RECLAMATION

Managing Water in the West

Hungry Horse Powerplant Modernization and Overhaul Project Draft Environmental Assessment

Hungry Horse Dam

Hungry Horse, Montana

U.S. Department of the Interior
Bureau of Reclamation
Pacific Northwest Region
Boise, Idaho

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U.S. DEPARTMENT OF THE INTERIOR

PROTECTING AMERICA'S GREAT OUTDOORS AND POWERING OUR FUTURE

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The mission of the Bureau of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public.

Acronyms and Abbreviations

Acronym or Abbreviation	Description
ACHP	Advisory Council on Historic Places
APE	area of potential effects
ARM	Administrative Rules of Montana
BMP	best management practice
BPA	Bonneville Power Administration
cfs	cubic feet per second
Corps	U.S. Army Corps of Engineers
CSKT	Confederated Salish and Kootenai Tribes of the Flathead Reservation
CWA	Clean Water Act
EA	environmental assessment
EPA	Environmental Protection Agency
ESA	Endangered Species Act
FCRPS	Federal Columbia River Power System
FONSI	Finding of No Significant Impact
FRM	flood risk management
GBD	gas bubble disease
HHPP	Hungry Horse Powerplant
IMPLAN	IMpact Analysis for PLANning
ITA	Indian Trust Asset
KAF	thousand acre-feet
kV	Kilovolt
kW	Kilowatt
kWh	kilowatt hour
MFWP	Montana Fish, Wildlife and Parks
MOA	Memorandum of Agreement
MTDEQ	Montana Department of Environmental Quality
MVA	mega-volt ampere
MW	Megawatt
NAAQS	National Ambient Air Quality Standards
NAICS	North American Industry Classification System
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NOAA	National Oceanic and Atmospheric Administration
NOAA Fisheries	NOAA Marine Fisheries Service
NRHP	National Register of Historic Places
PNNL	Pacific Northwest National Laboratory

Acronym or Abbreviation	Description
ppb	parts per billion
ppm	parts per million
Reclamation	U.S. Bureau of Reclamation
SHPO	State Historical Preservation Officer
SIP	State Implementation Plan
SWS	Selective Withdrawal System
TDG	total dissolved gas
TERO	Tribal Employment Rights Ordinance
THPO	Tribal Historial Preservation Officer
TMDL	Total Maximum Daily Load
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
µg	Microgram

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Chapter 1 Purpose and Need

1.1 Proposed Action

The Bureau of Reclamation (Reclamation) is proposing to modernize and overhaul the powerplant at Hungry Horse Dam while maintaining operations for flood risk management (FRM), hydropower, and fisheries resources. Many components of the powerplant are original and have been in use since the project was first put into service, while others were updated in the 1990s but need to be overhauled at this time. In addition, the powerplant needs modern fire prevention and protection safety features. This Draft Environmental Assessment (EA) for the Hungry Horse Powerplant Modernization and Overhaul Project (Project) examines the human and natural environmental consequences of the different action alternatives to address the proposed action.

1.2 Need for the Proposed Action

The need for the proposed action is to ensure safe, reliable hydropower generation at Hungry Horse Powerplant while maintaining FRM requirements and operations for downstream fisheries resources. Many of the powerplant's principal components have reached or exceeded their intended service life. In particular, they show problems stemming from age-related wear that could potentially result in increased hardware failures and forced outages, more-challenging repairs due to obsolescence and lack of spare parts, higher operation and maintenance costs, and longer down times. The current conditions of the hydroelectric generators, turbines, and auxiliary components contribute to growing safety-related concerns, potential limitations on plant operations, and increased risk to sustained long-term operation of the powerplant to satisfy Reclamation's contractual obligations and Hungry Horse Project's authorized purposes.

Hydroelectric generators are typically rewound (stator coils are removed and replaced) every 30 years. The Hungry Horse generators were rewound in the 1990s, so their life expectancy is nearing the end. Each of the turbines is original, and the units have not undergone a mechanical overhaul. The current efficiency is likely low, and the turbines experience significant cavitation (the rapid formation and collapse of vapor pockets in a flowing liquid in regions of very low pressure, a frequent cause of structural damage to propellers, pumps, etc.), which requires lengthy, frequent repairs. The proposed new turbines would operate at a higher efficiency (not increased generation), experience less cavitation, and the proposed mechanical overhaul should ensure another 30 years of reliable service.

Five of the six cranes that service the powerhouse have been in use since the powerplant was constructed and also need replacing or upgrading to ensure human safety, remain functional, and to accomplish the proposed action. Reclamation conducted a condition assessment of the five cranes in 2014 and 2015 and found that they require significant modifications to meet current industry and life-safety standards.

Reclamation also needs to overhaul the selective withdrawal system (SWS), which is showing signs of deterioration of some components and coating. The SWS was installed in 1995 to provide temperature control for the South Fork Flathead River and mainstem Flathead River downstream without impacting power production or operational flexibility. This water temperature control device allows Reclamation to draw warmer water from various depths in the reservoir in order to meet target water temperatures downstream of the dam to benefit fish in the South Fork and mainstem Flathead Rivers.

In summary, the Project is needed to ensure reliable, safe, and efficient powerplant operations and streamflow regulation.

1.3 Purpose of the Proposed Action

The purpose of the proposal is to modernize and overhaul the power generating units at the Hungry Horse Powerplant, by refurbishing or replacing key components, and to improve the fire safety features of the powerplant by bringing them up to industry standards. Reclamation would need to maintain current operations for FRM and generate hydropower while the project is being implemented, not only for the electricity, but also to minimize spill through the hollow jet valves. Minimizing spill through the hollow jet valves, by releasing water through the turbines and generating hydropower, reduces total dissolved gas (TDG) below the dam. Reducing TDG is important for fish downstream of the dam in the South Fork Flathead River. In addition, Reclamation would maintain operations for water temperatures in downstream fish habitat by continuing to release water through the SWS.

1.4 Objectives of the Proposed Action

Reclamation has identified the following objectives for this Project.

- Modernize the powerplant fire protection features;
- Provide reliable hydropower generation for the next 30 years;
- Modernize the powerplant switches;
- Have cranes functioning to industry standards;
- Ensure elevators are in working order;
- Ensure other components, such as penstocks and SWS, are serviced for future dependability.

The operational objectives Reclamation would achieve, identified through internal and external scoping, are:

- Maintain current FRM and variable flow discharge rates (VARQ);
- Maintain operations during Project implementation that benefit downstream fish;

- Minimize TDG increases during Project implementation;
- Continue to generate hydropower during Project implementation.

1.5 Background

The 78th Congress authorized construction of Hungry Horse Dam under Public Law 329, approved June 5, 1944 (58 Stat. 270, Public Law 78-329), for the purposes of irrigation, FRM, navigation, and hydropower. Construction started in 1948 and was completed in 1953. The concrete arch dam has a crest length of 2,115 feet and a height of 564 feet. At the time of its completion, Hungry Horse Dam was the third-largest dam and the second-tallest concrete dam in the world. The dam impounds Hungry Horse Reservoir, with a total storage capacity of about 3.5 million acre-feet.

The Hungry Horse Project, inclusive of the dam, powerplant, reservoir, and switchyard, plays an important role in meeting the electricity needs in the Pacific Northwest and provides FRM for downstream communities. The reservoir stores almost 3.5 million acre-feet of water for later release, to produce hydroelectricity. The original design for the powerplant included four Francis turbines, each driving a 71,250-kilowatt (kW) generator, for a total installed capacity of 285 megawatts (MW). The generator capacity was uprated in the 1990s to 107,000 kW each, for an existing total capacity of 428 MW. However, the current generation is restricted to 310 MW due to local transmission limitations.

The Hungry Horse Project is part of the Federal Columbia River Power System (FCRPS). The FCRPS comprises 31 dams and hydroelectric facilities, 14 of which are Federal facilities administered and operated by Reclamation and the U.S. Army Corps of Engineers (Corps) on the Columbia and Snake Rivers and their tributaries. The FCRPS also includes the regional transmission system operated by the Bonneville Power Administration (BPA) to deliver electric power. The Federal system produces electricity, provides FRM, and provides water for irrigation, navigation, recreation, and fish and wildlife.

In addition to power generation, the Hungry Horse Project benefits downstream hydroelectric dams on the Flathead, Clark Fork, Pend Oreille, and Columbia Rivers through release of stored water to support power generation at those facilities. This benefit was recognized early during planning for the Hungry Horse Project in reports to Congress that stressed the need to provide flood control for Flathead Lake agricultural lands and regulation of Columbia River waters to increase power production at Grand Coulee and Bonneville Dams. No irrigation facilities were ever constructed at Hungry Horse, and Reclamation has no irrigation obligations at Hungry Horse.

Reclamation supports efforts to improve habitat and increase species populations by releasing water year-round to preserve the river habitat downstream from Hungry Horse Dam. Through innovate engineering, Hungry Horse Dam releases water from specific reservoir elevations via the SWS to more closely follow the natural cycle of seasonal water temperatures. The SWS is a modification to the dam's four penstock intakes to provide

control for mixing water from variable depths in the reservoir. The purpose is to meet a favorable target temperature for discharge to benefit native resident fish downstream in the Flathead River.

1.6 Location and General Description of the Affected Area

The Hungry Horse Dam is located on the South Fork Flathead River, about 5 miles upstream from the confluence with the Flathead River. The facilities are approximately 9 miles southeast of Columbia Falls, 15 miles south of the west entrance to Glacier National Park, and 20 miles northeast of Kalispell in Flathead County, Montana (Figure 1-1). The powerhouse building is located at the downstream toe of the dam (Figure 1-2 and Figure 1-3). The site is in a deep, narrow canyon of the South Fork Flathead River. The concrete gravity arch dam provides almost 3.5 million acre-feet of water storage to regulate flow for irrigation, FRM, and hydropower production. At full pool, the reservoir is 35 miles long and covers a surface area of 23,800 acres.

The powerplant has four generators (termed G1, G2, G3, and G4) producing 428,000 kW and is tied to the BPA system. Flood control operations reduce flooding in the nearby Flathead Valley and farther downstream in the Clark Fork, Pend Oreille, and Columbia Rivers.

The average runoff of the South Fork Flathead River is about 2.6 million acre-feet, with much of the runoff coming from snowpack. Annual precipitation at the reservoir averages about 30 inches, and up to 90 inches in the mountains around the reservoir, generally in the form of snow. Much of the South Fork Flathead River drains the Bob Marshall Wilderness area. At least 57 miles of the river are part of the Wild and Scenic Rivers Act system.

About 94 percent of Flathead County is National or State Forest Lands, wilderness area, agriculture, or timber lands (Flathead County 2014). The Hungry Horse Project is surrounded by the Flathead National Forest. The U.S. Forest Service operates the recreational facilities around Hungry Horse Reservoir, including campgrounds, picnic areas, and boat launches. The National Park Service administers Glacier National Park, about 10 miles northeast of the City of Hungry Horse, and the campgrounds, picnic areas, and other facilities there.

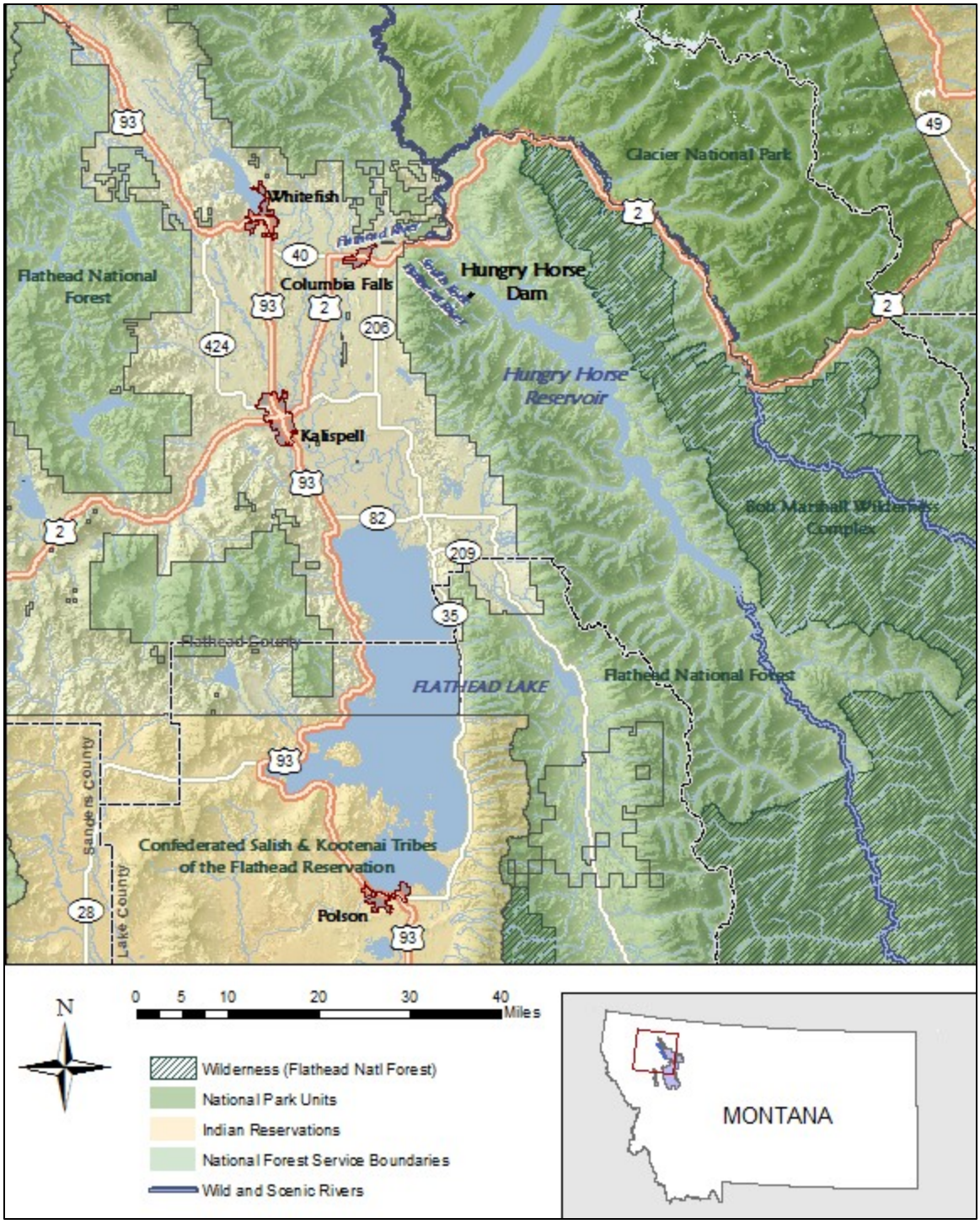

Figure 1-1. Vicinity map

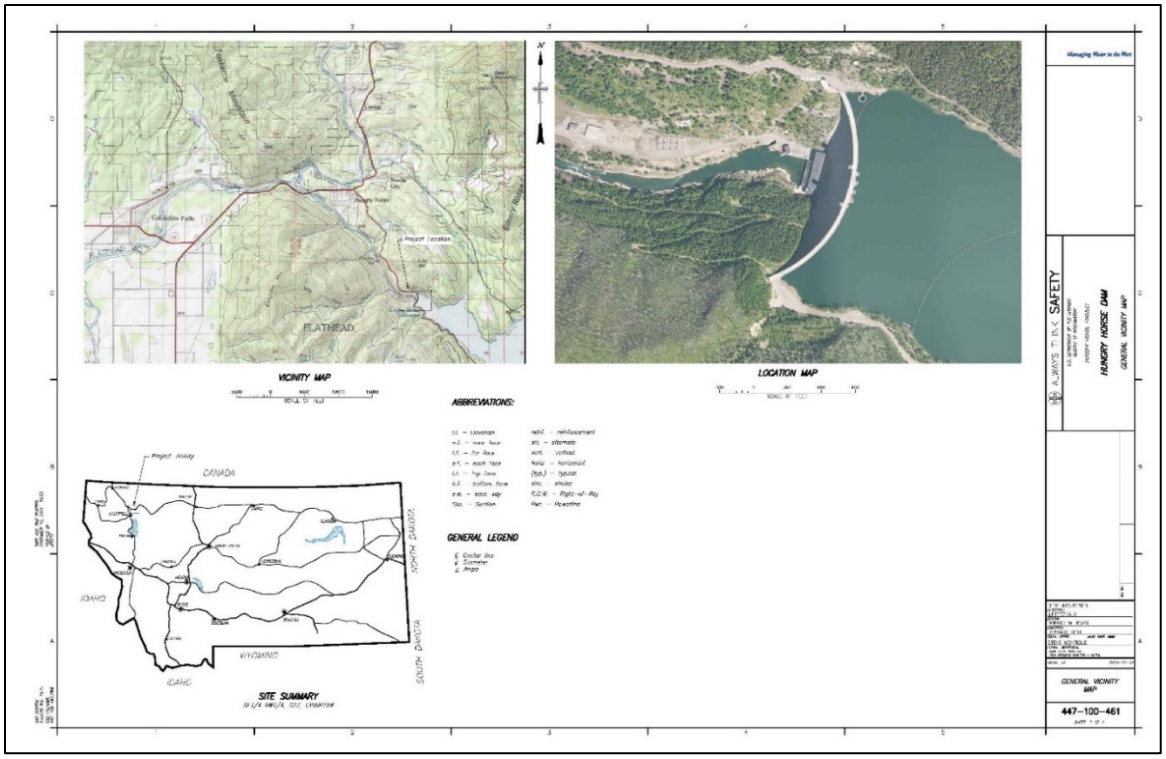

Figure 1-2. Facilities location overview

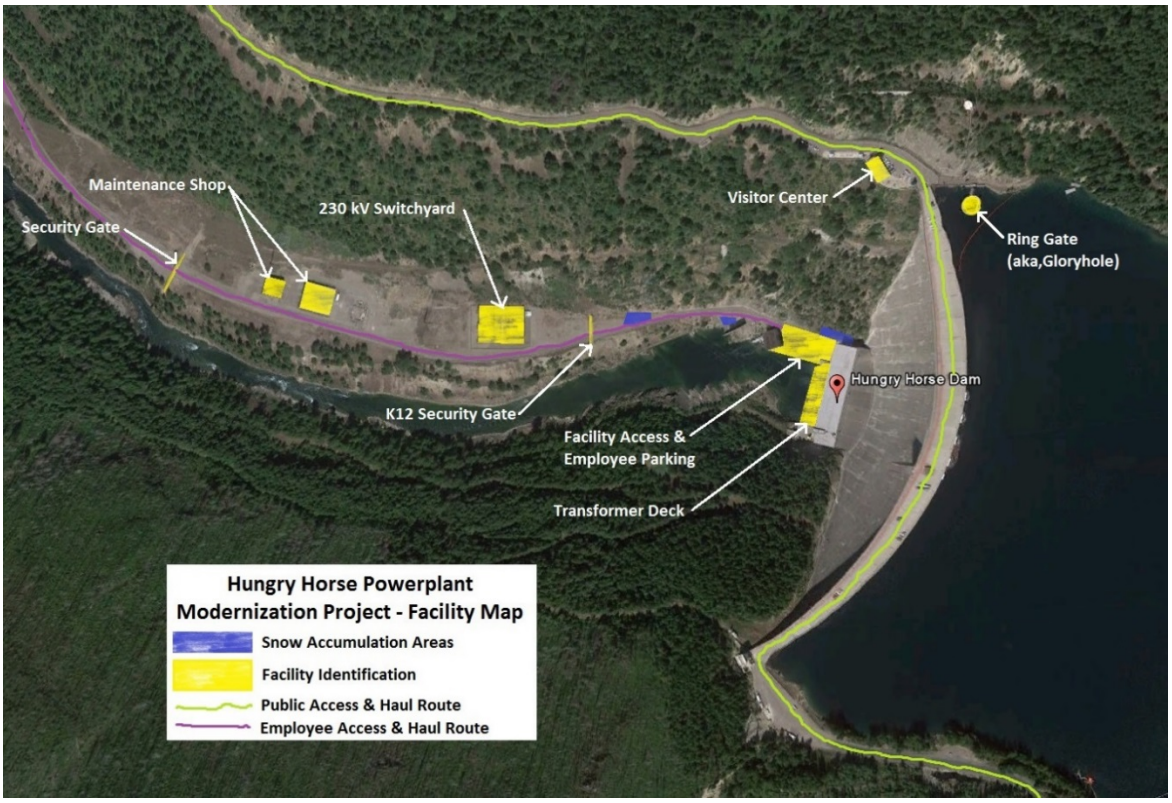

Figure 1-3. Hungry Horse Powerplant Facilities

1.6.1 Current Powerhouse Facilities

Power-generating facilities are housed in a building with a structural steel framework surmounting a reinforced concrete substructure that is 394 feet long, 76 feet wide, and 157 feet high, constructed across the river channel at the downstream toe of the dam. The original design included four 71,250-kWgenerators, for a total of 285,000 kW installed capacity. The generator capacity was uprated in the 1990s to 107,000 kW each, for a total plant capacity of 428,000 kW (Photograph 1-1).

Penstocks

The four steel penstocks are 13.5 feet in diameter and 450 feet long. The maximum operating head is 477 feet, with a maximum turbine discharge of 3,150 cubic feet per second for each turbine.

In 1995, a selective withdrawal system was installed on all four unit penstock intakes to control the temperature of water released for downstream fishery enhancement. Discharge from the powerplant can range from a minimum of 145 cfs up to about 12,500 cfs. This selective withdrawal system is used from June 1 to the end of September to increase the water discharge temperature, reduce the thermal shock for downstream fisheries and increase aquatic insect communities for bull trout growth and reproduction.

Generators

The above-ground powerplant building at the base of the dam houses four 107,000 kW hydroelectric generation units (Photograph 1-1). The generating units were uprated and overhauled during the period from 1990 to 1993, increasing the capacity of each unit from 71,250 kW to 107,000 kW, for a total of 428,000 kW. Conversion work for remote operation began in 1994. The switchyard was rebuilt in 1995, and a penstock selective withdrawal system was also installed in 1995.

The hydroelectric generation at Hungry Horse Dam has averaged slightly less than 1 billion kilowatt hours (kWh) annually, which is marketed through the FCRPS by BPA. The generators can be operated to meet base or peak powerload demands, and requests for power vary, depending on weather conditions, plant outages elsewhere, and other factors.

Photograph 1-1. One of four generators in the Hungry Horse Powerplant. Note the bridge cranes across the top of the photograph.

Cranes

There are two 290-ton bridge cranes in the power bay (Photograph 1-2), a 25-ton bridge crane in the machine shop, a 15-ton bridge crane in the tube house, a draft tube gantry crane on the transformer deck, and a forebay gantry crane on the crest of the dam (Photograph 1-3).

Photograph 1-2. View of the two bridge cranes in the power bay

Photograph 1-3. Forebay gantry crane at Hungry Horse Dam

Transformers

Power generated by the powerplant is passed through six 75 MVA, 13.8 kV/230 kV transformers located on the transformer deck above the powerplant tail bay (Photograph 1-4).

A seventh transformer, a spare, is also located on the deck. Transformers are each provided with a steel containment barrier, and the drains have hand-operated valves for water drainage. A fire protection system is located on the walls between the transformers.

Photograph 1-4. View of the transformer deck and the transformer stalls. Note the tanks and fire-suppression sprinklers.

1.7 Authority

Congress authorized the Project and allocated funding pursuant to the Reclamation Act of June 5, 1944 (58 Stat. 270, Public Law 78-329), and the Reclamation Act of June 17, 1902.

1.8 Scoping and Issues

The National Environmental Policy Act (NEPA) provides the opportunity for public involvement and comment during the preparation of an EA. The initial phase of public involvement is the scoping phase, during which the lead agency requests public input on the scope of the proposal being presented, the range of alternatives, the potential environmental impacts, and any possible mitigation measures. The lead agency notifies the public of the proposal through various media (for example, sending letters, publication notices, and internet postings). This allows the public to comment on the proposal during the scoping period. This section will summarize the public involvement and agency coordination activities that have been conducted to date for this EA.

1.8.1 Public Scoping

A public scoping period was held from December 14, 2015, through January 31, 2016, regarding Reclamation's intent to prepare an EA and requested public comment. A news release was provided to local-area media, and letters were sent to the Confederated Salish and Kootenai Tribes, as well as Federal and State agencies, to inform them of the proposed alternatives and solicit comments or concerns (Appendix A).

During the scoping period, Reclamation received five responses to the news release and scoping letter. The scoping comments are included in Appendix A and are summarized below.

- Support was provided by every respondent for Alternative B (the only action alternative that was presented in the scoping letter).
- There was general support for continuing operations and modifications that have improved habitat downstream for native fish, including stream flows and water temperature.
- The project should adhere to agreed-upon flow and temperature regimes downstream of the dam, and effort should be made to further naturalize seasonal dam discharges and water temperature downstream.
- The project should not affect the ability of operators to comply with VARQ (variable flow) restrictions, ramping rates, or to use the selective withdrawal system to improve downstream flows.
- There was concern from the public regarding spill and the potential for the project to increase total dissolved gas (TDG) in the river below the dam, as well as recommendations to perform the work during traditional non-spill months. Planned upgrades should be designed and implemented with the goal to further limit gas supersaturation and unnatural flow and temperature fluctuations downstream.
- Loss of zooplankton from the reservoir through entrainment was a concern for two responders. Remote, electronic adjustment and operation of the slide gates would be desirable to minimize the entrainment of zooplankton, and opportunities to improve the operations of the slide gates should be pursued. Reclamation should consider ways to restore the operation of the slide gates.
- Reclamation should improve the crane system so the selective withdrawal device can remain operational through late November. Also, the work should be scheduled between late November and early June, when the system is not in use. Consideration should be given to how the selective withdrawal system is winterized.
- Reclamation should re-install the thermometers in the turbine discharges so that thermal data could be easily shared.
- Reclamation should consider how to make use of the reservoir waters to cool

downstream flows in the face of warming waters due to climate change. The agency should analyze the effect of climate change in operations.

- Coordinate with the Western Electricity Coordinating Council and other regional utilities to ensure adequate power supply to compensate for generating units when they are scheduled to be off-line during the modernization project.

1.8.2 Issues Carried Forward for Alternative Development

From the public scoping, Reclamation identified the following issues that helped frame the development of action alternatives.

- Potential impacts to fish and continuing operations for instream flow and water temperatures for the South Fork Flathead River below the dam,
- Potential changes in spill and how the Project may impact TDG and water quality in the South Fork Flathead River below the dam,
- Potential changes in FRM during Project implementation, and
- Hydropower generation during Project implementation and potential impacts to power supply.

1.8.3 Other Concerns Identified During Scoping

Some public concerns were determined to be outside the scope of this EA because they were not pertinent to the decision to be made; there lacks a cause and effect relationship associated with the Project; or they would be addressed separate from this Project. These comments were not carried forward as issues for this analysis:

Comment: Potential changes to the SWS slide gates to optimize operation for temperature and zooplankton.

Response: Reclamation welcomes input from our partners regarding how best to manage the SWS for fish. As part of the work on the SWS, Reclamation has the opportunity to re-configure the SWS for optimal operations for fish.

Comment: Improve the crane system so the selective withdrawal device can remain operational through late November. Also, the work should be scheduled between late November and early June, when the system is not in use. Consideration should be given to how the selective withdrawal system is winterized.

Response: Reclamation would like to have a Standing Operating Procedure for the SWS developed in cooperation with our partners. Currently, operations into the fall are limited by weather conditions and safety concerns.

Comment: Reclamation should reinstall the thermometers in the turbine discharges so that thermal data could be easily shared.

Response: Reclamation has been seeking assistance from our information technology staff on how we can make this data public. We have the information, but we currently lack a path forward for securely sharing the data with outside users.

Comment: Utilizing reservoir waters to cool downstream flow in the face of warming waters due to climate change and analyzing the effect of climate change on operations is outside the scope of this Project.

Response: Reclamation is not proposing to change operations at this time, and therefore, it is not being analyzed herein. If there is a need in the future to release cooler water and change operations, Reclamation would then consider a new proposal.

1.9 Regulatory Compliance

Along with the Secretarial and Congressional authorizations cited above, various laws apply to the Preferred Alternative and are summarized below.

1.9.1 National Environmental Policy Act

NEPA requires that the action agency use a public disclosure process to determine whether there are any environmental impacts associated with proposed Federal actions. If there are no significant environmental impacts, a Finding of No Significant Impacts (FONSI) can be signed to complete the NEPA compliance.

1.9.2 Endangered Species Act (1973)

The Endangered Species Act (ESA) requires that Federal agency actions do not jeopardize the continued existence of listed species, or destroy or adversely modify their critical habitat. As part of the ESA's Section 7 process, an agency must request information from the U.S. Fish and Wildlife Service (USFWS) and the National Oceanic and Atmospheric Administration's (NOAA) National Marine Fisheries Service (NOAA Fisheries) on whether any threatened and endangered species occur within or near the project area. The agency then must evaluate impacts to those species. If the action may affect any listed species, the agency must consult with the USFWS or NOAA Fisheries.

1.9.3 National Historic Preservation Act of 1966

Section 106 of the National Historic Preservation Act (NHPA), as amended, requires that Federal agencies consider the effects that their projects have on properties eligible for, or are currently on, the National Register of Historic Places (NRHP). The 36 CFR 800 regulations provide procedures that Federal agencies must follow to comply with the NHPA. For any undertaking, Federal agencies must determine if there are properties of National Register quality in the project area, the effects of the project on those properties, and the appropriate mitigation for adverse effects. In making these determinations, Federal agencies are required to consult with the State Historic Preservation Office (SHPO), Native American tribes with a traditional or culturally significant religious interest in the study area, the interested public and, in certain cases, the Advisory Council on Historic Preservation (ACHP).

1.9.4 Executive Order 13007: Indian Sacred Sites

Executive Order 13007, dated May 24, 1996, instructs Federal agencies to promote accommodation of access to and protect the physical integrity of American Indian sacred sites. A sacred site is a specific, discrete, and narrowly delineated location on Federal land. An Indian tribe or an Indian individual determined to be an appropriately authoritative representative of an Indian religion must identify a site as sacred by virtue of its established religious significance to, or ceremonial use by, an Indian religion; provided that the tribe or appropriate authoritative representative of an Indian religion has informed the agency of the existence of such a site (E.O. 13007, Section 1 [b] [iii]).

1.9.5 Secretarial Order 3175: U.S. Department of the Interior Responsibilities for Indian Trust Assets

Indian Trust Assets (ITAs) are legal interests in property held in trust by the United States (with the Secretary of the U.S. Department of the Interior acting as trustee) for Indian tribes or Indian individuals. Examples of ITAs are lands, minerals, hunting and fishing rights, and water rights. In many cases, ITAs are on-reservation; however, they may also be found off-reservation.

The United States has an Indian trust responsibility to protect and maintain rights reserved by or granted to Indian tribes or Indian individuals by treaties, statutes, and executive orders. These rights are sometimes further interpreted through court decisions and regulations. This trust responsibility requires that officials from Federal agencies, including Reclamation, take all actions reasonably necessary to protect ITAs when administering programs under their control.

1.9.6 Executive Order 12898: Environmental Justice

Executive Order 12898, dated February 11, 1994, instructs Federal agencies, to the greatest extent practicable and permitted by law, to make achieving environmental justice part of its mission by addressing, as appropriate, disproportionately high and adverse human health or environmental effects on minority populations and low-income populations. Environmental justice means the fair treatment of people of all races, income, and cultures with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment implies that no person or group of people should shoulder a disproportionate share of negative environmental impacts resulting from the execution of environmental programs.

1.10 Other Actions and Activities Occurring at Hungry Horse Project

The following actions are related but separate because they are taking place at various locations at the Hungry Horse Project and serve different purposes and needs. Separate NEPA documents have been or will be completed for the following:

- **Radio System Addition**: Installation of a new radio system for internal communication and communication with emergency services.
- **Hungry Horse Supervisory Control and Data Acquisition (SCADA) Replacement**: Installation of communication equipment so the status of the dam can be seen by other stations.
- **Cavitation Repairs:** This work will occur in the powerplant and will repair cavitation damage to the unit turbines.
- **Hungry Horse Left Abutment Parking Lot Stabilization**: The left (looking downstream) upper abutment parking lot slope needs stabilization to prevent fall hazards. This is a minor facilities project that would not involve road work or significant disturbance.
- **Hungry Horse Right Abutment Parking Lot Rock Scaling**: The right abutment parking lot slopes needs stabilization to prevent fall hazards. This may include rock scaling and netting and would also be considered a minor facilities project.
- **Visitor Center Parking Lot Rock Scaling**: Stabilization of the right upper abutment parking lot slop to prevent fall hazards.
- **Road Asphalt Maintenance**: The asphalt on the road, in the switchyard, and the parking areas needs to be chip-sealed.

Chapter 2 Alternatives

2.1 Introduction

This chapter presents the alternatives being considered for the Hungry Horse Powerplant (HHPP) Modernization and Overhaul Project. They are: Alternative A – No Action; Alternative B – HHPP Modernization – Two Generating Units Offline for 4 Years; and Alternative C – HHPP Modernization – Two Generating Units Offline for 1 Year (Preferred Alternative). Under Alternative B, work would be conducted on two generating units simultaneously for 4 years and single generating units for 6 years. For Alternative C, Reclamation would work on two generating units simultaneously for 1 year and individual generating units for 9 years. During implementation, Reclamation would continue normal reservoir operations and releases, as described below in Section 2.2.

In the two action alternatives, Reclamation proposes to modernize and overhaul the powerplant by replacing and upgrading existing generators and auxiliary systems to maintain safe and reliable operations for the long-term future. These alternatives include the following actions:

- Modernize the powerplant fire protection and replace powerplant windows;
- Install remote motor operation for the powerplant disconnect switches;
- Refurbish or replace the cranes;
- Replace the governors and exciters;
- Overhaul the fixed wheel gates;
- Refurbish the elevators;
- Replace the turbines and rewind the generators;
- Overhaul the SWS; and
- Recoat the penstocks.

Reclamation estimates that the work would take approximately 10 years to complete and would begin in 2019 or later, depending on contracting, design, material acquisitions, emergencies, or other delays.

One of the primary concerns raised during scoping was increased spill associated with having multiple generating units offline, and the subsequent effects to water quality and fish downstream of the dam. Water is released from Hungry Horse Reservoir in the spring (see the Spring Refill Operations description in Section 2.2.1 for more complete information) to make room in the reservoir for spring runoff. Reclamation has three ways to release water from Hungry Horse Reservoir: 1) water can go through the available generating units and generate electricity; 2) water can be released, or spilled, through the hollow-jet valves; or 3) water can be released, or spilled, through the ring-gate. Because electrical transmission is limited, at the most, three hydropower generating units are operating. Although there are two methods to spill water,

Reclamation primarily spills through the hollow-jet valves because the ring-gate can only be used when the reservoir elevation is high enough for water to go over the top of the ring-gate.

Due to physics, spill through the hollow-jet valves and ring-gate results in increased TDG dowstream of the dam. In order to minimize TDG, Reclamation releases as much water as possible through the generating units. Each generating unit has the hydraulic capacity of 3,000 cfs, so if all four units could operate at the same time, the hydraulic capacity would be 12,000 cfs. However, because of electrical transmission limitations in the Flathead Valley, Reclamation is limited to only operating three generating units at a time, which would normally occur during spring operations while vacating the reservoir for FRM purposes. This means that 9,000 cfs would be released through the generating units, and any water volume greater than 9,000 cfs would have to be spilled.

