cultural and historic sites (i.e., the 45 sites listed in Tables 10 and 11), 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 within 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 non-Federal landowners would modify their existing land and water use practices to benefit Arctic grayling is comparatively low under Alternative A. However, if they chose to do so with an individual CCAA for their property, the Service would be required to follow the necessary steps to consult with SHPA and comply with NHPA for any potential impacts to cultural or historic properties from implementing the measures in the individual CCAA. In some cases, the analysis may result in identification of previously undetected cultural or historic resources and provide information on known sites that could be considered in project planning prior to any ground-disturbing activities.

Alternative B (Proposed Action)

Three general concepts establish the context for the analysis of effects of cultural and historic resources under Alternative B. First, the lands being considered in this analysis are almost exclusively privately owned and dedicated to agricultural production, especially livestock ranching. The 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 Arctic grayling. Second, because the actual level of landowner participation in the Agreement under Alternative B is unknown and data would not be collected until 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 9. Instead, project or site-level analyses would be required on each property for any ground-disturbing activities to ensure that these specific sites would not be adversely affected. Third, State and Federal agencies have specific regulatory requirements and associated accountability in cases where they advocate, design, implement or are otherwise involved in any site-specific project involving ground disturbance. Alternative B includes some measures that may result in ground disturbance and involve some changes in agricultural practices or infrastructure (see Table 1). Thus, the Service and FWP would conduct project-level analyses of potential impacts to cultural and historic sites

from implementation of any ground-disturbing measures in the SSP for each property to be enrolled in Agreement. Part of this process would require consultation with the Montana State Historical Preservation Office (SHPO) and may involve surveys for any currently unknown cultural or historic resources and to gather information on how existing resources may be affected. Ultimately, 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.

Summary

The two alternatives should generally result in little to no impact to cultural and historic resources in the Centennial Valley compared to current conditions. Under some scenarios, unintentional disturbance to cultural and historic sites may result from non-Federal landowner activities under Alternative A. Although Alternative B may require some ground-disturbing activities to implement conservation measures to benefit Arctic grayling, protection of cultural and historic resources is anticipated through the involvement of State and Federal agencies in the project-planning phase for SSPs and their associated regulatory requirements.

2. Local communities and their economies

The effect of the proposed action and the no-action alternative on the local communities in the Centennial Valley would be gauged by their influence on the social and economic underpinnings of the traditional ranching culture that exists in the proposed Project Area. The dominant land use in the affected area is not expected to 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, etc.) to benefit Arctic grayling.

Residents of the Centennial Valley are concerned that a potential listing of Arctic grayling under the ESA would result in some land use restrictions which they believe could have some impact on their financial status.

Alternative A (No Action)

No significant or long-term economic or social impacts are anticipated under Alternative A. Under Alternative A, non-Federal landowners may choose, on their own accord, to implement conservation measures to benefit Arctic grayling or prepare and implement individual CCAAs. They would voluntarily provide the associated costs or may be able to obtain cost-share for those same measures from State or Federal agencies or a non-profit organization (e.g., watershed group). Because such actions would be voluntary on the part of the landowners, we assume that the costs would not be an economic burden to them. Furthermore, for reasons discussed previously, we expect that few landowners would pursue such efforts under Alternative A. Therefore, the no-action alternative should not result in any impacts to local communities and their economies.

Alternative B (Proposed Action)

No significant or long-term economic or social impacts are anticipated under Alternative B. Landowner participation in the Agreement is voluntary. The FWP and Service would minimize time and costs to participating landowners by taking the lead in developing major components of the SSPs, and help with implementation and monitoring (FWP and USFWS 2016).

Capital or labor expenses needed to implement 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 various Farm Bill programs administered by NRCS, the Future Fisheries Improvement Program administered by FWP (FWP et al. 2006), and others. However, Participating Landowners may need to invest some of their own finances or labor to implement conservation measures when programs require a cost-share or if a participant's income exceeds program criteria and precludes participation. Because participation is voluntary, landowners are unlikely to enroll if economic hardship may result.

Under the proposed action, the economic output of agricultural lands should be equal to current levels because most of the conservation measures also result in more efficient uses of resources, leading to economically and ecologically sustainable ranching operations. Thus, the traditional ranching culture in the proposed Project Area should remain largely intact with no negative effect on the local community and its economy.

<u>Summary</u>

Each of the two alternative actions is expected to have no effect on the ranching community in the upper Centennial Valley and its economy.

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.

Alternative A (No Action)

Under Alternative A, no impacts on fishing and hunting are expected beyond current levels. Some landowners may pursue individual CCAAs or improve habitat through other means (e.g., NRCS projects), but these limited instances are not expected to meaningfully impact hunting and fishing.

Alternative B (Proposed Action)

Under Alternative B beneficial effects are expected for fishing and mostly no impact or beneficial effects for hunting. The conservation measures for Arctic grayling would also 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

Centennial Valley relative to current conditions. Instream flows would increase, riparian habitats would be protected or restored, barriers that fragment habitat would be removed, and entrainment in irrigation ditches would be reduced. Populations of Arctic grayling and brook trout are expected to respond positively to these changes, thus the overall sport fishery resource would be improved.