For Project implementation, there would be times when only two generating units would be available, which would limit the volume of water that could be released through the hydropower generating units to 6,000 cfs. Flows greater than 6,000 cfs would need to be spilled through the hollow-jet valves and/or ring-gate. During most of the year, because of flow, this is not a concern. But during spring and early summer, if flows into the reservoir are expected to be high and storage for FRM is required, then having only two generating units available would mean additional spill. This would be unavoidable for 1 year of implementation due to how the powerplant is constructed. In particular, the configuration of the powerplant switches and generating units dictates that it is not possible to complete the Project without having two generating units offline for some period of time. Reclamation recognized early on in the NEPA process that this would potentially increase spill and corresponding TDG. The desire to minimize the duration of spill attributable to Project implementation informed development of Alternative C.

2.2 Reservoir Operations and Releases

Reclamation operates and maintains all of Hungry Horse Project's major facilities. Operations for the Hungry Horse Project primarily include:

- Storage and release of water from Hungry Horse Reservoir
- Power generation at the Hungry Horse Powerplant
- Routine maintenance of project facilities

The following discussion describes the operations of Hungry Horse Dam and is provided for background information. Current seasonal operations for FRM, power generation, and fish will not change from current operations; their inclusion herein is for informational purposes.

2.2.1 Hungry Horse Dam Multiple-Purpose Operations

Congress has authorized Reclamation to operate Hungry Horse Dam for the multiple purposes of irrigation, FRM, navigation, and hydroelectric generation. Reclamation also operates the dam in coordination with other FCRPS facilities. Not only does Hungry Horse Dam's operating range

reflect variability in multiple affecting factors, such as water supply condition, FRM, hydroelectric power generation requirements, and flow needs for downstream anadromous and resident fish, but the specific operating purposes also change from month to month and season to season. This section discusses the general operating scheme, in particular FRM, by month and season.

Reclamation operates Hungry Horse Dam according to the variable discharge flood control rule curve (VARQ) for FRM. Variable-discharge flood control was developed to improve the multipurpose operation of Hungry Horse Dam while maintaining the level of local or mainstem flood protection in the Columbia River. VARQ enables Reclamation to more reliably supply spring and summer flows for fish while simultaneously ensuring higher reservoir elevations in the summer.

Fall Operations, September through December

During the fall season, Reclamation has two operating priorities: (1) maintain minimum flows at Columbia Falls, Montana for fish, and (2) FRM. The summer reservoir draft limit at Hungry Horse is elevation 3,550 feet (10 feet from full) by September 30, except in the lowest 20 percent of years (less than 72.2 million acre-feet), when the draft limit is elevation 3,540 feet. In many years, Hungry Horse Reservoir continues to draft throughout the fall to meet minimum flows at Columbia Falls and can be an additional 15 to 20 feet down by the end of December.

To provide local flood protection in wetter falls, the reservoir is required not to exceed elevation 3,555.7 feet from October 31 through November 30 and elevation 3,549.2 feet by December 31. Also, in wetter years, Hungry Horse can be operated to help meet hydropower operational targets; however, Reclamation limits any drafts for power to the FRM elevation of 3,549.2 feet by the end of December.

Winter Operations Storage Evacuation Period, January through April

During the winter season, Reclamation's operating priorities are FRM, minimum flows for resident listed fish, and power generation. Reclamation generally drafts Hungry Horse Reservoir below the required FRM elevations to meet minimum flow requirements at Columbia Falls, Montana, for resident listed fish. In water years when minimum flows do not draft the reservoir below the required FRM elevations, there is some flexibility to operate for power generation. The limits to this winter power flexibility are set to provide a 75 percent probability of refilling to the April 10 elevation objective.

On April 30, Hungry Horse Reservoir is typically at its lowest seasonal elevation, in order to capture the high flows during spring runoff and to reduce the risk of downstream flooding.

Spring Refill Operations, May through June

During early and mid-spring, Reclamation typically operates Hungry Horse Dam for FRM, power operations, and minimum flow requirements. Hungry Horse FRM rule curves are designed for both local and system FRM. For flood protection under the FCRPS, of which Hungry Horse Project is a part, Reclamation coordinates with the Corps on when Hungry Horse Reservoir can begin refill in the spring. The Corps computes the initial controlled flow at The

Dalles, Oregon (the location where the official water-supply forecast is prepared for the Columbia River Basin), and estimates the day that initial controlled flow is expected to be reached. When unregulated flows at The Dalles are equal to the initial controlled flow, the reservoirs can start refill. Hungry Horse Reservoir can actually start refill 10 days prior to the date that the initial controlled flow is expected to be met.

As spring flows increase, Reclamation no longer needs to make releases to meet minimum flow requirements at Columbia Falls but does have a minimum flow requirement below the project on the South Fork Flathead River, below the dam. As flows in the mainstem Flathead River increase, Reclamation must balance the refill of Hungry Horse Reservoir while attempting to control flows at Columbia Falls. At the same time, Reclamation attempts to limit spill (flows that bypass the power plant) in order to maintain TDG below the State of Montana Department of Environmental Quality water quality standard of 110 percent. With the current transmission limit, this sometimes requires delaying refill to the first week in July, when inflows drop below what can be put through the generators, due to either unit availability or transmission limitations. Hungry Horse may also be operated to be below the April 30 FRM point so that it can reduce the outflows during refill to prevent spills that would result in TDG above the limit.

Reclamation typically tries to refill Hungry Horse Reservoir by June 30. However, as mentioned previously, the timing and shape of the spring runoff may result in reservoir refill a few days before or after the June 30 target date. For example, a late snowmelt runoff may delay refill to sometime after June 30 in order to avoid excessive spill and/or surcharge of the reservoir. Local weather conditions, such as precipitation, may also have an influence.

Summer Operations, July through August

During the summer season, Reclamation's operating priorities are augmentation for fish and refill for resident fish. In wetter years, refill can be delayed until mid-July. After the refill period, Hungry Horse Dam releases are set to meet the September 30 targets. Hungry Horse releases are calculated to operate at either a constant release from July through September or for gradually declining outflows, in an attempt to provide a beneficial flow regime for resident fish below the project.

2.2.2 Daily Operations

The above sections describe how Reclamation operates Hungry Horse Dam across months and seasons to meet a variety of authorized purposes. Reclamation's daily operations also show how Reclamation meets the multiple purposes of power generation, listed and resident fish operations, and local flood protection.

Ramping Rates

Hungry Horse discharges are limited by ramping rates, as described in Table 2-1. These ramping rates were established to minimize impacts to listed and resident fish and are based on flows in the Flathead River at Columbia Falls, Montana. These ramping rates protect bull trout and other fish from stranding.

Table 2-1. Ramping Rate Guidelines at Hungry Horse Dam (in cubic feet per second [cfs])

Ramp Up Rates		
Flow Range (measured at Columbia Falls)	**Ramp Up Unit (Daily Max)**	**Ramp Up Unit (Hourly Max)**
3,200-6,000 cfs	Limit ramp up 1,800 cfs per day	1,000 cfs/hour
>6,000-8,000 cfs	Limit ramp up 1,800 cfs per day	1,000 cfs/hour
>8,000-10,000 cfs	Limit ramp up 3,600 cfs per day	1,800 cfs/hour
>10,000 cfs	No limit	1,800 cfs/hour
Ramp Down Rates		
Flow Range (measured at Columbia Falls)	**Ramp Up Unit (Daily Max)**	**Ramp Up Unit (Hourly Max)**
3,500-6,000 cfs	Limit ramp down to 600 cfs per day	600 cfs/hour
>6,000-8,000cfs	Limit ramp down to 1,000 cfs per day	600 cfs/hour
>8,000-12,000 cfs	Limit ramp down to 2,000 cfs per day	1,000 cfs/hour
>12,000 cfs	Limit ramp down to 5,000 cfs per day	1,800 cfs/hour

Minimum Flows

Minimum releases at Hungry Horse are to benefit listed resident bull trout and are determined by either the flow requirement just below Hungry Horse Dam or the flow requirement at Columbia Falls, depending on whichever one is greater. The minimum flows are calculated using the Hungry Horse inflow forecast and guidelines as set forth in Table 2-2. The minimum flows at Hungry Horse and Columbia Falls are updated in January, February, and March, after the final inflow volume forecast for the month is issued. The March final forecast sets the minimum flows for the rest of the calendar year.

Table 2-2. Minimum Flows in the South Fork Flathead River (Hungry Horse Dam) and Mainstem Flathead River (Columbia Falls)

At Hungry Horse Dam	
April through August Forecast	**Minimum flow**
>1,790 thousand acre-feet (KAF)	900 cfs
<1,190 KAF	400 cfs
Between 1,190 KAF and 1,790 KAF	Linearly interpolated between 400 and 900 cfs
At Columbia Falls	
April through August Forecast	**Minimum flow**
>1,790 KAF	3,500 cfs
<1,190 KAF	3,200 cfs
Between 1,190 KAF and 1,790 KAF	Linearly interpolated between 3,200 and 3,500 cfs.

Temperature Management

Reclamation placed selective withdrawal gates on the penstocks at Hungry Horse Dam, which have warmed the river since 1995 (Marotz et al 1996, Vermeyen 2006). These gates are used to provide warmer epilimnetic water (the water layer near the surface of a lake or reservoir that is warmer in the summer) to the river during the summer period, when the reservoir is stratified. By informal agreement with Montana Fish, Wildlife and Parks (MFWP), Reclamation operates the gates to achieve a temperature regime in the river as similar to natural conditions as possible. The purpose of this manipulation was to prevent the very cool (4° C hypolimnetic waters) from suppressing the primary and secondary production in the river and to prevent the cold-water plume from acting as an attractant to nonnative lake trout moving from Flathead Lake upstream, which may increase the predation pressure on native cutthroat and bull trout. Since the completion of the selective withdrawal gates, thermal issues in the river have been minimal.

Total Dissolved Gas

Hungry Horse Dam is operated to minimize spill and generation of TDG, to the extent possible. Although the installed generation capacity of Hungry Horse Dam is about 428 MW, there is a transmission limit of 310 MW (hydraulic capacity of about 9,000 cfs). Releases in excess of 9,000 cfs must be put through the hollow jet flow valves or ring-gate spillway when reservoir elevations allow, either of which can generate elevated levels of TDG. Empirical data and estimates show that limiting spill through the hollow jet flow valves to a maximum of 16 to 17 percent of total outflow will help to avoid exceeding the Montana state TDG standard of 110 percent saturation. When spill is anticipated to exceed 17 percent of total outflow, Reclamation attempts, to the extent possible, to pre-draft or reshape drawdown and refill operations to minimize spill and excess TDG generation.

2.3 Alternative A – No Action

Under the No Action Alternative, Reclamation would continue operating the HHPP's four

generating units and would address mechanical and electrical issues as they arise. The generating units would continue generating power, but as the components identified in Alternatives B and C breakdown or fail, need refurbishment, or need replacement, the unit would be taken off-line for the needed work. It is included herein for comparative purposes.

2.4 Alternative B – HHPP Modernization – Two Generating Units Offline for 4 Years

Under Alternative B, Reclamation would upgrade many elements of the powerplant, as described below. The modernization work includes inspecting and refurbishing or replacing components at several locations within the powerhouse and at the dam. The main difference between Alternative B and Alternative C is the length of time that two generating units are offline. Under Alternative B, Reclamation proposes to have two generating units offline for four spring/summer seasons, thus increasing the number of years when the duration and amount of spill would potentially increase. Reclamation would work on two generating units simultaneously for 4 years and single generating units for 6 years.

2.4.1 Proposed Modernization

The modernization work needed at Hungry Horse includes improving fire protection at the powerplant; modernizing the switchyard and powerplant disconnects; replacing or refurbishing the cranes; replacing the governors and exciter; overhauling the fixed wheel gate; refurbishing the elevator; replacing and overhauling the turbines; rewinding the generators; overhauling the SWS; and recoating the penstock. This alternative would take 10 years (currently planned for 2019 through 2028) to complete, with the understanding that the anticipated start date and schedule may be altered due to problems encountered during contracting, implementation, or improved efficiencies and time savings as the modernization work progresses.

Components of the Project

Crane Refurbishment or Replacement

There are a total of six cranes at the powerplant: three cranes are located within the powerhouse (two 290-ton bridge cranes and one 25-ton bridge crane), one in the valve house (40-ton), one on top of the dam (125-ton gantry crane), and one on the powerplant draft tube deck. The draft tube gantry crane was replaced in 2011 and is not included in this project. Under this alternative, the remaining five cranes would be replaced or refurbished. The new cranes and any exterior refurbished pieces would be of similar appearance and characteristics as the existing cranes, and meet current industry and life-safety standards. The crane work would take place from **August 2019 to March 2020**. It would take approximately 1 month to install and commission each new crane.

Transformer Fire Protection and Powerplant Window Replacement

To bring the fire protection system to current life-safety standards, Reclamation would raise the blast walls; upgrade the deluge system; modify the containment volume to make it larger; and

replace the powerplant windows with fireproof windows. The hydroelectric generating units (G1-G4) are paired (G1 and G2 are paired and G3 and G4 are paired) to share a common set of transformers, corresponding switches, and isophase bus; thus, this work would require two generating units to be offline simultaneously. Because the generating units are paired to the other parts of the powerplant, having fewer than two generating units offline is unavoidable.

Work near the generators and transformers, such as replacing the windows, may only be done safely while the generators are offline, which is why the windows would be replaced at the same time as the fire protection work. Replacement windows have been designed to mimic the current historic attributes of the existing windows.

Under this alternative, the proposed construction would take place from **March 2021 to November 2021**. G1 and G2 would be worked on in March through the middle of July, and G3 and G4 work would occur after G1 and G2 are complete, through the end of November. Since most of the work would occur outside, timing of construction is limited by weather conditions for worker safety, access, and constructability.

Powerplant Disconnect Switches

While the transformer fire protection is occurring and the generating units are offline, the existing powerplant disconnect switches would be modernized for remote operation. Currently, they are manually operated. The generating units, G1-G4, are paired to two disconnect switches, called 581 and 781, so this work must be accomplished while the two generating units are offline. To accomplish this proposed work, Reclamation would replace the disconnect switches with a remote operator. The majority of the work would occur on the transformer deck and take place from **March 2021 to November 2021.**

Governor Replacement

The four governor systems at the Hungry Horse Powerplant, inside the powerhouse at the foot of the dam, are original mechanical governors. Under this alternative, the governor components would be refurbished or replaced and programmable logic control would be added to collect additional information on the systems. This work would take place primarily in the governor cabinet and the control room from **January 2022 to December 2023**. This aspect of the project would be coupled with the excitation system replacement.

Exciter Replacement

The Hungry Horse powerplant currently operates four rotating DC exciters, one per hydroelectric generating unit. Each of these would be replaced with a static AC excitation system, along with the excitation power potential transformer and collector rings. The proposed construction activity would take place inside the powerplant, on the generator erection bay and within the control room, from **January 2022 to December 2023**. This part of the project would be coupled with governor replacement.

Fixed Wheel Gate Overhaul

Each of the hydroelectric generating units has one fixed wheel gate that is used in both

emergencies and regular maintenance. The fixed wheel gate is lowered from the top of the dam down to allow water in or block water from the penstock and must be lowered and in-place to allow work on the penstock and turbine to proceed safely. Because it is an important safety feature, the fixed wheel gate overhaul must occur before the penstock recoating, turbine replacement, and generator rewind work could occur. The majority of the proposed construction activity would take place on top of the dam and offsite in a maintenance building and occur from **June 2022 to June 2024.** Under this alternative, this component would be completed concurrently with the exciter and governor work but on different generating units (see Table 2-3).

Elevator Refurbishment

Hungry Horse has one powerhouse control bay elevator and two dam elevators that will be used throughout construction of many of the other proposed projects. Under this alternative, the elevators would be assessed and repaired or improved to ensure safe, reliable service. The work would take place within the immediate area of the elevators in the powerplant and in the dam and would occur from **March 2021 to February 2022.**

Turbine Replacement and Mechanical Overhaul

Each hydroelectric generating unit in the Hungry Horse powerplant has a single turbine. Under this alternative, each hydroelectric generating unit would be disassembled and all components either replaced or refurbished. The existing turbines would be removed and new turbines installed. Given the lengthy outage required for turbine replacement, the generator rewind, selective withdrawal system overhaul, and penstock recoating would also occur while the turbine work is occurring. The turbine replacement and mechanical overhaul work would take place within the powerhouse and would occur from **March 2025 to February 2029**.

Generator Rewind

Hydroelectric generating unit generators are typically rewound every 30 years. The Hungry Horse generators were rewound in the 1990s, so their life expectancy is nearing the end. Under this alternative, the rotors would be removed and rewound and the cores replaced while the generating units would be out of service during the turbine replacement. Given the lengthy outage required for this project, this project will also be coupled with the turbine replacement and mechanical overhaul, SWS overhaul, and penstock recoating. The work would take place within the powerhouse and would occur from **March 2025 to February 2029**.

Selective Withdrawal System Overhaul (SWS)

Each gate of the SWS would be removed, inspected, and overhauled as needed, depending upon the results of the inspection. The SWS relies on the top-of-dam 125-ton gantry crane for routine maintenance and repair, which limits timing to spring through fall months because the crane is not operated in the snow. The overhaul would be performed while the corresponding generating unit is offline for the turbine replacement and rewind. Under this alternative, work would take place from **March 2025 to August 2028**.

Penstock Recoating

Each hydroelectric generating unit has one penstock that brings water from the reservoir to the generating unit. While each generating unit is offline for the turbine replacement and rewind, the corresponding penstock would be inspected, repaired, and recoated, as necessary. Penstocks would be recoated with the same material they are currently coated with, and best management practices (BMPs) would be followed, including proper containment and disposal of removed material. The work would take place within each unit's penstock. Under this alternative, penstock work would take place from **March 2025 to August 2028**, at the same time as the turbine replacement and mechanical overhaul, generator rewinds, and selective withdrawal system refurbishment.

Timing

Dates are approximate and may be adjusted slightly either way as the work progresses. Although flexibility was considered in the development of the schedule, significant problems with construction, equipment, or materials for the project components could cause the timeline to shift. Reclamation would ensure that any shifts would not result in effects not analyzed in this EA.

Under this alternative, two generators would be offline at the same time (Table 2-3), which may necessitate additional spill through the hollow jet valves or ring gate, depending on the reservoir level. Any increased days of spill would likely occur approximately May through July from 2021 to 2024, but the number of days and the amount of spill are dependent on the water year. As the work progresses, Reclamation would adhere to this alternative's proposed schedule, to the greatest extent possible, while at the same time seek out time-saving efforts that would reduce the amount of time a generating unit must be offline. Reclamation has provided time estimates needed for each component of the project, but some components could take less time than estimated to complete. Time savings could potentially mean a reduction in the length of time generating units are offline when the reservoir is being drafted for FRM (April through June).

Table 2-3. Hungry Horse Modernization construction schedule for components that have potential to affect spill

Project	Total days	Start	End	Estimated months in which potential spill may occur (depending on water year)
Transformer Fire Protection and Windows	170	3/1/21	10/22/21	May-July 2021
Units 1 and 2	85	3/1/21	6/25/21	
Units 3 and 4	85	6/28/21	10/22/21	
Powerplant Disconnect Switches	170	3/1/21	10/22/21	May-July 2021
Units 1 and 2	85	3/1/21	6/25/21	
Units 3 and 4	85	6/28/21	10/22/21	
Governor and Excitation	497	1/10/22	12/5/23	
Unit 3	118	1/10/22	6/22/22	May-July 2022
Unit 2	117	7/11/22	12/20/22	
Unit 4	118	1/9/23	6/21/23	May-July 2023
Unit 1	117	6/26/23	12/5/23	
Fixed Wheel Gate Overhaul	530	6/1/22	6/10/24	
Unit 4	110	6/1/22	10/30/22	June-July 2022
Unit 1	110	1/11/23	6/11/23	May-July 2023
Unit 3	110	6/28/23	11/26/23	
Unit 2	110	1/20/24	6/10/24	May-June 2024

Minimization Measures

1. To the extent possible, work is planned to overlap with scheduled routine maintenance to limit the time generators are offline, minimize effects to affected resources, coordinate workers' schedules, conserve space, maximize efficiency, and minimize duplication of effort.

2. Penstock recoating – During penstock recoating, BMPs would be followed, including proper containment and disposal of removed material. Regular inspections would be performed.

3. Communication – Reclamation would continue communication and coordination practices regarding spill with Montana Fish, Wildlife and Parks and others.

4. Contractors would follow all applicable Federal, State, and local occupational and safety regulations.

Staging Areas and Access

Reclamation proposes to use all or portions of six sites belonging to Reclamation near the dam and powerhouse as contractor staging and laydown areas for the modernization project (Figure 2-1). The two sites located at the left and right dam abutments are currently accessible to the public. The site adjacent to the powerhouse below the dam and three areas near the switchyard are within secured areas that are not accessible to the public. The total area of the six sites is approximately 15 acres. Access to the left and right abutment sites is from NF-895 (West Side Road). U.S. Highway 2 in Hungry Horse provides access to sites below the dam via Colorado Boulevard. The proposed laydown sites are all previously disturbed, free of vegetation, and not currently being used. No roadwork or other ground disturbance will be required to accommodate project activities.

Figure 2-1. Potential contractor staging and laydown sites

Reservoir Operations and Releases

Reservoir operations and releases would adhere to the operations described in Section 2.2. As much as possible, discharges would go through all available generators. During implementation, there would be times when two generating units would be offline. When two generating units are being worked on and are therefore offline, discharges in excess of powerplant capacity (6,000 cfs with two generators offline) likely would be spilled through the hollow jet valves (unless use of the ring-gate is available). Spill through the hollow jet valves would potentially occur during the spring and early summer, depending on the water forecast, reservoir elevations, and FRM

operations. In-season forecasting, planning, and coordination would take place to manage reservoir operations to reduce the potential for spill as much as possible while staying within current operations.

Use of the SWS for temperature management would continue. To the extent possible, the selective withdrawal would be adjusted on the remaining online units to offset any colder water spilled through the hollow jet valves. Inspections and routine maintenance of the SWS would occur when the system is not in service (October through May) to avoid affecting temperature control operations. Since the SWS operates independently for each of the four powerplant penstocks, any maintenance that needs to occur during the in-service season typically has minimal effect on the ability to control discharge temperatures. Discharges would be switched to other generating units in order to conduct repairs on selective withdrawal gates without affecting temperature control operations. However, if required discharges are greater than what can be passed through the available units, then some amount of temperature control may be compromised.

2.5 Alternative C – HHPP Modernization – Two Generating Units Offline for 1 Year (Preferred Alternative)

Under Alternative C, Reclamation would modernize and overhaul the same components of the powerplant as described in Alternative B. The main difference between Alternative B and Alternative C is with regard to the scheduling of the different work components. Under Alternative C, Reclamation would complete the fixed gate overhaul at the same time and on the same generating unit as the exciter/governor replacement, thus reducing the length of time multiple generating units are offline, and the Project would still be completed in 10 years. Alternative C would have two generating units offline for 1 year, as opposed to 4 years as under Alternative B, thereby reducing the duration and amount of spill associated with implementation. Work would occur on two generating units simultaneously for 1 year and individual generating units for 9 years.

Having three generating units available, which would occur in all but one year of the Project under this alternative, is how Hungry Horse currently operates given the electricity transmission limitations in the valley. Two units would still be offline in 2021 while the fire protection improvement and powerplant disconnect switches modernization work would occur, which is unavoidable due to the coupling of the generating units and switches. This alternative offers a reduced timeline for potential spill during implementation.

2.5.1 Proposed Modernization

The modernization projects would be the same as under Alternative B, but with timing changes as described below in order to minimize the time two units are offline.

Timing

Dates are approximate and may be adjusted slightly either way as the work progresses. Although flexibility was considered in the development of the schedule, significant problems with

construction, equipment, or materials for the project components could cause the timeline to shift. Reclamation would ensure that any shifts would not result in effects not analyzed in this EA.

Under this alternative, only two generating units would be available in 2021 (or for 1 year when work for fire protection and powerplant switches begins), barring any unforeseen forced outages due to mechanical failure in the other generating units. This would provide an additional 3,000 cfs hydraulic capacity over Alternative B for 2022 to 2024, thus reducing spill volumes and frequency from Alternative A during those years. As the work progresses, Reclamation would adhere to this alternative's proposed schedule to the greatest extent possible, while at the same time seek out time-saving efforts that would reduce the amount of time a generating unit must be offline.

Table 2-4. Alternative C Hungry Horse Modernization construction schedule

Project	Total days	Start	End	Estimated months in which potential spill may occur (depending on water year)
Transformer Fire Protection and Windows	170	3/1/21	10/22/21	May-July 2021
Units 1 and 2	85	3/1/21	6/25/21	
Units 3 and 4	85	6/28/21	10/22/21	
Powerplant Disconnect Switches	170	3/1/21	10/22/21	May-July 2021
Units 1 and 2 (581)	85	3/1/21	6/25/21	
Units 3 and 4 (781)	85	6/28/21	10/22/21	
Governor and Excitation	497	1/10/22	12/5/23	No additional spill anticipated over normal operations
Unit 1	118	1/10/22	6/22/22	
Unit 3	117	7/11/22	12/20/22	
Unit 2	118	1/9/23	6/21/23	
Unit 4	117	6/26/23	12/5/23	
Fixed Wheel Gate Overhaul	497	1/10/22	12/5/23	
Unit 1	118	1/10/22	6/22/22	
Unit 3	117	7/11/22	12/20/22	
Unit 2	118	1/9/23	6/21/23	
Unit 4	117	6/26/23	12/5/23	

Minimization Measures

Minimization measures would be the same as in Alternative B.

Proposed Staging Areas

The proposed staging areas would be the same as in Alternative B.

Proposed Reservoir Operations and Releases during Alternative C Actions

The proposed resesrvoir operations and releases would be the same as in Alternative B.

2.6 Process for Alternative Development

The alternatives were developed by identifing the key components and auxiliary features of the powerplant that need modernizing, overhauling, or replacing and then putting a schedule together, keeping objectives (Section 1.4), such as continuing to generate hydropower and downstream flows for fish, in mind. First, Reclamation managers identified which components need to be implemented first, second, and so on. For instance, replacing the cranes, or overhauling them, needs to occur early in the process, as they are key to moving large pieces of machinery. Also, modernizing the fire protection is a safety concern and must be brought up to standards; therefore, it was identified as needing to occur earlier, as well. Second, managers identified which components are intrinsically tied and so must be done either at the same time or follow one another. For instance, the fixed wheel gate overhaul must occur before the penstock recoating, turbine replacement, and generator rewind work could occur because of safety concerns. Reclamation looked at the work that is needed for this project, considered the complexities associated with the moving parts, and put forth a construction schedule with estimated duration for completion.

Reclamation also considered the issues brought forth during scoping (Section 1.6), and in particular, concerns raised regarding continuing operations for fish, water quality (TDG), FRM, and hydropower generation. Given the identified issues, Reclamation developed the following sideboards, or criteria, for alternative development.

- Reclamation would adhere to agreed-upon instream flow and water temperature regimes downstream of the dam for native fish and habitat. This means that Reclamation would continue to release water and use the SWS to meet instream flow and water temperature, as is currently done, under each alternative. Reclamation does not propose any changes to these operations under any of the alternatives.
- Reclamation recognized that the Project has the potential to increase TDG in the South Fork Flathead River below the dam. Spill through the hollow-jet valves increases TDG in the South Fork Flathead River. Reclamation ameliorates some TDG by passing water through the generating units, thus reducing the level of TDG that would occur if the water were spilled. For alternative development, the agency recognized that work could not be completed on all four generating units at a time, as that would result in greater, unacceptable, TDG increases. Alternatives would only be considered that kept some generating units online.
- FRM is an important authorized purpose of Hungry Horse, and maintaining FRM was a concern brought forth during scoping. Reclamation does not propose any changes to

FRM or VARQ under any of the alternatives. Reservoir operations and releases are included in this EA (Section 2.2) for background purposes. Reclamation would maintain operations for FRM for downstream communities during Project implementation.

- Hydropower generation is another important authorized purpose of Hungry Horse. Power generation supplies electricity and also plays a role in reducing TDG in the South Fork Flathead River, as described above. Alternatives would only be considered that kept some generating units online, thus producing electricity, although Reclamation recognizes there would be some potentially unavoidable impacts to generation.

The two action alternatives recognize the importance of continuing operations for authorized purposes while accomplishing the needed work.

2.7 Alternatives Considered but not Analyzed in Detail

Reclamation considered an alternative that would have proposed much shorter timelines for completing the work components that require two generating units to be offline at the same time. This would have been accomplished by requiring contractors to have around-the-clock shifts, rather than a standard one shift per day. After some consideration, Reclamation dismissed this alternative because of the unlikelihood of it actually being implemented.

Reclamation also considered an alternative that would have proposed doing the fixed wheel gate work after the governor and exciter replacement and would have added 2 years to the life of the Project. It would have reduced the time two generating units are offline, thus reducing spill and impacts on water quality and fish. This alternative eventually informed the current Alternative C proposed herein. It was eliminated from consideration because Alternative C essentially accomplishes the same objective of reducing the amount of time two generating units are offline and implements the Project in 10 years rather than 12.

Chapter 3 Affected Environment and Environmental Consequences

3.1 Introduction

This chapter provides background information and a description of the evaluation conducted for key resources potentially affected by the Project. It describes the affected environment of various resource areas within the Project area and vicinity, and evaluates the potential effects of implementing the two action alternatives and the No Action Alternative. The action alternatives (including the Preferred Alternative) were developed based on the purpose and need for the Project.

The Affected Environment sections describe the existing environment that could be affected by the Project alternatives. The Environmental Consequences sections describe the potential environmental consequences of implementing the proposed alternatives on the resources evaluated below. Cumulative impacts that may result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions also are evaluated.

Information necessary to develop the affected environment discussion was obtained through a combination of online data review; meetings, discussions, and reports from agencies; field investigations; scoping comments; and a review of available aerial photography.

The affected environment, inclusive of human and natural environment, referred to in each section, unless specifically mentioned otherwise, is the area potentially affected by the Federal action and includes Reclamation's property at the Hungry Horse Dam site, the staging and laydown areas, and the local/regional transportation system used to construct and supply the Project from Highway 2 to the project site.

3.1.1 Resource Areas not Discussed in Detail

A preliminary analysis indicated that the modernization and overhaul of the generating units have no potential to affect certain resource areas, or the Project is anticipated to affect certain resources to such a limited extent that a detailed discussion of those areas is not justified. These resource areas are soils and geology, vegetation, wildlife, wetlands, land use, noise, and wild and scenic rivers. Because there is either no effect or very limited potential for effect, these resource areas would not influence the decision to be made regarding the alternatives and are not discussed in detail. The rationale for eliminating these resource areas from detailed discussion and further consideration is provided below.

Soils and Geology

Earth-disturbing activities on soil or geologic resources would not occur under either action alternative; therefore, soils and geology will not be addressed further in this EA.

Vegetation

Earth-disturbing activities would not occur. The laydown and staging areas are on previously disturbed sites. Impacts to vegetation resources would not occur under either action alternative; therefore, vegetation will not be addressed further in this EA.

Wildlife

No disturbance to intact wildlife habitat would occur under either action alternative. Only disturbed habitat at the laydown and staging area would be affected. There may be temporary displacement of wildlife that frequent these types of areas, but an abundance of undisturbed areas are located adjacent to the Project area for displaced wildlife to use. There may be minor disturbance to some species of wildlife from the increased traffic and associated vibrations. These would be temporary, and the local wildlife are already accustomed to traffic and operating noises. The majority of construction activities would occur within the dam, which would contain the noise. Wildlife impacts would be none to minimal, so effects to wildlife will not be addressed further in this EA.

Wetlands

There are no wetlands within the areas to be used by the Project under either action alternative, and no wetlands would be impacted by related actions; therefore, wetlands will not be addressed further in this EA.

Land Use

Land use would not change under either action alternative or with implementation of the related actions; therefore, land use will not be addressed further in this EA.

Noise

There would be a slight increase in traffic noise and vibration as a result of supplies and material movement and worker transportation. Material delivery would occur during normal business hours to avoid adverse impacts. The majority of construction activities would occur within the dam, which would contain the noise.

Wild and Scenic Rivers

There are no designated Wild and Scenic Rivers in the action area (the South Fork Flathead River from Hungry Horse Dam downstream to the confluence is not designated); therefore, this will not be discussed further in the EA.

Hazardous Materials

Contract specifications would protect contractors and Hungry Horse Powerplant workers from exposure to hazardous/dangerous waste through criteria that ensures worker health and safety and the proper treatment, temporary storage, and disposal of hazardous/dangerous wastes. Contract specifications require either a Negative Initial Exposure Assessment or the implementation of appropriate engineering controls for any contracted work area where the potential exists for airborne concentrations of lead or asbestos. Further safeguards are

provided through Reclamation Manual Policy (ENV P01) and Directives and Standards (ENV 02-02; ENV 05-01) requiring that Reclamation must ensure that hazardous/dangerous wastes generated on Reclamation property through its own or contracted activities are properly treated, stored, and disposed of in accordance with applicable environmental rules, regulations, and standards, and that wastes are recycled whenever possible.

Implementation of established worker safety standards and contract specifications would protect workers from potential exposure to hazardous/dangerous wastes. Release of hazardous/dangerous wastes to the environment would be prevented by implementation of waste management standard operating procedures, contract specifications, and Federal, State, and local environmental regulations.

3.2 Air Quality

3.2.1 Affected Environment

Under the authority of the Clean Air Act of 1970 (42 U.S.C. §7401 et seq.), as amended, EPA establishes National Ambient Air Quality Standards (NAAQS) to regulate emissions of hazardous air pollutants. If a region or area exceeds any of the EPA established parameters for safe air, the area may be classified as a nonattainment area. The threshold concentrations for six criteria pollutants are listed in Table 3-1 below.

Table 3-1. National Ambient Air Quality Standards issued by the EPA (40 CFR part 50) for pollutants considered harmful

Pollutant	Primary/ Secondary	Averaging Time	Level	Form
Carbon Monoxide (CO)	primary	8 hours	9 ppm	Not to be exceeded more than once per year
		1 hour	35 ppm	
Lead (Pb)	primary and secondary	Rolling 3 month average	0.15 µg/m^3 (1)	Not to be exceeded
Nitrogen Dioxide (NO_2)	primary	1 hour	100 ppb	98th percentile of 1-hour daily maximum concentrations, averaged over 3 years
	primary and secondary	1 year	53 ppb (2)	Annual Mean
Ozone (O_3)	primary and secondary	8 hours	0.070 ppm (3)	Annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years
PM2.5	primary	1 year	12.0 µg/m^3	annual mean, averaged over 3 years

Pollutant		Primary/ Secondary	Averaging Time	Level	Form
Particle Pollution (PM)		secondary	1 year	15.0 µg/m^3	annual mean, averaged over 3 years
		primary and secondary	24 hours	35 µg/m^3	98th percentile, averaged over 3 years
	PM10	primary and secondary	24 hours	150 µg/m^3	Not to be exceeded more than once per year on average over 3 years
Sulfur Dioxide (SO_2)		primary	1 hour	75 ppb (4)	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
		secondary	3 hours	0.5 ppm	Not to be exceeded more than once per year

Source: https://www.epa.gov/criteria-air-pollutants/naaqs-table (accessed 6/14/17).

(1) In areas designated nonattainment for the Pb standards prior to the promulgation of the current (2008) standards, and for which implementation plans to attain or maintain the current (2008) standards have not been submitted and approved, the previous standards (1.5 µg/m^3 as a calendar quarter average) also remain in effect.

(2) The level of the annual NO_2 standard is 0.053 ppm. It is shown here in terms of ppb for the purposes of clearer comparison to the 1-hour standard level.

(3) Final rule signed October 1, 2015, and effective December 28, 2015. The previous (2008) O3 standards additionally remain in effect in some areas. Revocation of the previous (2008) O_3 standards and transitioning to the current (2015) standards will be addressed in the implementation rule for the current standards.

(4) The previous SO_2 standards (0.14 ppm 24-hour and 0.03 ppm annual) will additionally remain in effect in certain areas: (1) any area for which it is not yet 1 year since the effective date of designation under the current (2010) standards, and (2)any area for which an implementation plan providing for attainment of the current (2010) standard has not been submitted and approved and which is designated nonattainment under the previous SO_2 standards or is not meeting the requirements of a SIP call under the previous SO_2 standards (40 CFR 50.4(3)). A SIP call is an EPA action requiring a state to resubmit all or part of its State Implementation Plan to demonstrate attainment of the required NAAQS.

The nearest two areas that have reached nonattainment status are at Whitefish and Kalispell, Montana, based on air quality monitoring stations for PM_{10} and $PM_{2.5}$ (MTDEQ 2017). As the crow flies, they are 16 and 17 miles away, respectively. Air quality in Montana is occasionally affected by wildfire smoke, but the project area of the proposed Hungry Horse Dam modernization work is in a rural setting, is in attainment status (EPA 2017), and air quality is generally good.

3.2.2 Environmental Consequences

Minimal air quality impacts would be associated with the modernization project at Hungry Horse Dam. The primary types of air pollution during construction would be combustible pollutants from equipment exhaust and fugitive dust particles from disturbed soils becoming airborne. Air quality impacts would be considered significant if the modernization project at

Hungry Horse violated applicable air quality standards, as listed above. This section provides a summary of air quality impacts associated with the proposed alternatives.

Alternative A – No Action Alternative

Under the No Action alternative, the modernization project at Hungry Horse and associated construction activities would not be completed. The Hungry Horse Dam and powerplant would remain operating under existing constraints and at the existing generation capacity. The land use activities surrounding Hungry Horse would continue to be managed as they currently are. Under the No Action Alternative, there are no anticipated air quality impacts, and future conditions would be similar to current conditions.

Alternative B – HHPP Modernization Two Generating Units Offline for 4 Years

Air quality would be temporarily impacted. There will be a slight increase in area exhaust emissions from increased construction traffic and worker transportation during modernization plan implementation. Potential adverse air quality impacts would likely be casued by combustible pollutants and fugitive dust (PM_{10}) associated with construction activities. Direct emission of CO_2-equivalent greenhouse gases from the proposed project would be substantially below the level considered by the Council on Environmental Quality to be relevant in a NEPA evaluation.

Montana and nearby states are home to many wind energy and coal-gasification plants, which provide power in addition to hydroelectric projects such as Hungry Horse. If less hydropower is supplied to the grid due to reduced hydroelectric power production during maintenance, it may be necessary to replace some of the lost hydropower with power from other sources. According to BPA (Druliner 2017), it is most likely that if demand exceeded supply, supplemental power supplies would come from other hydropower sources within the system (Hungry Horse Powerplant is one of many powerplants in the FCRPS). Under more extreme supply and demand conditions, as a last resort, it may be necessary for BPA to obtain additional power from natural gas-produced electricity. This may result in increased air pollution in the region, but the pollution would not occur in the immediate project area. This would be a last resort and is unlikely to occur. Although obtaining wind-generated power from the system is an option, wind penetration into the grid is complicated.

Alternative C – HHPP Modernization Two Generating Units Offline for 1 Year (Preferred Alternative)

Implementation of Alternative C will result in similar impacts as Alternative B.

3.2.3 Mitigation

Alternative A – No Action Alternative

No mitigation is proposed.

Alternative B – HHPP Modernization Two Generating Units Offline for 4 Years

BMPs implemented as part of the Project would avoid measurable air quality impacts.

Examples of appropriate BMPs would include dust suppression during construction and maintaining construction equipment exhaust emissions controls according to manufacturer's instructions. Proper maintenance of construction equipment and heavy machinery would prevent any increase in regulated air quality parameters over established limits. Compliance with all applicable Federal and State emission standards and BMPs would reduce potential impacts to less-than-significant levels.

Alternative C – HHPP Modernization Two Generating Units Offline for 1 Year (Preferred Alternative)

Mitigation activities under Alternative C will be the same for Alternative B.

3.2.4 Cumulative Impacts

There are some future road replacement/resurfacing/reconstruction projects in nearby areas that will require additional heavy vehicle usage to complete. Projects include a Montana Department of Transportation (MDT) bridge replacement, Highway 2 resurfacing in Columbia Falls, and asphalt placement on the Hungry Horse Powerplant road. Increased and sustained use of heavy machinery under Alternative B will produce greater-than-normal exhaust emissions. Asphalt placement will require heavy machinery to install, but air quality will improve long-term, as the paved road will provide for relatively permanent dust suppression. Combined with nearby construction activities described above, as well as past activities, cumulative impacts are unlikely to put the area into non-attainment status in the project area, and no cumulative effects are anticipated on this resource as a result of the proposed project.

3.3 Hydrology

3.3.1 Affected Environment

Hungry Horse Dam and Reservoir are on the South Fork Flathead River, about 5 miles upstream from its confluence with the mainstem Flathead River. The Middle Fork and South Fork Flathead Rivers are headwater tributaries within the Pend Oreille River basin that originate near the Continental Divide in the northern Rocky Mountains in the United States; the North Fork originates in British Columbia, Canada.

The annual peak inflows into the reservoir tend to occur in May, June, or early July, but rain-on-snow events can cause short-duration high flows during the winter months. Hungry Horse Dam is operated primarily for flood control and hydropower production. Full pool elevation for Hungry Horse Reservoir is 3,560 feet. Total storage capacity of the reservoir is about 3.5 million acre-feet. Storage capacity in Hungry Horse Reservoir provides local flood control for the communities of Columbia Falls and Kalispell, Montana, as well as system flood control for the Portland/Vancouver area on the mainstem Columbia River.

The South Fork Flathead River basin is approximately 1,690 square miles. The basin is a region of forested mountains and narrow valleys lying on the western slopes of the Rocky Mountains.

For additional information regarding hydrology and operations, see Section 2.2.

3.3.2 Environmental Consequences

Description of Modeling

The operations of Hungry Horse Dam were modeled to determine the impact of the modernization process on hydrologic conditions in the Flathead River basin. The model compared the current operations to the anticipated operations that could be expected for Alternative B during the modernization period, which consists of two hydropower generating units being out of service for up to 4 years, likely 2021 through 2024 This is when two generating units would be offline, hence changing how much water can be released through the generating units. Reclamation used historic flow data to estimate how much more volume and time spill through the hollow jet valves would occur for that 4-year period.

The model included operations and conditions from 1929 through 2013. The historical inflows to Hungry Horse Reservoir were input into a daily time-step Riverware model for the Flathead River basin. The model contained all of the current constraints for Hungry Horse Dam, including transmission limitations, FRM requirements, and operations for fish. The No Action Alternative was modeled with a maximum generation limit of 305 MW (approximately 9,000 cfs hydropower turbine hydraulic capacity), which is the approximate transmission limitation for Hungry Horse in the Flathead Valley. Alternative B was modeled with a maximum generation limit of 210 MW (6,000 cfs hydropower turbine hydraulic capacity), which is the approximate generation limit at Hungry Horse Dam with two generating units out of service. The results were compared to determine the changes in hydrologic conditions that could occur during the 4 years when two units are offline. That information was then used to inform analysis for Alternative C (see below), which would have 1 year in which the maximum generation limit would also be 210 MW (6,000 cfs hydropower turbine hydraulic capacity).

Understanding changes in how water is released from Hungry Horse, either through the hydropower generating units or through the hollow-jet valves, is important because it ties directly to water quality and TDG below. Hydropower generating units reduce TDG compared to the hollow-jet valves, so the operational preference is to release as much water through the generating units as possible.

Alternative A – No Action Alternative

Alternative A would not result in any changes to the hydrology of the system. The hydropower turbine hydraulic capacity would remain 9,000 cfs. Modeled results predict spill through the hollow-jet valves would occur in 69 percent of all years, and spill would occur during the February-through-July period 8 percent of the time. In other words, spill is likely to occur most years. and during the February-through-July time period (181 days), when there is spill in that year, the duration would last approximately 8 percent of the 181 day time period, or approximately 15 days. Hydrology for Alternative A is discussed more fully below for comparison with Alternative B.

Alternative B – HHPP Modernization Two Generating Units Offline for 4 Years

For Alternative B, Hungry Horse Reservoir elevations were compared to Alternative A, and there were no differences between the two alternatives in terms of reservoir conditions.

The total discharge from the dam, which includes flow through both the generating units and hollow-jet valve spillway, is also similar between the two alternatives. However, some slight shifting of discharge occurs under Alternative B when the model adjusts discharge through the generating units during the spring in order to reduce flow through the spillway.

Figure 3-1 is an exceedance plot of the total discharge from Hungry Horse Dam comparing the current operations and the two modernization alternatives. The total discharge is the same in both scenarios when flows are less than 3,000 cfs and greater than 13,000 cfs. The difference in hydraulic capacity of the hydropower units between the alternatives does not impact the flows in these ranges. The greatest differences occur in the 6,000 cfs to 9,000 cfs range of flows, because that is the range in which the difference in hydropower turbine hydraulic capacities of the alternatives occurs.

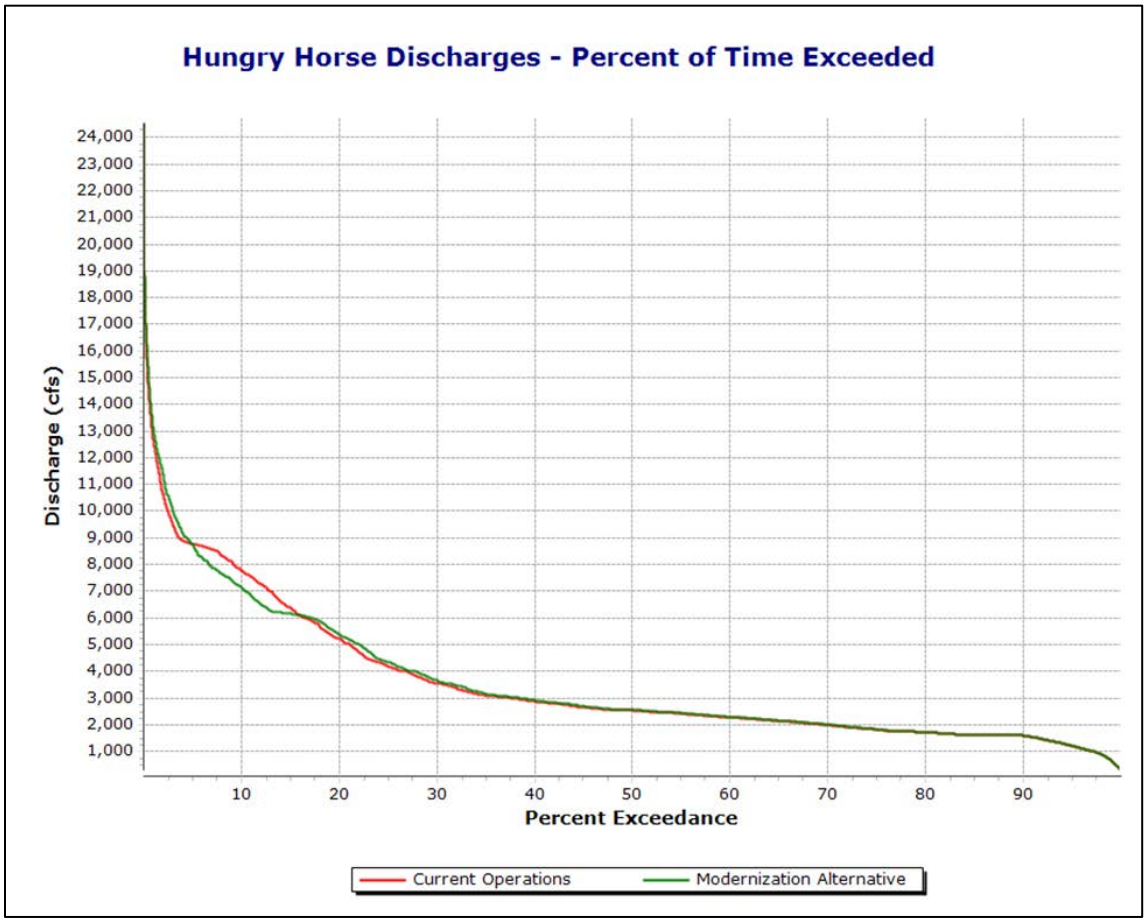

Figure 3-1. Total discharge exceedance plot comparing current operations and Alternative B

The greatest impact of reducing the hydropower turbine hydraulic capacity of the dam in Alternative B is the amount of spill bypassing the hydropower turbines. Figure 3-2 is an

exceedance plot comparing Hungry Horse Dam maximum spill per year between the No Action Alternative and Alternative B . The maximum spill per year for Alternative B is approximately 3,000 cfs higher than for the No Action Alternative. This plot also shows that the occurrence of spill increases under this alternative (approximately 89 percent of the years compared to approximately 69 percent of the years with Alternative A). Figure 3-3 is an exceedance plot for the February-through-July period showing the percent exceedance of spill. This figure shows that during this 6-month period, there would be spill approximately 26 percent of the time, or 47 days, for Alternative B, compared to 8 percent of the time for the No Action Alternative. This would apply during the 4-year time period when two hydropower generating units would be offline, projected to be 2021 through 2024. There would be a higher likelihood (89 percent compared to 69 percent) of spill and a longer duration (47 days compared to 15 days) than the No Action Alternative.

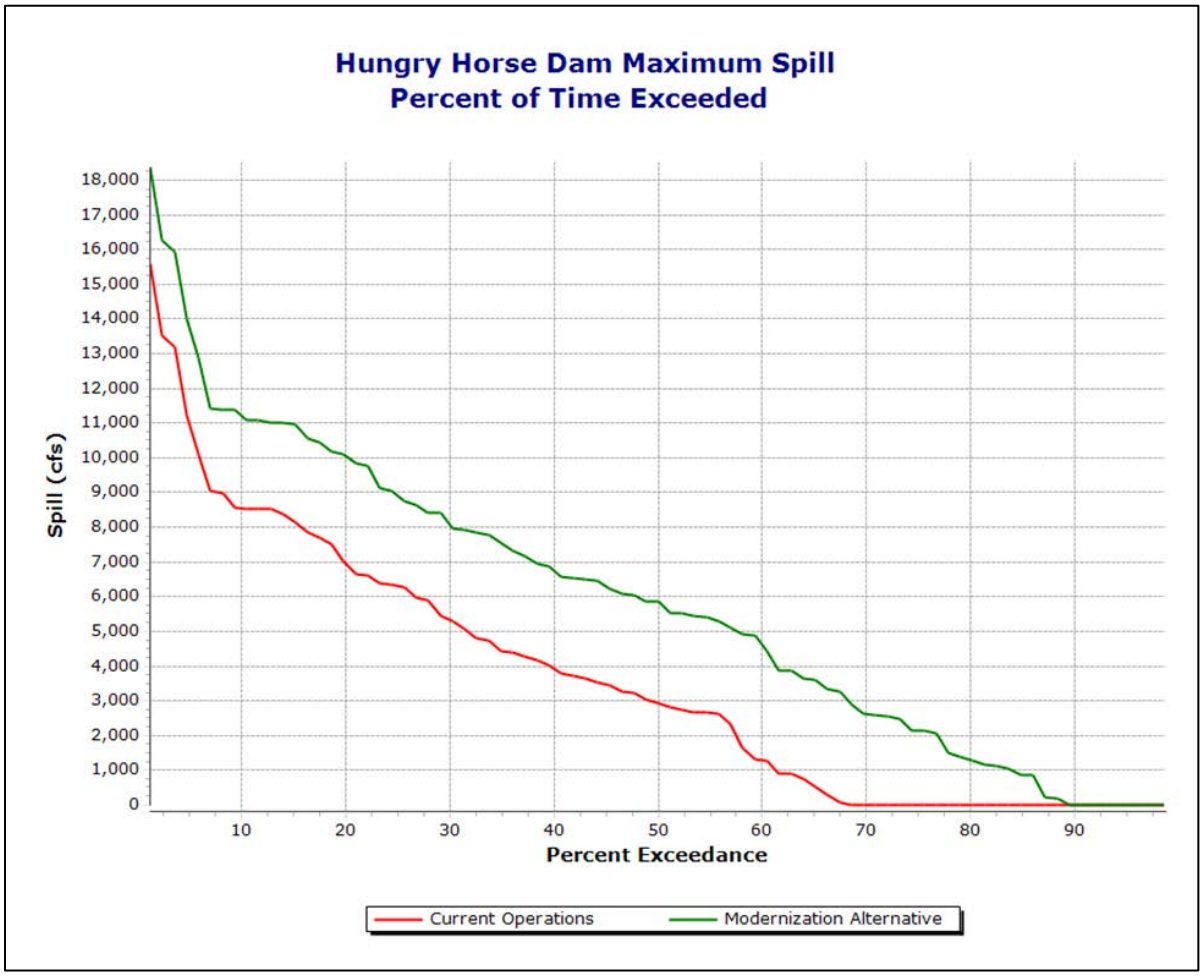

Figure 3-2. Maximum annual spill exceedance plot comparing current operations and Alternative B

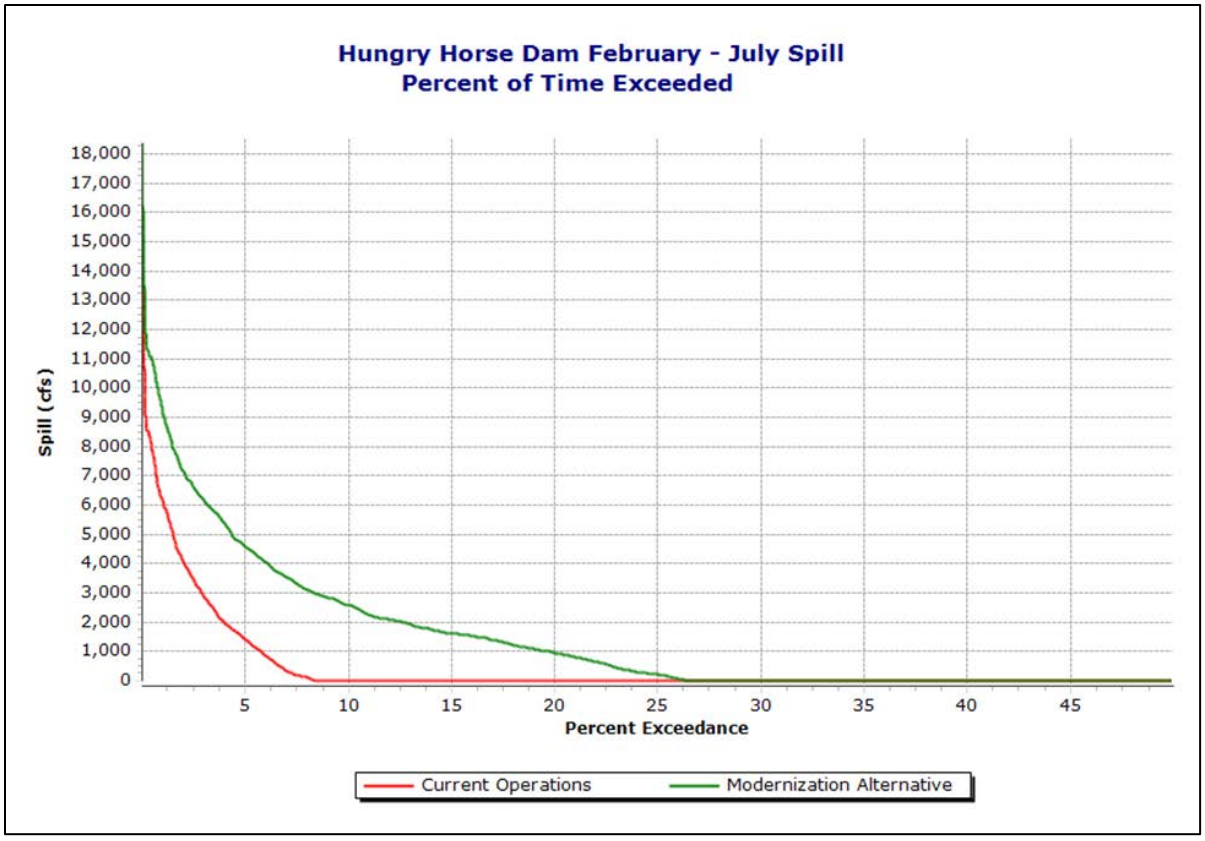

Figure 3-3. Dam spill exceedance plot for February through July comparing current operations and Alternative B

Figure 3-4 shows the number of days in which spill was greater than 1,000 cfs for the No Action Alternative and Alternative B, overlain with the January-through-July runoff volume. The January-through-July period of runoff volume was used because this is the period with the greatest snowmelt runoff and includes the months when spill is most likely to occur at Hungry Horse Dam. The figure shows that there is an increase in the number of days of spill with Alternative B when compared to the No Action Alternative every year that spill occurs. The modeling also showed that during some years when there is no spill with the No Action Alternative, there would be days of spill with Alternative B. The greatest increase in number of days of spill occurs in some of the higher water years, such as 1997 and 1959, when the duration of spill increased from about 1 month for the No Action Alternative to about 3 months for Alternative B.

These results are modeled and are valid for comparison of the alternatives; however, during real-time operations, in-season adjustments may be possible in some years in order to reduce the duration and magnitude of spill during the modernization process. Reclamation uses daily real-time hydrologic data to make changes to operations and would utilize that to the extent possible, without risking other authorized purposes, such as FRM, in order to reduce spill.

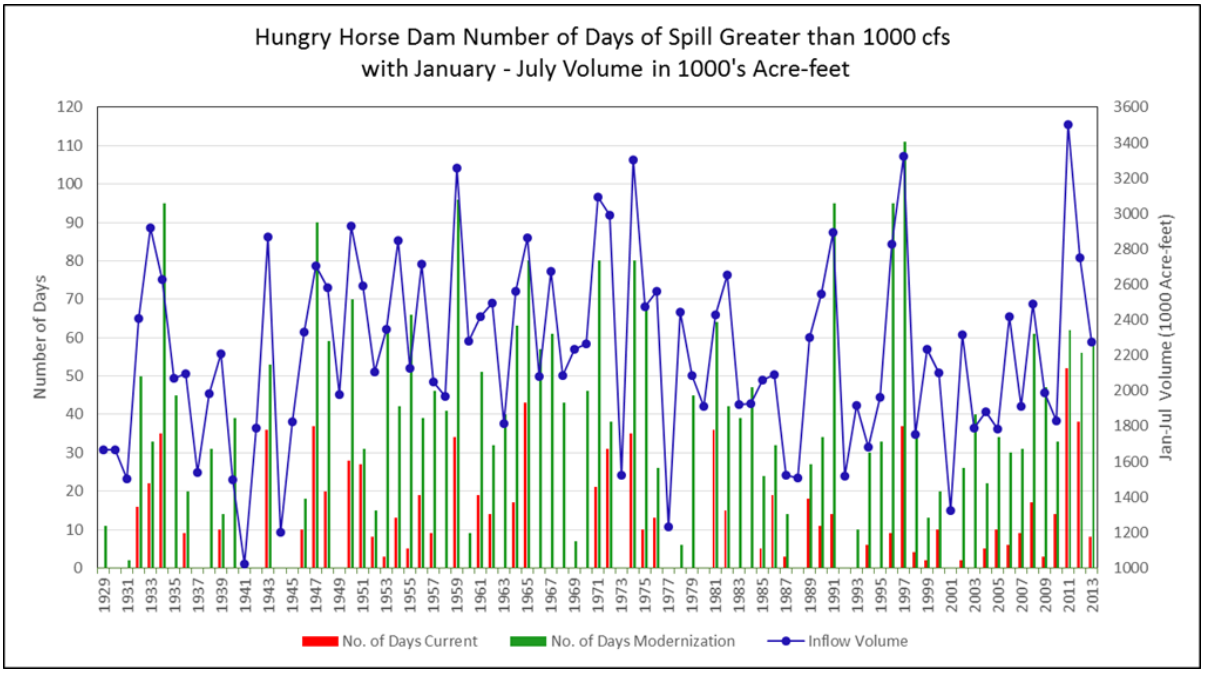

Figure 3-4. Number of days of spill greater than 1,000 cfs for current operations and Alternative B with January-through-July runoff volume

Summary

Alternatives A and B were modeled to study the impact of the Hungry Horse Dam modernization process on the hydrologic conditions in the Flathead River basin. The alternatives compared were the No Action Alternative, which modeled how the dam is currently operated, and Alternative B, which assumed that two hydropower units would be out of service for an extended period of time (4 years). The hydrologic impacts were compared between the , and the results showed that the water surface elevation of Hungry Horse Reservoir and the total discharge from Hungry Horse Dam did not differ substantially. However, there was increased spill through the hollow-jet valves with the modernization alternative when compared to the No Action Alternative because of reduced hydropower generating unit hydraulic capacity during implementation of Alternative B. The maximum annual spill was generally increased by 3,000 cfs when spill occurred with both alternatives, which correlates to the volume of water that would have been released through one hydropower generating unit. Additionally, there was spill with Alternative B in some years when there was no spill under the No Action Alternative. The duration of the spill also increased from 1 month for the No Action Alternative to 3 months under Alternative B in some of the higher water years.

For Alternative B, spill through the hollow-jet valves or ring-gate would generally be required in the spring and early summer months while two generating units would be offline during the powerplant disconnect switches upgrade, transformer fire protection/powerplant windows, governor and exciter replacement, and fixed wheel gate overhaul portion of the Project (4 years of implementation, approximately 2021 to 2023). During the spring months, Hungry Horse is operated to make space in the reservoir for spring runoff to protect

downstream communities from flooding. Reclamation creates space in Hungry Horse Reservoir by releasing water out of the reservoir. Water is released three ways: through the generating units, by spill through the hollow-jet valves, and/or through the ring-gate. The ring-gate is available for use if the reservoir surface elevation is high enough.

Flows in the South Fork Flathead River would not differ under this alternative from current conditions or the No Action Alternative. Essentially the same volume of water would be released (although the model indicates slight variations) from the reservoir, but it would be released through the hollow-jet valves and ring-gate outlet when hydraulic capacity of the powerplant is exceeded (releases over 6,000 cfs). Likewise, reservoir conditions would not change.

Under this Alternative, operations for FRM and fish would not change.

Alternative C – HHPP Modernization Two Generating Units Offline for 1 Year (Preferred Alternative)

Effects to hydrology would be the same as under Alternative B for 1 year (approximately 2021) or during implementation of the powerplant disconnect switches and transformer fire protection work. After that, hydrology would be the same as under the No Action Alternative because three generating units would be operating. vOperations would be the same because hydraulic capacity would be maintained and not differ from current operations. Conditions that would necessitate spill would be the same for both Alternative C and the No Action Alternative.

3.3.3 Mitigation

For all alternatives, mitigation actions for hydrology would be the same as those taken to address water quality. See Section 3.4.3 for a description of mitigation for water quality.

3.4 Water Quality

3.4.1 Affected Environment

Water quality of Hungry Horse Reservoir and the South Fork Flathead River is managed by the State of Montana under the framework of the Clean Water Act (CWA). Montana has established water quality standards for specific physical and chemical parameters in order to provide suitable conditions to support designated and potential uses. Some of these uses include aquatic life, drinking water, agricultural, and primary contact recreation. The South Fork Flathead River has been classified by the Montana Department of Environmental Quality (MTDEQ) as a Class B-1 water body. This designation protects the uses of Hungry Horse Reservoir and the South Fork Flathead River above the reservoir for drinking, culinary, and food processing purposes, after conventional treatment; bathing, swimming, and recreation; growth and propagation of salmonid fishes and associated aquatic life, waterfowl and furbearers; and agricultural and industrial water.

Section 303(d) of the CWA requires states and tribes to identify water bodies that do not

meet water quality standards. States and tribes must publish a list of these impaired waters every 2 years. The most recent 303(d) list for the state of Montana is the draft 2016 Integrated Report (MTDEQ 2016). The 60-day public comment period has closed, and MTDEQ and the EPA are working toward final approval of the document[1]. For lakes, rivers, and streams identified on this list, states and tribes must develop water quality improvement plans known as total maximum daily loads (TMDLs). These TMDLs establish the amount of a pollutant a water body can carry and still meet water quality standards. The primary water quality problems identified in the 2016 Integrated Report for the South Fork Flathead River downstream from Hungry Horse Dam is an altered flow regime that impacts the recreation beneficial uses of the river below Hungry Horse Dam (MTDEQ 2016).

Applicable Water Quality Standards

The water quality criteria (narrative and numeric) that protect the designated and potential uses for Hungry Horse Reservoir and the South Fork Flathead River downstream of Hungry Horse Dam are discussed below.

Administrative Rules of Montana (ARM) 17.30.623 contains the water quality standards for water classified as B-1 in the State of Montana. In addition, ARM 17.30.637 contains the general water quality criteria for all waters of the state. Two of these water quality standards are of a concern in the South Fork Flathead River below Hungry Horse Dam: water temperature and dissolved gas.

Water temperature in this section of the South Fork Flathead River is unique in that in 1995 Reclamation placed selective withdrawal gates on the penstocks at the reservoir to warm the river (Marotz et al 1996, Vermeyen 2006). These gates are used to provide warmer epilimnetic water to the river during the summer period when the reservoir is stratified. By informal agreement with MFWP, Reclamation operates the gates to achieve a temperature regime in the river as similar to natural conditions as possible. The purpose of this manipulation was to prevent the very cool (4° C hypolimnetic waters) water from suppressing the primary and secondary production in the river and to prevent the cold-water plume from acting as an attractant to nonnative lake trout moving from Flathead Lake upstream, which may increase the predation pressure on native cutthroat and bull trout. Since the completion of the selective withdrawal gates, thermal issues in the river have been minimal.

TDG is the other pollutant of concern in the South Fork Flathead River. Total dissolved gas is measured in percent saturation relative to the water surface, and must not exceed 110 percent. TDG levels can be increased above the water quality criteria by spilling water via spillways of dams. There are other ways that TDG may also be elevated, including passing water through turbines, low-level ports, fishways, or locks; and natural processes such a low barometric pressure, high water temperatures, or high levels of aquatic plant activity and growth. However, the vast majority of elevated TDG levels found in the South Fork

[1] More information can be found at the website http://deq.mt.gov/Water/WQPB/cwaic/reports.

Flathead River are caused by spills from the dam through the hollow-jet valves. As a result, Reclamation has installed a TDG monitoring station downstream from the dam to monitor TDG levels.

One of Reclamation's goals is to operate Hungry Horse Dam in a manner that meets water quality standards in the South Fork Flathead River below the dam. Typically, discharges through the powerhouse meet the Montana state TDG standard of 110 percent or less. There are occasions when all of the required reservoir discharges cannot be routed through the powerplant, such as during spring runoff/flood control, or during times when powerplant equipment is unavailable due to maintenance, equipment replacement, or unexpected equipment failure. Water not discharged through the powerplant is spilled either through the hollow-jet valve outlet tubes or the ring-gate spillway, resulting in higher TDG levels than water routed through the powerplant.

Transmission restrictions in the Flathead Valley associated with the shutdown of the Columbia Falls aluminum plant have increased the frequency of spill from Hungry Horse Dam. Full powerplant capacity is 428 MW; however, current transmission restrictions require that generation is limited to 310 MW. Depending on head (the vertical change in elevation of the water at the surface of the reservoir and the tailwaters downstream, below the dam) this generation restriction corresponds to approximately 9,000 cfs discharge through the powerplant. During FRM operations or unplanned power/transmission outages, the discharges will need to exceed powerplant capacity, which requires the excess water to be spilled.

Table 3-2. Monthly average TDG percentages downstream from Hungry Horse Reservoir, March 1998 to July 2016

Month	South Fork Flathead River (HGHM)
January	96.89
February	98.05
March	97.78
April	100.24
May	100.15
June	103.38
July	106.02
August	105.07
September	102.34
October	100.18
November	100.01
December	97.98

The TDG measured at the tailwater HGHM Hydromet station (located on the South Fork Flathead River near Columbia Falls at Hungry Horse) indicates that TDG can exceed water quality criteria during some spill events. Generally, the river reaches 110 percent of saturation if spill exceeds 2,000 cfs and/or spill exceeds 17.3 percent of the total discharge through the powerplant (see Figure 3-5 and Figure 3-6 for unit spill and percent spill TDG relationships). The unit spill relationship will be used to predict TDG from the historic spill

record, as well as from the modeled spill record for the modernization work documented in the previous hydrology section.