The overall effect of Alternative B on hunting should be status quo or positive. Riparian habitats are ecologically important for many species of wildlife (reviewed by Kauffman and Krueger 1984), so the proposed action would benefit game species (e.g., elk and moose) that forage in and use riparian zones for migration corridors. Non-Federal 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. Game species that use certain wetlands, however, may be affected. Over-irrigation and water loss from inefficient irrigation ditches have created incidental wetlands at some locations in the proposed Project Area. Alternative B may result in actions that reduce over-irrigation and increase irrigation ditch efficiency, thereby reducing the size of or eliminate these incidentally created wetlands. While some relatively small levels of waterfowl may use these wetlands, impacts from the conservation projects implemented through this CCAA are not expected to affect the status of these species or their abundance in a way to impact hunting.

Summary

Both alternatives should generally result in no overall negative impacts to the primary recreational activities in the Centennial Valley compared to current conditions. In order of beneficial effects to the primary recreational activities (hunting and fishing) on non-Federal lands in the proposed project, Alternative B ranks highest. 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 exists and continues. 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.

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Table 15. Summary of environmental impacts to the human environment.

Environmental parameter	Alternative A – "No Action"	Alternative B – "Proposed Action"
Arctic Grayling	Abundance and distribution of Arctic grayling expected to remain at current levels on non-Federal land, but some localized habitat improvements may result in population increases.	Abundance and distribution of Arctic grayling likely to increase on non-Federal land in proportion to landowner participation.
Hydrology	Largely status quo – system's hydrology would remain altered by irrigation diversions. Some localized conservation projects may result in hydrological improvements.	Reduced irrigation withdrawals across a large area would move the hydrologic system to a more natural hydrograph and flow regime, with increased instream flows and reduced thermal loading.
Vegetation	Largely status quo – alteration of plant communities on rangeland, pastures, and in riparian zones would continue to result in degraded conditions except in locations where specific restoration projects are being implemented. Local benefits possible where specific restoration projects are being implemented.	No impact or negative 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.
Wetlands	No significant impact. Incidental wetlands sustained by irrigation would persist. Local benefits possible where specific restoration projects are being implemented.	No significant impact to natural wetlands, but some incidental wetlands sustained by overirrigation may be affected.
Fishes	Degraded habitat conditions would likely persist and may favor more tolerant, introduced species. Local benefits possible where specific restoration projects are being implemented.	Hydrologic and riparian (streamside vegetation) improvements should improve habitat conditions for most fishes in the proposed Project Area.
Wildlife	Minimal impact, but local benefits possible where specific restoration projects are being implemented.	Improved terrestrial and aquatic habitat conditions would result in minimal impact or benefits to most wildlife species. Species using riparian zones would especially benefit.
Listed species of wildlife	Minimal impact, but localized benefits possible where specific restoration projects are being implemented	Either a beneficial effect or minimal impact.
Cultural resources	No impact other than existing (agricultural) land use.	No impact – ground-disturbing activities require environmental assessment and SHPO consultation, as necessary.

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Environmental parameter	Alternative A – "No Action"	Alternative B – "Proposed Action"
Local communities and economies	No impact	Economic output of agricultural lands should remain at current levels because most conservation measures also result in more efficient uses of resources, leading to economically and ecologically sustainable ranching operations. Traditional ranching culture in the proposed Project Area should remain largely intact with no negative effect on the local community and its economy.
Recreation	No impact.	Either a beneficial effect or no significant impact. Recreational fishery should improve.

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Table 16. Summary of MEPA criteria used to determine significance of impacts under the proposed action (Alternative B).

Significance criteria	(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 prec that would as a result impact of th proposed a that would commit the departmen future actio with signific impacts or decision in principle ab such future actions
Arctic Grayling	20-year Agreement duration, with expected extension. Long-term benefits to grayling abundance and distribution in the Centennial Valley.	Without the implementation of the proposed action, the expectation is that the status of grayling will remain unchanged.	None	The upper Missouri River Arctic grayling are the last native population in the continental US. They are a Montana species of Concern. The proposed action will improve the status and assure the long-term persistence of this native species.	The Arctic grayling is a Montana Species of Concern and an ESA candidate species.	None
Hydrology	Long-term benefits to natural river function, temperature profile and flows in the Centennial Valley by reducing irrigation withdrawals.	Significant benefits to river function and flows are very likely to occur; less likely or won't occur without the Agreement.	None	Significant improvements to the Centennial Valley hydrology will improve the instream habitat for resident fish including grayling.	Accrued benefits will reduce the probability that water withdrawal restrictions will be imposed and recreational angling will be suspended under the Montana Drought Plan.	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 and revegetation 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 the potential to improve productivity of agricultural lands. Restoration of riparian vegetation will restore natural function and fish and wildlife habitat in the Centennial Valley.	None
Wetlands	No significant impacts to natural wetlands.	None	None	Not applicable	Not applicable	None