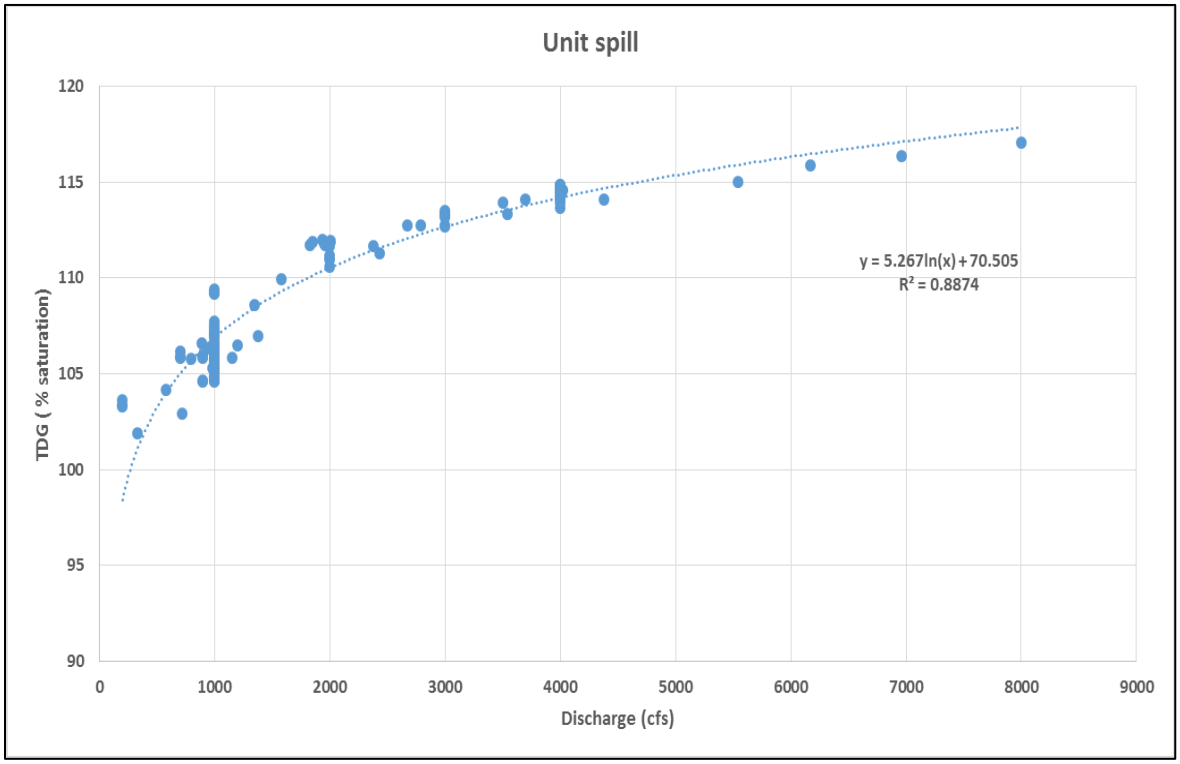

Figure 3-5. Spill/TDG relationship at Hungry Horse Reservoir

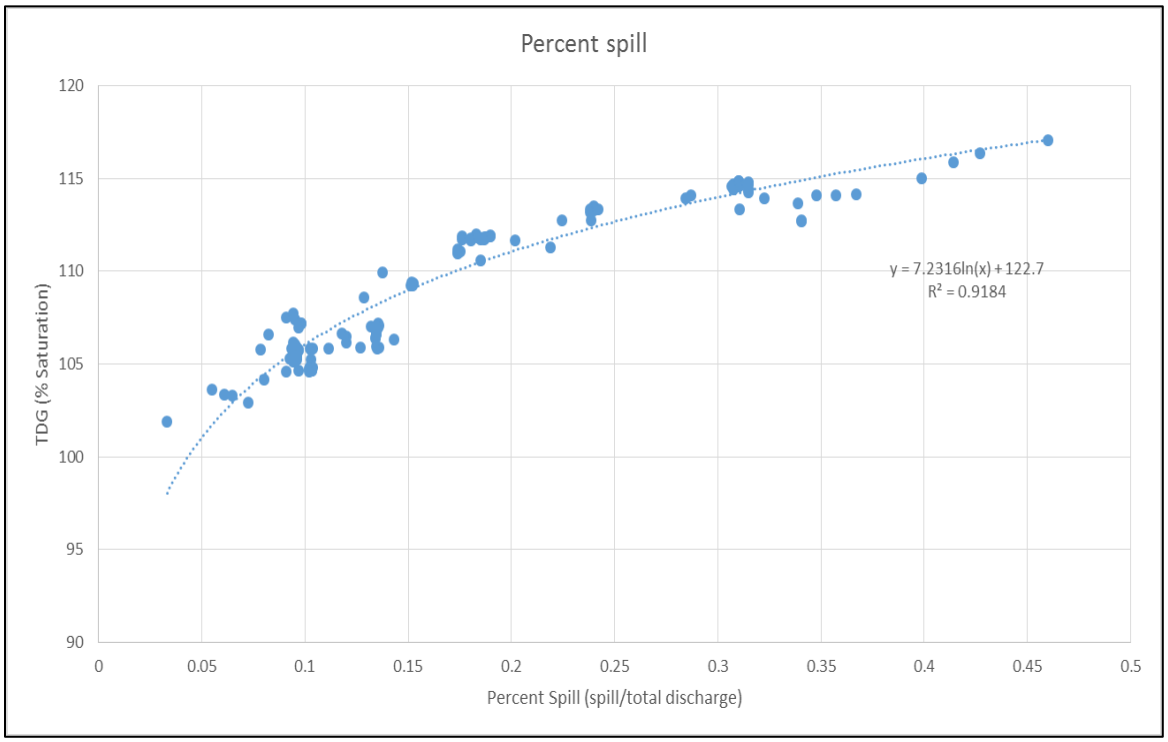

Figure 3-6. Percent spill/TDG relationship at Hungry Horse Reservoir

Spill and TDG Data

In addition to the modeled information, Reclamation looked at TDG and spill data from the HGHM Hydromet station on the South Fork Flathead River. This information helps to better define the spill-to-TDG correlation. Measurements of spill from the hollow-jet valve outlet tubes and data from 2011 through 2014 showed that approximately 16 percent of the total flow can be spilled through the hollow-jet valve outlet tubes before TDG exceeds 110 percent downstream.

During flood control operations in the spring of 2014, Reclamation tested whether the configuration of the spill through the tubes would affect TDG levels (see results in Table 3-3). Reclamation hypothesized that splitting the spill through the three outlet tubes would produce lower TDG levels downstream when compared to spilling all of the flow through one tube. To test this hypothesis, Reclamation discharged spill ranging from 1,000 to 4,000 cfs through different configurations of the three outlet tubes and measured TDG and flow at the HGHM Hydromet station. Results showed that splitting the spill through three outlet tubes resulted in slightly lower TDG levels downstream at the 1,000 and 2,000 cfs spill levels. At the 3,000 and 4,000 cfs spill levels, there was no difference in TDG levels among releases from one, two, or three tubes. These results should be comparable to other situations where cold water is being spilled through the outlet tubes. These results are not necessarily comparable to situations where the water spilled through the outlet tubes may be warmer than the tested water because warmer water holds less dissolved gas than cold water for the same volume.

Table 3-3. Hollow-jet valve TDG test, Spring 2014

Spill Discharge (cfs)	No. of Tubes	Total Dissolved Gas (%)
1,000 (10% of total flow)	3	105
	2	106
	1	107
2,000 (18% of total flow)	3	111
	2	112
	1	112
3,000 (24% of total flow)	3	113
	2	113
	1	113
4,000 (31% of total flow)	3	115
	2	115
	1	115

Table 3-3 shows that when TDG is at 110 percent or greater, it takes substantially more water to see large increases in TDG. Although there is a large increase in TDG from 10 percent of flow to 18 percent of flow, the increases in TDG slow down markedly with more spill.

During the spring of 2017, Reclamation had two generating units offline at Hungry Horse due to mechanical problems which forced the dam to spill up to 54 percent of the total flow

(see results in Table 3-4). The results indicate that although the modeled predicted outcome is informative, conditions like stream temperature and how the water is released factor into TDG levels. The modeled results would predict that when spilling 54 percent of total flow, TDG would have been more than 117 percent; but in reality TDG was measured at 113.5 percent. Although the modeled results are valuable in informing the volume, frequency, and duration of potential spill, TDG is a combination of environmental factors and spill and, given the variables that influence TDG, it is difficult to precisely estimate what TDG levels would be.

Table 3-4. Spring 2017 spill and TDG results

Date	Spill Discharge (cfs)	TDG	Percent of Total Flow
May 2	2,900	111.3	34
May 3	2,900	112.0	32
May 4	4,025	112.8	42
May 15	4,660	113.8	45
May 16	4,870	113.8	48
May 17	4,870	113.7	47
May 18	4,894	113.6	48
May 19	Unknown but similar to May 18 and 22	113.6	Unknown but similar to May 18 and 22
May 20		113.6	
May 21		113.5	
May 22	4,980	113.6	49
May 23	4,980	113.7	49
May 24	4,980	113.5	54
June 13	467	105.1	7
June 14	467	104.3	8
June 15	0	104.2	0

3.4.2 Environmental Consequences

Significance Criteria

The water quality impact analysis is based on available water quality data and state water quality standards (as described above).

Alternative A – No Action

Modeled Current Operations

Reclamation would continue operating the generating units with the current maintenance and production schedules. Water quality conditions are not expected to change as a result of the No Action Alternative until the failure of key generator components renders multiple units inoperable. At that time, the likelihood of spill events occurring at Hungry Horse would increase. Modeled results indicate that TDG generation above 110 percent saturation may occur during spill events greater than 2,000 cfs at Hungry Horse Dam. As the units fail, the ability to operate the system would also fail, resulting in increased spill at Hungry Horse Dam and increased TDG generation in the South Fork Flathead River below Hungry Horse Dam. The modeled results, however, do not account for water temperature and how it

influences TDG levels (e.g., warmer water temperatures can contribute to increases in TDG).

The environmental consequences of the current operations on temperature conditions within Hungry Horse Reservoir and the reach of the South Fork Flathead River below Hungry Horse Dam also are not expected to change substantially. The SWS would continue to operate on the functioning hydropower generating units as needed for temperature adjustment of the river.

Alternative B – HHPP Modernization Two Generating Units Offline for 4 Years

Modeled HHPP Modernization

Current operation and maintenance schedules dictate that one hydropower generating unit in the powerplant is out of production at a time, and during low electrical demand periods, as many as two units may not be operating. For this Alternative, spill was modeled under the assumption that two units would not be available during the modernization of the powerplant. Although modeled for the 10 year implementation schedule, two units would be planned offline for only 4 years (approximately 2021-2024). As discussed in the Hydrology section, if conditions required spill under the No Action Alternative, spill would be expected to increase by approximately 3,000 cfs while two units are not available (which correlates to the volume of water that is released through a generating unit). During implementation of Alternative B, spill may also occur, depending on conditions, more frequently than in the No Action Alternative. This means that the frequency and length of TDG increases may increase.

On average, the modeled data indicate that the number of days TDG is above 110 percent would increase by 24 days under Alternative B (Figure 3-7 and Figure 3-8) . In some dry years, there may be no increase, and in some wet years, this increase would be as high as 83 additional days above 110 percent. In the current period of record, spill above 110 percent is approximately 3.42 percent of the total record. For Alternative B, spill above 110 percent would increase to 11.64 percent of the period of record (see Table 3-5).

Furthermore, the percentage of TDG would also increase, and in some cases, substantially. In the model, the amount of increased TDG due to the implementation of Alternative B averaged 4.73 percentage points above the estimated TDG percentage from the modeled current operations. The maximum gain in TDG estimated from this alternative is 13.87 percentage points. At times when TDG is already above 110 percent, the increases due to the modernization will increase an average of 3.55 percentage points, with maximum TDG increasing 8.45 percentage points. The maximum TDG estimated for the period of record is 119.87 percent TDG, while the maximum during implementation of this alternative is estimated to be 120.61 percent TDG.

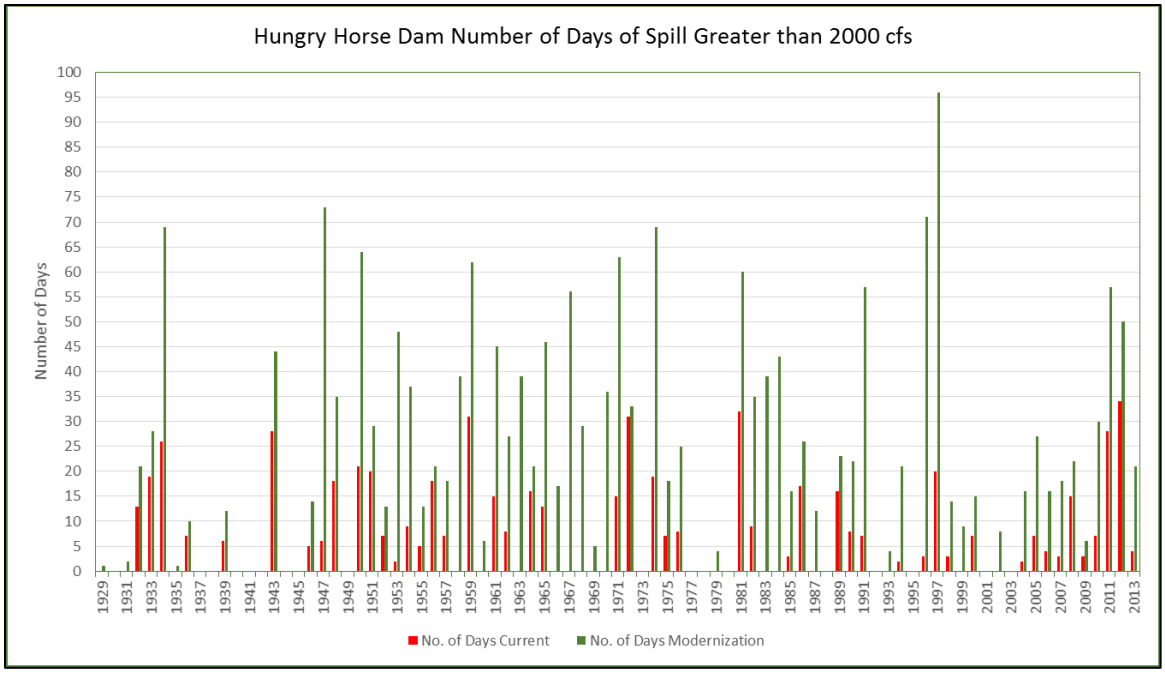

Figure 3-7. Number of spill days greater than 2,000 cfs current operations and with two generating units offline

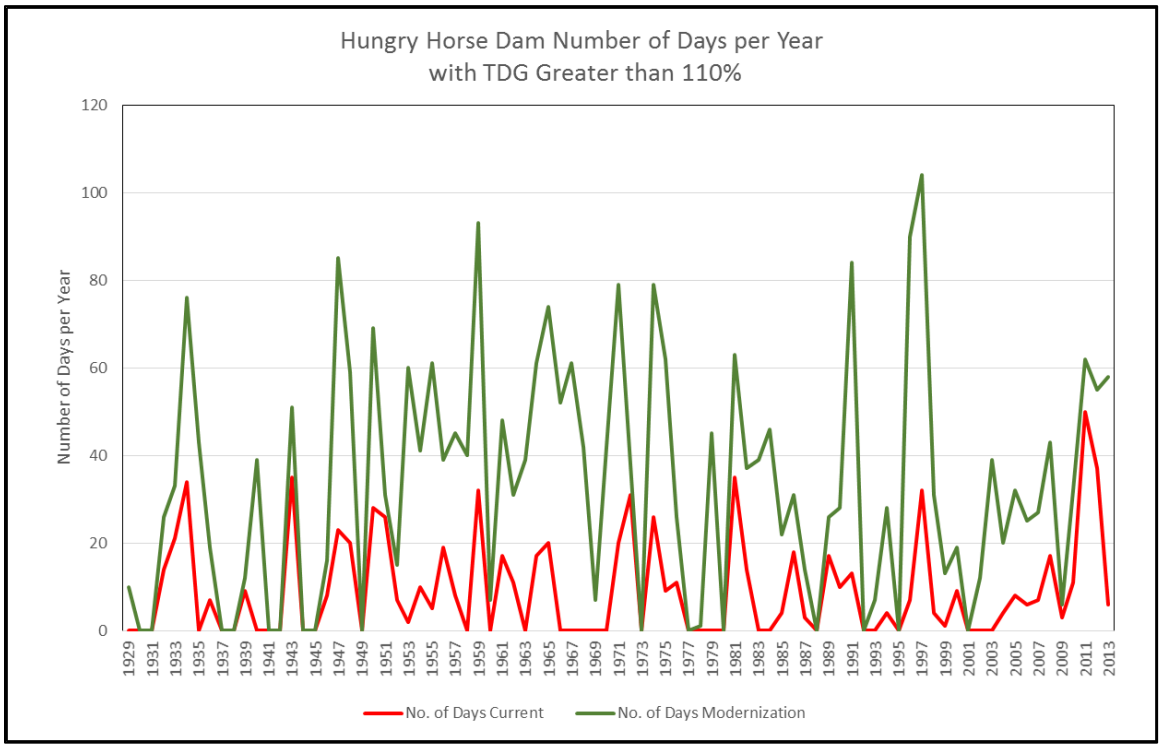

Figure 3-8. Number of days with TDG greater than 110 percent current operations and with two generating units offline

Table 3-5. Frequency distribution of discharge and TDG for the modeled historical current operations and under the modeled modernization conditions

TDG Percent	Modeled Current Operations Frequency	Percentage	Modeled Modernization Conditions Frequency	Percentage
100 and less	29,868	96.49%	27,057	87.41%
105	26	0.08%	293	0.95%
110	270	0.87%	754	2.44%
111	86	0.28%	251	0.81%
112	104	0.34%	400	1.29%
113	76	0.25%	363	1.17%
114	97	0.31%	251	0.81%
115	96	0.31%	354	1.14%
116	88	0.28%	264	0.85%
117	83	0.27%	297	0.96%
118	84	0.27%	267	0.86%
119	62	0.20%	227	0.73%
120	14	0.05%	160	0.52%
120+	0	0.00%	16	0.05%

The environmental consequences of Alternative B on temperature conditions within Hungry Horse Reservoir and the reach of the South Fork Flathead River below Hungry Horse Dam are not expected to change significantly. The SWS selective withdrawal gates would continue to operate on the functional generating units for temperature adjustment of the river.

Alternative C – HHPP Modernization Two Generating Units Offline for 1 Year (Preferred Alternative)

Effects to water quality would be the same as under Alternative B for the first year of implementation while the transformer fire protection/powerplant windows portions of the Project are being completed and two generating units are offline. After that, effects to water quality would be the same as under the No Action Alternative because three turbines would be operating. Operations would be the same as the No Action Alternative from the second year of implementation through the remainder of the Project because hydropower turbine hydraulic capacity would be maintained and not differ from current operations. Conditions (operations for FRM, flows, etc.) that would necessitate spill would be the same for both Alternative C and the No Action Alternative.

The environmental consequences of Alternative C on temperature conditions within Hungry Horse Reservoir and the reach of the South Fork Flathead River below Hungry Horse Dam are not expected to change significantly. The SWS gates would continue to operate on the functional generating units for temperature adjustment of the river.

3.4.3 Mitigation

For all alternatives, the following mitigation actions would be implemented.

- When spill is below 2,000 cfs, Reclamation would adjust releases through the hollow-jet valves to minimize TDG.

- Coordination would occur with MFWP, MTDEQ, and the USFWS when spill is anticipated.
- Existing CWA variances for TDG would be updated and maintained.
- The Hydromet station would be maintained.
- Forecasts would be used to adjust discharges through the available generating units to minimize spill to the extent possible; in-season adjustments may be possible in some years in order to reduce the duration and magnitude of spill.
- Downstream water temperature targets would be maintained with use of the SWS to the extent possible.

3.4.4 Cumulative Impacts

Other future projects identified in the Hungry Horse Dam area include various communications and road maintenance activities, and these projects would likely be concurrent with the modernization work. However, Reclamation does not anticipate that there would be effects to water quality from these other projects, so there would be no additional effects to consider cumulatively.

3.5 Fisheries

3.5.1 Affected Environment

Fisheries in the vicinity of the Project include Hungry Horse Reservoir and the South Fork Flathead River below Hungry Horse Dam. However, the modernization of Hungry Horse Dam would not affect the fish in the Hungry Horse Reservoir or in the Flathead River downstream of the confluence with the South Fork Flathead River directly through construction activities, or indirectly through hydrologic or water quality effects resulting from Project implementation. The fisheries in the reservoir and the South Fork Flathead River are described briefly and possible effects discussed.

Hungry Horse Reservoir

Hungry Horse Reservoir contains a number of native fish species. Game fish species include westslope cutthroat trout, bull trout, and mountain whitefish; while northern pikeminnow, largescale suckers, longnose sucker, and sculpins are classified as non-game fish. MFWP does not artificially stock the reservoir, and fish populations are maintained solely through natural spawning and rearing. Westslope cutthroat and bull trout are the most important game fish species. When sexually mature, these fish migrate to and spawn in the tributary streams that feed the reservoir, including the South Fork Flathead River and its tributaries. Juvenile fish typically rear in these streams for 3 years before they migrate downstream to the reservoir, where they grow to maturity. While in the reservoir, westslope cutthroat trout feed primarily on insects and zooplankton, while the larger bull trout forage mostly on other fish. The reservoir's population of westslope cutthroat trout is one of the most secure metapopulations in existence.

Changes in flood control protocols and storage prediction equations have resulted in reduced drafts of the reservoir (in quantity, frequency, and duration), requiring larger and more frequent water releases through Hungry Horse Dam during the spring refill period to restore a more natural spring runoff pattern (Marotz et al. 1996, Hansen and Evarts 2002, Reclamation 2009, Muhlfeld et al. 2011). Minimum flow requirements below the dam and at Columbia Falls on the mainstem Flathead River, along with maintaining required storage levels for flood control, require that Reclamation typically draft the reservoir through the winter and spring so that Hungry Horse reaches its minimum pool elevation typically before May 1.

South Fork Flathead River below Hungry Horse Dam

Most of the fish species that are found in the South Fork below the dam spend a portion of their life in the Flathead River and Flathead Lake. Fish species in the South Fork Flathead River that may be influenced by the Project include westslope cutthroat trout, bull trout, mountain whitefish, and lake trout.

Fish habitat conditions in the 5 miles of the South Fork below the dam have improved since 1995 with operation of the selective withdrawal system and VARQ. Releases from the dam changed from the fairly constant temperature of 39° F to 41° F to a more natural thermal regime approximating conditions in the unregulated reach of the Flathead River. Prior to selective withdrawal, MFWP (Marotz 2007) documented mostly mountain whitefish and a few trout, including non-native lake trout and brook trout, and very few bull trout and westslope cutthroat trout. Following installation of selective withdrawal, the trend observed was for increasingly higher numbers of native trout, no lake trout, very few brook trout, increasing numbers of bull trout, and very high numbers of westslope cutthroat trout. MFWP (Marotz 2015) also indicated that mountain whitefish numbers have increased since operation of the selective withdrawal system.

3.5.2 Environmental Consequences

Significance Criteria

Water quality parameters are important in support of cold-water fisheries. Fish can be affected by changes in water quality conditions. The water quality impact analysis (Section 3.4) is based on available water quality data and state water quality standards, as discussed above. This analysis examines the existing fisheries and the habitat that supports them, and then uses water quality analyses in this document to predict possible effects to fishery resources due to the proposed action, as compared to the No Action Alternative.

Alternative A – No Action

Reclamation would continue operating the generating units with the current maintenance and production schedules. Water quality conditions and the fishery in the South Fork Flathead River downstream of Hungry Horse Dam would not be expected to change as a result of the No Action Alternative until the failure of key generator components renders multiple units inoperable. At that time, the likelihood of spill events occurring at Hungry Horse would increase. Total dissolved gas generation can occur during spill events greater than 2,000 cfs

at Hungry Horse Dam. As the units fail, the ability to operate the system would also fail, resulting in increased spill at Hungry Horse Dam and increased TDG in the South Fork Flathead River below Hungry Horse Dam, potentially having a negative impact on the fishery.

Alternative B – HHPP Modernization Two Generating Units Offline for 4 Years

As discussed in the Water Quality section, current operation and maintenance schedules dictate that a single unit in the power plant is out of production at a time. Additionally, during low demand periods, as many as two units may not be operating. By completing the overhaul and uprating on a single unit at a time, Hungry Horse would continue to operate as it has in the past, with two to three units in production at a time. However, if multiple units failed during the planned modernization project, spill would be expected to increase substantially and for a longer period of time. As such, spill was modeled (see Section 3.4) under the assumption that two units would not be available during the modernization of the powerplant. As discussed in the Hydrology section, spill would be expected to increase by approximately 3,000 cfs over baseline if two units were not available. In addition, the spill period would be expected to lengthen substantially, varying by current conditions. Both of these situations mean that TDG exceedances would also increase substantially.

Supersaturation of gases in water has the potential to adversely affect fish by forming bubbles in tissues as the dissolved gases come out of solution (Weitkamp et al. 2003). MDEQ water quality standards require that waters remain below 110 percent TDG supersaturation. As noted in Section 3.4, on average, the modeled data indicate that the number of days TDG is above 110 percent would increase by 24 days. In some dry years, there may be no increase, and in some wet years, this increase would be as high as 83 additional days above 110 percent. In the current period of record, spill above 110 percent is 3.42 percent of the total record. Under the modernization scenario, spill above 110 percent increases to 11.64 percent of the period of record (see Table 3-5 above) during project implementation.

The behavior of resident fish exposed to TDG supersaturation in Pacific Northwest rivers greatly influences the degree of supersaturation these fish actually experience (PNNL 2006). Because TDG supersaturation is a physical condition that is moderated by hydrostatic pressure, the depths occupied by fish during supersaturation conditions determine the biological effects experienced by members of the exposed population. Deeper locations may provide an opportunity for fish to recover from the short-term exposure to supersaturation experienced by the fish after the periods they occupy shallower depths. Recent literature (Weitkamp 2008) indicates that TDG supersaturation results in little or no gas bubble disease (GBD) at levels up to 120 percent of saturation when compensating depths (2 m or more) are available. Research has shown that fish have the capacity to rapidly recover from GBD, within hours, when they reach compensating depths or TDG supersaturation is decreased.

The hydrology and water quality analyses previously discussed in this document indicate that conditions may occur with spill and TDG that would affect resident fish under Alternative B.

The level of impact depends on the TDG concentration and amount of time TDG levels exceed the concentrations discussed previously.

Loss of fish as a result of elevated TDG levels would not be expected to have a noticeable impact on the South Fork Flathead River fisheries because of the small amount of time (less than 1 percent) where TDG may be greater than 120 percent. In addition, fish would have the ability to move to deeper locations from below the dam to the Devils Elbow area and/or move downstream (towards or into the Flathead River), where TDG would be lower.

Alternative C – HHPP Modernization Two Generating Units Offline for 1 Year (Preferred Alternative)

Effects to fisheries would be the same as under Alternative B for the year of implementation while the transformer fire protection/powerplant windows portions of the Project are being completed and two generating units are offline. After that, effects to fisheries would be the same as under the No Action Alternative because three turbines would be operating. Operations would be the same as the No Action Alternative for 9 out of 10 years of Project implementation because hydropower turbine hydraulic capacity would be maintained and not differ from current operations. Conditions (operations for FRM, flows, etc.) that would necessitate spill would be the same for both Alternative C and the No Action Alternative and, similarly, instream temperatures would not change. Thus, effects to fisheries would be the same as the No Action Alternative for 9 years.

3.5.3 Mitigation

No mitigation is proposed. Reclamation would continue flow and temperature operations for fish.

3.5.4 Cumulative Impacts

Other future projects identified in the Hungry Horse Dam area include various communications and road maintenance activities, and these projects would likely be concurrent with the modernization work. Reclamation does not anticipate that there would be effects to fisheries from these other land-based projects and therefore, there would be no additional effects to consider cumulatively.

3.6 Federally Protected Species

3.6.1 Affected Environment

The following list of species and critical habitats protected by the Endangered Species Act (ESA) was developed by accessing listed species for Flathead County, Montana, at https://ecos.fws.gov/ecp0/reports/species-by-current-range-county?fips=30029

- Yellow-billed Cuckoo (*Coccyzus americanus*), Threatened
- Bull trout (*Salvelinus confluentus*), Threatened
- Bull trout Critical Habitat, Designated

- Spalding's catchfly (*Silene spaldingii*), Threatened
- Grizzly bear (*Ursus arctos horribilis*), Threatened
- Canada Lynx (*Lynx canadensis*), Threatened

Spalding's catchfly (herbaceous perennial plant in the pink family) and yellow-billed cuckoo are not known to occur near the Project area (powerplant, dam, staging areas, and transportation routes) and therefore were not analyzed in this EA.

Of the other species listed above, Reclamation determined this Project would not affect grizzly bear or Canada lynx, which may be transient visitors to the area. As terrestrial species that are not dependent on aquatic resources, the hydrological effects of the proposed action would have no effect on these species. As stated in Section 3.1.1 the only possible mechanism of effect to consider would be increased traffic associated with bringing material, equipment, and construction crews to the powerplant. All activity would take place in areas that are already frequently used by people, and most work would occur within the confines of the powerplant. The north side of the South Fork Flathead River has two roads that would be used to access the powerplant and the top of the dam. The Canada lynx is an elusive, forest dewelling feline that feeds primarily on snowshoe hare, and would tend to avoid areas of traffic and human activity (USFWS 2013). Grizzly bears would also not likely be found on the north side of the river, where the road is. The slight increase of traffic associated with this Project would not affect the yellow-billed cuckoo, grizzly bear, or Canada lynx. Therefore, the discussion herein of effects is limited to bull trout.

Bull Trout

Status and Distribution

The USFWS issued a final rule listing the Columbia River and Klamath River populations of bull trout as threatened species under the ESA on June 10, 1998 (USFWS 1998). This listing was reaffirmed in the most recent status review (USFWS 2008). Critical habitat for bull trout was designated September 30, 2010. However, the South Fork Flathead River downstream of Hungry Horse Dam was not designated critical habitat because it is only transitional habitat for bull trout that dip in and out of the Flathead River. The USFWS finalized the Bull Trout Recovery Plan in September 2015 (USFWS 2015), which outlines the conservation actions needed to recover bull trout populations.

Several populations of adfluvial[2] bull trout occur throughout the South Fork Flathead River drainage upstream from Hungry Horse Dam. In 1998, the status and trend of bull trout in the Hungry Horse Core Area were considered strong and stable, based on information available at the time of listing (USFWS 1998). This population is one of the largest interconnected strongholds for bull trout in the United States (USFWS 2002). Since 1998, the population has continued to remain stable and even increase, suggesting that the status and trend

[2] *Adfluvial* refers to the life history strategy in which adult fish spawn and juveniles subsequently rear in streams but migrate to lakes for feeding as subadults and adults.

determinations were accurate (USFS 2013).

In recent years, Hungry Horse Reservoir has been held at more stable levels (as opposed to drawdowns of up to 200 feet in the early 1990s), further improving connectivity with reservoir tributaries and the upstream watershed. Hungry Horse Dam is a complete barrier to all upstream and most downstream movement of bull trout. Entrainment of bull trout through the dam probably occurs at low levels, but has not been an issue, likely due to the depth and configuration of penstock withdrawal of water in relation to the reservoir depths bull trout like to hang out in.

The South Fork Flathead River below Hungry Horse Dam is dominated by native fish species, though rainbow and lake trout have been observed. As mentioned previously, fish habitat conditions in the 5 miles of the South Fork below the dam have improved since 1995, with operation of the selective withdrawal system and VARQ. Releases from the dam changed from the fairly constant temperature of 39° F to 41° F to a more natural thermal regime approximating conditions in the unregulated reach of the Flathead River. Prior to selective withdrawal, MFWP (Marotz 2007) documented mostly mountain whitefish and a few trout, including non-native lake trout and brook trout, and very few bull trout and westslope cutthroat trout. Following installation of selective withdrawal, the trend observed was for increasingly higher numbers of native trout, no lake trout, very few brook trout, increasing numbers of bull trout, and very high numbers of westslope cutthroat trout.

3.6.2 Environmental Consequences

Significance Criteria

Water quality parameters are important in support of cold-water fisheries, particularly bull trout. The water quality impact analysis (Section 3.4) is based on available water quality data and state water quality standards. This analysis examines the bull trout and the habitat that supports them, and then uses water quality analyses in this document to predict possible effects due to the proposed action as compared to the No Action Alternative.

Alternative A – No Action

Reclamation would continue operating the generating units with the current maintenance and production schedules. Water quality conditions and bull trout in the South Fork Flathead River downstream of Hungry Horse Dam would not be expected to change as a result of the No Action Alternative until the failure of key generator components renders multiple units inoperable. At that time, the likelihood of spill events occurring at Hungry Horse would increase. Increases in TDG generation can occur during spill events greater than 2,000 cfs at Hungry Horse Dam. As the units fail, the ability to operate the system would also fail, resulting in increased spill at Hungry Horse Dam and increased TDG in the South Fork Flathead River below Hungry Horse Dam.

Alternative B – HHPP Modernization Two Generating Units Offline for 4 Years

As discussed above, spill was modeled under the assumption that two units would not be available during the modernization of the powerplant. Spill would be expected to increase by

approximately 3,000 cfs if two units were not available. In addition, the spill period would be expected to lengthen substantially. Both of these situations mean that TDG exceedances would also increase substantially, potentially having a negative impact on any bull trout that are present immediately below the dam for approximately 2 river miles (to Devil's Elbow – a point in the river where natural features ameliorate TDG) during the spill event.

The behavior of resident fish exposed to TDG supersaturation in Pacific Northwest rivers greatly influences the degree of supersaturation these fish actually experience (PNNL 2006). Because TDG supersaturation is a physical condition that is moderated by hydrostatic pressure (the pressure that is exerted by a fluid at equilibrium at a given point within the fluid, due to the force of gravity), the depths occupied by fish during supersaturation conditions determine the biological effects experienced by members of the exposed population. Recent literature (Weitkamp 2008) indicates that TDG supersaturation results in little or no GBD at levels up to 120 percent of saturation when compensating depths (2 m or more) are available. River locations where water is deeper provide an opportunity for fish to avoid or recover from short-term exposure to supersaturation.

The hydrology and water quality analyses previously discussed in this document determined that bull trout (assuming they are present during the high spill event) would likely be affected by Alternative B during the 4 years of implementation while two generating units are offline if TDG levels near 120 percent. The level of impact depends on the TDG concentration and amount of time TDG levels exceed the concentrations discussed previously, which are in term dependent on the volume of water spilled. If they are low water years, there may be little to no spill and TDG may never go above 110. But if they are higher water years, spill may be substantial and TDG may be higher, depending on volume, barometric pressures, and water temperatures.

As discussed above in Sections 3.4 and 3.5, there is only a small likelihood of TDG being elevated to a level that would impact fish, including bull trout. Impacts at the bull trout population level due to loss of individual bull trout as a result of elevated TDG levels are not expected. The time that TDG would be at or above 120 is predicted to be infrequent (less than 1 percent of all the modeled time) and would not be expected to have a noticeable impact on the population. In addition, bull trout would have the ability to move to deeper locations from below the dam to the Devils Elbow area and/or move downstream (toward or into the Flathead River), where TDG would be lower.

Alternative C – HHPP Modernization Two Generating Units Offline for 1 Year (Preferred Alternative)

Effects to bull trout under Alternative C would be the same as under Alternative B for the year of implementation while the transformer fire protection/powerplant windows portions of the project are being completed and two generating units are offline. After that, effects to bull trout would be the same as under the No Action Alternative because three turbines would be operating. Operations would be the same as the No Action Alternative for 9 out of 10 years of Project implementation because hydropower turbine hydraulic capacity would be

maintained and not differ from current operations. Conditions (operations for FRM, flows, etc.) that would necessitate spill would be the same for both Alternative C and the No Action Alternative and, similarly, in-stream temperatures would not change.

3.6.3 Mitigation

No mitigation is proposed. Reclamation would continue flow and temperature operations for fish.

3.6.4 Cumulative Impacts

Other future projects identified in the Hungry Horse Dam area include various communications and road maintenance activities, and these projects would likely be concurrent with the modernization work. Reclamation does not anticipate that there would be effects to bull trout from these land-based projects, so therefore there would be no cumulative effects to consider.

3.7 Power

3.7.1 Affected Environment

The Hungry Horse Powerplant originally included four 71.25 MW generators (a total of 285 MW installed capacity). Reclamation uprated the generators to 107 MW each in the 1990s, which increased the installed capacity from 285 MW to 428 MW. Each of the four generating units discharge flow to the South Fork Flathead River and has a hydraulic capacity of 3,000 cfs (when the reservoir is at full pool, or 3,560 feet). The total hydraulic capacity of the project is around 12,000 cfs if all units are online and there are no transmission restrictions.

However, since the 2009 closing of the aluminum plant in Columbia Falls, transmission is restricted to 310 MW, which equates to a flow of around 9,000 cfs. The amount of electricity generated at Hungry Horse and the hydraulic capacity of the power project at any given time during the year is directly affected by the reservoir elevation, transmission limitation, operational constraints, regional load or demand for electricity, river flows, maintenance, and overall FCRPS obligations for balancing power generation. Coordination with the Corps and BPA occurs throughout the year to manage the power needs of the region.

Transmission restrictions in the Flathead Valley associated with the shutdown of the Columbia Falls aluminum plant have increased the frequency of spill from Hungry Horse Dam. With current transmission restrictions limited to 310 MW, or 9,000 cfs discharge through the powerplant, during FRM operations or unplanned outages, the discharge at times may exceed the powerplant capacity. When flows exceed the powerplant capacity, the discharges require spill through the hollow-jet valves or the ring-gate outlet.

Although Reclamation can generate up to 310 MW of electricity, maximum generation typically only occurs during FRM operations, between February and June. The remainder of the year, Reclamation normally produces less than 210 MW.

3.7.2 Environmental Consequences

Significance Criteria

The purpose of this discussion is to describe the level of impact the various alternatives have on power production at Hungry Horse and to compare the alternatives. The level of impact would be significant, for the purposes of this analysis, if the alternative resulted in Reclamation's inability to provide 50 percent or more than the current power generation in any given year of implementation.

Alternative A – No Action

Reclamation would continue operating the generating units with the current maintenance and production schedules. The benefit of providing power generation at Hungry Horse would continue until failure of key generator components renders multiple units inoperable. At that time, depending on the extent of the outage or if more than one generating unit is affected, hydropower generation would be reduced. Demand for electricity would be met within the FCRPS system (Druliner 2017). Due to the way the system is operated, and in close coordination with BPA, the loss of production would not result in any noticeable effects to power within the larger system. Likewise, there would be no impact or loss of electricity to the regional users.

Alternative B – HHPP Modernization Two Generating Units Offline for 4 Years

Alternative B would make the facility more reliable for its authorized purposes. During implementation, when two generating units would be offline (for 4 years, approximately 2021 through 2024), power production would be limited to approximately 214 MW, down from a maximum of 310 MW. Power production at Hungry Horse is not demand-driven; rather, it is a product of FRM operations. Power production is considered a benefit associated with FRM. Close coordination with BPA includes informing the agency of how much generation is available daily, and that information is used within the larger system to meet electricity demand in the FCRPS. Because the system is highly interconnected and coordinated, any reductions in the ability to produce electricity is made up elsewhere in the system (Druliner 2017).

Alternative C – HHPP Modernization Two Generating Units Offline for 1 Year (Preferred Alternative)

Under Alternative C, there would only be one year during implementation in which two hydropower generating units would be offline. During that year, power production would be limited to approximately 214 MW. For the remaining implementation years, the impacts would be similar to the No Action Alternative because there would be three hydropower generating units available.

3.7.3 Mitigation

No mitigation is proposed.

3.7.4 Cumulative Impacts

Other future projects identified in the Hungry Horse Dam area include various communications and road maintenance activities, and these projects would likely be concurrent with the modernization work. Reclamation does not anticipate that there would be cumulative effects to power generation when all of these projects are considered together along with past construction activites.

3.8 Recreation

3.8.1 Affected Environment

South Fork Flathead River

Due to the nature of the proposed activities, the affected environment is limited to the area immediately surrounding the dam and the portion of the South Fork Flathead River that flows between the dam and the mainstem of the Flathead River. Downstream from the reservoir, river access becomes difficult due to steep banks and swift currents. Here, the river is dominated by native fish species; however, rainbow and lake trout have been observed in this location (USFS 2016). The targeting of bull trout is not permitted below the dam on the South Fork Flathead River, and there is no fishing allowed just below the dam to the Devils Elbow (MFWP 2017). However, the river reach from Devils Elbow to the confluence of the mainstem is a popular local fishing area. Special regulations for this reach include catch-and-release only for cutthroat trout, with an extended season for whitefish and trout with artificial lures and/or maggots.

No creel surveys have been conducted on the South Fork of the Flathead River below the reservoir. However, angling pressure (the number of people fishing in an area) would be simliar to the average use provided by the self-reporting creel surveys conducted on the upper reach of the South Fork Flathead River, given known estimates of commercial use on both reaches. The surveys were conducted every 2 years between 2005 and 2013 and show an average of 12,019 angler days, with residents comprising approximately 75 percent of the total use (MFWP 2015). The year with the lowest angler pressure was 2011, with 9,195 angler days. Commerical angling pressure for the 2013 season was estimated at 768 anglers days for the upper reach, slightly lower than 920 angler days estimated on the river below the reservoir (MFWP 2017). All commercial trips are regulated and administered by the U.S. Forest Service (USFS).

Hungry Horse Reservoir

Hungry Horse Reservoir is 35 miles long and covers 23,782 acres at full pool. Boating, fishing, and water sports are popular pasttimes on the reservoir. In recent years, due to implementation of VARQ, the reservoir has been held at more stable levels (as opposed to drawdowns of up to 200 feet in the early 1990s), further improving connectivity with reservoir tributaries and the upstream watershed and thus improving the reservoir fishery. However, the State of Montana continues to express concern over the effect of water level

fluctuation on native fish and recreation (USFS 2013). Available targeted fish species in the reservoir include cutthroat trout, bull trout, and whitefish. The recreational bull trout fishery on Hungry Horse Reservoir has continued since 2004 and is being closely monitored (Hensler and Benson 2007; Rosenthal and Hensler 2008; Rosenthal 2009, 2010). Limited harvesting of bull trout is permitted within the reservoir from the third Saturday in May until August 15. Angler catch and harvest of bull trout from Hungry Horse Reservoir has been estimated as follows in Table 3-6.

Table 3-6. Angler catch and harvest of bull trout from Hungry Horse Reservoir

Season	Total Bull Trout Catch	Bull Trout Number Harvested
2004-05	355	48
2005-06	2,154	58
2006-07	623	56
2007-08	533	57
2008-09	621	74
2009-10	832	97

In addition, anglers may participate in the catch-and-release fishery authorized in the upper end of the reservoir and in the South Fork Flathead River into the Bob Marshall Wilderness. Due to their special status, the season is limited for bull trout, a special permit is required, and the angler must have a catch card in possession while targeting this species (MFWP 2017). The fishery is closely monitored and is not assumed to be a high threat due to the ability to adjust regulations quickly if needed (see the Fisheries and Federally Protected Species Sections for more information).

The area immediately surrounding the reservoir is categorized by the USFS as providing roaded natural recreational opportunities. The USFS is recommending that this area become a focused recreation area in the Flathead Forest Revision Plan (USFS 2016). Recreation amenities surrounding the reservoir include eight boat launches, 16 developed campgrounds and four day-use areas. Popular campgrounds include Abbott Bay, Murray Bay, and Lost Johnny Point, all of which meet universal accessibility standards, are attended by a campground host, and provide potable water. Overnight camp fees range from $11.00 to $24.00 per night depending, on the amenities provided. Dispersed camping and recreational opportunities are also available, and five individual campsites can be reserved through the USFS (USFS 2015). Day passes for day-use areas are currently priced at $3.00 and $5.00 per day. Summer recreation activities near the reservoir include camping, bank fishing, and hiking. Snowmobiling is a popular winter sport and is permitted on designated trails surrounding the reservoir.

Reclamation opened the Hungry Horse Powerplant to visitors in 1953. An estimated 150,000 people visited the dam in 1954, and more than 47,000 of those took the guided tour through the dam. Today, guided tours are no longer available, but the visitor center is still open to the public. In 2015, 17,006 visitors toured the center.

3.8.2 Environmental Consequences

Significance Criteria

Direct impacts are derived from displacement of the recreating public or disturbances resulting from construction activities that affect the quality or the recreational experience.

Direct impacts:

- Minimal impacts include short-term displacement (less than 1 year) without similar opportunities in the vicinity, or displacement up to 5 years when similar opportunities are available. Minimal impacts also include minor or localized disturbances resulting from noise or other activities.
- Moderate impacts include displacement (1 to 5 years) when no other similar opportunities are available within the local area. Moderate impacts can include disturbances that disrupt the quality of recreational experiences on a short-term basis.
- Significant impacts include loss of a recreational opportunity, a change in recreational setting, or long-term displacement of the recreating public.

Indirect Impacts:

- Minimal impacts are seen when there is a short-term (less than 1 year) loss of fishing quality resulting from changes in fish populations.
- A moderate impact occurs when changes in fish populations result in a substantial reduction of the total number of angler days (below the 5-year average) for 1 or more years.

A significant impact occurs when changes in fish populations result in a change in regulations that reduces the allowable harvest of game species or prohibits the targeting of bull trout.

Alternative A – No Action Alternative

Current operations would continue and long-term maintenance needs would be deferred. The likelihood of equipment outages would increase over time as the infrastructure ages and replacement parts become more difficult to locate or otherwise refurbish. If these equipment outages affect the ability to perform selective withdrawals or dramatically increase spills, the fishery downstream of the dam could be affected.

Because recreational opportunities surrounding the reservoir and in the lower reach of the South Fork are directly related to the quality of the fisheries, long-term impacts may occur. The level of impact would range between minimal and significant depending on the type and duration of equipment outages. Significant impact would be seen if fishing regulations were changed for game species as a result of impacts to local fish populations below the dam in the South Fork of the Flathead.

Alternative B – HHPP Modernization Two Generating Units Offline for 4 Years

Disruptions to recreational activities would be localized to the area immediately surrounding the dam, with minor displacement of recreationists on the upper staging areas for short periods of time. Minor impacts to traffic would occur during removal or replacement of the gantry crane, fixed wheel gate overhaul, and selective withdrawal overhaul. Snowmobile enthusiasts that use the upper staging areas would not be affected, as staging areas would remain available during the winter months. Members of the public hoping to see the visitor center would experience minor disruption due to construction noise and traffic congestion during periods of high activity. This would result in a minor effect to the overall quality of the experience and may displace some visitors for short periods of time.

There would be a higher risk of TDG exceeding state limits due to the probability of increased spills. This may result in minimal impacts to fish populations within a 3-mile stretch of river below the dam. This impact is expected to be localized and short-term, as TDG would dissipate quickly, and fish would be able to recover. The resulting indirect effect to recreationalists would be minor, as it would be unlikely to affect the total number of angler days or result in changes to the existing fishing regulations.

Alternative C – HHPP Modernization Two Generating Units Offline for 1 Year (Preferred Alternative)

Impacts would be the same as those described for Alternative B.

3.8.3 Mitigation

No mitigation is proposed.

3.8.4 Cumulative Impacts

Other future projects identified in the Hungry Horse Dam area include various communications and road maintenance activities, and these projects would likely be concurrent with the modernization work. This may result in minor disruptions to recreationists if they are using the road crossing the dam due to traffic delays, but combined with other past activities, these cumulative effects would not be significant because delays would be short in duration and temporary.

3.9 Visual Resources

3.9.1 Affected Environment

The geographical area surrounding Hungry Horse Reservoir lies within the South Fork Flathead River subbasin. This subbasin was classified as having a high ecological integrity, although the lower end, where the Hungry Horse Dam is located, is marked by evidence of past and current management activities. The area of potential impact is limited to a 5-mile viewshed surrounding Hungry Horse Dam, including a small reach of South Fork Flathead River downstream of the dam. Outside the 5-mile foreground and midground view, the high absorption capacity of the surrounding landscapes significantly reduces the visual contrast

created by the dam.

The high visual quality is derived from the natural landscapes, ecological integrity, and varied topographical features. The natural landscapes dominate the view, and major modifications such as the dam, its ancillary facilities, and the town of Hungry Horse are easily screened from the majority of key observation points along the main access roads. When the dam comes into view, its massive presence dominates the natural landscape. Hard vertical and horizontal lines contrast sharply with the opposing and sloping lines of the canyon. Light-colored concrete sets among the darker vegetation, accentuating this dramatic view.

The majority of observers are dam personnel and recreational visitors to the area. Recreation facilities such as boat ramps and campgrounds are typically located in open spaces adjacent to the reservoir and are only seen for brief periods of time from the water or when entering an individual site. Because of the location, relative elevation of the dam, and the sinuosity of the reservoir, views from these key observations points are limited. Downstream of the dam, the canyon narrows and access is difficult. The South Fork of the Flathead River winds through this enclosed landscape, with its thick vegetation and restricted views. From here, the dam is generally screened from view. Viewshed analysis shows that the dam can generally can be seen for approximately 1 mile along the main access road, in the immediate foreground of the dam, and at limited locations on the reservoir and surrounding hillsides with higher elevations.

Visual Quality objectives set in the 1986 Flathead Forest Plan (USFS 1986) for portions of the area near the reservoir allow for maximum modification, with areas near the dam allowing a lesser degree of modification from the natural landscape. Visual Quality objectives along the South Fork of the Flathead River below the dam aim to retain the character of the natural landscape. The USFS is currently in the planning process for the Flathead Forest Plan Revision and has defined a series of alternatives based on Scenic Integrity objectives. Class objectives are as follows:

- Very High Integrity: the valued scenery appears natural or unaltered. Only minute visual disturbances to the valued scenery, if any, are present
- High Integrity: the valued scenery appears natural or unaltered, yet visual disturbances are present; however, they remain unnoticed because they repeat the form, line, color, texture, pattern and scale of the valued scenery
- Moderate Integrity: the valued scenery appears slightly altered. Noticeable disturbances are minor and visually subordinate to the valued scenery because they repeat its form, line, color, texture, pattern and scale.
- Low Integrity: the valued scenery appears moderately altered. Visual disturbances are co-dominant with the valued scenery, and may create a focal point of moderate contrast. Disturbances may reflect, introduce, or borrow valued scenery attributes from outside the landscape being viewed.

Alternatives in the Draft Forest Plan revision (USFS 2016b) for the areas surrounding the reservoir include both moderate and low Scenic Integrity objectives, and include high Scenic Integrity objectives for the area immediately below the dam. To be consistent with the Forest's Scenic Integrity objectives, deviations that are visible in some areas of the forest should generally be subordinate to the surrounding natural landscape and diminish over time. The maximum degree of deviation from current conditions should still be within the desired Scenic Integrity objectives (USFS 2016).

3.9.2 Environmental Consequences

Significance Criteria

Direct Impacts:

- Negligible impacts result from visual intrusions that have a minor contrast with the existing landscape. Visual intrusions are generally screened from view and/or blend into the background. These visual intrusions mirror the basic elements of line, form, color, texture, and scale; do not draw the attention of casual observers; and meet the Scenic Integrity objectives for the area.
- Moderate impacts result from visual intrusions that create a moderate contrast with the existing landscape. These visual intrusions may draw the attention of the casual observer but do not dominate the view. Viewshed modifications adhere to Scenic Integrity objectives.
- Significant impacts include major modifications with a high degree of visual contrast. They distract from the existing landscape and often dominate the view. Visual intrusions that do not adhere to Scenic Integrity objectives are also included in this category.

Alternative A – No Action Alternative

There would be no impact to visual quality as a result of the No Action alternative.

Alternative B – HHPP Modernization Two Generating Units Offline for 4 Years

Sound and movement tend to attract attention; therefore, while the work is being done, the activities would draw the attention of the casual observers located at key observation points along the main road and when crossing the dam. This impact would be negligible and would diminish as the individual project components are completed. Although there would be substantial replacements involved with the proposed activities, the replacements would duplicate the existing equipment and therefore would retain the basic design elements such as line, form, color, texture, and scale of the existing facilities. The activities in Alternative B would conform to the Scenic Quality objectives, deviations would be subordinate to the surrounding landscape, and the historic appearance of the Hungry Horse Dam would be maintained.

Alternative C – HHPP Modernization Two Generating Units Offline for 1 Year (Preferred Alternative)

Effects to Visual Resources would be the same as under Alternative B.

3.9.3 Mitigation

No mitigation is proposed.

3.9.4 Cumulative Impacts

Other future projects identified in the Hungry Horse Dam area include various communications and road maintenance activities, and these projects would likely be concurrent with the modernization work. As described under Alternative B, work on the dam may draw attention of the casual observers, but the project combined with other past and present construction activities cumulatively would still be negligible and temporary, diminishing as the projects are completed.

3.10 Climate Change

A region's climate is affected by latitude, terrain, and altitude, as well as nearby water bodies and their currents. Human activities have the potential to affect climate change, which in turn has the potential to affect areas through both direct and indirect effects. Since future climatological phenomena cannot be predicted, climate change effects are estimated based on projections.

In the *Columbia River Basin Climate Impact Assessment* (Reclamation 2016), a reconnaissance-level assessment of potential hydrologic impacts of climate change in the basin projected that impacts would be most pronounced in transitional Columbia River subbasins where the dominant form of precipitation is a mix of both rain and snow. The effects may include potential increases or decreases in the magnitude and duration of flow events, alter the timing of snowmelt, and affect the precipitation patterns (e.g., shift from snowfall toward rainfall). This, in turn, could indirectly affect soil erosion rates due to more or less precipitation. However, consideration of elevation, aspect, geology, vegetation, and changing land use must be taken into account, as well (Melillo et al. 2014).

3.10.1 Affected Environment

Hungry Horse Dam and Reservoir are located on the South Fork Flathead River, a tributary of the Clark Fork, and part of the larger Pend Oreille River drainage, which ultimately flows to the Columbia River. They are part of the greater Upper Columbia River Basin. The Columbia River is the largest river in the Pacific Northwest at more than 1,240 miles long, and with a drainage area of roughly 260,000 square miles, 15 percent of which is within Canada. Hungry Horse is one of many dams in the FCRPS (Figure 3-9).

Figure 3-9. Map illustrating Columbia River Power System (source: http://nowater-nolife.org/watersheds/columbia/map.html)

3.10.2 Environmental Consequences

Alternative A – No Action Alternative

Under the No Action alternative, modernization activities would not occur. Instead, generating units would be taken offline and repaired/replaced as problems arise. The Hungry Horse Dam and powerplant would continue operating under existing constraints and at the existing generation capacity until parts of the system could no longer function safely. Due to decreased efficiency and to periods when power production is reduced or offline for unplanned maintenance, additional energy sources (most likely from hydroelectric, wind,

solar, or natural sources) may be necessary, but it would depend on the demand at the time (Druliner 2017).

In the long term (more than 10 years), implementation of the No Action alternative could potentially have no to very small effect on climate change. Any impacts to climate change from implementation of the No Action alternative are anticipated to be unmeasurable to negligible.

Alternative B – HHPP Modernization Two Generating Units Offline for 4 Years

Alternative B would temporarily increase emissions from construction equipment. The proposed project would require heavy equipment operations that would emit exhaust that partially contributes to climate change. These emissions would not be expected to have a significant impact on this resource in the short or long term because over the span of geologic time, the minor amount of vehicle/equipment emissions that would occur over a fairly short amount of time (i.e., about 10 years for construction) in this isolated area is considered insignificant. Implementation of the modernization project would ensure reliable availability of a power supply for at least the next 30 years. Under Alternative B, there would be no discernible direct, indirect, short-term or long-term adverse impacts to climate change from the modernization project implementation.

Alternative C – HHPP Modernization Two Generating Units Offline for 1 Year (Preferred Alternative)

Under Alternative C, there would be no discernible direct, indirect, short-term or long-term adverse impacts to climate change or from climate change. Differences between Alternative B and Alternative C are the extended project duration of 2 years, which would have insignificant or unmeasurable impacts on climate change in the immediate area or region.

3.10.3 Mitigation

Mitigation measures for all alternatives would be the same as those to protect air quality. Best management practices would be implemented to maintain construction equipment exhaust emission controls and to ensure compliance with all applicable Federal and State emission standards.

3.10.4 Cumulative Impacts

The past, present, and foreseeable future impacts, when added to the impacts of this project from climate change, are difficult to project. Using the best available information (Reclamation 2016) for the Upper Columbia River Basin and given the location of this rather isolated area and minor project scale, none of the alternative actions would produce any measurable or significant effect on the occurrence and/or intensity of climate change or contribute to the effects of climate change. It would not contribute to measurably more intense or serious effects of climate change on a local, regional, or global level.

3.11 Cultural Resources

This section addresses the affected environment and environmental consequences of the Project on cultural resources. The Project has been reviewed following the procedures outlined in 36 CFR 800 implementing Section 106 of the National Historic Preservation Act (NHPA), which encourages close coordination with NEPA and requires Federal agencies to take into account the effects of their actions on properties listed or eligible for listing on the National Register of Historic Places (NRHP). The Finding of Effect report for Reclamation's Section 106 analysis is included in Appendix B of this EA.

As part of the Section 106 consultation process, Reclamation consulted with the Montana SHPO and Tribal Historic Preservation Officer (THPO) for the Confederated Salish and Kootenai Tribes (CSKT) regarding the project area of potential effects (APE). Copies of this correspondence are included in Appendix B. Letters from Montana SHPO and CSKT THPO concurring with the findings of the Section 106 analysis are also included.

Reclamation, as the lead Federal agency, has provided opportunities to comment on impacts the Project may have on cultural resources to the Montana SHPO, Native American tribes, and other interested parties.

Avoidance of cultural resources through project design remains the preferred method for reducing the intensity of impacts on cultural resources. Throughout the planning process, Reclamation has sought to avoid cultural resource impacts and implement best management practices, including thorough consultation under NHPA Section 106 and continuation of Native American consultation.

3.11.1 Affected Environment

Reclamation has identified resources at the Hungry Horse Dam and Powerplant complex as historic properties eligible for the NRHP that could be impacted by the Project. To be eligible for inclusion in the NRHP, a property must meet the requirements of at least one of the four primary NRHP criteria:

A. That are associated with events that have made a significant contribution to the broad patterns of our history; or

B. That are associated with the lives of persons significant in our past; or

C. That embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or

D. That have yielded, or may be likely to yield, information important in prehistory or history.

Hungry Horse Dam and Powerplant meets the requirements of Criteria A and C and retains historic integrity. The complex was determined eligible for the NRHP by agreement between

Reclamation and the Montana SHPO in 2005. Under these criteria, the complex is significant for its association with the creation of the larger Columbia River power system and its effects on the industrial and social history of northwestern Montana; the complex also has significance for exemplifying the development of modern concrete construction methods during the mid-20th century.

Complete analysis of the characteristics that make Hungry Horse eligible for the NRHP can be found in the Finding of Effect report for Reclamation's Section 106 analysis included in Appendix B of this EA.

Archeological

For the analysis of impacts to archeological resources, the affected environment included the areas of the Hungry Horse complex in the project APE that could be impacted by staging of construction materials and equipment.

Reclamation has reviewed construction records on file at the Grand Coulee Power Office and Hungry Horse Field Office to determine the extent of previous disturbance in the area of direct physical effects. During the construction of the dam and powerplant, the site underwent massive disturbance due to excavation and aggregate production. As a result, no archeological resources remain in these areas. Recent projects have included portions of the secondary staging area, confirming the absence of resources. The project will, therefore, cause no impacts to archeological resources.

Traditional Cultural Properties

No Traditional Cultural Properties that would be impacted by the Project have been identified during past projects or ongoing consultations with the Confederated Salish and Kootenai Tribes.

Historic Buildings and Structures

The affected environment for analysis of impacts to the historic built environment is considered to be the interiors and exterior façades of the Hungry Horse Dam and Powerplant, including the valve house and the exterior transformer deck and cranes.

The Hungry Horse Project Historic American Engineering Record document (Roise 2016) has served as the primary reference point for identification and analysis of historic structures impacted by the Hungry Horse modernization effort. Extensive archival documentation related to the original construction of the complex was used as reference for assessing the impacts of this project on historic structures. Reclamation cultural resources professionals have investigated official reports, newspaper accounts, secondary sources, historic photos, and conducted site visits on several occasions.

3.11.2 Environmental Consequences

Significance Criteria

Historic properties were analyzed under both NEPA and NHPA for how the project might

affect them. NEPA analysis refers to project impacts, and the NHPA analysis refers to project effects.

Under NEPA, direct impacts to historic properties are those that are caused by the action and occur at the same time and place. They are not limited to physical impacts to the property; they can also include impacts to the setting. The context and intensity of impacts must be considered. The intensity of an impact refers to the degree to which the action may impact or cause loss or destruction to significant cultural resources and may be categorized as Minor, Not Significant, or Significant. Indirect impacts are caused by the action and are later in time or farther removed in distance but still are reasonably foreseeable, such as changes in land use patterns and related effects on air quality. Cumulative impacts result from the proposed action's incremental impact when added to those of other past, present, and reasonably foreseeable future actions, regardless of what agency (Federal or non-Federal) or person undertakes such other actions.

Direct impacts to archaeological resources normally result from ground-disturbing activities such as construction, staging, or laydown associated with upgrading the generating units. As previously stated, there are no expected ground disturbances in areas that were not previously disturbed during dam construction and archaeological resrouces will not be impacted as a result. Although changes in reservoir level during repair of the generating units could constitute a direct effect on reservoir shoreline sites, this fluctuation will not be in excess of what occurs during normal operation of the dam, and so cannot be considered an impact separate from routine operating procedures.

Indirect impacts to archaeological sites were not identified.

Alternative A – No Action Alternative

Archaeological

Alternative A, the No Action alternative, would have no adverse effect and no significant impact to NRHP-eligible archaeological resources.

Buildings and Structures

Alternative A, the No Action alternative, would have no adverse effect and no significant impact to historic properties. If no action occurred, Reclamation would find it progressively more difficult and expensive to maintain the equipment identified for replacement under Alternatives B and C.

Alternative B – HHPP Modernization Two Generating Units Offline for 4 Years

Archaeological

Alternative B, carrying out the modernization project, would have no effect and no impact to NRHP-eligible archaeological resources. No NRHP-eligible archaeological resources were identified within the project APE.

Buildings and Structures

In the analysis of the Hungry Horse Dam and Powerplant modernization effects under Section 106 of the National Historic Preservation Act, Reclamation determined that the work proposed in Alternative B would have an adverse effect on some of the qualities that make the complex eligible for the National Register of Historic Places through the replacement of historic cranes throughout the project. The other modernization project components have been determined to have no adverse effect, as shown in Table 3-7.

Carrying the Section 106 analysis of effects into analysis of impact for this environmental assessment, Reclamation has reached the determination that the adverse effects of the modernization project will generally constitute low-intensity impacts that do not rise to the level of a significant impact on the analyzed environment. Mitigation of the single project component determined to have an adverse effect under NHPA will result in no significant impact for the Project as a whole.

Table 3-7. Summary of NHPA Section 106 Findings

Action	Effect
Main Unit Transformer Fire Protection	No Adverse Effect
Powerplant Window Replacement	No Adverse Effect
Switchyard / Powerplant Disconnect Switch Automation	No Adverse Effect
Crane Replacement	Adverse Effect
Governor and Exciter Replacement	No Adverse Effect
Fixed Wheel Gate Overhaul	No Adverse Effect
Elevator Repair and Rehabilitation	No Adverse Effect
Turbine Replacement	No Adverse Effect
Generator Rewind	No Adverse Effect
Selective Withdrawal System Overhaul	No Adverse Effect
Penstock Recoating	No Adverse Effect

Action	Effect
Spillway Refurbishment	No Adverse Effect
Powerplant and Valve House Door Rehabilitation	No Adverse Effect
Hollow Jet Valve / Outlet Tube Overhaul	No Adverse Effect

Alternative C – HHPP Modernization Two Generating Units Offline for 1 Year (Preferred Alternative)

Archaeological

Alternative C would have no effect and no impact to NRHP-eligible archaeological resources. No NRHP eligible archaeological resources were identified within the project APE.

Buildings and Structures

The impacts to historic properties under Alternative C would be the same as Alternative B impacts.

3.11.3 Mitigation

Alternative A – No Action Alternative

If the No Action Alternative were implemented, no mitigation would be necessary. To complete consultation under Section 106 of the NHPA, Reclamation would need to notify the THPO, Montana SHPO, and the ACHP if Reclamation decided not to proceed with the Project.

Alternatives B and C

To resolve the NHPA adverse effect of Alternatives B or C, a memorandum of agreement (MOA) would be prepared in consultation with Montana SHPO and the CSKT THPO to stipulate measures to minimize or mitigate the effects to the NRHP-eligible Hungry Horse Dam and Powerplant. The ACHP would be notified of the adverse effect and invited to participate in development of the MOA. The low intensity of impacts caused by most of the modernization sub-project would require no mitigation. Resolution of the adverse effect of crane replacement under the MOA found in Appendix D would result in no significant impact under NEPA.

3.11.4 Cumulative Impacts

Alternative A – No Action Alternative

There would be no impacts to cultural resources under the No Action alternative, so there would be no contribution to cumulative effects to cultural resources under Alternative A.

Alternatives B and C

Because of the adverse effect resulting from replacement of the historic cranes at Hungry Horse, the build alternatives would contribute to cumulative impacts to cultural resources.

3.12 Indian Trust Assets

3.12.1 Affected Environment

Indian Trust Assets (ITAs) are legal interests in property held in trust by the United States for Federally recognized Indian Tribes or individual Indians. ITAs may include land, minerals, Federally reserved hunting and fishing rights, Federally reserved water rights, and instream flows associated with trust land. The General Allotment Act of 1887 allotted land to some Tribes, while others were allotted land through treaty or specific legislation until 1934 when further allotments were prohibited. These allotments are considered ITAs.

As stated in the 1994 memorandum, "Government-to-Government Relations with Native American Tribal Governments," Reclamation is responsible for the assessment of project effects on Tribal trust resources and Federally recognized Tribal governments. Reclamation is tasked to actively engage and consult Federally recognized Tribal governments on a government-to-government level when its actions affect ITAs.

The U.S. Department of the Interior Departmental Manual Part 512.2 delegates the responsibility for ensuring protection of ITAs to the heads of bureaus and offices (Department of the Interior 1995). The Department is required to "protect and preserve ITAs from loss, damage, unlawful alienation, waste, and depletion" (Department of the Interior 2000). Reclamation is responsible for determining if a proposed project has a potential to affect ITAs.

Federally recognized Indian Tribes with trust land are beneficiaries of the Indian trust relationship, with the U.S. government acting as trustee. No one can sell, lease, or otherwise encumber ITAs without approval of the U.S. government. While the majority of ITAs are located on-reservation, ITAs can also occur outside reservation boundaries. Consequently, the Confederated Salish and Kootenai Tribes (CSKT) have a historical presence and cultural interest in the larger project area.

3.12.2 Environmental Consequences

Alternatives A, B, and C

No ITAs have been identified in the project area. None of the alternatives would impact ITAs since project impacts are limited to Hungry Horse Dam and surrounding project areas. Additionally, none of the alternatives impact operation of the reserve.

3.12.3 Mitigation

No mitigation is proposed.

3.12.4 Cumulative Impacts

No cumulative impacts were identified.

3.13 Indian Sacred Sites

Executive Order 13007, signed by President Clinton on May 24, 1996, defines a sacred site as:

> *Any specific, discrete, narrowly delineated location on Federal land that is identified by an Indian tribe, or Indian individual determined to be an appropriately authoritative representative of an Indian religion, as sacred by virtue of its established religious significance to, or ceremonial use by, an Indian religion; provided that the tribe or appropriately authoritative representative of an Indian religion has informed the agency of the existence of such a site [E.O. 13007, Section 1 (b) (iii)].*

3.13.1 Affected Environment

The Hungry Horse Dam sits within the traditional territory of the CSKT. In 1855, the CSKT ceded the lands around Hungry Horse Reservoir to the Flathead National Forest. The CSKT retain cultural and historical ties to those lands and also have reserved rights under their treaty to hunt, fish, and gather from unoccupied Federal lands.

To date, the CSKT have not specifically identified any sacred sites within the immediate vicinity of the proposed project area. A number of locations with traditional place names and traditional cultural value are present in the general area of Hungry Horse Reservoir, but the CSKT have not specifically identified these sites as having established religious significance or ceremonial use, nor are they part of the affected environment of the current powerplant modernization.

Tribal Consultation and Coordination

The CSKT THPO was contacted for this project as part of the NHPA Section 106 consultation process and also as part of the early communications for this EA. The acting CSKT THPO concurred with an initial level of effort and APE for the project that did not include archaeological or traditional cultural properties/Indian sacred sites research due to the level of impacts caused by original dam construction. The THPO concurred with Reclamation's NHPA finding of no archaeological sites or traditional cultural properties/Indian sacred sites affected by the proposed undertaking. The THPO also concurred with the recommendation that the Hungry Horse Modernization project move forward with the determination of adverse effect on historic properties and agreed to be signatory to a Memorandum of Agreement to mitigate the defined adverse effects.

The Chair of the CSKT was sent a scoping letter (Appendix A) to inform the tribes and solicit comments relative to the proposed modernization. The CSKT chair did not respond to the scoping letter.

3.13.2 Environmental Consequences

Significance Criteria

Any alternative adversely affecting Indian sacred sites would be considered a significant impact.

Alternative A – No Action Alternative

There are no impacts to Indian sacred sites from Alternative A because there would be no action.

Alternative B – HHPP Modernization Two Generating Units Offline for 4 Years

Based upon the review of existing information and consultations with the CSKT THPO, implementation of Alternative B would not result in direct or indirect impacts to sacred sites.

Alternative C – HHPP Modernization Two Generating Units Offline for 1 Year (Preferred Alternative)

Based upon the review of existing information and consultations with the CSKT THPO, implementation of Alternative C would not result in direct or indirect impacts to sacred sites.

3.13.3 Mitigation

Because there are no impacts to Indian Sacred Sites under any alternative, no mitigation is proposed.

3.13.4 Cumulative Impacts

There are no impacts from implementation of the alternatives. Therefore, there are no cumulative impacts when considered with the other past, present, or reasonably forseeable future actions.

3.14 Transportation

3.14.1 Affected Environment

As noted in Figure 3-10, the affected environment for impacts to trasportation from this project includes:

- Colorado Boulevard/River Road extending from Highway 2 to the project area
- NF-895/Hungry Horse Dam Road extending from Highway 2 to the project area

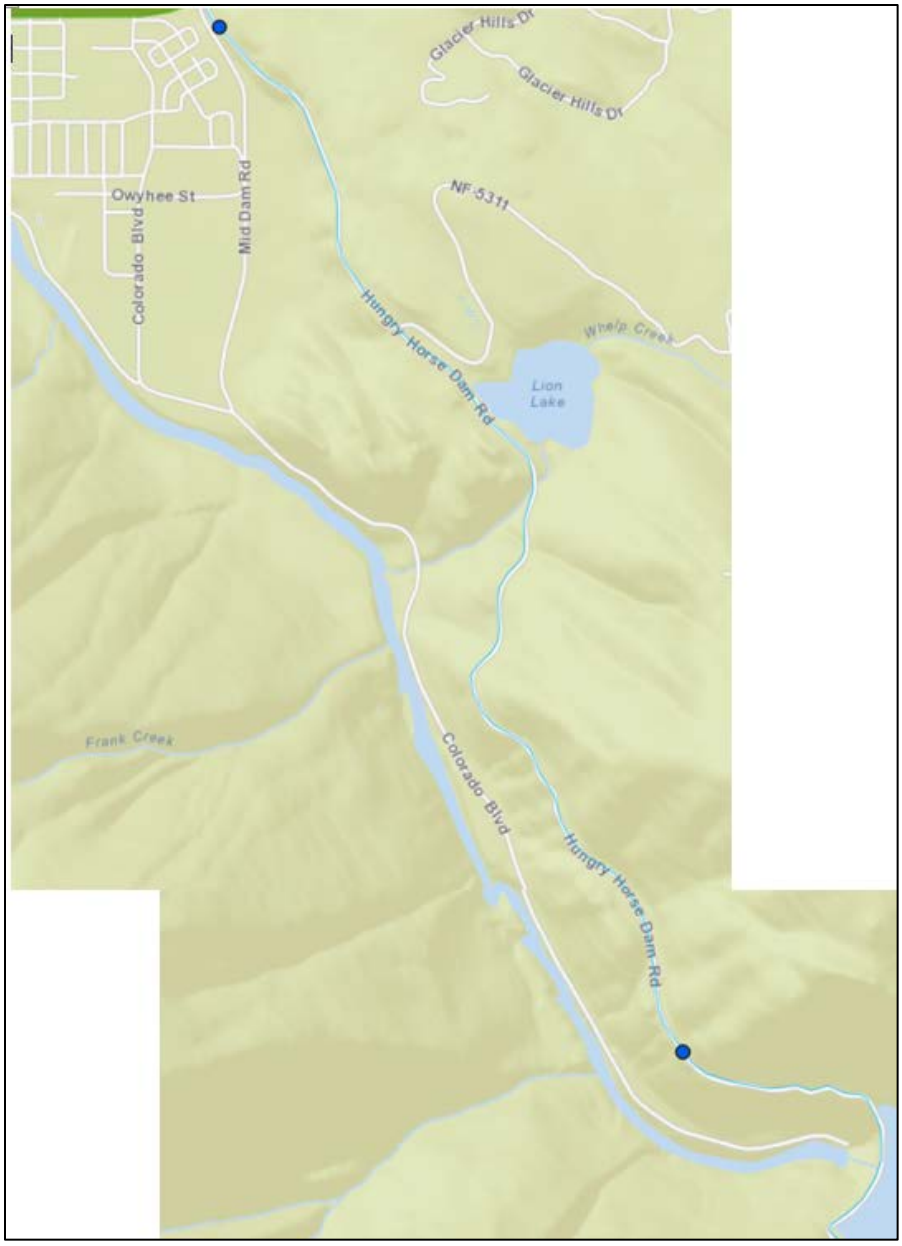

Figure 3-10. Travel route from Highway 2 to project site

The primary route would be Colorado Blvd from Highway 2. This is a paved two-lane road that leads the entire way to the powerplant portion of the dam. The distance is 3.6 miles from Highway 2 to the security gate at Hungry Horse Powerplant. It is the main route that facility workers use. This road is not traveled much, as it is used mainly for access to the Hungry Horse facility or the Flathead National Forest for recreation (e.g., boating, river rafting, fishing, etc.).