Significance criteria	(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 prec that would as a result impact of th proposed a that would commit the departmen future actio with signific impacts or decision in principle ab such future actions
Fishes	Long-term benefits to abundance and distribution of all fishes in Centennial Valley.	Without the implementation of the proposed action, the expectation is that the status of resident Centennial Valley fishes will remain unchanged.	None	The proposed action will improve the abundance of native and non-native game fish species.	The fisheries and angling opportunities in the Centennial Valley should improve.	None
Wildlife	No significant impacts to terrestrial or aquatic wildlife.	Wildlife will primarily benefit from improvements to riparian habitats from the proposed action.	None	Minor benefits to wildlife using riparian areas.	There are no anticipated significant impacts from the proposed action.	None
Listed species of wildlife	No significant impacts anticipated for listed species.	Likely	None	Minor benefits to wildlife using riparian areas.	There are no anticipated significant impacts from the proposed action.	None
Cultural resources	No impact – ground-disturbing activities will require assessment and SHPO consultation as necessary	Not applicable	None	None	None	None
Local communities and 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 and participate in the conservation/restoration of Artic grayling.	Support of agricultural communities and conserving grayling are important to Montana. Both benefit from the proposed action.	None

Significance criteria	(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 prec that would as a result impact of th proposed a that would commit the departmen future actio with signific impacts or decision in principle ab such future actions
Recreation	Long-term improvement to recreational angling in the Centennial Valley. Minor impacts to hunting.	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 the Centennial valley is a resource of state importance. The minor impacts to wildlife will have little noticeable effect.	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)

We are not aware of any past, present, or reasonably foreseeable future Federal or non-Federal actions in or near the Project Area resulting in individually minor effects that, when combined with the effects of any of the two alternatives, would result in significant cumulative effects on Arctic grayling, hydrology, vegetation, wetlands, wildlife, social and economic considerations, Federal land, geology, air quality, cultural and historic resources, and visual resources in the Project Area.

VI. COMPLIANCE, CONSULTATION AND COORDINATION WITH OTHERS

A. NEPA COORDINATION AND ENVIRONMENTAL EVALUATION CONDUCTED BY THE AGENCIES

Montana Fish, Wildlife and Parks (FWP)

FWP is a State agency and its actions must comply with the Montana Environmental Protection Act (MEPA). Any actions that affect the human environment, such as headgate construction, barrier removal, fish passage structure construction, etc. that FWP would perform or contract under a site-specific plan developed under the proposed action would require preparation of an Environmental Assessment in accordance with section 12 of the Administrative Rules of Montana that describe FWP's implementation of MEPA. Each Environmental Assessment would include a public comment period and result in a decision notice. For instance, an Environmental Assessment would be required were a specific plan to stock Arctic grayling eggs or fish in the Centennial Valley streams proposed under the Agreement.

U.S. Fish and Wildlife Service (Service)

The Service is a Federal agency and actions must comply with NEPA. The Service's Montana Partners for Fish and Wildlife Program (Partners), Refuge Program (Refuges), Fisheries Program (Fisheries), and Ecological Services (ES) Program have been involved in ongoing Arctic grayling conservation efforts in the Centennial Valley. The Partner's Program is expected to be the Service's lead entity for implementation of the proposed action. The Partners Program conducts an environmental evaluation for every conservation or restoration project with individual landowners, 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 Environmental Assessment is conducted under the provisions of NEPA.

Site-specific compliance with laws and regulations protecting cultural and historic resources (e.g., NHPA and 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 State Historical Preservation Office during the development of site-specific plans under the proposed action.

The Service's ES Program would review each proposed site-specific plan prior to FWP issuing a Certificate of Inclusion 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 the Service to verify that the agencies have met their environmental review obligations under applicable State and Federal laws.

Endangered Species Act

The potential issuance of an enhancement of survival permit that is associated with an Agreement is a Federal action that is subject to the consultation provisions of section 7 of the Act. Section 7(a)(2) of the Act 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 Act is the Federal agency's responsibility, not the property owner's (i.e., not the applicant's). The Service must, therefore, conduct an intra-Service (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. If Arctic grayling were to be listed, then the Service is also required to complete a conference biological opinion on 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 are expected to have an impact upon women, minority groups, or civil rights of any citizen of the United States (Executive Order 12898). In accordance with Secretarial Order 3206 on American Indian tribal rights, federal-tribal trust responsibilities, and the ESA, the Service contacted Multiple Native American tribes offering consultation with them on any potential effects to them from implementation of the proposed action.

C. PUBLIC REVIEW AND COMMENT

The Service is providing the draft Agreement and this draft environmental assessment to the public for review and comment for a period of 30 days, consistent with pertinent ESA and National Environmental Policy Act regulations and policy. The Service would send copies of the Agreement, and this draft environmental assessment directly to interested individuals including, Native American Tribes, non-Federal landowners, County Commissioners, congressional and State representatives, State and Federal agencies, and other potentially interested parties.

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