Approximately 30 vehicles per weekday traverse this route as associated with work at the dam, once in the morning and again in the afternoon. In addition to facility worker traffic in the winter, approximately 10 vehicles per weekday travel this route, including the general

recreating public. In the summertime, an additional 20 vehicles per weekday travel this route, either by accident or for recreation such as vacationing, site seeing, river rafting, fishing, cutting firewood, etc. There are no bridges along the route, and it would be easy to secure traffic for oversized deliveries. For the project, Table 3-8 shows the estimated number of vehicles and heavy equipment and the timeframe per project element that would use these routes.

The upper road, NF-895/Hungry Horse Dam Road, is also a two-lane road, and would be used for the Gantry crane replacement. It may also be used for the elevator overhaul. The Gantry crane replacement would likely be by a cargo van to drop off personnel and tools, and then the van would move to a parking spot. The distances is 3.9 miles from Highway 2 to the Visitor Center on the top right side of the dam. The annual average daily traffic count for Hungry Horse Dam Road, information supplied by the MDT for 2016, was 221 (Hardan 2017).

3.14.2 Environmental Consequences

Significance Criteria

Based on information from the dam tender about traffic along these two routes, a significant impact would occur if construction-related traffic impeded tourist traffic more than 30 minutes of time lost. Rerouting traffic would also be considered a significant impact.

Alternative A – No Action Alternative

There would be no effect to traffic resulting from the No Action alternative, and future conditions would be similar to current conditions.

Alternative B – HHPP Modernization Two Generating Units Offline for 4 Years

The probability of impeding traffic is minimal and temporary and would be restricted to the summer tourist season. No road closures are planned. No interruption to other means of transportation (pedestrian, bicycles, snowmobiles, etc.) are expected. There is no anticipated impact on existing parking areas. Safety risks and deterioration of roads are not considered significant.

Table 3-8. Traffic estimates per each element of the project

Project	Total Days	Start	End	# Cars Colorado Blvd (per day)	# Semi-Trucks Colorado Blvd (total)	# Cars NF-895 (per day)	# Semi-Trucks NF-895 (total)
Transformer Fire Protection	195	3/4/2019	11/29/2019	--	--	--	--
Units 1 and 2	94	3/4/2019	7/11/2019	4-6	7-10	0	0
Units 3 and 4	95	7/22/2019	11/29/2019	4-6	7-10	0	0
Powerplant Windows	195	3/4/2019	11/29/2019				
Units 1 and 2	94	3/4/2019	7/11/2019	4-6	9-12	0	0
Units 3 and 4	95	7/22/2019	11/29/2019	4-6	9-12	0	0
Switchyard Disconnect	195	3/4/2019	11/29/2019				
Units 1 and 2	94	3/4/2019	7/11/2019	1-3	2-4	0	0
Units 3 and 4	95	7/22/2019	11/29/2019	1-3	2-4	0	0
Governor Modification	538	6/1/2020	6/22/2022				
Unit 3	118	6/1/2020	11/11/2020	9-12	8-12	0	0
Unit 2	118	1/11/2021	6/23/2021	9-12	8-12	0	0
Unit 4	118	6/28/2021	12/8/2021	9-12	8-12	0	0
Unit 1	118	1/10/2022	6/22/2022	9-12	8-12	0	0
Excitation Replacement	538	6/1/2020	6/22/2022				
Unit 3	118	6/1/2020	11/11/2020	8-10	6-8	0	0
Unit 2	118	1/11/2021	6/23/2021	8-10	6-8	0	0
Unit 4	118	6/28/2021	12/8/2021	8-10	6-8	0	0
Unit 1	118	1/10/2022	6/22/2022	8-10	6-8	0	0
Fixed Wheel Gate Overhaul	530	6/1/2020	6/10/2022				
Unit 4	110	6/1/2020	10/30/2020	1-2	0	6-8	4-6

Project	Total Days	Start	End	# Cars Colorado Blvd (per day)	# Semi-Trucks Colorado Blvd (total)	# Cars NF-895 (per day)	# Semi-Trucks NF-895 (total)
Unit 1	110	1/11/2021	6/11/2021	1-2	0	6-8	4-6
Unit 3	110	6/28/2021	11/26/2021	1-2	0	6-8	4-6
Unit 2	110	1/20/2022	6/10/2022	1-2	0	6-8	4-6
Penstock Recoating	895	3/11/2024	8/13/2027				
Unit 1	120	3/11/2024	8/23/2024	6-8	10-14	0	0
Unit 2	120	3/10/2025	8/22/2025	6-8	10-14	0	0
Unit 3	120	3/9/2026	8/21/2026	6-8	10-14	0	0
Unit 4	120	3/1/2027	8/13/2027	6-8	10-14	0	0
Turbine Replacement	1,035	3/11/2024	2/25/2028				
Unit 1	260	3/11/2024	3/7/2025	6-9	6-8	0	0
Unit 2	260	3/10/2025	3/6/2026	6-9	6-8	0	0
Unit 3	260	3/9/2026	3/5/2027	6-9	6-8	0	0
Unit 4	260	3/1/2027	2/25/2028	6-9	6-8	0	0
Generator Rewind	1,035	3/11/2024	2/25/2028				
Unit 1	260	3/11/2024	3/7/2025	8-10	6-8	0	0
Unit 2	260	3/10/2025	3/6/2026	8-10	6-8	0	0
Unit 3	260	3/9/2026	3/5/2027	8-10	6-8	0	0
Unit 4	260	3/1/2027	2/25/2028	8-10	6-8	0	0
Selective Withdrawal	895	3/11/2024	3/13/2027				
Unit 1	120	3/11/2024	8/23/2024	1-2	0	6-8	6-8
Unit 2	120	3/10/2025	8/22/2025	1-2	0	6-8	6-8
Unit 3	120	3/9/2026	8/21/2026	1-2	0	6-8	6-8
Unit 4	120	3/1/2027	8/13/2027	1-2	0	6-8	6-8

Project	Total Days	Start	End	# Cars Colorado Blvd (per day)	# Semi-Trucks Colorado Blvd (total)	# Cars NF-895 (per day)	# Semi-Trucks NF-895 (total)
Cranes	150	8/15/2019	3/11/2020				
Gantry Crane	30	8/15/2019	9/25/2019	1-2	0	5-8	12-14
Left Powerhouse Crane	30	9/26/2019	11/6/2019	5-8	6-8	0	0
Right Powerhouse Crane	30	11/7/2019	12/18/2019	5-8	6-8	0	0
Valve House Crane	30	12/19/2019	1/29/2020	5-8	4-6	0	0
Mechanical Shop Crane	30	1/30/2020	3/11/2020	5-8	4-6	0	0
Elevator 1 & 2	240	3/12/2021	2/10/2022	1-2	2-4	3-5	8-12

Only occasional inconveniences may be experienced during peak tourist season, and with the implementation of signage and/or flag holders, this impact would be minimal and is determined to be insignificant. No rerouting of traffic is anticipated.

Alternative C – HHPP Modernization Two Generating Units Offline for 1 Year (Preferred Alternative)

The probability of impeding traffic during the summer tourist season is minimal and temporary. No road closures are planned. No interruption to other means of transportation (pedestrian, bicycles, snowmobiles, etc.) are expected. There is no anticipated impact on existing parking areas. Safety risks and deterioration of roads are not considered significant.

Only occasional inconveniences may be experienced during peak tourist season, and with the implementation of signage and/or flag holders, this impact would be minimal and is determined to be insignificant. No rerouting of traffic is anticipated.

3.14.3 Mitigation

Alternative A – No Action

No mitigation is proposed.

Alternatives B and C

To eliminate or minimize any potential tourist delays from construction-related traffic, signage and/or flag holders would be posted wherever deemed appropriate.

3.14.4 Cumulative Impacts

The project area lies within the Flathead National Forest and is adjacent to Glacier National Park to the north. The town of Hungry Horse is very small, with a population of 826 (2010 Census), and no significant construction projects have taken place there in the recent past. There are some road replacement/resurfacing/reconstruction projects in the area to be undertaken. They include:

- MDT replacement of the Highway 2 bridge that crosses the South Fork of the Flathead River at Hungry Horse. A contract was recently awarded to Sletten Construction, with construction scheduled for June 2017 through November 2018.
- Urban resurfacing project on Highway 2 through Columbia Falls was scheduled to open for construction bid on June 15, 2017. It is anticipated that the majority of construction will take place late summer/early fall of 2017, with some minor work carrying over to the spring of 2018.
- MDT road reconstruction of Highway 2 is planned through the canyon area leading up to the new Highway 2 bridge that crosses the South Fork of the Flathead River. MDT is in the process of conducting a planning study to help determine their course of action for this section of roadway. It is quite a few years out (Hardan 2017).
- Reclamation's Pacific Northwest Regional Office has been attempting to award a

contract to complete a chip seal/asphalt placement project on the lower road (Colorado Boulevard) from Highway 2 to the powerplant. It is expected to be awarded around September/October 2017, and the work is anticipated to occur between July and August 2018.

- Flathead County plans to continue with their normal maintenance activities for both winter and summer. This includes snow removal and sanding and general street maintenance with crack seals, chip seals, and overlays. Drainage improvements may also be made as necessary (Prunty 2017).

Columbia Falls, Montana, is the next nearest town to the project area. According to the 2010 U.S. Census, it has a population of 4,688. It is 11.4 miles away and a 20-minute drive. The city began holding regular council meetings in May 2017 to conduct a series of public hearings and meetings to determine the greatest community development needs (e.g., public facilities, economic development, and housing needs). Depending on the outcomes of these meetings and hearings, the city may apply for State or Federal funding. It is anticipated that this project will be completed before the City of Columbia Falls might begin any construction activities. If or when any development occurs at Columbia Falls, a new environmental analysis may be required, and a cumulative impacts assessment may be prepared at that time.

Except for the road repair work along Colorado Boulevard from Highway 2 to the dam, all of the other roadwork projects are outside the scope of analysis for the transportation section, (i.e., they are located on the other side of Highway 2). Most of the roadwork will be completed before this project begins. Reclamation would coordinate all significant construction-related activities with MDT to avoid, minimize, and/or mitigate for any transportation impacts. At this time, under current schedules and timeframes, it is not anticipated that there will be cumulative impacts to transportation when considering past, present, and reasonably forseeable future construction activities from this project.

3.15 Socioeconomics

3.15.1 Affected Environment

This section presents an assessment of existing conditions and estimates of the regional economic impacts resulting from changes in construction expenditures for each action alternative. The regional economic impact analysis considers both the initial, or direct, impact on the primary affected industries and the secondary, or indirect, impacts resulting from those industries that provide inputs to the directly affected primary industries. The analysis also includes induced impacts, or the changes in economic activity stemming from household spending of income earned by those employed in the sectors of the economy impacted either directly or indirectly. These secondary impacts are often referred to as multiplier effects.

This section describes the social and economic conditions in a three-county study that includes Flathead County, where Hungry Horse Dam and Power Plant are located, and Lake

and Missoula Counties. The key parameters include the study area population, industry output, employment, and labor income.

Population

Population estimates for the primary study area are shown in Table 3-9. The U.S. Census Bureau decennial estimate for year 2010 population was 228,973 for the three-county study area, which increased to 239,803 in 2015. All study-area counties experienced slower growth between 2010 and 2015 compared to the growth between 2000 and 2010. Within the three-county study area, Flathead County grew the most, with a 2.21 percent average annual increase during from 2000 to 2010, and 1.15 percent from 2010 to 2015.

Flathead County seasonal tourist and visitation tends to increase the population by as much as 40 percent from June through August. Flathead County is one of the fastest growing counties in Montana, and has the three fastest growing cities in the state: Whitefish, Kalispell, and Columbia Falls. The Flathead County population increased from 74,471 to 90,928 between 2000 and 2010, a 22.1 percent increase, due in large part to in-migration of retirees and middle-aged professionals. The three incorporated cities in Flathead County are Kalispell, Whitefish, and Columbia Falls. The closest city to Hungry Horse Dam is Kalispell, which is about 20 miles away. Of the smaller towns, the closest is Hungry Horse, followed by Martin City and Coram. Kalispell is the county seat and is the state's seventh largest city, with a population of 19,927 in 2010 and 22,052 in 2015. Kalispell, Whitefish, and Columbia Falls each have developed unique but interdependent economic bases. Kalispell is the major retail trade center for the region, as well as the agricultural service center and government base for the county. Whitefish is a recreation-oriented community, and Columbia Falls hosts the primary industrial employer in the county (Montana Department of Labor and Industry 2010).

Table 3-9. Population change in the primary and secondary study areas

Geographic Areas	2000 Population	2010 Population	County 2010 Population Rank[3]	2015 Population Estimate[4]	Average Annual Percent Change 2000 to 2010	Average Annual Percent Change 2010 to 2015
Montana	902,195	989,415	--	1,032,949	0.97%	0.88%
Flathead County	74,471	90,928	3	96,165	2.21%	1.15%
Hungry Horse	934	826	na		-1.16%	na
Martin City	331	500			5.11%	na
Coram	337	539			5.99%	na
West Glacier	na	227			na	na

[3] Ranking based on 2010 population from largest to smallest for all counties in Montana.

[4] In 2016, only state and county estimates were available for 2015; other area data was only available for 2014.

Geographic Areas	2000 Population	2010 Population	County 2010 Population Rank[3]	2015 Population Estimate[4]	Average Annual Percent Change 2000 to 2010	Average Annual Percent Change 2010 to 2015
Columbia Falls	3,645	4,688		5,093	2.86%	1.73%
Helena Flats	na	1,043			na	na
Evergreen	6,215	7,616			2.25%	na
Kalispell	14,223	19,927		22,052	4.01%	2.13%
Whitefish	5,032	6,357		7,073	2.63%	2.25%
Lake County (contains Polson)	26,507	28,746	9	29,457	0.84%	0.49%
Flathead Indian Reservation[5]	26,172	28,359	na	na	0.84%	na
Polson	4,041	4,488		4,707	1.11%	0.98%
Missoula County	95,802	109,299	2	114,181	1.41%	0.89%
Primary Study Area Totals	**196,780**	**228,973**	**--**	**239,803**	**1.64%**	**0.95%**
Sanders County	10,227	11,413	17	11,336	1.16%	-0.13%
Lincoln County	18,837	19,687	10	19,052	0.45%	-0.65%
Glacier County	13,247	13,399	13	13,647	0.11%	0.37%

The Flathead Indian Reservation is located mostly in Lake County. The Reservation has had about the same population levels as Lake County (with roughly half of the lands overlapping) for the years data were available from 2000 to 2010, and increasing by the same amount, at just under 1 percent per year on average. The surrounding counties of Sanders, Lincoln, and Glacier have smaller populations than the study-area counties and have shown relatively smaller population increases, and in some cases, decreases.

Economic Measures

The common measures of economic impacts include employment, industry output, and labor income. The parameters are summarized in Table 3-10 below, by North American Industry Classification System (NAICS) sectors.

[5] The Flathead Indian Reservation lies within a very small part of Flathead County, about half of Sanders County, about half of Lake County, and a small part of Missoula County.

Table 3-10. Year 2013 employment, industry output, and labor income for the three-county study area

NAICS Industry Sectors	Employment	Percent of Total	Output (millions $)	Percent of Total	Labor Income (millions $)	Percent of Total
Ag, Forestry, Fish & Hunting	4,602	3.1%	$251	1.5%	112	1.9%
Mining	630	0.4%	60	0.9%	34	0.6%
Utilities	482	0.3%	402	2.3%	61	1.1%
Construction	8,833	6.0%	1,552	9.0%	448	7.7%
Manufacturing	6,218	4.2%	2,108	12.2%	291	5.0%
Wholesale Trade	3,464	2.3%	721	4.2%	234	4.0%
Retail trade	17,260	11.7%	1,119	6.5%	482	8.3%
Transportation & Warehousing	3,354	2.3%	742	4.3%	207	3.6%
Information	2,184	1.5%	592	3.4%	109	1.9%
Finance & insurance	6,208	4.2%	995	5.8%	306	5.3%
Real estate & rental	8,582	5.8%	2,250	13.0%	120	2.1%
Professional-scientific & tech svcs	9,181	6.2%	932	5.4%	398	6.9%
Management of companies	629	0.4%	109	0.6%	43	0.7%
Administrative & waste services	9,010	6.1%	481	2.8%	244	4.2%
Educational svcs	1,883	1.3%	73	0.4%	41	0.7%
Health & social services	18,907	12.8%	1,812	10.5%	1,017	17.5%
Arts, entertainment & recreation	5,653	3.8%	369	2.1%	90	1.6%
Accommodation & food services	13,264	9.0%	737	4.3%	284	4.9%
Other services	9,247	6.3%	565	3.3%	272	4.7%
Government & non NAICs	18,349	12.4%	1,318	7.6%	1,000	17.3%
Total	$147,940	100.0%	$17,285	100.0%	$5,795	100.0%

Source: The 2013 Implan Model

Employment

Employment measures the number of jobs related to the sector of the economy. In the study area, activities related to health and social services generate the largest number of jobs (12.8 percent of total regional employment). Government ranks second in terms of overall number of jobs in the study area (12.4 percent of total), followed by retail trade (11.7 percent of total).

Industry Output

Industry output, or sales, represents the value of production of goods and services produced by businesses within a sector of the economy. The real estate and rental sector produces the highest level of output in the study area (13 percent of total industry output). The manufacturing sector ranks second in level of output (12.2 percent of total industry output). Ranking third is the health and social services sector (10.5 percent of total industry output).

Labor Income

Labor income is the sum of employee compensation and proprietor income. The health and social services sector generated the largest portion of labor income in the region (17.5 percent of total regional labor income). The sectors related to government ranked second (17.3 percent of total regional labor income). Ranking third are the sectors related to retail trade (8.3 percent of total labor income).

3.15.2 Environmental Consequences

The Project is not expected to change the study area population, since there would be a peak of about 20 workers, who are expected to be temporary and will likely not relocate permanently. Construction activities associated with the alternatives would result in positive economic output at the study-area regional level.

Significance Criteria

The modeling package used to assess the regional economic effects stemming from construction expenditures for each action alternative is IMpact Analysis for PLANning (IMPLAN). IMPLAN is an input-output modeling system that estimates the effects of economic changes in an economic region. The common measures of regional economic impacts include employment, regional output (expressed as sales), and income.

Input-output models measure commodity flows from producers to intermediate and final consumers. Purchases for final use (final demand) drive the model. Industries produce goods and services for final demand and purchase goods and services from other producers. These other producers, in turn, purchase goods and services. This buying of goods and services (indirect purchases) continues until leakages from the region (imports and value added) stop the cycle.

These indirect and induced effects (the effects of household spending) were mathematically derived using a set of multipliers. The multipliers describe the change of output for every regional industry caused by a $1 change in a final demand for any given industry. The IMPLAN model data files are compiled from a variety of sources for the study area, including the U.S. Bureau of Economic Analysis, the U.S. Bureau of Labor, and the U.S. Census Bureau. This analysis used 2013 IMPLAN data and multipliers, the most current data available to the Bureau of Reclamation, for Flathead, Lake, and Missoula Counties in Montana.

Overall, this analysis assumed that a majority of the construction expenditures would be

funded from sources outside the study area, although it would vary by tasks and years. Money from outside the region spent on goods and services within the region would contribute to regional economic impacts, as opposed to when money originates from within the study region, which is much less likely to generate regional economic impacts.

In terms of the contractor workforce, it was assumed that some would move temporarily to the region and others would commute from within Flathead County or adjacent counties. For this reason, some portion of wages would be spent inside the study area during the 10- to 12-year construction period.

Alternative A – No Action Alternative

No scheduled construction or modernization is anticipated for this alternative; therefore, minimal regional impacts related to construction would be generated. Reclamation would continue operating the project without scheduled system improvements. The maintenance schedule would be followed with allowances for emergency repairs or replacements. Repair costs and time needed to obtain replacement parts would continue to increase based on the aging technology and the scarcity of the replacement parts. There likely would be no funding spent on safety improvements or a concentrated series of other equipment replacements, modifications, and improvements, until a breakdown occurs.

Alternative B – HHPP Modernization Two Generating Units Offline for 4 Years

Regional Economic Effects

The economic impacts were estimated for the three-county regional study area distributed throughout the construction period, shown in Table 3-11. These regional impacts would not occur uniformly each year; instead, they would vary year to year proportionate to annual expenditures. The majority of the estimated employment, output, and income impacts are due to the expenditures on materials and wages earned by the workforce involved in construction activities.

Table 3-11 shows construction expenditures, measured in 2017 dollars, expected to be made inside the study region. Construction expenditures made outside the three-county area were considered leakages and would have no impact on the local economy. Some construction items (specialized equipment and skilled labor) are more likely to be purchased outside the region and brought to the construction site because of their high cost and lack of availability in the region.

The employment reported below is the potential total of all jobs generated directly and indirectly from project-related expenditures estimated to occur within the study area. Local expenditure dollar amounts for Alternative B were entered into the IMPLAN model by year, and outputs were the resulting estimated jobs, output dollar amounts generated, and labor income, shown in Table 3-11. Although the timing of construction and labor dollars varies over time, the total spent would be about the same between the two action alternatives.

Table 3-11. Alternative B – Construction Impacts for the three-county study area

Years	Estimated Local Expenditures (2017$)	Employment Impact	Output Impact	Labor Income Impact
2019	$3,507,458	43.4	$5,788,861	$1,846,812
2020	$549,394	6.8	$906,744	$289,277
2021	$1,391,134	17.2	$2,295,988	$732,485
2022	$520,728	6.4	$859,432	$274,183
2023	$597,633	7.4	$986,359	$314,677
2024	$934,339	11.6	$1,542,074	$491,965
2025	$1,088,550	13.5	$1,796,590	$573163
2026	$1,056,845	13.1	$1,744,263	$556,469
2027	$774,325	9.6	$1,277,980	$407,712
2028	$43,827	0.5	$72,334	$23,077
2029	--	--	--	--
2030	--	--	--	--
Total	**$10,464,233**	**129.6**	**$17,270,626**	**$5,509,821**

Sources: Reclamation estimates for 2017 dollars by year and IMPLAN Model

The potential number of onsite construction jobs would vary over time, and is estimated to be up to a maximum of roughly 20 at any one time. Any impacts would be minimal, since the number of workers is low and would be spread over the approximately 10- to 12-year construction period, varying year-to-year as shown in Table 3-12 below.

Table 3-12. Estimated number of contract employees by task and timeframe for Alternative B

Project Description	Construction Schedule for Alternative B	Total Number of Contract Employees[6]	Avg Daily Number of Contract Employees[7]	Percent Local Employees	Percent Temporarily Relocating
Main Unit Transformer Fire Protection	Mar 2019 - Nov 2019	14	3-5	100%	-
Powerplant Window Replacement	Mar 2019 - Nov 2019	11	3-5	100%	-
Crane Replacement	Aug 2019 - Mar 2020	16	4-6	5%	-
Governor Modification	Jun 2020 - Jun 2022	21	6-8	-	-
Excitation Replacement	Jun 2020 - Jun 2022	18	5-7	-	-
Fixed Wheel Gate Overhaul	Jun 2020 - Jun 2022	11	3-5	100%	-
Elevator Repairs	Mar 2021 - Feb 2022	7	2-4	100%	-
Switchyard & Powerplant Disconnect Switches	Feb 2023 - Nov 2023	13	4-6	100%	-
Turbine Replacement &	Mar 2024 - Feb 2028	24	4-6	5%	50%

[6] This is an estimate of the total number of contract employees that may be onsite during the life of the given project.

[7] This is an estimate of the average number of contract employees that will be on the site daily for the given project.

Project Description	Construction Schedule for Alternative B	Total Number of Contract Employees[6]	Avg Daily Number of Contract Employees[7]	Percent Local Employees	Percent Temporarily Relocating
Mechanical Overhaul					
Generator Rewind	Mar 2024 - Feb 2028	24	5-8	5%	50%
Selective Withdrawal Refurbishment	Mar 2024 - Aug 2027	11	3-5	100%	-
Penstock Recoating	Mar 2024 - Aug 2027	12	4-6	100%	-

Source: Reclamation's 2017 estimates

Tribal Employment Rights Ordinance

Tribal Employment Rights Ordinance (TERO) ordinances extend Indian preference hiring to all construction projects on or near an Indian Reservation. A TERO program monitors and enforces employment and contracting rights of Indians and ensures that their rights are protected and exerted. Portions of the work associated with the Project would be located near the Flathead Reservation. Tribal ordinances would be included among the laws, codes, and regulations covered by the Permits and Responsibilities clause of the Reclamation contract for the work, as appropriate. Reclamation's contractor would be directed to contact the CSKT Employment Rights Office for information about these requirements. However, Reclamation's Contracting Officer is not a party to enforcing Indian preference requirements; it is a matter solely between the Tribe and the contractor.

Alternative C – HHPP Modernization Two Generating Units Offline for 1 Year (Preferred Alternative)

The impacts under Alternative C would be the same as those under Alternative B. The timing of construction and labor dollars, as well as the number of workers, would vary by year, but the totals are nearly the same. Regional economic impacts would be the same between alternatives, with Alternative C regional impacts displayed in Table 3-13. Alternative C numbers of workers by task over the time period are shown in Table 3-14.

Table 3-13. Alternative C – Construction Impacts for the three-county study area

Years	Estimated Local Expenditures (2017$)	Employment Impact	Output Impact	Labor Income Impact
2019	$3,507,458	43.4	$5,788,861	$1,846,811
2020	$157,347	1.9	$259,692	$82,849
2021	$207,906	2.6	$343,137	$109,470
2022	$100,925	1.2	$166,571	$53,141
2023	$922,769	11.4	$1,522,978	$485,873
2024	$1,353,191	16.8	$2,233,365	$712,507
2025	$316,750	3.9	$522,778	$166,781
2026	$920,181	11.4	$1,518,707	$484,511
2027	$1,072,055	13.3	$1,769,366	$564,478
2028	$1,040,830	12.9	$1,717,831	$548,037
2029	$758,777	9.4	$1,252,318	$399,525
2030	$41,311	0.5	$68,181	$21,752

Years	Estimated Local Expenditures (2017$)	Employment Impact	Output Impact	Labor Income Impact
Total	**$10,399,500**	**128.8**	**$17,163,788**	**$5,475,737**

Sources: Reclamation estimates for 2017 dollars by year and IMPLAN Model

Table 3-14. Estimated number of contract employees by task and timeframe for Alternative C

Project Description	Construction Schedule for Alternative C	Total Number of Contract Employees[8]	Avg Daily Number of Contract Employees[9]	Percent Local Employees	Percent Temporarily Relocating
Main Unit Transformer Fire Protection	Mar 2019 - Nov 2019	14	3-5	100%	-
Powerplant Window Replacement	Mar 2019 - Nov 2019	11	3-5	100%	-
Crane Replacement	Aug 2019 - Mar 2020	16	4-6	5%	-
Governor Modification	Jun 2020 - Jun 2022	21	6-8	-	-
Excitation Replacement	Jun 2020 - Jun 2022	18	5-7	-	-
Fixed Wheel Gate Overhaul	Jun 2023 - Jun 2025	11	3-5	100%	-
Elevator Repairs	Mar 2023 - Feb 2024	7	2-4	100%	-
Switchyard & Powerplant Disconnect Switches	Feb 2024 - Nov 2024	13	4-6	100%	-
Turbine Replacement & Mechanical Overhaul	Mar 2026 - Feb 2030	24	4-6	5%	50%
Generator Rewind	Mar 2026 - Feb 2030	24	5-8	5%	50%
Selective Withdrawal Refurbishment	Mar 2026 - Aug 2029	11	3-5	100%	-
Penstock Recoating	Mar 2026 - Aug 2029	12	4-6	100%	-

3.15.3 Mitigation

No socioeconomic mitigation was identified for the alternatives.

3.15.4 Cumulative Impacts

This project would not result in any socioeconomic cumulative impacts when evaluated in

[8] This is an estimate of the total number of contract employees that may be onsite during the life of the given project.

[9] This is an estimate of the average number of contract employees that will be on the site daily for the given project.

conjunction with other past, present, or reasonably forseeable future projects being done at Hungry Horse Dam and Powerplant.

3.16 Environmental Justice

Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations," dated February 11, 1994, requires Federal agencies to identify and address disproportionately high and adverse human health or environmental effects of their actions on minorities and low-income populations and communities, as well as the equity of the distribution of the benefits and risks. Environmental justice addresses the fair treatment of people of all races and incomes with respect to actions affecting the environment. Fair treatment implies that no group should bear a disproportionate share of negative impacts. Indicators usually include analyzing racial and ethnic populations, income, unemployment, poverty rates, and housing conditions in the study area.

3.16.1 Affected Environment

The area around Hungry Horse Dam and its reservoir is located in Flathead County. Surrounding counties were also analyzed for comparison. In terms of geographic location, the town of Hungry Horse (population about 826) is closest to the reservoir, at less than 1 mile to the west, and Martin City (population about 500) is 1 mile from the town of Hungry Horse in the direction of Glacier National Park. Columbia Falls, a city of about 5,100 people, is 7 miles from Hungry Horse. The dam and reservoir are 15 miles south of the west entrance to Glacier National Park, where the town of West Glacier is located, with a population of roughly 227. Kalispell, the largest city in Flathead County with roughly 20,000 people, is 20 miles away.[10]

Based on year 2010 Census data, Table 3-15 provides the percentages of population for six racial categories. White, Black or African American, American Indian and Alaska Native, Asian (includes Native Hawaiian and Other Pacific Islander), Some Other Race, and the Hispanic or Latino population percentages were included for Flathead County, towns and cities, the Flathead Indian Reservation, surrounding counties, and the State of Montana (U.S. Census Bureau 2010).[11] The study area percentage of Hispanic or Latino population was at or below the state's 2.9 percent, with the exceptions of Lake County and the Flathead Indian Reservation, which were both about 3.5 percent. Only a small portion of the Flathead Indian Reservation is located within the boundaries of Flathead County. The proportion of American Indian population in Lake County was more than three times that of the state's population as a whole, due largely to the presence of the Flathead Indian Reservation. Nearly all of the Blackfeet Indian Reservation lies within Glacier County, which was 68.3

[10] Population data was taken from the socioeconomic section.

[11] Racial/ethnic categories do not sum to 100 percent since respondents could select race alone and more than one race.

percent American Indian.

Table 3-15. Year 2010 race and ethnicity percentages in the study area

Geographic Areas	2010 Population	Percent White	Percent African American	Percent American Indian[12]	Percent Asian[13]	Percent Some Other Race	Percent Hispanic[14]
Montana	989,415	91.8	0.8	7.9	1.3	0.9	2.9
Flathead County	90,928	97.5	0.5	2.4	1.2	0.6	2.3
Hungry Horse	826	96.9	0.8	3.9	1.9	0.6	1.5
Martin City	500	96.2	0	4.2	0.4	0	0
Coram	539	96.3	0.4	4.5	0.9	0	0.6
West Glacier	227	100	0	0.4	0	0	0
Columbia Falls	4,688	97.2	0.8	3.7	1.1	0.3	2.8
Helena Flats	1,043	96.9	0.3	5.0	0.7	0.3	2.0
Evergreen	7,616	97	0.5	3.5	1.0	0.9	2.8
Kalispell	19,927	96.7	0.6	2.8	1.8	0.8	2.9
Whitefish	6,357	97.5	0.9	1.6	1.5	0.5	2.8
Lake County (contains Polson)	28,746	76.4	0.7	28.7	0.9	0.8	3.5
Flathead Indian Reservation[15]	28,359	73.6	0.7	32.2	0.9	0.8	3.6
Polson	4,488	82.3	0.5	22.8	1.6	0.9	3.4
Sanders County	11,413	94.7	0.4	6.9	0.7	0.6	2.0
Missoula County	109,299	95.2	0.9	4.1	2.0	0.6	2.6
Lincoln County	19,687	98.2	0.4	2.5	0.8	0.6	2.3
Glacier County	13,399	33.5	0.4	68.3	0.4	0.2	1.8

Low-income populations are identified by several socioeconomic metrics. The Census American Community Survey 2010 to 2014 5-year estimates, shown in Table 3-16, include median household and per capita incomes, percentage of the population below the poverty level, and unemployment rates. The Flathead County median household and per capita incomes were about the same as the State of Montana rate, and were lower in surrounding counties, except for Glacier County, due to the presence of Glacier National Park. Incomes

[12] American Indian and Alaska Natives.

[13] Asian category includes Native Hawaiian and other Pacific island people.

[14] Hispanics can be of any race.

[15] The Flathead Indian Reservation lies within a very small part of Flathead County, about half of Sanders County, about half of Lake County, and a small part of Missoula County.

varied widely among cities and towns in Flathead County, with higher levels in areas with more tourism, and the lowest rates were in the town of Hungry Horse.

Unemployment measures can be challenging since they can vary seasonally and generally do not account for people who have given up searching for suitable employment. Overall, the percentages of people unemployed in the civilian labor force were higher in Glacier and Lincoln Counties compared with Flathead County and the state-wide rate. Of the Flathead County towns, Martin City and Coram showed the highest unemployment rates.

In an attempt to gauge available temporary or rental housing, the 2010 Census number of housing units vacant and the percentage of those available for rent were included in Table 3-16. The data showed that the highest percentage of vacant housing units for rent was 41.2 percent in Kalispell and 29.0 percent in Columbia Falls, followed by Evergreen at 27.7 percent. The lowest rental rates were in Lake and Lincoln Counties, and the towns of West Glacier, Coram, and Hungry Horse.

Table 3-16. Income, poverty, unemployment, and housing by county, state, and study area total

Geographic Areas	Census 2010 – 2014 5-Year Estimates				Census 2010		
	Income		Percent Below Poverty Level (%)	Percent Unemployed[16] (%)	Total # of Housing Units	Housing Vacancy Rates	
	Median Household Income ($)	Per Capita Income ($)				Total # of Vacant Units	Percent For Rent
State of Montana	46,766	25,977	15.3	4.4	482,825	73,218	13.8
Flathead County	46,858	25,789	13.7	5.3	46,963	9,459	10.2
Hungry Horse	20,573	16,597	48.3	4.6	637	278	6.8
Martin City	51,250	15,432	5.1	16.7	265	37	10.8
Coram	33,532	27,682	19.5	11.8	303	72	5.6
West Glacier	51,250	29,698	11.3	8.0	314	197	0
Columbia Falls	45,393	20,778	12.5	3.8	1,994	131	29.0
Helena Flats	57,778	27,752	5.6	3.8	408	26	15.4
Evergreen	34,951	17,309	13.0	4.2	3,147	148	27.7

[16] Percent of the civilian labor force who are unemployed, excluding those in the armed forces and who are not otherwise in the labor force (but who are over 16 years old).

Geographic Areas	Census 2010 – 2014 5-Year Estimates				Census 2010		
	Income		Percent Below Poverty Level (%)	Percent Unemployed[16] (%)	Total # of Housing Units	Housing Vacancy Rates	
	Median Household Income ($)	Per Capita Income ($)				Total # of Vacant Units	Percent For Rent
Kalispell	40,511	22,054	15.6	5.6	9,379	741	41.2
Whitefish	48,813	30,642	11.8	5.1	4,086	1,104	15.7
Lake County (contains Polson)	38,492	21,927	22.6	6.4	16,588	5,156	5.9
Flathead Indian Reservation[17]	36,412	20,789	23.5	6.6	15,149	3,930	7.5
Polson	36,285	19,591	20.2	5.2	2,506	515	18.6
Sanders County	31,665	19,145	22.9	5.0	6,678	1,557	6.9
Missoula County	47,029	26,559	16.0	6.4	50,106	4,108	xx
Lincoln County	35,603	22,464	17.1	6.8	11,413	2,570	6.0
Glacier County	51,250	29,698	11.3	8.0	5,348	987	16.4

3.16.2 Environmental Consequences

Significance Criteria

Environmental justice analysis evaluates the effects of potential adverse environmental impacts on natural resources and associated human health impacts, as well as socioeconomic impacts, to identify and describe disproportionate adverse effects to minority and/or low-income populations.

Alternative A – No Action Alternative

No scheduled construction-related spending and employment would occur in the immediate area, which may have minimally benefited the low-income population in and around the town of Hungry Horse.

Alternative B – HHPP Modernization Two Generating Units Offline for 4 Years

Alternative B could create as many as 10 to 12 on-site construction-related jobs at any one time during the 10 years that the Hungry Horse modification project would be occurring.

[17] The Flathead Indian Reservation lies within a very small part of Flathead County, about half of Sanders County, about half of Lake County, and a small part of Missoula County.

Some portion of these jobs likely would be filled by persons coming into the study area from surrounding counties or farther, although the number cannot be reliably estimated.

Overall, the town of Hungry Horse had the lowest median and per capita incomes and the greatest percentage of people below the poverty level. The socioeconomic section showed that Hungry Horse was the only place with a population decrease. Taken together, it may indicate that local employment opportunities could be beneficial, but that rental housing could be in short supply; however, if the population continued to decline, housing shortages may not occur. The largest number of workers that would likely temporarily relocate (for at most about 5 years) would be 12. Internet searches showed that a range of options exist in the immediate vicinity around the reservoir, in Hungry Horse, and in and around Martin City and West Glacier for camping, RV camping, lodges, motels, and rooms for rent. Although Columbia Falls is within 7 miles of Hungry Horse, low-income housing is in short supply (Gadwa 2017). Taken as a whole, there may be minimal positive effects in Hungry Horse and the immediate area from construction-related spending and employment, with insignificant low-income housing impacts.

Alternative C – HHPP Modernization Two Generating Units Offline for 1 Year (Preferred Alternative)

Environmental consequences for Alternative C would be the same as for Alternative B.

3.16.3 Mitigation

No mitigation actions were identified for any of the alternatives.

3.16.4 Cumulative Effects

This project would not result in any cumulative impacts when evaluated in conjunction with other past, present, and reasonably forseeable future projects being done at Hungry Horse Dam and Powerplant.

Chapter 4 Consultation and Coordination

4.1 Introduction

This chapter summarizes the activities that took place for Reclamation's public scoping activities for the Project.

4.2 Public Involvement/Scoping

Public scoping activities involved soliciting comments from the general public, State and Federal government agencies, and representatives of the CSKT.

The primary mechanism used to solicit public comments was advertisements informing the public about Reclamation's intent to conduct a NEPA analysis. The scoping period was held from December 9, 2015, through January 31, 2016. An official Federal scoping notice was released on December 9, 2015, to all media outlets and newspapers in the Pacific Northwest (Appendix A).

Following the scoping period, activities will include ongoing interactions with the public, Confederated Tribes of the Colville Reservation, Spokane Tribe of Indians, and agencies during preparation of the EA. The public, all agencies, and the Tribes will be given the opportunity to review and comment on the draft EA during the public comment period. Reclamation will continue to engage all parties through completion of the final EA and, if warranted, preparation of the FONSI.

A summary of the scoping comments received is included in Section 1.5 and letters are included in Appendix A.

4.3 National Historic Preservation Act

Congress enacted the NHPA in 1966. Section 106 of the NHPA requires Federal agencies to consider project-related impacts to historic properties, which includes prehistoric and historic-period archeological sites, traditional cultural properties, and elements of the built environment. Federal regulations (36 CFR 800) define the process for implementing the NHPA, which includes consultation with the SHPO, affected Tribes, and the ACHP, about Federal findings regarding project effects (36 CFR 800.4 [a][4]).

Reclamation engaged in consultation with the SHPO regarding the project APE, level of effort, and recommended effects. Reclamation provided the agency with the completed NHPA Section 106 cultural resources review for the Project. SHPO responded with their concurrence of a finding of No Historic Properties Affected for any of the alternatives (36 CFR 800.5 [d] [1]). The consultation letters between Reclamation and SHPO are provided with this document as Appendix B.

4.4 Tribal Coordination and Consultation

A scoping letter was sent to the Confederated Salish and Kootenai Tribe to involve and address any questions or concerns related to the proposed actions. No indication was received from the tribes that any comments or concerns existed or that further consultation was warranted.

4.5 Endangered Specied Act (1973) Section 7 Consultation

The ESA requires that all Federal agencies ensure that their actions do not jeopardize the continued existence of listed species, or destroy or adversely modify their designated critical habitat. As part of the ESA's Section 7 process, an agency must request information from the USFWS and NOAA Fisheries regarding whether any threatened and endangered species occur within or near the action area. The agency then must evaluate impacts to those species. If the action may affect any listed species, the agency must consult with the USFWS and/or NOAA Fisheries. Reclamation obtained listed species information from NOAA Fisheries[18] and the USFWS[19].

Based on preliminary analysis in this Draft EA, consultation with the USFWS for bull trout is necessary. Reclamation will undertake consultation per Section 7 of the ESA with the USFWS prior to the release of the FONSI.

[18] See the website http://www.westcoast.fisheries.noaa.gov/publications/protected_species/salmon_steelhead/status_of_esa_salmon_listings_and_ch_designations_map.pdf for a map of the Status of ESA Listings & Critical Habitat Designations for West Coast Salmon & Steelhead.

[19] See the websites http://ecos.fws.gov/tess_public/reports/species-by-current-range-county?fips=53025 and http://ecos.fws.gov/tess_public/reports/species-by-current-range-county?fips=53017 for listed species in Grand and Douglas Counties (respectively) in Washington State.

Chapter 5 References

Druliner, P. 2017. Personal Communication. Conversation between Pam Druliner (Bureau of Reclamation, Boise, Idaho), and Andrew Deatherage (Bonneville Power Administration, Portland, Oregon). June 14, 2017.

Flathead County, Montana. 2014. About Flathead County website. https://flathead.mt.gov/about_flathead_county/index.php. Last accessed September 19, 2017.

Gadwa, Laura. 2017, *in litt*. Email from Laura Gadwa (Executive Director, Columbia Falls Area Chamber of Commerce) to Rebecca Redhorse (Bureau of Reclamation, Denver, Colorado). Subject: Hungry Horse and area housing. June 21, 2017.

Hansen, B. and L. Evarts 2002. Hungry Horse mitigation, Flathead Lake: annual progress report 2002 (Project 1991-01901). Bonneville Power Administration Report DOE/BP-00004100-3. 18 pp. *In* Evaluation of Revegetation Strategies and Technologies for Restoration of Bull Trout Habitat and Shoreline Woody Vegetation. Hungry Horse Reservoir, Hungry Horse, Montana. Prepared by Kenneth D. Lair and Stephen Grabowski. U.S. Department of the Interior, Bureau of Reclamation, Technical Service Center. Denver, CO. 2011. 278 pp.

Hardan, Chris. 2017, *in litt*. Email from Chris Hardan (Montana Department of Transportation, Missoula, Montana) to Yvonne Bernal (Bureau of Reclamation, Denver, Colorado). Subject: Hungry Horse Dam Modernization Environmental Assessment—Transportation Section. June 8, 2017.

Hensler and Benson. 2007. Angler Survey of Experimental Recreational Bull Trout Fishery at Hungry Horse Reservoir and South Fork Flathead River, Montana for the 2006 season. Montana Fish, Wildlife and Parks, Kalispell. *In* U.S. Forest Service. 2013. Conservation Strategy for Bull Trout on USFS lands in Western Montana. U.S. Forest Service Northern Region. March 2013.

IMPLAN Group LLC, IMPLAN System (2013 data and software). Huntersville, North Carolina. www.IMPLAN.com.

Marotz, B.L. 2007. South Fork Flathead River fish surveys downstream of Hungry Horse Dam before and after installation of selective withdrawal temperature control device on Hungry Horse Dam. Unpublished report, Montana Fish Wildlife and Parks. 9 pp.

Marotz, B.L. 2015. *In litt*. Email from B.L. Marotz (Montana Fish Widlife and Parks, Kalispell, Montana) to Rick Reiber, (Bureau of Reclamation, Boise, Idaho). Subject: Hungry Horse Modernization Project. Personal email communication on October 13, 2015.

Marotz, B.L., C. Althen, B. Lonon, and D. Gustafson. 1996. Model development to establish integrated operational rule curves for Hungry Horse and Libby Reservoirs – Montana.

U.S. Department of Energy, Bonneville Power Administration, Department of Environment, Fish and Wildlife Proj. No. 83-467; Contract No. DE-BI79-88BP92452. 114pp. + appendices. *In* Evaluation of Revegetation Strategies and Technologies for Restoration of Bull Trout Habitat and Shoreline Woody Vegetation. Hungry Horse Reservoir, Hungry Horse, Montana. Prepared by Kenneth D. Lair and Stephen Grabowski. U.S. Department of the Interior, Bureau of Reclamation, Technical Service Center. Denver, CO. 2011. 278pp.

Melillo, J.M., T.C. Richmond, and G.W. Yohe (Eds.). 2014. Climate Change Impacts in the United States: The Third National Climate Assessment, Full Report. U.S. Global Change Research Program, 841 pp.

Muhfeld, C.C., L. Jones, D. Kotter, W.J. Miller, D. Geise, J. Tohtz, and B. Marotz. 2011. Assessing the impacts of river regulation on native bull trout (*Salvelinus confluentus*) and westslope cutthroat trout (*Oncorhynchus clarkia lewisi*) habitats in the Upper Flathead River, Montana, USA. River research and Applications 2011. John Wiley & Sons, LTD. *In*Evaluation of Revegetation Strategies and Technologies for Restoration of Bull Trout Habitat and Shoreline Woody Vegetation. Hungry Horse Reservoir, Hungry Horse, Montana. Prepared by Kenneth D. Lair and Stephen Grabowski. U.S. Department of the Interior, Bureau of Reclamation, Technical Service Center. Denver, CO. 2011. 278pp.

Montana Department of Environmental Quality. 2016. Montana Final 2016 Water Quality Integrated Report. Document Number WQPBIMTSTR-011f. Available at http://deq.mt.gov/Portals/112/Water/wqpb/cwaic/Reports/IRs/2016/Final2016IR.pdf.

Montana Department of Environmental Quality. 2017. *Air Quality Nonattainment Information.* Accessed 6/14/2017. Retrieved from Air Quality Nonattainment Maps Available at http://deq.mt.gov/Air/airquality/Planning/airnonattainment.

Montana Department of Labor and Industry. 2010. Demographic and economic information for Flathead County. Census and Economic Research and Analysis Bureau. Helena, Montana.

Montana Fish, Wildlife and Parks. 2015. Angling Surveys. Retrieved March 31, 2017. http://fwp.mt.gov/fishing/anglingData/anglingPressureSurveys/

Montana Fish, Wildlife and Parks. 2017. Fishing Regulations. Retrieved March 31, 2017. http://fwp.mt.gov/fishing/regulations/

National Oceanic and Atmospheric Administration. 1981-2010 U.S. Climate Normals. National Climatic Data Center. Accessed June 15, 2017. https://www.ncdc.noaa.gov/data-access/land-based-station-data/land-based-datasets/climate-normals/1981-2010-normals-data.

Pacific Northwest National Laboratory. 2006. Total Dissolved Gas Effects on Fishes of the

Lower Columbia River. PNNL-15525. Report Prepared for the U.S. Army Corps of Engineers (Portland District). McGrath, K, Dawley EM, Geist DR. Portland, Oregon:

Prunty, David. 2017, *in litt*. Email from David Prunty (Flathead County, Kalispell Montana) to Yvonne Bernal (Bureau of Reclamation, Denver, Colorado). Subject: Hungry Horse Dam Modernization Environmental Assessment—Transportation Section. June 12, 2017.

Roise, Charlene. 2016. *Historic American Engineering Record, Hungry Horse Dam and Powerplant,* HAER No. MT-120. Draft, March 2016.

Rosenthal, L. 2009. Angler Survey of Experimental Recreational Bull Trout Fishery for Hungry Horse Reservoir and South Fork Flathead River, Montana for the 2008-2009 season. Montana Fish, Wildlife and Parks, Kalispell. *In* U.S. Forest Service. 2013. Conservation Strategy for Bull Trout on USFS lands in Western Montana. U.S. Forest Service Northern Region. March 2013.

Rosenthal, L. 2010. Angler Survey of Experimental Recreational Bull Trout Fishery for Hungry Horse Reservoir and South Fork Flathead River, Montana for the 2009-2010 season. Montana Fish, Wildlife and Parks, Kalispell. *In* U.S. Forest Service. 2013. Conservation Strategy for Bull Trout on USFS lands in Western Montana. U.S. Forest Service Northern Region. March 2013.

Rosenthal and Hensler. 2008. In U.S. Forest Service. 2013. Conservation Strategy for Bull Trout on USFS lands in Western Montana. U.S. Forest Service Northern Region. March 2013.

U.S. Bureau of Reclamation. 1995. Hungry Horse Project History. Stene, Eric A. https://www.usbr.gov/projects/pdf.php?id=125

U.S. Bureau of Reclamation. 2009. Bureau of Reclamation record of decision for Upper Columbia flood control and fish operations final environmental impact statement. Bureau of Reclamation, Pacific Northwest Region. Boise, Idaho.

U.S. Bureau of Reclamation. 2011. Evaluation of Revegetation Strategies and Technologies for Restoration of Bull Trout Habitat and Shoreline Woody Vegetation at Hungry Horse Reservoir, Montana. Hungry Horse Reservoir, Hungry Horse, Montana. Lair, Kenneth D. and Stephen Grabowski. Bureau of Reclamation, Technical Service Center. Denver, CO. 278 pp.

U.S. Bureau of Reclamation. 2016. Columbia River Basin Climate Impact Assessment Final Report. *West-Wide Climate Risk Assessment.* Prepared for the United States Congress. Available at https://www.usbr.gov/watersmart/wcra/docs/cbia/ColumbiaBasinImpactAssessment.pdf

U.S. Census Bureau. 2010. https://factfinder.census.gov/faces/nav/jsf/pages/community_facts.xhtml#.

_____. 2017. American FactFinder. Table DP-1 Profile of general population and housing characteristics: 2010. SF-1 2010 demographic profile data. (accessed January 2017)http://factfinder.census.gov.

_____. 2017. American FactFinder. Table QT-H1 General housing characteristics: 2010. SF-1 2010 demographic profile data. http://factfinder.census.gov. accessed February 2017.

_____.2017. American FactFinder. Table DP-1 Profile of general population and housing characteristics: 2000. SF-1 2000 demographic profile data. (accessed January 2017) http://factfinder.census.gov.

_____. 2017. American FactFinder. Table DP03 selected economic characteristics. 2010-2014 American Community Survey 5-year estimates. (accessed March 2017). http://factfinder.census.gov.

U.S. Department of the Interior. 1995. Departmental Manual Part 512.2 Intergovernmental Relations Part 512: American Indian and Alaska Native Programs Chapter 2: Departmental Responsibilities for Indian Trust Resources Originating Office: Office of American Indian Trust 512 DM 2. www.usbr.gov/native/policy/DM_FInal_12-1-95_512%20DM%202.pdf.

_____. 2000.Departmental Manual 303 DM 2 2.7(A). Order No. 3215, Principles for the Discharge of the Secretary's Trust Responsibilities. April 2000.

U.S. Environmental Protection Agency. 2017. *Criteria Air Pollutants.* June 14, 2017. Retrieved from NAQQS Table available at https://www.epa.gov/criteria-air-pollutants/naaqs-table.

U.S. Fish and Wildlife Service. 1998. Endangered and Threatened Wildlife and Plants; Determination of Threatened Status for the Klamath River and Columbia River Distinct Population Segments of Bull Trout. 63 *Federal Register* 111 (June 10, 1998), 31647-31674.

U.S. Fish and Wildlife Service. 2002. Bull trout (Salvelinus confluentus) Draft Recovery Plan. U.S. Department of the Interior, Fish and Wildlife Service. Portland, Oregon.

U.S. Fish and Wildlife Service. 2008. Bull Trout (Salvelinus Confluentus) 5-Year Review: Summary and Evaluation. U.S. Fish and Wildlife Service, Portland, Oregon.

U.S. Fish and Wildlife Service. 2013. Canada Lynx Fact Sheet. http://fws.gov/mountain-prairie/species/mammals/lynx/canada_lynx.pdf. Accessed May 11, 2015.

U.S. Fish and Wildlife Service. 2015. Bull trout Recovery Plan. U.S. Department of the Interior, Fish and Wildlife Service. Portland, Oregon.

U.S. Forest Service. 1986. Flathead National Forest Plan. Kalispell, Montana.

U.S. Forest Service. 2013. Conservation Strategy for Bull Trout on USFS lands in Western Montana. U.S. Forest Service Northern Region. March 2013.

U.S. Forest Service. 2015 Campground Information. Publication NO. R1-14-07. Retrieved January 26, 2016. http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprd3835535.pdf

U.S. Forest Service. 2016a. Flathead National Forest Draft Revised Forest Plan. Retrieved April

6, 2017. https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/fseprd502201.pdf

U.S. Forest Service. 2016b. Flathead National Forest Draft Revised Forest Plan. Appendix B – Maps –Recreational Opportunity Spectrum (ROS) Maps. Retrieved April 6, 2017. https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/fseprd502486.pdf

U.S. Forest Service. 2016c. Hungry Horse Ranger District Website. Last accessed January 26, 2016. http://www.visitmt.com/listings/general/national-forest/hungry-horse-ranger-district.html

Vermeyen, T.B. 2006. Hungry Horse Selective Withdrawal System Evaluation 2000-2003. Hungry Horse Project, Montana. Hydraulic Laboratory Report HL-2006-06. U.S. Bureau of Reclmation Hydraulic Investigations and Laboratory Group. http://www.usbr.gov/pmts/hydraulics_lab/pubs/HL/HL-2006-06.pdf.

Weitcamp, D.E., R. P. Sullivan, T. Swant, and J. DosSantos. 2003. Gas Bubble Disease in Resident Fish of the Lower Clark Fork River. Transactions of the American Fisheries Society 132:865-876.

Weitkamp, D.E. 2008. Draft Total Dissolved Gas Supersaturation Biological Effects, Review of Literature 1980-2007. Parametrix. Bellevue, Washington.

Appendix A – Public Scoping Notices and Comments

United States Department of the Interior

BUREAU OF RECLAMATION
Pacific Northwest Region
Grand Coulee Power Office
P.O. Box 620
Grand Coulee, WA 99133-0620

IN REPLY REFER TO:

GCPO-1400
PRJ-3.00

DEC - 9 2015

Interested Parties (see attached list)

Subject: Request for Public Comments for the Hungry Horse Power Plant Modernization, Montana.

Dear Interested Parties:

The Bureau of Reclamation (Reclamation) is asking for your help in identifying issues and concerns associated with the proposed Hungry Horse Power Plant (HHPP) Modernization, which includes various components associated with the dam. Reclamation proposes to overhaul and modernize the HHPP's four generating units. Many of the plant's principal components are being operated far beyond their intended service life. In particular, the four units that comprise the HHPP show problems stemming from age and wear that resulted in increased hardware failures and forced outages, more challenging repairs due to obsolescence and lack of spare parts, higher operation and maintenance costs, and longer down times. These conditions also contributed to growing safety related concerns, potential limitations on plant operations, and increased risk to sustained long-term operation of the plant to satisfy Reclamation's contractual obligations and Project purposes. Reclamation will use information you provide to help develop alternative access options and analyze the environmental impacts of the proposal in an Environmental Assessment, as required by the National Environmental Policy Act (NEPA).

Reclamation is evaluating the following alternatives:

Alternative A – No Action Alternative: Reclamation would continue operating the HHPP's four generating units under the existing maintenance program. Operations to generate electricity and regulate streamflows would continue according to existing protocols. Reclamation would continue maintenance and operation of the HHPP generating units in accordance with current agreements with the Bonneville Power Administration. The existing maintenance schedule would be followed with allowances for emergency repairs or replacements. Maintenance and repair costs, production outages, and time needed to obtain replacement parts would continue to increase based on the aging technology and the scarcity or unavailability of replacement parts.

Alternative B – Hungry Horse Power Plant Modernization: Reclamation would upgrade the power plant, overhaul and modernize the four generating units, conduct major maintenance on the penstocks and selective withdrawal system, refurbish the dam outlet works tubes and spillway, and upgrade the domestic water system. These systems and their related components exhibit age-related component wear, corrosion or erosion that leads to increased frequency and longer durations of repair outages, as well as reduced plant reliability. The modernization program includes inspecting and refurbishing or replacing components at several locations within the powerhouse and at the dam. The proposed action is expected to include, but is not limited to, replacement or repair of the specific components, as follows: crane replacement, main unit transformer fire protection, turbine replacement and mechanical overhaul, governor upgrade, exciter replacement, fixed wheel gate overhaul, selective withdrawal system overhaul, generator rewind, spillway refurbishment, elevator repairs, switchyard and power plant disconnect

switches, penstock recoating, hollow jet valve and outlet tube refurbishment, and domestic water system upgrade.

The four generating units at the Hungry Horse Power Plant have a combined hydraulic discharge capacity to the South Fork Flathead River of about 12,000 cfs if all units are online and there are no transmission restrictions. Over the last several years, a transmission restriction has limited total generation from the power plant. The actual current generation limit is 310 MW, which equates to a flow of around 9,000 cfs. The hydraulic capacity of the power plant at any given time is directly affected by the reservoir elevation, transmission limit, and how many units are off-line due to maintenance. Improvements associated to the HHPP Modernization will result in increased reliability of equipment, but will not result in increased capacity or address the transmission limitation issue.

The Environmental Assessment required under NEPA will evaluate the impacts of each alternative on the human and natural environments. The final Environmental Assessment is expected to be published in the summer of 2016. Reclamation is asking for your assistance in identifying issues and concerns, refining the alternatives, and evaluating potential impacts of implementing the alternatives. Reclamation will consider this evaluation in the decision-making process.

Please send your written comments on this proposal to Chris Vick, Bureau of Reclamation, Pacific Northwest Regional Office, 1150 N. Curtis Road, Suite 100, Boise, Idaho 83706, by January 31, 2016. If you wish to comment via email, you may send comments to cvick@usbr.gov.

Also, please fill out and return the form below or notify us via email if you wish to remain on the mailing list to receive a copy of the Environmental Assessment. If Reclamation does not receive notification, we will assume you do not wish to be on the mailing list.

If you have any questions concerning the Environmental Assessment process, please contact Mr. Chris Vick at (208) 378-6547.

Sincerely,

Acting For

Coleman W. Smith, Jr.
Power Manager

Enclosure

Cut along this line

- ☐ Please keep my name on the mailing list for the Hungry Horse Power Plant Modernization Project
- ☐ Please send me a printed copy of the EA, rather than an electronic copy.
- ☐ Please change my address on your mailing list to:

Name _____

Address _____

City, State, Zip Code _____

Mailing List:

Brian Marotz
Montana Fish Wildlife and Parks
490 North Meridian Road
Kalispell, MT 59901

Tom Livers
Montana Department of Environmental Quality
P.O. Box 200901
Helena, MT 59620-0901

Thomas Tidwell
Flathead National Forest
Supervisor's Office
650 Wolfpack Way
Kalispell, MT 59901

Larry Timchak
P.O. Box 638
Kalispell, MT 59903

Jeff Mow
Superintendent
Glacier National Park
Park Headquarters
P.O. Box 128
West Glacier, MT 59936

Clarinda Burke
CSKT Tribal Historic Preservation Officer
Cultural Preservation
P.O. Box 278
Pablo, MT 59855

Chairman Vernon Finley
The Confederated Salish and Kootenai Tribes
P.O. Box 278
Pablo, MT 59855

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NEWS RELEASE ARCHIVE

Reclamation Seeks Comments for Proposed Hungry Horse Power Plant Modernization

Media Contact: Lynne Brougher, (509) 633-9503
Chris Vick, (208) 378-6547

For Release: December 14, 2015

COLUMBIA FALLS, Montana– The Bureau of Reclamation is seeking public comments to identify issues and concerns to be addressed in an Environmental Assessment for a proposed Hungry Horse Power Plant (HHPP) Modernization, part of Hungry Horse Dam in northwest Montana.

The power plant's four generating units include components that are operating far beyond their intended service life. The proposed modernization and overhaul project will alleviate safety-related concerns, potential limitations on plant operations, and increased risk to sustained long-term operation of the plant.

The Environmental Assessment will evaluate the impacts of each alternative on the human and natural environments and is expected to be published in summer of 2016. Reclamation proposes to evaluate the following alternatives:

Alternative A – No Action: Reclamation would continue operating the HHPP's four generating units under the existing maintenance program with allowances for emergency repairs or replacements. Operations to generate electricity and regulate streamflows would continue according to existing protocols and agreements with the Bonneville Power Administration. Maintenance and repair costs, production outages, and time needed to obtain replacement parts would continue to increase based on the aging technology and the scarcity or unavailability of such parts.

Alternative B – Hungry Horse Power Plant Modernization: Reclamation would upgrade the power plant, overhaul and modernize the four generating units, conduct major maintenance on the penstocks and selective withdrawal system, refurbish the dam outlet works tubes and spillway, and upgrade the domestic water system.

To submit comments, or for additional information, contact Chris Vick, Bureau of Reclamation, Pacific Northwest Regional Office, 1150 Curtis Road, Suite 100, Boise, ID 83706, by January 31, 2016. Contact can also be made by emailing cvick@usbr.gov or by calling (208) 378-6547.

###

Reclamation is the largest wholesale water supplier in the United States, and the nation's second largest producer of hydroelectric power. Its facilities also provide substantial flood control, recreation, and fish and wildlife benefits. Visit our website at https://www.usbr.gov and follow us on Twitter @USBR.

United States Department of the Interior

BUREAU OF RECLAMATION
Pacific Northwest Region
Grand Coulee Power Office
P.O. Box 620
Grand Coulee, WA 99133-0620

IN REPLY REFER TO:

MAR 29 2016

GCP-1400
PRJ-3.00

Interested Parties (see enclosed list)

Subject: Hungry Horse Power Plant Modernization, Montana.

Dear Interested Parties:

Thank you for your preliminary scoping comments on the Hungry Horse Power Plant Modernization Plan. We appreciate the time you have taken to address your environmental concerns associated with this project. Over the next several months, the Bureau of Reclamation (Reclamation) will address your comments through the National Environmental Policy Act (NEPA) process and through discussions with the U.S. Fish and Wildlife Service. We will notify you when a draft Environmental Assessment (EA) will be made available for review and comment.

Should you have any additional questions, please contact Mr. Nate Krohn at 208-600-2134.

Sincerely,

Coleman W. Smith, Jr.
Power Manager

Enclosure

HH Modernization Pre-Scoping Interested Parties

Jeff Mow
Superintendent
Glacier National Park
West Glacier, MT 59936

Brian Marotz
Hydropower Mitigation Coordinator
Montana Fish, Wildlife and Parks
490 North Meridian Rd.
Kalispell, MT 59901

Laura Anderson
Montana Department of Environmental Quality
P.O. Box 200901
Helena, MT 59620-0901

Larry Timchak
President
Flathead Valley Chapter, Trout Unlimited
P.O. Box 638
Kalispell, MT 59901

Flathead Valley Chapter, Trout Unlimited
P.O. Box 638
Kalispell, MT 59901

January 21, 2016

U.S. Bureau of Reclamation
Pacific Northwest Regional Office
1150 N. Curtis Road
Suite 100
Boise, Idaho 83706

Attn: Chris Vick

Thank you for this opportunity to comment on the Hungry Horse Power Plant Modernization plan.

The Flathead Valley Chapter of Trout Unlimited represents nearly 400 conservation-minded members in Northwest Montana. Our primary mission is to conserve, protect and restore valuable populations of wild and native coldwater fishes and their habitat in Montana. We recognize the Bureau of Reclamation as a valuable partner in this process.

Our primary concern with any modifications to Hungry Horse Dam, or other water regulation facilities in the Flathead is that any proposed changes ensure high quality stream flows, water temperatures and habitat necessary to protect and native westslope cutthroat trout and the threatened bull trout.

We appreciate the need to modernize and protect the investments made in electrical generation facilities to assure an affordable and reliable source of power generation. We support Alternative B in your request and we support the Bureau in efforts to rectify current problems and extend the life of the generation facility at Hungry Horse, but those gains should not come at the expense of our wild fish.

Changes have been made at Hungry Horse over the years that have greatly enhanced Flathead River fish habitat and our principal concerns are that those enhancements be considered and protected during and after any modifications. Peaking flows following dam construction and the release of very cold waters in the spring and summer were very detrimental to our native fishes. Our chapter has worked hard to address those and other problems concerning dam operations and we will continue to do so in the future.

The selective withdrawal structure that was installed during the 1990s along with agreed-to VarQ flow operations that followed about a decade later have greatly improved habitat downstream for our native and wild fish. The ability to mimic natural flow and temperature regimes in the South Fork and mainstem downstream of Hungry Horse have resulted in increases in fish population numbers as well as improved health for our native cutthroat trout and ESA-listed bull trout in those areas. We see these

operational modifications as being essential to protecting and conserving our wild fish populations and want to insure that those gains not be diminished.

The EA should make it clear that while work is being accomplished on the power generation facilities, gates, spillway and penstocks, strict attention is to be paid to maintaining agreed-to flow and temperature regimes downstream of the dam. Results of the modification project should, in no way affect the ability of operators to comply with VarQ restrictions or to use the selective withdrawal system to improve downstream flows.

One further concern that has been voiced by some of our members is the ability to make use of the reservoir waters to cool downstream flows in the face of warming waters due to climate change. While this may not be directly affected by the proposed modifications, it is likely to become an issue in the near future and should be addressed by the Environmental Assessment. As we saw this past summer, the Flathead River water temperature in late summer rose to a point that may become detrimental to our coldwater fish populations. One obvious solution to increased warming of the river downstream of the South Fork, rather than directly emulating natural flows, would be to use colder waters from lower in the reservoir to cool harmful warm flows to improve fish survival. This is an operational issue that needs to be addressed by the Bureau along with local fisheries managers.

Thank you again for this opportunity to be involved in the assessment process. We look forward to reviewing the Environmental Assessment and working with USBR in protecting our valuable Montana fisheries in the future.

Sincerely,

Larry Timchak

Larry Timchak, President
Flathead Valley Trout Unlimited

United States Department of the Interior

NATIONAL PARK SERVICE
Glacier National Park
West Glacier, Montana 59936

IN REPLY REFER TO:

L21 (1.D)

JAN 0 4 2016

Chris Vick
Bureau of Reclamation
Pacific Northwest Regional Office
1150 N. Curtis Road, Suite 100
Boise, Idaho 83706

Dear Mr. Vick:

RE: Request for Public Comments for the Hungry Horse Power Plant Modernization, Montana

Glacier National Park recently became aware of Bureau of Reclamation (BOR) plans to modernize and upgrade infrastructure associated with the Hungry Horse Power Plant. Migratory fish destined for spawning in park waters regularly move through the dam influenced portion of the river and we appreciate the outreach by the BOR to involve the park at this stage of the NEPA process. The park supports safe, effective, and environmentally sensitive operation of the facility and wishes to offer some ideas and thoughts in support of this effort.

The two alternatives proposed appear to capture the range of likely management options for BOR given the age and condition of the facility. Alternative B, the only action alternative put forth by BOR at this time, is clearly preferred to the status quo or no action alternative. However, we strongly encourage BOR to include evaluation of any potential dam modifications in the Environmental Assessment that could improve in-river/reservoir conditions for native fish in the eventual preferred alternative.

There are a number of operational and structural areas where this could be accomplished or improved upon under any action alternative. Currently, the BOR operates the facility with consideration for established flow ramping rates and instream flow requirements to minimize adverse impacts to aquatic resources. In evaluating alternatives, BOR should identify any potential changes that could arise from implementing modernization techniques that could impact their ability to follow established flow ramping rates and instream flow requirements downstream. In addition, effort should be made to further naturalize seasonal dam discharges and water temperatures downstream.

Construction timing is also an important consideration. Construction timing should take into account the need to have all units on-line during spring runoff conditions to minimize spill. Uncontrolled spill can lead to supersaturated gas conditions in the river downstream of the project which can adversely impact aquatic life. Upgrading turbines and other infrastructure during the traditional non-spill months should be considered.

TAKE PRIDE® IN AMERICA

Further, remote, electronic adjustment and operation of the slide gates would be desirable to minimize entrainment of zooplankton. Zooplankton are an important item in the food web of the reservoir and opportunities to reduce the loss of zooplankton from the reservoir through improved operation of the slides gates should be pursued in any action alternative.

Again, thank you for the opportunity to provide input into the process at this early stage.

Sincerely,

Jeff Mow
Superintendent

Brougher, Lynne <lbrougher@usbr.gov>

Re: Hungry Horse power plant modernization input

1 message

Vick, Christopher <cvick@usbr.gov> [redacted] Mon, Dec 21, 2015 at 8:40 AM

Cc: Lynne Brougher <LBrougher@usbr.gov>, Dennis Philmon <dphilmon@usbr.gov>

Thank you Matt.

Chris

Chris Vick, P.E., PMP
Deputy Power Manager
Bureau of Reclamation
Pacific Northwest Regional Office
PN-1610
1150 N Curtis Drive
Boise, ID 83706
Direct (208) 378-6547
Cell (509) 449-9376

On Sun, Dec 20, 2015 at 7:28 PM, Matthew Latcham [redacted] wrote:

> **I vote for** Alternative B – Hungry Horse Power Plant Modernization.
>
> The reason that I believe we should modernize the power plant is that Montana is already loosing coal power plants in the eastern part of the state due to EPA changes in coal power plant regulations. As a nation we know that global warning is happing and any way that we can generate electricity with burning fossil fuels we should try to pursue. We have the dam and just need to update (modernize) it, why would we choose any other option. As for people concerned about damage to the fish population, the option to burn more fossil fuels will in the end be more damaging to the fish population because of higher air / water temperatures.
>
> Matt Latcham
> [redacted]

cvick@usbr.gov

Chris Vick
US Bureau of Reclamation, Pacific Northwest Regional Office
1150 N. Curtis Road, Suite 100
Boise, Idaho 83706

Brian Marotz
Hydropower Mitigation Coordinator
Montana Fish, Wildlife & Parks
490 North Meridian Rd.
Kalispell, MT 59901

January 29, 2016

Subject: Hungry Horse Power Plant Modernization, Montana.

Dear Mr. Vick

We appreciate Reclamation's invitation to help identify issues and concerns associated with the proposed Hungry Horse Power Plant Modernization project.

We urge Reclamation to pursue Alternative B to effectively modernize the facility. The environmental impacts analysis should evaluate any potential changes in the ability to follow established instream flow requirements and flow ramping rates in the South Fork Flathead River and mainstem Flathead River downstream. We encourage reclamation to evaluate ways to ensure that the preferred alternative further naturalizes seasonal dam discharges and water temperatures downstream.

Turbines and associated electrical equipment-
Modernizing turbines and associated electrical systems will necessitate temporary outages during construction. It will be important to schedule upgrades to avoid outages during spring runoff when all four turbines must be operational to avoid uncontrolled spill and associated gas supersaturation.

Avoid spill and gas supersaturation-
Reclamation's excellent management of Hungry Horse Dam operations has effectively limited spill. When spill has become unavoidable, Reclamation has done a good job configuring the outlet tubes to minimize gas saturation downstream. Even so, it remains important to continue to reduce gas supersaturation and/or sudden temperature change (+ or -) when the turbines are bypassed. The glory hole releases the warmest water from the reservoir when in use and the outlet tubes release cold water from the reservoir hypolimnion. Planned upgrades should be designed and implemented with the goal to further limit gas supersaturation and unnatural flow and temperature fluctuations downstream.

Selective withdrawal-
Reclamation should evaluate improving the crane system so that the selective withdrawal device can remain operational through late November. Currently, ice on the crane tracks and foul weather makes it difficult to access the selective withdrawal system during late fall, causing the selective withdrawal system to be taken offline earlier than would be optimal in many years. Winterizing the selective withdrawal device prematurely causes a sudden drop in discharge temperature downstream. Reclamation has worked diligently to extend the operation of selective withdrawal until the reservoir thermocline approaches isothermal condition (fall turnover) when temperature control is no longer

possible, but physical limitations due to ice and foul weather are currently the limiting factor. Optimally, any protocol for operating selective withdrawal and the crane itself, should allow the selective withdrawal device to operate through November, or until fall turnover, to better mimic natural temperatures in the dam discharge. Modernizing the selective withdrawal system should be scheduled between late November and early June when the system is not in use. Temperature control is needed on all turbines in operation during the period mid-June through November.

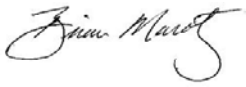
Reclamation should continue their efforts to evaluate how selective withdrawal is winterized. It may be more cost-effective to position the Control Gates and Stationary Gates underwater for winter storage. The lowest sections of the selective withdrawal device (Relief Gates), located directly in front of the turbine penstocks, can be raised by the crane for inspection and maintenance, and then stored underwater.

Temperature Monitoring-
When selective withdrawal first became operational in 1996, the temperature array on the face of the dam allowed the dam operator to observe the reservoir thermal structure from the control room. This allowed the operator to easily adjust the control gates to the correct depth and match the appropriate targeted discharge temperature. Additional thermometers in the turbine discharges allowed the dam operator to confirm that daily temperature targets were met, and or make fine-scale adjustments to meet the daily targets. Modern technology could be used to re-install these useful features, so that thermal data could be easily shared in tables and graphical formats.

Limit Zooplankton Entrainment through the Turbines-
The Slide Gates on the Control Gates have been difficult to operate due to deterioration and because the gates must be adjusted manually (as opposed to being operated from the control room). The Slide Gates were included in the final design plan for selective withdrawal because the USFWS expressed concern that washout losses of zooplankton would harm bull trout residing in the reservoir. These apertures were designed to minimize zooplankton loss through the turbines by avoiding the depth zone in the reservoir where zooplankton are most abundant. Tailwater temperatures could still be achieved through “stratified” selective withdrawal. That is, the control gate could be raised to intake warm surface waters (warmer than the discharge target), and mixed with cold water entering the slide gates from below the thermocline, so that water from the two sources would mix within each penstock to achieve the seasonal temperature target downstream. MFWP research (Cavigli et al. 1998) showed that loss of zooplankton could be reduced by incrementally opening the side gates during the warm months as the warm epilimnetic layer thickens. Reducing zooplankton washout is still desirable, so Reclamation should consider ways to restore the operation of the Slide Gates.

Thanks again for seeking our input early in the NEPA process.

Sincerely,



Brian Marotz
Hydropower Mitigation Coordinator

DEQ
Montana Department
of Environmental Quality

January 7, 2016

Chris Vick
Bureau of Reclamation
Pacific Northwest Regional Office
1150 N. Curtis Road, Suite 100
Boise, ID 83706

RE: DEQ Letter of Support: Proposed Hungry Horse Power Plant Modernization

I am writing today to express Montana Department of Environmental Quality's support for the Hungry Horse Power Plant Modernization project's proposed Alternative B. The Pacific Northwest's hydroelectric facilities are a crucial economic resource for the region, but as they age it becomes increasingly important to manage their operation effectively and to refurbish and modernize them when and where feasible so that they can continue to provide reliable, low-cost, clean electricity for the region for years to come. Leveraging the existing infrastructure while making upgrades to the dam in order to improve its performance, in many cases replacing equipment that is more than 60 years old, will help ensure the long-term, cost-effectiveness of the dam's operation.

The Montana Energy Bureau's primary recommendation is that the Bureau of Reclamation should work closely with the Western Electricity Coordinating Council, the region's utilities, and other regional planning organizations in the lead up to any dam upgrades that will take a portion or all of the dam's electricity generating turbines off-line. Because the dam is such a large generator of electricity for the region, there is the potential for the temporary loss of electricity generating capacity at the dam to have negative impacts for the region's electricity grid if the temporary losses in capacity aren't coordinated appropriately and with sufficient advanced warning for the region's other electricity generators and transmission operators to adjust their own construction and maintenance plans adequately.

The Montana Energy Bureau also recommends that the Bureau of Reclamation consider how portions of the modernization plan, such as spillway or outlet tube refurbishments, might be able to deliver secondary benefits, in particular to the environment above and below the dam.

If you should have any further questions, please do not hesitate to contact me or Garrett Martin, Senior Energy Policy Analyst, 406-444-6582, gmartin@mt.gov.

Sincerely,

Laura Andersen

Appendix B – Section 106 Correspondence

United States Department of the Interior

BUREAU OF RECLAMATION
Pacific Northwest Region
Grand Coulee Power Office
P.O. Box 620
Grand Coulee, WA 99133-0620

IN REPLY REFER TO:

GCPO-1300
ENV-3.00

MAR 15 2017

Dr. Mark Baumler
State Historic Preservation Officer
Montana State Historical Society
P.O. Box 201202
Helena, MT 59620-1202

Subject: Hungry Horse Modernization Project – Finding of Adverse Effect under Section 106 of the National Historic Preservation Act.

Dear Dr. Baumler:

The Bureau of Reclamation has conducted its efforts to identify and evaluate historic properties in the Area of Potential Effects for the Hungry Horse Modernization Project. The attached report identifies the Hungry Horse Dam and Powerplant (Hungry Horse) as the historic property affected by the modernization project.

Following our analysis of the proposed project and applying the criteria of adverse effects given in 36 CFR 800.5(a)(1), Reclamation has determined that the modernization project will result in adverse effects to some of the characteristics that make Hungry Horse eligible for the National Register of Historic Places.

The attached cultural resources report provides information documenting the finding of adverse effects as required in 36 CFR 800.11(e). The report also outlines preliminary mitigation recommendations for resolving the adverse effects through a Memorandum of Agreement (MOA). We request that you concur with the finding of adverse effect and review the suggested mitigations.

We look forward to your comments, especially on the suggested mitigations, as they will assist us to develop an MOA that addresses the concerns of all consulting parties.

Should you have any questions or comments about this letter and the attached report, please contact the Power Office Historian, Shawn Lingo, at (509) 633-6113.

Sincerely,

Coleman W. Smith Jr.

Coleman W. Smith, Jr.
Power Manager

Enclosure

Big Sky. Big Land. Big History.
Montana
Historical Society

Historic Preservation rc
Museum rc
Outreach & Interpretation
blications
Research Center rc

April 5, 2017 .

Mr. Coleman W. Smith, Jr.
Power Manager.
Bureau of Reclamation ,
Pacific Northwest Region ,
Grand Coulee Power Office ,
P.O. Box 620 ,
Grand Coulee, WA 99133-0620 .

Ref: Hungry Horse Modernization Project –.Finding of Adverse Effect under Section 106 of the NHPA .

Dear Mr. Smith: .

Thank you for providing the comprehensive and well-written report on the above referenced property and undertaking. . SHPO concurs with the BOR that the crane replacement component of this work represents an adverse effect to the . property's National Register qualities. SHPO accepts BOR's proposed mitigation measures. .

Having seen the multiple filing cabinets of documents on the topic of the dam and powerhouse stored at Hungry Horse, SHPO believes that cataloguing, archiving, and digitizing documents for public use on the web will have a meaningful public benefit. I spoke with BOR Power Office Historian, Shawn Lingo who told me that documents might be stored on . site or in a local institution's archive. Either approach is acceptable to SHPO if materials are in the type of archivally stable environment the Department of the Interior Museum Program recommends. For the sake of avoiding open-ended language in the MOA, BOR could simply commit to keeping the archive at the dam, and amend the MOA if BOR archives it elsewhere. Another key detail to include in the MOA is the timeframe for the archiving component. .

SHPO is confident that BOR can achieve visually compatible, code compliant windows for the powerhouse. In the MOA, we would like to see language calling for continued consultation on windows. In all window projects, *adverse* or . otherwise, we ask to review shop drawings of the proposed units alongside close-up photos or drawings of historic units. .

Thanks for consulting with us. Feel free to contact me with any questions you might have. .

Sincerely,

Pete Brown ,.,
Historic Architecture Specialist ,.,

File: BOR-Hungry Horse-2017032103 .

225 North Roberts Street 9
P.O. Box 201201 9
Helena, MT 59620-1201 9
(406) 444-2694 9
(406) 444-2696 FAX 9
montanahistoricalsociety9og 9 9

United States Department of the Interior

BUREAU OF RECLAMATION
Pacific Northwest Region
Grand Coulee Power Office
P.O. Box 620
Grand Coulee, WA 99133-0620

IN REPLY REFER TO:

GCPO-1300
ENV-3.00

MAR 15 2017

Kyle Felsman, Tribal Historic Preservation Officer
The Confederated Salish and Kootenai Tribes of the Flathead Nation
P.O. Box 278
Pablo, MT 59855

Subject: Hungry Horse Modernization Project – Finding of Adverse Effect under Section 106 of the National Historic Preservation Act. (Tracking No. U16-09:17.001)

Dear Mr. Felsman:

The Bureau of Reclamation has conducted its responsibility to identify and evaluate historic properties in the Area of Potential Effects (APE) for the Hungry Horse Modernization Project. The attached report identifies the Hungry Horse Dam and Powerplant (Hungry Horse) as the historic property affected by the modernization project.

In our consultation on the APE for the project last April, Reclamation specified the methods it would use to identify archeological resources and Traditional Cultural Properties (TCPs). Following review Reclamation cultural resources staff have not identified any archeological sites or TCPs within the APE, and have determined that this project will not affect either type of resource.

Following our analysis of the proposed project and application of the criteria of adverse effects given in 36 CFR 800.5(a)(1), Reclamation has determined that the modernization project will result in adverse effects to some of the characteristics that make Hungry Horse eligible for the National Register of Historic Places. These effects are limited to the historic built environment of Hungry Horse.

The attached cultural resources report provides information documenting the finding of adverse effects as required in 36 CFR 800.11(e). The report also outlines preliminary mitigation recommendations for resolving the adverse effects through a Memorandum of Agreement (MOA). We request that you concur with our findings, especially those regarding lack of effect on archeological resources and TCPs, and review the suggested mitigations.

We look forward to your comments as they will assist us to develop an MOA that addresses the concerns of all consulting parties.

Should you have any questions or comments about this letter and the attached report, please contact the Power Office Archeologist, Derek Beery, at (509) 633-9233. He is available to discuss this with you on the phone or meet face-to-face, as you find convenient.

Sincerely,

Coleman W. Smith, Jr.
Power Manager

Enclosure

Lingo, Shawn <slingo@usbr.gov>

Reclamation Hungry Horse Dam Modernization Consultation

3 messages

Beery, Derek <dbeery@usbr.gov> Fri, May 12, 2017 at 2:32 PM
To: Kyle.Felsman@cskt.org
Cc: Shawn Lingo <slingo@usbr.gov>, Coleman Smith <cwsmith@usbr.gov>

Good Afternoon Kyle,

I am following up to see if you had any comments or concerns regarding the Section 106 report for the Hungry Horse Dam Modernization Project. The Grand Coulee Power Office Manager, Coleman Smith, sent the report to you with a Consultation letter at the end of March. Reclamation's overall finding on the project was an adverse affect to the historic character of the Dam itself -but since the project is confined to the dam built environment there are no anticipated affects to archaeological sites, Traditional Cultural Properties, or Indian Sacred Sites.

MT SHPO has since concurred with our findings but I wanted to check in with you to see if you had any questions or concerns with our finding before we move forward with the NEPA process.

I'm sorry to say I won't be traveling over to the cooperating group meeting next week due to some pressing concerns here at Grand Coulee Dam, but I will do my best to call into the meeting. I hope to talk to you then!

Thanks,

Derek

--

Derek S. Beery
Archaeologist
Grand Coulee Power Office (GCPO)
United States Bureau of Reclamation
P.O. Box 620 Code 1300
Grand Coulee, WA 99133
(509) 633-9233 desk
(509) 237-4477 cell

_____

Sorry for not ge ng my comments to you sooner. I did receive the leĀer a few weeks back. I didn't have any real concerns from the beginning. Here are my official comments.

I concur with your recommenda on that the Hungry Horse Moderniza on project move forward with the determina on of adverse effect on historic proper es. I also concur that there appears to be no threat to archaeological sites or TCPs. The proposed mi ga on methods stated within the Sec on 106-Finding of Adverse Effects Report looks sufficient.

Let me know if you need anything else Derek. Thanks for ge ng a hold of me! We'll keep in touch.

Kyle Felsman

Tribal Historic Preserva on Officer

Confederated Salish and Kootenai Tribes

Work: (406) 675-2700 Ext. 1108

Cell: (406) 546-2339

kyle.felsman@cskt.org

P.O. Box 278

Pablo, MT 59855

From: Beery, Derek [mailto:dbeery@usbr.gov]
Sent: Friday, May 12, 2017 3:33 PM
To: Kyle Felsman <Kyle.Felsman@cskt.org>
Cc: Shawn Lingo <slingo@usbr.gov>; Coleman Smith <cwsmith@usbr.gov>
Subject: Reclama on Hungry Horse Dam Moderniza on Consulta on

[Quoted text hidden]

Lingo, Shawn <slingo@usbr.gov> Tue, May 16, 2017 at 8:25 AM
To: Derek Beery <dbeery@usbr.gov>
Cc: Corey P Carmack <CCarmack@usbr.gov>, Benjamin Miller <bjmiller@usbr.gov>

Thanks Derek
[Quoted text hidden]
--
Shawn Lingo, Historian
U.S. Bureau of Reclamation, Grand Coulee Power Office
PO Box 620
Grand Coulee, WA 99133

Hungry Horse Modernization Project Location and APE

20160429104 - PETE

United States Department of the Interior

BUREAU OF RECLAMATION
Pacific Northwest Region
Grand Coulee Power Office
P.O. Box 620
Grand Coulee, WA 99133-0620

- BOR

- Hungry Horse Dam & powerplant modernization - APE SCOPING, FH CO

IN REPLY REFER TO:

GCP-1300
ENV-3.00

APR 25 2016

CONCUR
MONTANA SHPO
DATE 5/18/16 SIGNED

RECEIVED
APR 29 2016
BY: SHPO

Dr. Mark Baumler
State Historic Preservation Officer
Montana State Historical Society
P.O. Box 201202
Helena, MT 59620-1202

Subject: Hungry Horse Dam and Powerplant Modernization – Area of Potential Effects (APE) and level of effort to identify historic properties.

Dear Dr. Baumler:

Reclamation is proposing to conduct a modernization project at the Hungry Horse Dam and Powerplant. The purpose of this project is to replace or upgrade existing components of the plant and dam that are exhibiting substantial age-related wear and design deficiencies, and to increase the operational reliability and flexibility of the Hungry Horse project for critical power production needs.

We are in the early stages of the planning process and environmental assessment, but have sufficient project information to determine the Area of Potential Effects (APE) for this project. The APE designated in the enclosed map includes the effects of both potential project options. We have also enclosed a plan describing the project and outlining our method for identifying and documenting historic properties in the APE.

We request that you concur with the APE and the level of effort to be used in identifying historic properties as described in the attachment.

If you have questions related to the APE, level of effort, or other issues related to the Hungry Horse Dam and Powerplant Modernization, please direct your questions to Mr. Shawn Lingo, the Power Office Historian, at slingo@usbr.gov or 509-633-6113.

Sincerely,

Coleman W. Smith Jr.

Coleman W. Smith, Jr.
Power Manager

Enclosures – 2

THE CONFEDERATED SALISH AND KOOTENAI TRIBES
OF THE FLATHEAD NATION
P.O. BOX 278
Pablo, Montana 59855
(406) 275-2700
FAX (406) 275-2806
www.cskt.org

A People of Vision

A Confederation of the Salish,
Pend d' Oreille
and Kootenai Tribes

GCP-1300
ENV-3.00

May 5, 2016

United States Department of the Interior
Bureau of Reclamation
Pacific Northwest Region
Grand Coulee Power Office
P.O. Box 620
Grand Coulee, WA 99133-0620

Dear Mr. Smith

I concur with the APE since it encompass approximate 74 acres. I also concur with the Level of effort to be used to identify Historic Properties.

Sincerely,

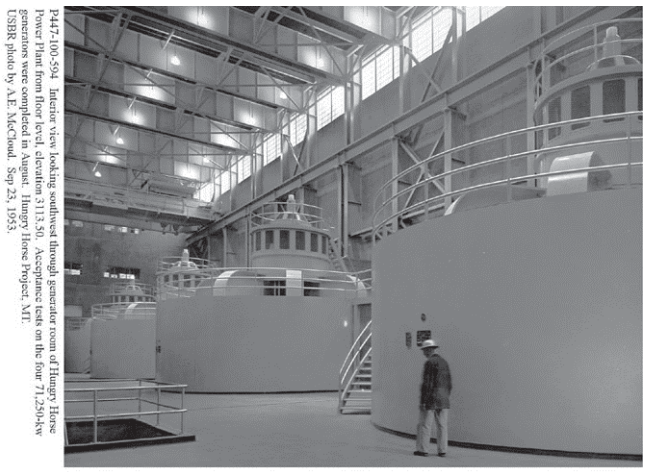
Clarinda Burke

Clarinda Burke

RECLAMATION
Managing Water in the West

Hungry Horse Powerplant Governors and Exciters Upgrades- Finding of No Adverse Effect

Hungry Horse Dam near Hungry Horse, Montana



Interior of the Generator Floor in the Hungry Horse Powerplant, Looking Southwest, 1953

Prepared by:

Derek Beery
Reclamation Archaeologist

With contribution by:
Kelsey Doncaster
Reclamation Historian

U.S. Department of the Interior
Bureau of Reclamation
Pacific Northwest Region

April 2015

Abstract

As a part of maintaining critical power producing infrastructure at Hungry Horse Dam and Powerplant (24FH0998), the U.S. Department of Interior, Bureau of Reclamation (Reclamation) is proposing to upgrade the governor and exciter systems for each of the four generators in the powerplant. These upgrades provide the benefits of modernizing the significant powertrain equipment at Hungry Horse Dam as maintenance and repairs are increasing on this aging equipment. The benefits will include improved reliability for power generation and increased efficiency of equipment. Hungry Horse Dam and Powerplant were found to be eligible for the National Register of Historic Places (National Register) through a "consensus determination" in 2005. Reclamation has reached a Finding of No Adverse Effect for this proposed project because the exciter and governor upgrades will not adversely affect the character defining features of the powerplant or its eligibility for inclusion in the National Register.

Summary and Conclusions

Reclamation is proposing to replace the excitation system and modify the governor systems for the four generators in the Hungry Horse Dam Powerplant. Some of the equipment used in the Powerplant is in need of upgrading to increase efficiency and reduce maintenance and repairs. Upgrade of both systems will not adversely impact the simple surfaced, industrial, power generating character features of the Generator Floor. HAER photo documentation and retention of the original plans for the powerplant minimizes the project's effects to Hungry Horse Dam while helping mangers and planners maintain the historic character of the powerplant. The project was designed with specific components meant to retain the general utilitarian, massive, industrial and electricity generating setting that contributes to the historic integrity of the Hungry Horse Powerplant.

Based on these considerations, Reclamation has reached a Finding of No Adverse Effects as per CFR 800.5(b) for this proposed project. In the event that there are any changes in the proposed project that arise during construction that might affect this finding, Reclamation shall re-initiate consultation with SHPO prior to proceeding with those changes.

Derek Beery\
Reclamation Archaeologist

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-PETE
-BOR
-Hungry Horse powerplant Governors & Exciters upgrades, FHCO

United States Department of the Interior

BUREAU OF RECLAMATION
Pacific Northwest Region
Grand Coulee Power Office
P.O. Box 620
Grand Coulee, WA 99133-0620

IN REPLY REFER TO:

GCPO-1000
ENV-3.00

APR 0 3 2015

RECEIVED
APR 06 2015
BY: SHPO

Dr. Mark Baumler
State Historic Preservation Officer
Montana State Historical Society
PO Box 201202
Helena, MT 59620-1202

CONCUR
MONTANA SHPO
DATE 4/14/15 SIGNED

Subject: Hungry Horse Powerplant Governors and Exciters Upgrades- Finding of No Adverse Effect, Hungry Horse Dam, Flathead County, MT (Tracking No. U15-009:15.001)

Dear Dr. Baumler:

The, Bureau of Reclamation is proposing to upgrade the governor and exciter systems for each of the four generators in the Hungry Horse Powerplant. The benefits of this modernization project will include improved reliability for power generation and increased efficiency of equipment. Hungry Horse Dam and Powerplant were found to be eligible for the National Register of Historic Places (National Register) through a "consensus determination" in 2005. Because this is an action that has the potential to affect historic properties, we are consulting with your office under Section 106 of the National Historic Preservation Act.

Reclamation has reached a recommendation for a Finding of No Adverse Effects as per CFR 800.5(b) for this proposed project. Additional justification for this finding is attached in the Finding of No Adverse Effect report. These actions will not adversely impact the simple surfaced, industrial, power generating character of the powerplant.

We ask that you concur with our finding regarding the project effects. If you have questions, please call Derek Beery, the Grand Coulee Power Office Archaeologist, at (509) 633-9233. In order to meet expected project schedules, we would appreciate it if you could informally contact us with questions as soon as possible so that we can resolve any potential issues within the 30-day period

Sincerely,

Coleman W. Smith, Jr.

Coleman W. Smith, Jr.
Power Manager

Enclosure

WBR:DBeery:CSmith:mriechmann04/03/2015:509-633-9507
U:MRiechman:corresp\pwrmgr\NoPE_Baumler_HHFO FovernorsExciters_04/03/15.docx

Preserving America's Heritage

Advisory Council on Historic Preservation

Electronic Section 106 Documentation Submittal System (*e*106) Form

***MS Word* format**

Send to: *e106@achp.gov*

I. Basic information

1. Name of federal agency:

U.S. Bureau of Reclamation (Reclamation)

2. Name of undertaking/project (Include project/permit/application number if applicable):

Hungry Horse Dam and Powerplant Modernization Project (Hungry Horse)

3. Location of undertaking (Indicate city(s), county(s), state(s), land ownership, and whether it would occur on or affect historic properties located on tribal lands):

Construction activity for this project will take place throughout the Hungry Horse Dam and Powerplant, located on the South Fork of the Flathead River about twenty miles north-east of Kalispell in Flathead County, Montana. The facility is owned and operated by Reclamation. The legal location description is T30N, R19W, Section 22 in the SW ¼ of the SE ¼ & the SE ¼ of the SW ¼ section; Section 27 in the NW ¼ of the NE ¼ & the NE ¼ of the NW ¼ section. The area is covered by the Doris Mountain 7 ½ minute USGS quadrangle map.

4. Name and title of federal agency official and contact person for this undertaking, including email address and phone number:

Agency Official: Coleman W. Smith, Power Manager

Grand Coulee Power Office

cwsmith@usbr.gov

(509)633-9501

Contact person: Shawn Lingo, Historian

Grand Coulee Power Office

slingo@usbr.gov

(509) 647-0297

5. Purpose of notification.

- This documentation is to notify the ACHP that the proposed Project will adversely affect historic properties pursuant to 36 Code of Federal Regulations (CFR) 800.6(a).

II. Information on the Undertaking

6. Describe the undertaking and nature of federal involvement (if multiple federal agencies are involved, specify involvement of each):

The Hungry Horse Modernization Project is being planned to replace and upgrade existing hydropower infrastructure at the dam and powerplant in order to maintain safe and reliable power generation operations for the long-term future. Much of the hydropower equipment at Hungry Horse dates from the time of its completion in 1953 and is beginning to show problems associated with aging power infrastructure at the end of its expected service life. Difficulty in obtaining replacement parts is becoming an obstacle to efficient powerplant operation, increasing unplanned outages and extending downtime.

Modernization will include inspecting, refurbishing, and replacing critical components throughout the Hungry Horse Project, including:

- Transformer Fire Protection & Powerplant Window Replacement
- Powerplant and Switchyard Disconnect Switch Replacement
- Crane Replacement
- Governor and Exciter Replacement
- Fixed Wheel Gate Overhaul
- Elevator Refurbishment
- Turbine Replacement
- Generator Rewind
- Selective Withdrawal System Overhaul
- Penstock Recoating
- Spillway Refurbishment
- Powerplant & Valve House Bi-fold Door Replacement
- Hollow Jet Valve and Outlet Tube Refurbishment

Many of these projects are inter-related and will require extensive coordination to complete over the ten year span of the modernization effort. Hungry Horse Project facilities may require additional unanticipated repairs that cannot be identified until the units are out of operation and accessible for internal inspection. The Hungry Horse Modernization Project is being planned and carried out by Reclamation.

7. Describe the Area of Potential Effects:

APE consultation documents and correspondence are included with the attached the Finding of Effect report as an appendix.

The project has the potential to result in direct physical effects to the ground surface at the staging areas. The project also has the potential to affect the built environment, especially the interior of the Powerhouse and the associated transformer deck and cranes. The project has limited potential to result in visual effects to the surrounding viewshed due to the replacement of the dam-top gantry crane. These three kinds of effects provide the basis for determining the APE. Total area for construction and staging areas is approximately 74 acres.

APE for Ground Surface-Disturbing Activities

The APE for ground disturbing activities includes the potential staging areas. These areas were selected to allow for the possibility that the areas might be used for laydown areas and staging for other materials used for the project.

APE for Activities that could affect the built environment

The APE for activities that might affect the built environment includes areas throughout the Hungry

Horse Dam and Powerplant. The three dimensional boundaries of the dam and powerhouse were established as the APE for these effects.

APE for Visual Effects of the Project

No new exterior additions beyond the scope of fire suppression measures on the transformer decks and the replacement the dam-top gantry crane are expected. The effects will be changes in degree and not in type, meaning that the existing scale and industrial character of the complex will not be affected. Due to these factors no separate Visual APE was included for the Hungry Horse Modernization Project.

8. Describe steps taken to identify historic properties:

Identification of historic properties was conducted by Reclamation cultural resource management staff who meet the Secretary of the Interior's Professional Qualification Standards in history, architectural history, and archeology.

Archeological Resources

Reclamation has reviewed records on file at the Grand Coulee Power Office and Hungry Horse Field Office to determine the extent of previous disturbance in the area of direct physical effects. During the construction of the dam and powerplant the site underwent massive disturbance due to excavation and aggregate production. As a result, no archeological resources remain in these areas. Recent projects have included portions of the secondary staging areas, confirming the absence of historic properties. Because disturbance will be limited to only the ground surface due to use of the areas for staging and storage, it as determined that test pits or shovel scrapes were not needed to identify archeological resources in these disturbed zones. Any additional archeological fieldwork necessitated by the expansion of the staging areas or site work will be conducted by personnel who meet the Secretary of the Interior's standards for professional archeologists.

Traditional Cultural Properties

No Traditional Cultural Properties that would be affected by the undertaking have been identified within the APE of the modernization project during past or ongoing consultations with the CSKT THPO.

Historic Structures

The Hungry Horse Project Historic American Engineering Record (HAER) document served as the primary reference point for identification and analysis of historic structures affected by the Hungry Horse Modernization effort. Extensive archival documentation related to the original construction of the complex was used as reference for assessing the effect of this project on the characteristics that make the complex eligible for the NRHP. Reclamation cultural resources staff investigated official reports, newspaper accounts, secondary sources, historic photos, and conducted site visits on several occasions.

9. Describe the historic property:

Construction of Hungry Horse Dam and Powerplant began in 1949. At the time that the Hungry Horse dam was completed in 1953 it was one of the largest concrete arch dams in world. Reaching of height of 564 feet above the excavated riverbed, the concrete arch dam holds back the South Fork of the Flathead River, creating a reservoir thirty-four miles long. It contains over 3 million yards of concrete, a volume exceeded by only three other dams, also constructed by Reclamation—Grand Coulee, Shasta, and Hoover. During its construction Reclamation pioneered the use of industrial fly ash as a pozzolanic additive to enhance durability and strength of the concrete, providing valuable lessons for the subsequent development of modern concrete. The four generating units at Hungry Horse Powerplant give it the second highest generating capacity of Reclamation's Columbia River facilities. The complex has been determined by Reclamation, in consultation with the Montana State Historic Preservation Office, to be eligible for the National Register of Historic Places (NRHP).

Hungry Horse Dam and Powerplant has regional significance due to its role in the larger Columbia River

power system and its impact on the commerce, industry, and social history of northwestern Montana. The complex may have national significance due to contributions to the development of modern methods of concrete construction, especially its use of industrial fly ash to enhance concrete performance.

This historical significance is embodied in the existing physical characteristics of the Hungry Horse complex. Much of the existing architecture and mechanical systems are little changed from the period of original construction.

The character defining features of the Hungry Horse Powerplant are well summarized in the 1958 report documenting the design and construction of the project. “The architectural treatment of the powerhouse achieves character and scale consistent with the massive concrete dam forming its back drop, by it is simple, massive proportions and large, plain surfaces devoid of superficial ornamentation. The plan of the structure is well defined by its principal façade. Continuous glazed metal windows . . . are located immediately below the roof projection of the unit bays.” Also mentioned are the elevator towers and functional interior ornamentation throughout the complex. The large cranes in the powerhouse and on top of the dam are original and form character defining elements due to their important historic role in dam operations and their visibility. The external appearance of the original generating units plays a character defining role by establishing a sense of scale in the powerhouse interior and because of their obvious functional importance.

10. Describe the undertaking’s effects on historic properties:

The Hungry Horse Modernization Project comprises individual projects affecting all the functional systems of the dam, powerhouse, switchyards, and withdrawal system. These projects will take place as a phased effort, and many of the individual project actions are interdependent. All but one of the sub-projects planned during this decade-long effort will not have an adverse effect on the historic integrity of character defining features at the project. Much of the work will be focused on repair of existing power infrastructure. Any replacements will either be in kind or in a few instances, such as the switch automation project, will substitute modern components with little or no visual evidence of the change. Reclamation has determined that such work will not affect the qualities that make Hungry Horse eligible for the NRHP and therefore will have no adverse effect under Section 106 of the National Historic Preservation Act.

11. Explain how this undertaking would adversely affect historic properties (include information on any conditions or future actions known to date to avoid, minimize, or mitigate adverse effects):

Reclamation has determined that one of the modernization sub-projects, replacement of the historic cranes, will adversely effect the historic character of Hungry Horse Dam and Powerplant. Execution of this project as planned will have direct negative effects on character defining features at Hungry Horse by diminishing integrity of materials, design, and feeling.

Steps taken to Minimize or Mitigate Adverse Effects

Reclamation seeks to avoid or minimize the effects of the Hungry Horse modernization on the historic dam and powerhouse complex. For the projects that do not have direct negative effects on historic resources, ensuring that the work is executed according to plan and meets applicable historic preservation standards and practices is the best way to avoid potential adverse effects.

Replacement of the historic cranes with reliable modern cranes of adequate weight capacity is considered to be a critical step in ensuring successful completion of the modernization effort. Retention and rehabilitation of the cranes was considered but dismissed, thereby eliminating the potential to avoid the adverse effect.

For the transformer fire protection project, Reclamation will avoid creating an adverse effect by replicating the existing historic steel windows in fire-rated materials and configuration.

Since it is not possible to completely avoid adverse effects to Hungry Horse’s historic integrity while

meeting the needs of the modernization effort, Reclamation has proposed in consultation with the Montana SHPO a variety of actions to mitigate the negative impact of the projects on historic properties:

- Reclamation will ensure that replacement cranes are compatible in configuration and, where possible, in scale with the historic cranes that they are replacing.
- Crane manufacturer's name plates will be retained as Bureau of Reclamation museum property. These could be used along with historic photos for interpretive purposes.
- Replacement cranes will be painted to match historic colors.
- New powerhouse windows will reproduce existing historic windows as closely as possible in materials and configuration. Shop drawings of the proposed new windows will be presented for SHPO review in further consultation.
- A large collection of historic photographs, drawings, product literature and other documents related to the construction of the Hungry Horse project is currently housed in sub-standard conditions at the dam. Reclamation will undertake to organize and re-house the collection in archival conditions meeting Department of the Interior Museum Program recommendations. Historic photos and other pertinent documents will be digitized and made accessible to the public as a study collection covering this important period of Montana history.

Completion of a Memorandum of Agreement (MOA) between Reclamation and the Montana SHPO will formalize and provide details for these proposed mitigation actions and for any other actions that may be agreed upon.

12. Provide copies or summaries of the views provided to date by any consulting parties, Indian tribes or Native Hawai'ian organizations, or the public, including any correspondence from the SHPO and/or THPO.

See attached correspondence.

III. Optional Information

13. Please indicate the status of any consultation that has occurred to date. Are there any consulting parties involved other than the SHPO/THPO? Are there any outstanding or unresolved concerns or issues that the ACHP should know about in deciding whether to participate in consultation?

Montana SHPO has concurred with Reclamation's determination of effect for the Modernization. Reclamation consulted previously with the Montana SHPO on one of the sub-projects, replacement of the generator governors and exciters, reaching a determination of no adverse effect.

Reclamation is engaged in ongoing consultation with the Confederated Salish and Kootenai Tribes (CSKT) concerning archeological and traditional cultural properties at Hungry Horse. The CSKT THPO has concurred with Reclamation's determinations concerning APE, level of effort, and finding of effect as shown in the attached correspondence.

14. Does your agency have a website or website link where the interested public can find out about this project and/or provide comments? Please provide relevant links:

No.

15. Is this undertaking considered a "major" or "covered" project listed on the Federal Infrastructure Projects Permitting Dashboard or other federal interagency project tracking system? If so, please provide the link or reference number:

No, the Hungry Horse Modernization does not fit these criteria.

The following are attached to this form (check all that apply):

_X_ Section 106 consultation correspondence

_X_ Maps, photographs, drawings, and/or plans

_X_ Additional historic property information (Finding of Effect Report, January 2017)

___ Other: