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Clark Canyon Dam Hydroelectric Project; Notice of Availability of Environmental Assessment; Notice

DEPARTMENT OF ENERGY

Federal Energy Regulatory Commission

[Project No. 14677–001—Montana]

Clark Canyon Dam Hydroelectric Project; Notice of Availability of Environmental Assessment

In accordance with the National Environmental Policy Act of 1969 and the Federal Energy Regulatory Commission's (Commission or FERC) regulations, 18 CFR part 380 (Order No. 486, 52 FR 47897), Office of Energy Projects staff have reviewed Clark Canyon Hydro, LLC's application for license for the proposed Clark Canyon Dam Hydroelectric Project. The project would be located at the U.S. Bureau of Reclamation's (Reclamation's) Clark Canyon Dam, on the Beaverhead River near the city of Dillon, Beaverhead County, Montana, and would occupy a total of 62.3 acres of federal land administered by the U.S. Bureau of Reclamation and the U.S. Bureau of Land Management.

Staff have prepared an environmental assessment (EA) analyzing the potential environmental impacts of the project, and conclude that constructing and operating the project, with appropriate environmental protective measures, would not constitute a major federal action that would significantly affect the quality of the human environment.

A copy of the EA is available for review at the Commission in the Public Reference Room or may be viewed on the Commission's Web site at *http://www.ferc.gov* using the ''eLibrary'' link. Enter the docket number excluding the last three digits in the docket number field to access the document. For assistance, contact FERC Online Support at *FERCOnlineSupport@ferc.gov* or toll-free at 1–866–208–3676, or for TTY, 202–502–8659.

You may also register online at *http://www.ferc.gov/docs-filing/esubscription.asp* to be notified via email of new filings and issuances related to this or other pending projects. For assistance, contact FERC Online Support.

Any comments should be filed within 30 days from the date of this notice. Comments may be filed electronically via the Internet. See 18 CFR 385.2001(a)(1)(iii) and the instructions on the Commission's Web site *http://www.ferc.gov/docs-filing/efiling.asp*. Commenters can submit brief comments up to 6,000 characters, without prior registration, using the eComment system at *http://www.ferc.gov/docs-filing/ecomment.asp*. You must include your name and contact information at the end of your comments.

For assistance, please contact FERC Online Support. Although the Commission strongly encourages electronic filing, documents may also be paper-filed. To paper-file, mail comments to: Kimberly D. Bose, Secretary, Federal Energy Regulatory Commission, 888 First Street NE., Washington, DC 20426. The first page of any filing should include docket number P–14677–001.

For further information, contact Kelly Wolcott by telephone at 202–502–6480 or by email at *kelly.wolcott@ferc.gov*.

Dated: June 23, 2016.

Kimberly D. Bose,

Secretary.

Environmental Assessment for Hydropower License

Clark Canyon Dam Project

FERC Project No. 14677–001

Montana

Federal Energy Regulatory Commission, Office of Energy Projects, Division of Hydropower Licensing, 888 First Street NE., Washington, DC 20426.

June 23, 2016.

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Acronyms and Abbreviations

AIR additional information request
APLIC Avian Power Line Interaction Committee
APE Area of Potential Effect
applicant Clark Canyon Hydro, LLC
BLM U.S. Bureau of Land Management
BMPs best management practices
°C degrees Celsius
certification Section 401 Water Quality Certification
CFR Code of Federal Regulations
cfs cubic feet per second
Commerce U.S. Department of Commerce
Commission Federal Energy Regulatory Commission
CWA Clean Water Act
CWQMP Construction Water Quality Monitoring Plan
District East Bench Irrigation District
DO dissolved oxygen
Revised DOEP Revised Dissolved Oxygen Enhancement Plan
EA environmental assessment
ESA Endangered Species Act
ESCP Erosion and Sediment Control Plan
°F degrees Fahrenheit
FERC Federal Energy Regulatory Commission
FPA Federal Power Act
FWS U.S. Fish and Wildlife Service
HPMP Historic Properties Management Plan
Interior U.S. Department of the Interior
IPaC Information, Planning, and Conservation system
kWh kilowatt-hour
kV kilovolt
L&WCF Land and Water Conservation Fund
mg/L milligram per liter
Montana DEQ Montana Department of Environmental Quality
Montana DFWP Montana Department of Fish, Wildlife and Parks
Montana DNRC Montana Department of Natural Resources and Conservation
Montana NHP Montana Natural Heritage Program
MOU Memorandum of Understanding
msl mean sea level
MW megawatt
MWh megawatt-hour
National Register National Register of Historic Places
NERC North American Electric Reliability Council
NHPA National Historic Preservation Act of 1966
NTU nephelometric turbidity unit
NWPP Northwest Power Pool
P–12429 FERC Project No. 12429
PA Programmatic Agreement
Park Service National Park Service
project Clark Canyon Dam Project
Reclamation U.S. Bureau of Reclamation
RM river mile
ROW right-of-way
SHPO State Historic Preservation Officer
SOC Species of Concern
TCP traditional cultural property
TDG total dissolved gas
TMDL total maximum daily load

ULT Ute ladies'-tresses
VMP Vegetation Management Plan
VRMP Visual Resources Management Plan

EXECUTIVE SUMMARY

Proposed Action

On November 23, 2015, Clark Canyon Hydro, LLC (applicant) filed an application to construct and operate the 4.7-megawatt (MW) Clark Canyon Dam Hydroelectric Project (project). The project would be located at the U.S. Bureau of Reclamation's (Reclamation's) Clark Canyon Dam on the Beaverhead River, near the city of Dillon, Montana.[1] The proposed project would occupy a total of 62.3 acres of federal land managed by Reclamation and the U.S. Bureau of Land Management.

Existing Reclamation Facilities

Reclamation's Clark Canyon Dam and Reservoir is a flood control and water conservation facility located at the head of the Beaverhead River[2] in southwestern Montana. Clark Canyon Dam was completed in 1964 as part of Reclamation's Pick-Sloan Missouri River Basin Program, East Bench Unit. It is managed to provide irrigation storage, flood control, and recreation opportunities.

Clark Canyon Dam is a 2,950-foot long, 147.5-foot high, zoned, earth-fill structure, with an uncontrolled spillway at a crest elevation of 5,578 feet mean sea level (msl). The reservoir has a volume of 257,152 acre-feet at the flood control pool elevation of 5,560.5 msl. The dam includes an intake structure and conduit located within the reservoir that leads to a shaft house at the dam crest. From the shaft house, a 9-foot-diameter outlet conduit carries water through the dam approximately 360 feet and discharges it into a stilling basin. The discharge capacity of the outlet works is 2,325 cubic feet per second (cfs) at a reservoir water surface elevation of 5,547 feet msl. Reclamation manages approximately 15 recreation sites at Clark Canyon Reservoir and just downstream of the dam, including fishing access, campgrounds, day-use areas, boat ramps, and an overlook.

Proposed Project Facilities

The proposed Clark Canyon Dam Hydroelectric Project would use the existing dam, reservoir, intake and outlet works, and stilling basin. The proposed project would involve the installation of a new 360-foot long, 8-foot diameter steel lining within Reclamation's outlet works from the existing gate chamber to the stilling basin. At the river end of the liner, a trifurcation would separate flows into two 8-foot-diameter, 35-foot-long steel penstocks leading to a new powerhouse and a new 10-foot long, 8-foot diameter steel outlet pipe that would discharge into the stilling basin through a fixed cone valve.[3] The 46-foot by 65-foot concrete powerhouse would be located at the toe of the dam adjacent to the stilling basin and contain two 2.35-megawatt (MW) vertical Francis-type turbine/generator units, for a total installed capacity of 4.7 MW. Water discharged from the turbines would pass through 25-foot-long steel draft tubes that would transition into a concrete draft tube and tailrace channel discharging into the stilling basin. An aeration basin, consisting of three 45-foot-long, 10-foot-wide frames containing 330 diffusers would be installed in the stilling basin to inject air into the water column to elevate DO levels by a maximum of 7.5 milligrams per liter above reservoir conditions at the intake before the water enters the Beaverhead River. Power would be carried through a 1,100-foot-long underground transmission line from the powerhouse to a new substation containing step-up transformers and switchgear, and from there along a 7.9-mile-long overhead transmission line to the existing Peterson Flat substation (the point of interconnection).

Proposed Operation

The project would operate in a run-of-release mode, meaning the project would operate only using flows made available by Reclamation in accordance with its standard practices and procedures; thus project operation would not affect storage or reservoir levels. The project would be operated automatically, but an operator would be on site daily.

Power generation would be seasonally dictated by Reclamation's operations. The project would be able to operate with flow release ranging from 87.5 to 700 cfs (minimum capacity of 87.5 cfs and a maximum capacity of 350 cfs per unit totaling 700 cfs). Flows less than the 87.5-cfs would cause the isolation valve in the penstock to close, allowing all flows to bypass the powerhouse and pass through the existing outlet works into the stilling basin. When the project is operating at maximum capacity, any inflows in excess of 700 cfs would bypass the powerhouse and continue to flow through Reclamation's existing outlet works and over its spillway into the stilling basin. The proposed project would generate up to 15,400 megawatt-hours (MWh) annually.

Proposed Environmental Measures

The applicant proposes the following environmental measures to protect or enhance aquatic, terrestrial, cultural, recreational and visual resources during project design, construction, and operation:

- Implement the Erosion and Sediment Control Plan (ESCP) filed with the license application to minimize soil erosion and dust, protect water quality, and minimize turbidity in the Beaverhead River;
- Implement the Instream Flow Release Plan filed with the license application with provisions to temporarily pump flows around Reclamation's existing intake and outlet works to prevent interrupting Reclamation's flow releases into the Beaverhead River during installation of the proposed project's penstock;
- Maintain compliance monitoring staff on site 24 hours per day and 7 days per week when bypassing flows around Reclamation's intake and outlet works to ensure prompt response to a pumping equipment failure or malfunction and Reclamation's flow releases are maintained in the Beaverhead River downstream.
- Implement the Construction Water Quality Monitoring Plan (CWQMP) filed with the license application that includes monitoring and reporting water temperature, dissolved oxygen (DO), total dissolved gas (TDG), and turbidity levels during construction to protect aquatic resources during construction;
- Implement the Revised Dissolved Oxygen Enhancement Plan (Revised DOEP) filed with the license application that includes installing and operating the aeration basin and monitoring and reporting of water temperature, DO, and TDG levels for a minimum of the first five years of project operation to ensure water quality does not degrade during project operation;
- Implement the Vegetation Management Plan filed with the license application that includes provisions for revegetating disturbed areas, wetland protection, and invasive weed control before, during, and after construction;
- Conduct a pre-construction survey for raptor nests and schedule construction activities or establish a 0.5-mile construction buffer, as appropriate, to minimize disturbance of nesting raptors;

[1] The applicant supplemented its application on December 10, 2015; February 1, 2016; February 9, 2016; and March 11, 2016.

[2] Red Rock River and Horse Prairie Creek flow into Clark Canyon reservoir; reservoir releases form the head of the Beaverhead River.

[3] The fixed cone value would provide a controlled release of flows when the powerhouse is offline or when the flow requirements are greater than the turbine capacity.

• Design and construct the project transmission line in accordance with current avian protection guidelines, including installing flight diverters and perch deterrents to prevent collision and electrocution hazards and increased predation of upland sage grouse;

• Implement the Visual Resources Management Plan (VRMP) filed with the license application that includes measures to design and select materials to reduce the visual contrast of project facilities;

• Post signs and public notice, limit construction hours, days, and locations, and stage construction traffic to reduce conflicts with recreational users and other motorists;

• Implement the Buffalo Bridge Fishing Access Road Management Plan filed with the license application that includes provisions for flagging, traffic control devices, and public notice of construction activities to maintain traffic safety and minimize effects on fishing access;

• Install and maintain an interpretive sign near the dam that describes the concept and function of the hydroelectric project and how it affects the sport fisheries, including any measures taken to eliminate or reduce adverse effects;

• Use a single-pole design for the transmission line, along with materials and colors that reduce visibility and blend with the surroundings; and

• Implement the revised Historic Properties Management Plan (HPMP) filed February 9, 2016, and stop work if any unanticipated cultural materials or human remains are found.

Public Involvement and Areas of Concern

This project was previously licensed under a similar design as FERC Project No.12429 (P–12429) on August 26, 2009.[4] The license was amended on March 7, 2013, to alter the project transmission line from a 0.3-mile-long, 24.9-kV buried transmission line to a 7.9-mile-long, 69-kV overhead powerline.[5] That license was terminated on March 19, 2015, for failure to commence construction by the deadline established in section 13 of the FPA. Because of the similarity of the project features and level of consultation that occurred during the preparation of the current license application, the Commission waived the pre-filing, three-stage consultation process and scoping for this project by notice issued on December 4, 2015. On February 23, 2016, the Commission issued a notice stating that the application was accepted and ready for environmental analysis, setting March 24, 2016, as the deadline for filing protests and motions to intervene as well as comments, terms and conditions, recommendations, and prescriptions.

The primary issues associated with licensing the project are the protection of wetlands, water quality, fish and wildlife habitat, visual resources, and cultural resources during project construction and operation.

Alternatives Considered

This EA analyzes the effects of project construction and operation and recommends conditions for an original license for the project. The EA considers three alternatives: (1) the applicant's proposal, as outlined above; (2) the applicant's proposal with staff modifications (staff alternative); and (3) no action—no project construction or operation (no-action alternative).

Staff Alternative

Under the staff alternative, the project would be constructed and operated as proposed by the applicant with the modifications and additional measures described below. This alternative includes all of the mandatory conditions specified by Reclamation under section 4(e) of the Federal Power Act and all but one of the conditions specified by Montana Department of Environmental Quality's (Montana DEQ) section 401 Water Quality Certification (certification).[6] Our recommended modifications and additional environmental measures include, or are based on, recommendations made by federal and state resource agencies that have an interest in resources that may be affected by operation of the proposed project.

Under the staff alternative, the project would include most of the applicant's proposed measures, as outlined above, and the following additional measures: (1) TDG and DO compliance monitoring at all times during project operation rather than just potentially for the first five years of operation; (2) water temperature monitoring for the first five years of project operation and, after consultation with the agencies, filing a proposal for Commission approval regarding the possible cessation of temperature monitoring after the first five years; (3) installing and maintaining a pressure transducer and water level alarm in the Beaverhead River when flows are being bypassed around Reclamation's existing intake and outlet works to alert compliance monitoring staff if water levels downstream of the dam are reduced; (4) notifying Montana Department of Fish, Wildlife, and Parks (Montana DFWP) in addition to Reclamation in the event of an unplanned shutdown during project operation; (5) notifying Montana DEQ and Montana DFWP within 24 hours of any deviation from water temperature, DO, TDG, or turbidity requirements during construction and operation and filing a report with the Commission within 30 days describing the deviation, any adverse effects resulting from the deviation, the corrective actions taken, any proposed measures to avoid future deviations, and comments or correspondence, if any, received from the agencies; (6) maintaining records of pre-construction raptor surveys that includes presence of birds, eggs, and active nests, the qualifications of the biologist performing the survey, and measures implemented to avoid disturbing nesting birds; and (7) constructing the transmission line segments that cross the Horse Prairie and Medicine Lodge drainages outside of the greater sage-grouse breeding season (March 1–April 15); and (8) revising the HPMP in consultation with the Montana State Historic Preservation Officer (Montana SHPO) and Reclamation to include a Treatment Plan to resolve project effects on the Clark Canyon Dam and to clarify consultation procedures and filing the plan with the Commission for approval prior to construction.

Under the no-action alternative, the proposed project would not be built and environmental resources in the project area would not be affected.

Project Effects

Geology and Soils

Some unavoidable minor, short-term increases in turbidity would occur in the Beaverhead River downstream of the project during project construction. These effects would be minimized by implementing the applicant's ESCP.

Aquatic Resources

Operating the project in a run-of-release mode would protect aquatic habitat in the impoundment and in the Beaverhead River downstream of the project. Installing the penstock and associated valves would temporarily impair Reclamation's ability to release stream flows downstream of the dam.

[4] *See* 128 FERC ¶ 62,129 (2009).

[5] *See* 142 FERC ¶ 62,192 (2013).

[6] The staff alternative does not include condition 11 which stipulates that the applicant meet annually with all watershed stakeholders to discuss water quality monitoring efforts associated with project operation. However, we recognize that the Commission is required to include valid section 401 water quality certification conditions in any license issued for the project.

However, pumping flows around Reclamations' existing intake and outlet works to the Beaverhead River as outlined in the applicant's Final Instream Flow Release Plan would ensure that streamflows and water quality are maintained downstream during this phase of construction. Also, the applicant's proposal to provide 24-hour attendance of the pumping system for the duration of pumping activities would ensure that any failure or malfunction of the pumping equipment could be dealt with in a timely manner to avoid downramping during the trout spawning season. Staff's recommendation to install a flow meter and water level alarm would detect falling water levels in the event of an equipment failure and alert construction staff of the need to activate backup pumps.

Current dam operations can cause total dissolved gases (TDG) levels to rise above 115 percent saturation, exceeding the state standard of 110 percent and potentially harming fish. Discharging flows through the project instead of Reclamation's outlet works would reduce the plunging effect and potential for entrained air to enter solution under pressure, thereby reducing the potential for TDG supersaturation which would be a project benefit. However, TDG supersaturation could still affect aquatic resources at times in the summer or early fall when flow release requirements exceed the hydraulic capacity of the project or when the project is shut down and flows exit at high pressure through the existing outlet works.

Reducing the turbulence from Reclamation's discharges could also reduce dissolved oxygen (DO) levels downstream. However, injecting air through the proposed aeration basin based on incoming DO levels and the level of aeration needed to maintain the state criteria of 7.5–8.0 mg/L as described in the applicant's Revised DOEP would maintain adequate DO levels in the project tailrace and potentially enhance DO levels in the summer months, which would benefit trout in the Beaverhead River. Deploying corrective measures and emergency shutdown procedures if DO falls below state criteria would further protect aquatic resources during low DO periods.

The applicant's proposal to monitor water temperature, DO, TDG, and turbidity prior to and during construction as described in its CWQMP and its proposal to monitor water temperature, DO, and TDG for a minimum of the first five years of project operation as described in its Revised DOEP would allow the applicant to document and report compliance with state water quality criteria and would inform the need for corrective measures to protect water quality during the monitoring period. Staff's recommendation that the applicant extend monitoring for DO and TDG for the term of any license issued would ensure that the aeration basin continues to function properly and maintains or improves water quality downstream. Staff's recommended reporting requirements during construction and operation would facilitate the Commission's administration of the license and ensure that any appropriate corrective measures to protect water quality are timely identified and implemented.

The applicant's proposal to screen the pump intakes would limit the potential for entrainment of fish during project construction. However, some fish are likely to be entrained and injured as they pass through the project turbines during operation similar to existing conditions.

Terrestrial Resources

Project construction would temporarily disturb and displace some wildlife and would permanent remove 0.10 acres of vegetation. Implementing the best management practices in the applicant's proposed VMP would protect wetlands and prevent the introduction and spread of noxious weeds during construction.

Vegetation lost during construction of the transmission line right-of-way and staging and spoil areas would be restored following construction using native plant species approved by Reclamation and BLM which would provide locally-adapted and naturally-occurring habitat and forage for wildlife.

The potential for avian electrocutions and collisions with the transmission line would be reduced by the applicant's proposals to design the transmission line in adherence to current avian protection standards, including installing flight diverters and perch deterrents on the power line. Perch deterrents would also discourage predators from perching on the transmission line poles, which would protect greater sage-grouse. Restricting construction within 0.5 miles of a raptor nests would avoid disturbing or displacing nesting raptors.

Threatened and Endangered Species

Project construction and operation would not affect the federally listed threatened Ute ladies'-tresses, the threatened grizzly bear, or the threatened Canada lynx because the project area does not contain suitable habitat for either species, or for the snowshoe hare, which is the primary prey of the Canada lynx. There is no designated critical habitat within the project area for these species.

Cultural Resources

Clark Canyon Dam and six other cultural resource sites along the transmission corridor were identified during site investigations. Project construction would only affect the Clark Canyon Dam, which was determined to be eligible for listing on the National Register of Historic Places. The Montana SHPO concurred with these findings.[7] Revising the HPMP to include a Treatment Plan to resolve project effects on the Clark Canyon Dam and to clarify consultation procedures for addressing any future maintenance activities would protect known and any newly discovered historic properties.

Recreation, Land Use, and Aesthetics

Clark Canyon Reservoir and the Beaverhead River are popular recreational destinations, particularly for fishing, boating, and camping. The noise and dust associated with construction activities could disturb recreationists, and safety concerns could arise where recreational users and construction vehicles use the same roadways to access areas near the dam or transmission line. The applicant's proposed Buffalo Bridge Fishing Access Road Management Plan would reduce the effects of construction traffic on recreation users at that location. The applicant's proposed limits on construction hours and days, along with public notice of construction activities would help to minimize conflicts with recreational users, and its proposed signing, flagging, barriers, and construction traffic staging would minimize conflicts with other motorists. During project operation, minor noise and light from the powerhouse could be noticeable to recreation users nearby, particularly below the dam.

Installing and maintaining an interpretive sign at the Clark Canyon Dam Fishing Access site would inform visitors of the concept and function of the hydroelectric project, how it affects the sport fisheries, and any measures taken to eliminate or reduce adverse effects.

Construction of the powerhouse, transmission line, and construction and access roads would introduce new visual elements to the existing

[7] *See* the Programmatic Agreement issued by the Commission on May 5, 2016, and the letter from the Montana SHPO to the Commission, filed March 25, 2016.

environment. Implementing the applicants proposed Visual Resources Management Plan would ensure that project design incorporates the use of color, form, grading, and revegetation that would minimize the project's long-term visual contrast with the existing environment. The overhead transmission line would be designed and located to further minimize visual effects on scenic vistas and nearby recreational use.

Under the no-action alternative, the project would not be constructed and the environmental resources in the project areas would not be affected.

Conclusions

Based on our analysis, we recommend licensing the project as proposed by the applicant with staff modifications and additional measures, as described above under *Alternatives Considered.*

In section 4.2 of the EA, we estimate the likely cost of alternative power for each of the two alternatives identified above. Our analysis shows that during the first year of operation under the applicant's proposal, project power would cost $2,331,512, or $151.40/MWh, more than the likely alternative cost of power. Under the staff alternative, project power would cost $2,335,362, or $151.65/MWh, more than the likely alternative cost of power.

We chose the staff alternative as the preferred alternative because: (1) the 4.7–MW project would save the equivalent amount of fossil-fueled generation and capacity, thereby helping to conserve non-renewable energy resources and reduce atmospheric pollution; and (2) the recommended environmental measures proposed by the applicant, as modified by staff, would adequately protect and enhance environmental resources affected by the project. The overall benefits of the staff alternative would be worth the cost of the proposed and recommended environmental measures.

We conclude that issuing a license for the project, with the environmental measures that we recommend, would not be a major federal action significantly affecting the quality of the human environment.

Environmental Assessment

Federal Energy Regulatory Commission, Office of Energy Projects, Division of Hydropower Licensing, Washington, DC

Clark Canyon Dam Hydroelectric Project

FERC Project No. 14677–001—Montana

Month XX, 2016

1.0 INTRODUCTION

1.1 Application

On November 23, 2015, Clark Canyon Hydro, LLC (applicant) filed an application for an original license to construct, operate, and maintain the Clark Canyon Dam Hydroelectric Project (project). The 4.7-megawatt (MW) project would be located at the U.S. Bureau of Reclamation's (Reclamation's) Clark Canyon Dam on the Beaverhead River, near the city of Dillon, Montana (figure 1). The proposed project would occupy 62.1 acres of federal lands within the Pick-Sloan Missouri Basin Program, East Bench Unit, administered by Reclamation, and 0.2 acres of land administered by the U.S. Bureau of Land Management. The project would generate an average of about 15,400 megawatt-hours (MWh) of energy annually.

1.2 Purpose of Action and Need For Power

1.2.1 Purpose of Action

The Federal Energy Regulatory Commission (Commission or FERC) must decide whether to issue a license to the applicant for the project and what conditions should be placed in any license issued. In deciding whether to issue a license for a hydroelectric project, the Commission must determine that the project will be best adapted to a comprehensive plan for improving or developing a waterway. In addition to the power and developmental purposes for which licenses are issued (*e.g.,* flood control, irrigation, and water supply), the Commission must give equal consideration to the purposes of energy conservation, the protection, mitigation of damage to, and enhancement of fish and wildlife (including related spawning grounds and habitat), the protection of recreational opportunities, and the preservation of other aspects of environmental quality.

Issuing a license for the project would allow the applicant to generate electricity at the project for the term of an original license, making electric power from a renewable resource available to the public.

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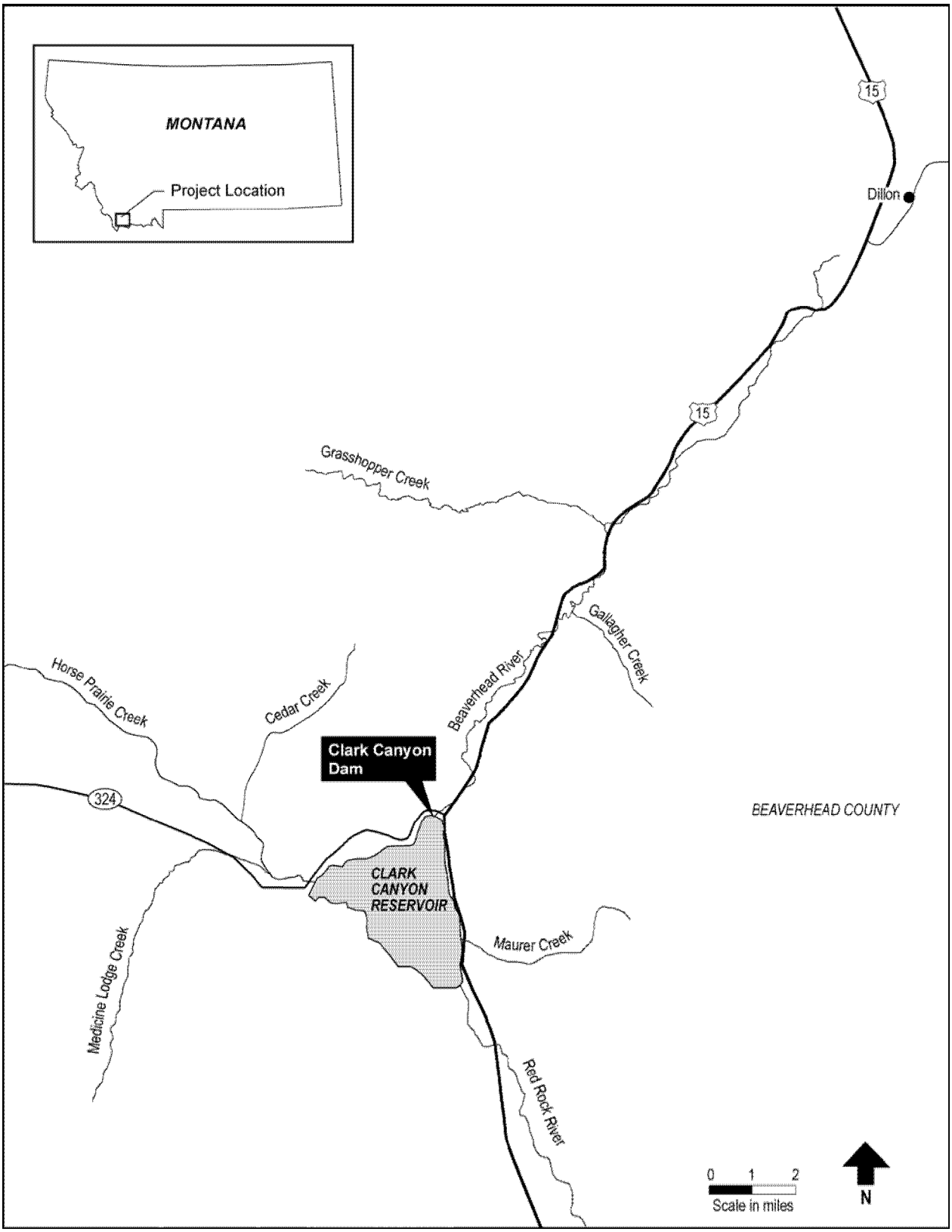

Figure 1. Location of Clark Canyon Dam Hydroelectric Project (Source: staff).

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This environmental assessment (EA) assesses the environmental and economic effects of constructing and operating the proposed hydroelectric project: (1) As proposed by the applicant, and (2) with our recommended measures and agency mandatory conditions. We also consider the effects of the no-action alternative. Important issues that are addressed include the protection of wetlands, water quality, fish and wildlife habitat, visual resources, and cultural resources during project construction and operation.

1.2.2 Need for Power

The project would provide hydroelectric generation to meet part of Montana's power requirements, resource diversity, and capacity needs. The project would have an installed capacity of 4.7 MW and generate approximately 15,400 MWh per year.

The North American Electric Reliability Corporation (NERC) annually forecasts electric supply and demand nationally and regionally for a 10-year period. The proposed project would be located in the Northwest Power Pool area of the Western Electricity Coordinating Council (WECC) region of NERC. For the 2016–2025 time period, NERC projects that total demand for the summer, the peak season for the entire WECC Region, decreased by 2.3 percent due to generally mild temperatures and increased distributed solar generation. The demand for the summer season is projected to increase by 1.1% per year, while the annual energy load is projected to increase by 1.2% per year for the same time period.

We conclude that power from the proposed project would help meet a need for power in the WECC region in both the short and long term. The project would provide power that would displace non-renewable, fossil-fired generation and contribute to a diversified generation mix. Displacing the operation of fossil-fueled facilities avoids some power plant emissions and creates an environmental benefit.

1.3 Statutory and Regulatory Requirements

A license for the project is subject to numerous requirements under the Federal Power Act (FPA) and other applicable statutes. The major regulatory and statutory requirements are summarized in table 1 and described below.

TABLE 1—MAJOR STATUTORY AND REGULATORY REQUIREMENTS FOR THE CLARK CANYON DAM HYDROELECTRIC PROJECT

[Source: Staff]

Requirement	Agency	Status
Section 18 of the FPA (fishway prescriptions)	FWS	No fishway prescription or requests for reservation of authority to prescribe fishways were filed.
Section 4(e) of the FPA (land management conditions).	Reclamation	Interior, on behalf of Reclamation, filed preliminary conditions on March 17, 2016.
Section 10(j) of the FPA	FWS	Interior, on behalf of FWS, filed section 10(j) recommendations on March 17, 2016.
	Montana DFWP	No section 10(j) recommendations were filed.
Endangered Species Act consultation	FWS	Commission staff generated official species list from FWS's IPaC website on April 15, 2016.
Clean Water Act—section 401 water quality certification.	Montana DEQ	Applicant submitted an application for certification on April 15, 2016, which was received by Montana DEQ on April 18, 2016. Montana DEQ issued a draft certification for public comment on June 3, 2016; comments are due to Montana DEQ by July 5, 2016. Certification is due by April 18, 2017.
National Historic Preservation Act	Montana SHPO	The Clark Canyon Dam was determined to be eligible for listing on the National Register of Historic Places. A PA was signed by the SHPO and filed on May 31, 2016, requiring the applicant to revise its HPMP and prepare a Treatment Plan to resolve effects.

Notes: Commission—Federal Energy Regulatory Commission. FPA—Federal Power Act. FWS—U.S. Fish and Wildlife Service. HPMP—Historic Properties Management Plan. Interior—U.S. Department of the Interior. Montana DEQ—Montana Department of Environmental Quality. Montana DFWP—Montana Department of Fish, Wildlife and Parks. Montana SHPO—Montana State Historic Preservation Officer. PA—Programmatic Agreement. Reclamation—U.S. Bureau of Reclamation.

1.3.1 Federal Power Act

1.3.1.1 Section 18 Fishway Prescription

Section 18 of the FPA states that the Commission is to require construction, operation, and maintenance by a licensee of such fishways as may be prescribed by the Secretaries of the U.S. Department of Commerce (Commerce) or the U.S. Department of the Interior (Interior). Neither Commerce nor Interior filed a fishway prescription or requested a reservation of authority to prescribe fishways at the project.

1.3.1.2 Section 4(e) Conditions

Section 4(e) of the FPA provides that any license issued by the Commission for a project within a federal reservation shall be subject to and contain such conditions as the Secretary of the responsible federal land management agency deems necessary for the adequate protection and use of the reservation. Interior, on behalf of Reclamation, filed preliminary conditions on March 17, 2016, pursuant to section 4(e) of the FPA. These conditions are described under section 2.2.5, *Modifications to Applicant's Proposal—Mandatory Conditions.*

1.3.1.3 Section 10(j) Recommendations

Under section 10(j) of the FPA, each hydroelectric license issued by the Commission must include conditions based on recommendations provided by federal and state fish and wildlife agencies for the protection, mitigation, or enhancement of fish and wildlife resources affected by the project. The Commission is required to include these conditions unless it determines that they are inconsistent with the purposes and requirements of the FPA or other applicable law. Before rejecting or modifying an agency recommendation, the Commission is required to attempt

to resolve any such inconsistency with the agency, giving due weight to the recommendations, expertise, and statutory responsibilities of such agency.

On March 17, 2016, Interior, on behalf of the U.S. Fish and Wildlife Service (FWS), timely filed recommendations under section 10(j), as summarized in table 7 in section 5.4.1, *Recommendations of Fish and Wildlife Agencies.* In section 5.4, *Summary of Section 10(j) Recommendations and 4(e) Conditions,* we discuss how we address the agency recommendations and comply with section 10(j).

1.3.2 Clean Water Act

Under section 401 of the Clean Water Act (CWA), a license applicant must obtain certification from the appropriate state pollution control agency verifying compliance with the CWA. On April 15, 2016, the applicant applied to the Montana Department of Environmental Quality (Montana DEQ) for 401 water quality certification (certification) for the Clark Canyon Dam Hydroelectric Project. Montana DEQ acknowledged receipt of the application on April 18, 2016.[8] Montana DEQ issued a draft certification for a 30-day public comment period on June 3, 2016; comments are due to Montana DEQ by July 5, 2016. Clark Canyon Hydro filed the draft certification with the Commission on June 7, 2016. The certification is due by April 18, 2017.

1.3.3 Endangered Species Act

Section 7 of the Endangered Species Act (ESA) requires federal agencies to ensure that their actions are not likely to jeopardize the continued existence of endangered or threatened species or result in the destruction or adverse modifications of the critical habitat of such species. No federally listed species are known to occur within the project area; however, on April 15, 2016, Commission staff generated an official species list on FWS's Information, Planning, and Conservation (IPaC) Web site that indicates that three threatened species: The Ute ladies'-tresses (*Spiranthes diluvialis*), the grizzly bear (*Ursus arctos horribilis*), and the Canada lynx (*Lynx canadensis*) may occur in the project area. There are no critical habitats in the project area for these species. See section 3.3.4, *Threatened and Endangered Species,* for our analysis of the occurrence of listed species and the potential for effects on them. We conclude that the proposed action would have no effect on the threatened Ute ladies'-tresses, threatened grizzly bear, or the threatened Canada lynx.

1.3.4 National Historic Preservation Act

Section 106 of the National Historic Preservation Act of 1966 (NHPA) as amended requires that every federal agency ''take into account'' how the agency's undertakings could affect historic properties. Historic properties are districts, sites, buildings, structures, traditional cultural properties (TCPs), and objects significant in American history, architecture, engineering, and culture that are eligible for inclusion in the National Register of Historic Places (National Register).

The Clark Canyon Dam was determined to be individually eligible for listing on the National Register and would be adversely affected by project construction; six other sites located along the transmission line corridor that may or may not be eligible would not be adversely affected by project construction and operation. Commission staff and the Montana SHPO concurred with these findings as discussed in a letter and Programmatic Agreement (PA) issued on May 5, 2016. The SHPO signed the PA and filed it on May 31, 2016. In the event that a license is issued for the project, the PA requires the licensee to revise its proposed HPMP[9] to include a Treatment Plan to resolve effects on the dam, as well as address other concerns raised by the SHPO and Reclamation with regard to future consultation and review of ongoing activities at the dam (as discussed in section 3.3.6, *Cultural Resources*). The Treatment Plan and revised HPMP would be developed by the licensee in consultation with the SHPO and Reclamation, and would be filed with the Commission for approval prior to construction. Additionally, the Commission contacted the Shoshone-Bannock, Eastern Shoshone, Nez Perce, and Salish-Kootenai tribes inviting comments and consultation. No comments or requests for consultation were received from the tribes.

1.4 Public Review and Consultation

The Commission's regulations (18 Code of Federal Regulations [CFR], section 4.38) require that applicants consult with appropriate resource agencies, tribes, and other entities before filing an application for a license. This consultation is the first step in complying with the Fish and Wildlife Coordination Act, the ESA, the NHPA, and other federal statutes. Pre-filing consultation must be complete and documented according to the Commission's regulations.

In its tendering notice issued December 4, 2015, the Commission stated its intent to waive the three-stage pre-filing consultation process and scoping for this project based on the pre-filing consultation record. No objections were filed.

1.4.1 Interventions

On February 23, 2016, the Commission issued a notice stating that the applicant's application was accepted and ready for analysis. This notice set March 24, 2016, as the deadline for filing protests and motions to intervene. On March 22, 2016, Upper Missouri Waterkeeper filed a motion to intervene.

1.4.2 Comments on the License Application

The February 23, 2016, notice solicited comments, terms and conditions, recommendations, and prescriptions. In a letter filed March 17, 2016, Interior, on behalf of Reclamation and FWS, filed preliminary comments, terms and conditions, recommendations, and prescriptions. The following entities commented:

Commenting agencies and other entities	Date filed
Wade Fellin	February 26, 2016.
Brian Wheeler	March 1, 2016.
Michael Stack	March 8, 2016.
Tim Hunt	March 11, 2016.
Steve Hemkens	March 14, 2016.
Kimball Leighton	March 17, 2016.
Department of the Interior	March 17, 2016.

[8] The letter confirming receipt was dated April 18, 2016, and filed with the Commission the following day.

[9] The HPMP filed with the license application was developed by the applicant before the Clark Canyon Dam was determined to be eligible for listing on the National Register. A modified HPMP filed by the applicant on February 9, 2016, acknowledges eligibility and adverse effects on the dam, but does not resolve the effects.

Commenting agencies and other entities	Date filed
Gregg B. Messel	March 21, 2016.
Woody Bailey	March 21, 2016.
Montana Department of Fish, Wildlife & Parks	March 24, 2016.
Rhonda Sellers (on behalf of International Federation of Fly Fishers)	March 24, 2016.
Luke Massaro	March 24, 2016.
Christian Appel	March 24, 2016.
Cordell Appel	March 24, 2016.
Upper Missouri Waterkeeper [10]	March 24, 2016.
Montana Historical Society	March 25, 2016.
Montana Trout Unlimited	March 25, 2016.

The applicant filed reply comments on April 8, 2016.

2.0 PROPOSED ACTION AND ALTERNATIVES

2.1 No-Action Alternative

The no-action alternative is license denial. Under the no-action alternative, the proposed project would not be built and environmental resources in the project area would not be affected.

2.2 Applicant's Proposal

2.2.1 Proposed Project Facilities

Reclamation's Clark Canyon Dam and Reservoir are existing flood control and water conservation facilities at the head of the Beaverhead River in southwestern Montana, about 20 miles southwest of Dillon, Montana. Clark Canyon Dam was completed in 1964 for Reclamation's Pick-Sloan Missouri River Basin Program, East Bench Unit, which was authorized as part of the Flood Control Acts of 1944 and 1946.

The dam is a zoned, earth-fill structure that is approximately 2,950 feet long at the crest. The crest of the dam is at elevation 5,578 feet mean sea level (msl), with a structural height of 147.5 feet and width of 36 feet. The outlet works include an approach channel, an intake structure, a concrete conduit, a shaft house, and a 9-foot-diameter conduit that discharges into a stilling basin. The outlet works contain a gate chamber with four 3-foot by 6.5-foot high pressure gates. The discharge capacity of the outlet works is 2,325 cubic feet per second (cfs) at a reservoir water surface elevation of 5,547 feet msl. In addition, there is a separate uncontrolled spillway with a crest elevation of 5,571.9 feet msl, and a design discharge of 9,520 cfs.

The proposed project (figure 2) would use the existing dam, reservoir, and outlet works, and would consist of the following new facilities: (1) A 360-foot-long, 8-foot-diameter steel penstock within Reclamation's existing concrete conduit, ending in a trifurcation; (2) two 35-foot-long, 8-foot-diameter steel penstocks equipped with isolation valves extending from the trifurcation to the powerhouse, each penstock transitioning to 6-foot-diameter before entering the powerhouse; (3) a 10-foot-long, 8-foot-diameter steel penstock leaving the trifurcation and ending in a 7-foot-diameter cone valve and reducer to control discharge into Reclamation's existing outlet stilling basin; (4) a 65-foot-long, 46-foot-wide reinforced concrete powerhouse, located at the toe of the dam adjacent to the spillway stilling basin, containing two vertical Francis-type turbine/generator units with a total capacity of 4.7 MW; (5) two 25-foot-long steel draft tubes transitioning to a concrete draft tube/tailrace section; (6) a 17-foot-long, 15-foot-wide tailrace channel connecting with Reclamation's existing spillway stilling basin; (7) an aeration basin downstream of the powerhouse with three 45-foot-long, 10-foot-wide frames containing 330 diffusers; (8) a 4.16-kilovolt (kV) buried transmission line from the powerhouse to a substation containing step-up transformers and switchgear located 1,100 feet downstream of the powerhouse; (9) a 500-foot-long access road connecting to the existing access road; (10) a 7.9-mile-long, 69-kV overhead transmission line extending from the substation to the Peterson Flat substation (the point of interconnection); and (11) appurtenant facilities.

2.2.2 Proposed Project Boundary

The proposed project boundary [11] will enclose: 4.3 acres around the outlet conduit, penstock, powerhouse, aeration basin, tailrace, and valve house; 1.9 acres of staging area; 2.5 acres along proposed and existing access roads; and 0.4 acres along the transmission line corridor, for a total of about 12.7 acres of federal lands under jurisdiction of Reclamation's Pick-Sloan Missouri Basin Program, East Bench Unit.

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[10] Upper Missouri Waterkeeper also filed a form letter signed by 178 citizens urging the Commission to consider how the project may contribute to recent poor water quality conditions in the Beaverhead River.

[11] Upper Missouri Waterkeeper's recommends that the existing Clark Canyon Dam and Reservoir be included in the project boundary. However, since the dam was constructed and is operated by Reclamation for flood control and water conservation purposes, the applicant will have no control over the dam or reservoir. The dam and reservoir would not be project features to be included in the project boundary.

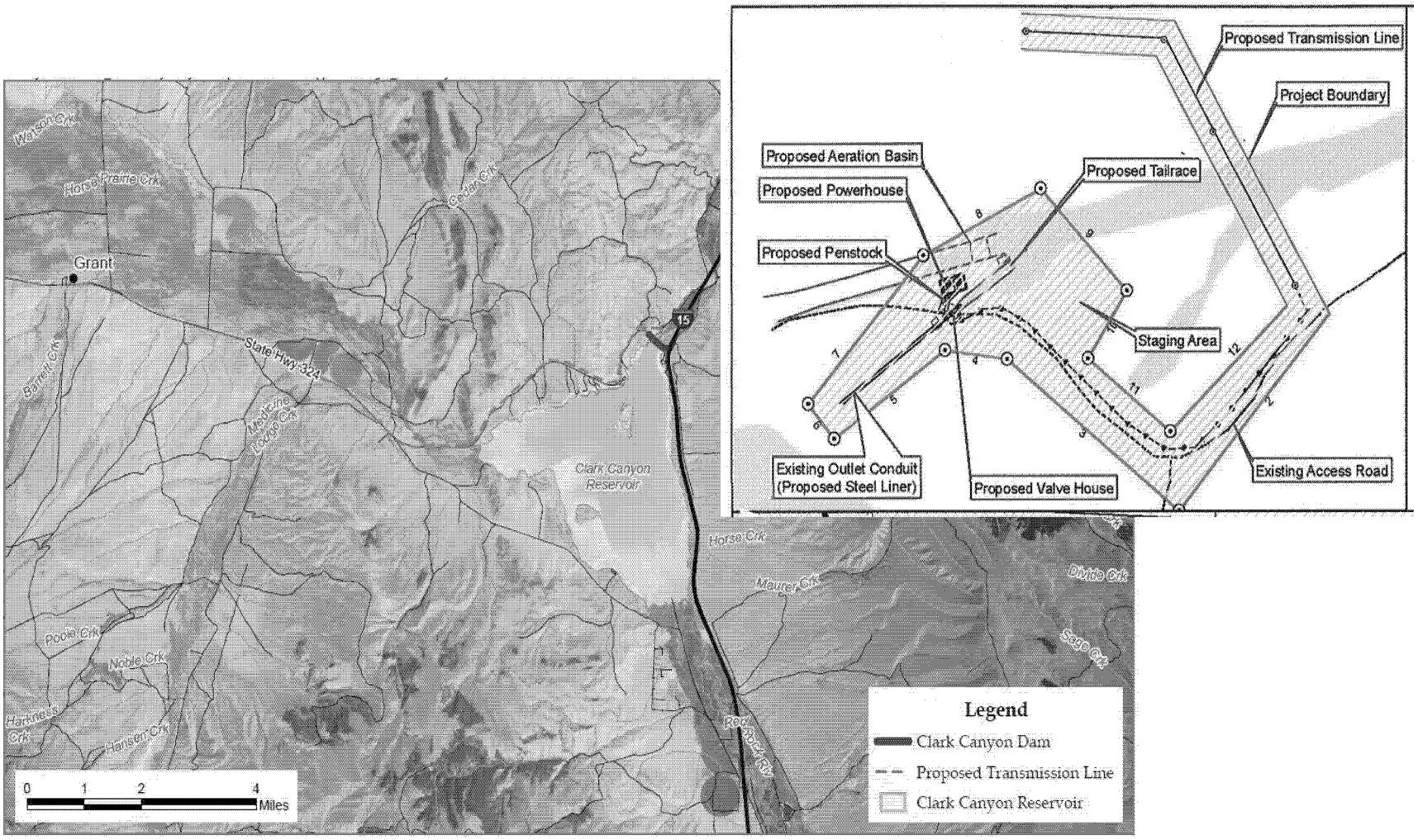

Figure 2. Clark Canyon Dam Project features (Source: Clark Canyon Hydro, LLC, 2015, as modified by staff).

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2.2.2 Project Safety

As part of the licensing process, the Commission would review the adequacy of the proposed project facilities. Special articles would be included in any license issued, as appropriate. Commission staff would inspect the licensed project both during and after construction. Inspection during construction would concentrate on adherence to Commission-approved plans and specifications, special license articles relating to construction, and accepted engineering practices and procedures. Operational inspections would focus on the continued safety of the structures, identification of unauthorized modifications, efficiency and safety of operation, compliance with the terms of the license, and proper maintenance. Additionally, Reclamation's preliminary section 4(e) conditions require Reclamation review and approval of plans and specifications to ensure structural adequacy and compatibility of the proposed projects with the authorized purposes of Reclamation's East Bench Unit. Any license issued would give Reclamation oversight over construction, operation, and maintenance of the project as they pertain to the structural integrity or operation of the East Bench Unit. Construction, operation, and maintenance of project works that may affect the structural integrity or operation of the East Bench Unit would also be subject to periodic or continuous inspections by Reclamation.

2.2.3 Proposed Project Operation

The Clark Canyon Dam and Reservoir are owned and operated by Reclamation for irrigation storage, flood control, and recreational opportunities. Reclamation's existing facilities are not currently capable of providing hydroelectric power generation. Regulation of the reservoir and corresponding water releases are made in accordance with standard procedures developed by Reclamation. The East Bench Irrigation District (District) is responsible for operation of the dam and reservoir in close coordination with Reclamation. Operation of the dam and reservoir would not be altered to accommodate operation of the proposed hydroelectric facilities. The proposed project would use water that is currently released from the reservoir into the Beaverhead River through the existing intake structure and outlet works on the dam.

The proposed hydropower project would require no modification to existing Clark Canyon Dam and Reservoir uses and would operate in a run-of-release mode with no daily storage, using normally released flows to produce power. The hydropower project would have the ability to be operated automatically, but an operator would be on site daily for operation. Power generation would be seasonally dictated as flow regimes, reservoir levels, and so on are set forth by Reclamation.

The project would operate using Reclamation's flow releases ranging from 87.5 to 700 cfs (minimum capacity of 87.5 cfs and a maximum capacity of 350 cfs per unit totaling 700 cfs). Flows less than the 87.5-cfs would cause the isolation valve in the penstock to close, allowing all flows to bypass the powerhouse and flow through the existing outlet works into the stilling basin. When the project is operating at maximum capacity, flows in excess of 700 cfs would continue to flow through Reclamation's existing outlet works and over its spillway into the stilling basin.

The proposed project would have an installed generating capacity of 4.7 MW, with an average annual generation of 15,400 MWh.

2.2.4 Proposed Environmental Measures

The applicant proposes the following environmental measures:

- Implement the Erosion and Sediment Control Plan (ESCP) filed with the license application to minimize soil erosion and dust, protect water quality, and minimize turbidity in the Beaverhead River;
- Implement the Instream Flow Release Plan filed with the license application with provisions to temporarily pump bypassed flows around Reclamation's existing intake and outlet works to prevent interrupting Reclamation's flow releases into the Beaverhead River during installation of the proposed project's penstock;
- Maintain qualified compliance monitoring staff on site 24 hours per day and 7 days per week when flows are bypassing Reclamation's outlet works to ensure staff promptly responds to a pumping equipment failure or malfunction and ensure Reclamation's flow releases are maintained in the Beaverhead River downstream;
- Implement the Construction Water Quality Monitoring Plan (CWQMP) filed with the license application that includes monitoring and reporting water temperature, dissolved oxygen (DO), total dissolved gas (TDG), and turbidity levels during construction;
- Implement the Revised Dissolved Oxygen Enhancement Plan (Revised DOEP) filed with the license application that includes installing and operating an aeration basin to increase DO levels of water exiting the powerhouse and monitoring and reporting water temperature, DO, and TDG levels for a minimum of the first five years of project operation to ensure water quality does not degrade during project operation;
- Implement the Vegetation Management Plan filed with the license application that includes provisions for revegetating disturbed areas, wetland protection, and invasive weed control before, during, and after construction;
- Conduct a pre-construction survey for raptor nests and schedule construction activities or establish a 0.5-mile construction buffer as appropriate to minimize disturbing nesting raptors;
- Design and construct the project transmission line in accordance with current avian protection guidelines, including installing flight diverters and perch deterrents;
- Post signs and public notice, limit construction hours, days, and locations, and stage construction traffic to reduce conflicts with recreational users and other motorists;
- Implement the Buffalo Bridge Fishing Access Road Management Plan filed with the license application, including provisions for flagging, traffic control devices, and public notice of construction activities to maintain traffic safety and minimize effects on fishing access;
- Install and maintain an interpretive sign near the dam that describes the concept and function of the hydroelectric project and how it affects the sport fisheries, including any measures taken to eliminate or reduce adverse effects;
- Use a single-pole design for the transmission line, along with materials and colors that reduce visibility and blend with the surroundings; and
- Implement the revised Historic Properties Management Plan (HPMP) filed February 9, 2016. Stop work if any unanticipated cultural materials or human remains are found.

2.2.5 Modifications to Applicant's Proposal—Mandatory Conditions

2.2.5.1 Section 4(e) Land Management Conditions

Interior, on behalf of Reclamation, filed nine mandatory conditions under FPA section 4(e). Conditions 1 through 3 and conditions 5 through 9 are administrative conditions that would require the applicant to enter into a construction, operation, and maintenance agreement with Reclamation; consult with and receive

approval from Reclamation for those facilities that would be an integral part of, or could affect the structural integrity or operation of, the federal reservation; not impair the structural integrity or operation of the federal facilities or the federal government's ability to fulfill its trust responsibilities to Indian tribes; have no claim against the United States arising from any change in operation of the federal facility; recognize the primary right of any Reclamation activity or the fulfillment of Indian water rights taking precedence over project hydropower activities; provide to the Commission's Regional Engineer copies of all correspondence between the licensee and Reclamation; provide Reclamation the opportunity to review and approve the design of contractor-designed cofferdams, blasting, and deep excavations; and acknowledge that the timing, quantity, and location of water releases and release changes from the facilities would be at the sole discretion of Reclamation. Condition 4 requires the applicant to revegetate all newly disturbed land areas with plant species indigenous to the area within 6 months of the completion of the project's construction.

2.2.5.2 Water Quality Certification Conditions

Montana DEQ's certification includes 13 conditions. Conditions 1 through 7 and condition 11 are environmental measures that are evaluated in the EA. Conditions 8 through 10 and conditions 12 and 13 are administrative or legal in nature and not environmental measures; therefore we do not analyze them in the EA.

The administrative measures specify that Clark Canyon Hydro: Allow Montana DEQ reasonable entry and access to the project and review of appropriate records; obtain all required permits, authorizations, and certifications prior to commencement of any activity that would violate Montana water quality standards; understand that Montana DEQ's reserves its authority to require adaptive management plans that may include corrective actions and monitoring necessary to correct water quality violations that may result from construction or operation; consider the terms and conditions of the certification to be violated if the project is found to not be in compliance with any of the certification conditions or if the project is constructed or operated in any way not specified in the application, supporting documents or as modified by the conditions; and understand that the certification expires upon transfer of property covered by the certification unless the new owner submits to Montana DEQ a written consent to all the certification conditions.

Environmental measures included in Montana DEQ's certification conditions 1 through 7 and condition 11 that are analyzed in this EA are as follows:

- Condition 1 stipulates that Clark Canyon Hydro conduct water quality monitoring for DO, temperature, and TDG for a minimum of five years following initial project operation and to continue monitoring these parameters each year thereafter while discharging between July and October, unless Montana DEQ determines that additional monitoring is not warranted upon review of the five-year monitoring results.
- Condition 2 stipulates that Clark Canyon Hydro submit a plan prior to construction to monitor Clark Canyon Reservoir and the Beaverhead River for turbidity, TDG, DO, and temperature during project construction.[12]
- Condition 3 stipulates that Clark Canyon Hydro maintain minimum DO levels at saturation from June 1 through August 31 and 8.0 milligrams per liter (mg/L) the rest of the year downstream of the project while discharging into the Beaverhead River.
- Condition 4 stipulates that Clark Canyon Hydro maintain TDG levels at 110 percent or lower downstream of the project while discharging into the Beaverhead River.
- Condition 5 stipulates that Clark Canyon Hydro submit a plan prior to construction for project engineering modifications to maintain DO levels during project operation.[13]
- Condition 6 stipulates that the project automatically go offline in the event that DO levels fall below Montana DEQ standards, that an on-call operator arrive at the powerhouse within 30 minutes to evaluate the cause of any noncompliance reading, and that Clark Canyon Hydro deploy a redundant DO probe at its compliance point in the Beaverhead River.
- Condition 7 stipulates that Clark Canyon Hydro notify Montana DFWP and Montana DEQ within 24 hours of any unauthorized discharge of pollutants to state waters within the project boundary.
- Condition 11 stipulates that Clark Canyon Hydro meet annually with all watershed stakeholders to discuss water quality monitoring efforts associated with project operation.

2.3 Staff Alternative

Under the staff alternative, the project would include all of the applicant's proposals, all of Reclamation's conditions specified under FPA section 4(e), all but one of Montana DEQ's certification conditions,[14] and the following additional measures:

- Conduct TDG and DO compliance monitoring at all times during project operation;
- Conduct water temperature monitoring for the first five years of project operation and, after consultation with Montana DFWP, Montana DEQ, and FWS, file a proposal for Commission approval regarding the possible cessation of the temperature monitoring program after 5 years;
- Install and maintain a pressure transducer and water level alarm in the Beaverhead River when flows are being bypassed around Reclamation's existing intake and outlet works to alert compliance monitoring staff if water levels downstream of the dam are reduced;
- During project operation, notify Montana DFWP in addition to Reclamation in the event of an unplanned shutdown;
- Notify Montana DEQ and Montana DFWP, within 24 hours of any deviation from water temperature, DO, TDG, or turbidity requirements during construction and operation and file a report with the Commission within 30 days describing the deviation, any adverse effects resulting from the deviation, the corrective actions taken, any proposed measures to avoid future deviations, and comments or correspondence, if any, received from the agencies;
- Document the results of the pre-construction raptor survey and the measures taken to avoid disturbing raptors by maintaining a record that includes nesting bird survey data, including the presence of migratory birds, eggs, and active nests, the qualifications of the biologist performing the survey, and any avoidance measures implemented;
- Construct the transmission line segments that cross the Horse Prairie

[12] Montana DEQ clarified in a phone conversation with staff that condition 2 refers directly to the applicant's CWQMP filed with the license application and would not require a new or modified plan to be submitted. *See* telephone record summary between FERC and Montana DEQ filed on June 9, 2016.

[13] Montana DEQ clarified in a phone conversation with staff that condition 5 refers directly to the applicant's Revised DOEP filed with the license application and would not require a new or modified plan to be submitted. *See* telephone record summary between FERC and Montana DEQ filed on June 9, 2016.

[14] The staff alternative does not include condition 11 which stipulates that the applicant meet annually with watershed stakeholders to discuss water quality monitoring efforts associated with project operation. However, we recognize that the Commission is required to include all valid 401 water quality certification conditions in any license issued for the project.

and Medicine Lodge drainages outside of the greater sage-grouse breeding season (March 1–April 15); and

• Revise the Historic Properties Management Plan (HPMP) in consultation with the Montana SHPO and Reclamation to include a Treatment Plan to resolve project effects on the Clark Canyon Dam and to clarify consultation procedures in the plan (see section 3.3.6). File the HPMP with the Commission for approval prior to construction.

Proposed and recommended measures are discussed under the appropriate resource sections and summarized in section 4 of this EA.

3.0 ENVIRONMENTAL ANALYSIS

In this section, we present: (1) A general description of the project vicinity; (2) an explanation of the scope of our cumulative effects analysis; and (3) our analysis of the proposed action and other recommended environmental measures. Sections are organized by resource area (*e.g.,* aquatic resources, recreation). Under each resource area, historical and current conditions are first described. The existing condition is the baseline against which the environmental effects of the proposed action and alternatives are compared, including an assessment of the effects of proposed mitigation, protection, and enhancement measures, and any potential cumulative effects of the proposed action and alternatives. Staff conclusions and recommended measures are discussed in section 5.2, *Comprehensive Development and Recommended Alternative.*[15]

3.1 General Description of the River Basin

The Beaverhead River is formed by the confluence of the Red Rock River and Horse Prairie Creek immediately upstream of Clark Canyon Dam. Other important tributaries include Cedar Creek, Medicine Lodge Creek, and Maurer Creek upstream of the dam, and Gallagher Creek and Grasshopper Creek downstream of the dam. From its origin at the tailrace of Clark Canyon Dam, the river flows approximately 71 miles to its confluence with the Big Hole River at Twin Bridges, Montana, where it forms the Jefferson River. The Jefferson River merges with the Madison and Gallatin rivers at Three Forks, Montana, about 100 miles downstream of Clark Canyon Dam, to form the Missouri River.

The topography of the Beaverhead River Basin is characterized by arid hillsides throughout the first 12 river miles (RM), opening into a wide valley about 8 miles south of Dillon, Montana. The total drainage area encompasses 3,619 square miles. Average annual precipitation in the basin is largely dependent on location and elevation. The southeast and western portions of the basin receive up to 20 inches. At the city of Dillon, about 20 miles from Clark Canyon Dam, the average annual precipitation is 11.7 inches. Winter and summer temperatures average about 26 and 63 degrees Fahrenheit (°F), respectively, at Dillon.

Clark Canyon Reservoir and the Beaverhead River provide water for Reclamation's East Bench Unit of the Pick-Sloan Missouri Basin Irrigation Program. The program provides full irrigation services for up to 28,055 acres of land to support the agricultural industry.

3.2 Scope of Cumulative Effects

According to the Council on Environmental Quality's regulations for implementing the National Environmental Policy Act (40 CFR, section 1508.7), cumulative effect is the impact on the environment that results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time, including hydropower and other land and water development activities.

Based on our review of the license application and agency and public comments, we have identified aquatic resources, including fisheries and water quality, as resources that may be cumulatively affected by the project in combination with other past, present, and future activities, because of the potential for the project to adversely affect aquatic habitat and water quality, which are affected by upstream land uses and water storage and diversion.

3.2.1 Geographic Scope

The geographic scope of the analysis defines the physical limits or boundaries of the proposed action's effects on the resources. Because the proposed action would affect these resources differently, the geographic scope for each resource varies.

We have determined that the geographic scope for cumulatively affected fishery resources would encompass the Beaverhead River from Clark Canyon Dam to Barrett's Diversion Dam, located about 11 miles downstream. We chose this geographic scope because construction and operation of the project may affect streamflows and aquatic habitat in this reach.

For water quality, we have determined that the geographic scope would encompass Clark Canyon Reservoir, its two primary tributaries (Red Rock River and Horse Prairie Creek), and the Beaverhead River from Clark Canyon Dam downstream to Barrett's Diversion Dam. We chose this geographic scope because these stream reaches are on the CWA section 303(d) list as being impaired for water quality, and actions within these waterbodies together with construction and operation of the project may affect water quality in the Beaverhead River.

3.2.2 Temporal Scope

The temporal scope of analysis includes a discussion of the past, present, and reasonably foreseeable future actions and their effects on fishery and water quality resources. Based on the term of the proposed license, we will look 30 to 50 years into the future, concentrating on the effects on fish, fish habitat, and water quality from reasonably foreseeable future actions. The historical discussion is limited, by necessity, to the amount of available information. We identified the present resource conditions based on the license application, agency comments, and comprehensive plans.

3.3 Proposed Action and Action Alternatives

In this section, we discuss the effects of the project alternatives on environmental resources. For each resource, we first describe the affected environment, which is the existing condition and baseline against which we measure effects. We then discuss and analyze the specific cumulative and site-specific environmental issues.

Only the resources that would be affected, or about which comments have been received, are addressed in detail in this EA. Based on this, we have determined that geology and soils, fishery, water quality and quantity, terrestrial, threatened and endangered species, recreation, cultural, and aesthetic resources may be affected by the proposed action and action alternatives. We have not identified any substantive issues related to socioeconomics associated with the

[15] Unless noted otherwise, the sources of our information are the final License Application filed on November 23, 2015 (Clark Canyon Hydro, LLC, 2015a) and additional information filed on December 10, 2015 (Clark Canyon Hydro, LLC, 2015), February 1, 2016 (Clark Canyon Hydro, LLC, 2016b), February 9, 2016 (Clark Canyon Hydro, LLC, 2016a), and March 11, 2016 (Clark Canyon Hydro, LLC, 2016).

proposed action, and therefore, socioeconomics is not assessed in this EA. We present our recommendations in section 5.2, *Comprehensive Development and Recommended Alternative.*

3.3.1 Geologic and Soil Resources

3.3.3.1 Affected Environment

Clark Canyon Dam is located at the confluence of the Red Rock River and Horse Prairie Creek, where the watercourses become the Beaverhead River. The terrain in the area is generally characterized as arid rolling hills with watercourses carving floodplains and canyons into volcanic rock. In areas where the canyon sides become unstable as a result of erosion or seismic activity, landslides do occur and some affect the path of river flow.

Downstream of the dam, the river valley is relatively deep and narrow for about 12 miles, with an average gradient of 0.244 percent. The valley widens as the river crosses an area near the Blacktail Fault at Barrett's Diversion Dam, where the Blacktail uplift was developed by late movement of this active fault (described in more detail below). Below the diversion, the valley is characterized by agricultural activity and the irrigation that supports it, stemming from the irrigation and flood control functions of Clark Canyon Reservoir. Surface soils in the hills and mountains are generally loamy and sandy with rock escarpments and fragments, while the alluvial valley soils are loamy and clayey. Watercourses have generally carved soil down to bedrock and loose gravel.

Seismic activity in the southwestern region of Montana is significant and has been shown to have the highest degree of tectonic plate movement within the state (Bartholomew et al., 1999). A portion of the region borders the highly active Yellowstone caldera in Wyoming. Documented earthquakes occurred in 1925, 1959, and 1983, centered at Clarkston Valley, Hebgen Lake, and Borah Peak, Idaho, respectively. These epicenters all lie within 90 miles of Clark Canyon Reservoir, and at least one of the earthquakes (Hebgen Lake) was felt in nine states and three Canadian provinces. It also caused subsidence within the Hebgen Lake Basin of as much as 6.7 meters, as well as a landslide large enough to dam Madison Canyon and create Earthquake Lake.

The nearest faults to Clark Canyon Dam are known as Red Rock Fault and Blacktail Fault. Both run approximately southeast to northwest, perpendicular to the flow of the Beaverhead River downstream of the dam. Red Rock Fault is about 10 miles upstream along the Red Rock River, while the Blacktail Fault is about 12 miles downstream toward the city of Dillon. Being close to a population center, Blacktail Fault has been well-documented as an active fault.

In 2000, Reclamation commissioned a study to assess the amount of sedimentation that has accumulated in Clark Canyon Reservoir since operation of the earthfill dam began in 1964. The sedimentation is generally believed to be contributed by the drainage area to the reservoir, although a minor amount is trapped upstream by Lima reservoir. Loss of storage below the normal operating water surface level could also occur from shoreline erosion, although this has not been studied. Reclamation's mapping of the reservoir concluded that 2.3 percent of the reservoir's storage volume had been lost since operation began, an average of 114.7 acre-feet of sedimentation per year.

The areas where construction of the proposed project would occur are all areas that were disturbed during construction of Clark Canyon Dam, completed in 1964. The valve house, powerhouse, and staging area would all be located on the toe of the downstream face of the dam adjacent to the existing spillway and stilling basin. There would be no new penetrations through the dam structure; the project would use the existing outlet tunnel downstream of the intake gates by installing a new steel liner in the tunnel with a new trifurcated diversion structure to allow for flows to the existing outlet stilling basin or to the proposed powerhouse.

3.3.1.2 Environmental Effects

Effects of Construction

Ground disturbance associated with construction of the project, including the powerhouse, access road, and transmission line, could release sediment into nearby wetland areas and the Beaverhead River downstream of the dam, and it could adversely affect the structural stability or seepage characteristics of the existing dam. Turbidity could also be increased by a change in flow patterns through the dam during construction.

Proposed construction work would disturb multiple areas on the downstream side of the dam, as well as inside the dam. The disturbance downstream of the dam would include burial of 0.3 miles of transmission line. The applicant proposes to lengthen the existing access road and place a temporary staging and spoil site on the uphill side of the proposed transmission line burial corridor and existing access road.

To minimize soil erosion and dust, protect water quality, and minimize turbidity in the Beaverhead River, the applicant proposes to implement the measures contained in its ESCP. The ESCP includes best management practices (BMPs) such as:

- Defining clearing limits within project area and buffer zones around sensitive areas, including wetlands;
- Stabilizing construction access road entrances and exits, parking and staging areas;
- Controlling flow rates coming onto and leaving the project area utilizing, but not limited to, swales, dikes, sediment ponds, or sediment traps, as necessary;
- Installing sediment controls to minimize erosion and stabilize soils including, but not limited to, silt fences, wattles, interceptor dikes, swales, and vegetative filtration;
- Preserving natural vegetation and stabilize soils utilizing nets, blankets, mulch, and seeding, as necessary;
- Protecting slopes utilizing, but not limited to, terracing or pipe slope drains;
- Protecting stormwater drain inlets utilizing catch basin inserts;
- Stabilizing channels and outlets;
- Controlling the release of pollutants to protect water quality and aquatic resources by keeping chemical storage areas covered or designating a concrete handing area; and taking all precautions to avoid spills (*e.g.* herbicides would not be mixed within 200 feet of wetlands or open water, maintain spill kits on-site, etc.);
- Controlling de-watering processes within the project area;
- Visually inspecting all construction and disturbance areas every two weeks throughout the entirety of construction activity, or after any project related discharges or rain events; and
- Using existing developed and primitive roads where possible to access the project area and construction features.

Constructing facilities at an existing earthfill dam such as the Clark Canyon Dam has the potential to adversely affect the dam's structural ability to withstand a seismic or flood event by adversely affecting the seepage characteristics of the dam. The applicant proposes to construct the powerhouse and appurtenant facilities in a manner to avoid any effects on reservoir levels or dam stability. The proposed hydroelectric facilities would also be designed to withstand seismic and hydrostatic forces.

To ensure that the area is suitable for the foundation loading of the hydroelectric facilities, geotechnical borings would be drilled and the results reviewed and approved by the Commission and Reclamation. To confirm that the proposed facilities would not affect the stability of the existing structures, and to confirm that the proposed structures would be compatible with applicable seismic and hydrostatic load standards, the applicant would finalize design plans and drawings and submit for Commission and Reclamation review and approval. The plans would include structural drawings, construction methods, and mitigation measures for potential impacts from construction of the powerhouse, steel conduit liner, shaft house, transmission line, and all appurtenant facilities. The Commission and Reclamation would review final design plans before the start of construction, as well as the results of geotechnical borings. Borings would be located and drilled after final design plans specify the exact location of the hydroelectric facilities. The results of the borings would show the composition of the subsurface geology and dam structures, including the location of bedrock, to confirm the suitability of the final design location of the powerhouse and foundation loading.

Our Analysis

The proposed project would disturb areas downstream of the dam during construction of the powerhouse and appurtenant facilities, burial of the transmission line, and upgrade of the access road. The ESCP would control sediment release, if properly implemented. Approved and properly implemented erosion and sediment control measures, consistent with the Commission's guidelines, would minimize sediment releases that could result from construction disturbance. Inspection and maintenance of the erosion and sediment control structures, especially around rainfall events and disturbance activities, would ensure compliance with Commission guidelines. With effective erosion control measures in place, sediment from construction activities would not likely enter wetlands or the Beaverhead River.

The applicant's proposal to avoid any jurisdictional wetlands and route the transmission line along the uphill side of the existing access road would limit the potential for sediment release from construction activities into wetlands and the Beaverhead River. Although project construction would result in ground disturbance and could potentially result in sediment release into the river, the applicant's proposed plan would protect environmental resources.

Effects of Operation

Potential effects on geology and soils during project operation could occur as a result of sediment release caused by concentrated runoff. Revegetated or paved surfaces such as the access roads, parking area, or walkways could generate runoff. If improperly managed, that runoff could cause rills or gullies that transport sediment into Beaverhead River. Similarly, construction areas and the spoil area, especially the buried transmission line corridor, could be susceptible to increased erosion if revegetation work were not completed properly.

Our Analysis

Post-construction stabilization and effective site restoration as discussed in section 3.3.3.2, *Environmental Effects, Terrestrial Resources,* would minimize long-term effects on environmental resources. With effective erosion control measures in place, sediment from construction activities would not likely enter wetlands or the Beaverhead River.

Once in operation, the project should have little or no effect on geology and soils. Proper implementation of the applicant's ESCP would prevent excessive runoff that could possibly cause rills or gullies to form, thereby protecting water quality, wetlands, and soil resources. Intake and discharge of water for project use would be confined to areas already established for those purposes.

3.3.2 Aquatic Resources

The proposed project has the potential to affect water quantity, water quality, and fisheries resources in Clark Canyon Reservoir and the Beaverhead River. The Affected Environment section describes these resources in the project area.

3.3.2.1 Affected Environment

Water Quantity

The hydrology of the Beaverhead River is dictated by Reclamation's operation of the Clark Canyon Reservoir as an irrigation and flood control facility. On average, the lowest reservoir elevations typically occur in late summer or early fall at the end of the irrigation season, with the highest reservoir elevations typically occurring in mid-May just prior to the irrigation season. For the period of record of 1965 to 2007, the estimated mean monthly streamflow downstream of the dam ranged from a low of about 170 cfs during the winter to a high of about 750 cfs during the peak summer irrigation season (figures 3 and 4). Starting in April, water releases from the reservoir are increased until mid-July when the pool in the reservoir is nearly full. Flows then drop until around mid-October before stabilizing until the following April, which corresponds to a period of reduced reservoir storage.

Extended periods of low flows (<100 cfs) occurred in 1967, 1975, 1986, 1990–1993, 2001–2009, and 2013–2014. The low-flow period of 2001–2004 reduced the reservoir storage to its lowest level since construction, with flow releases during this period ranging from a fall/winter low of about 30 cfs to a summer high of about 500 cfs (figure 3). Unusually high flow years occurred in 1976, 1984, 1996, and 1999. In 1984, spring snow melt, accompanied by spring rains, contributed to a maximum combined release of 2,586 cfs through the dam outlet works and spillway.

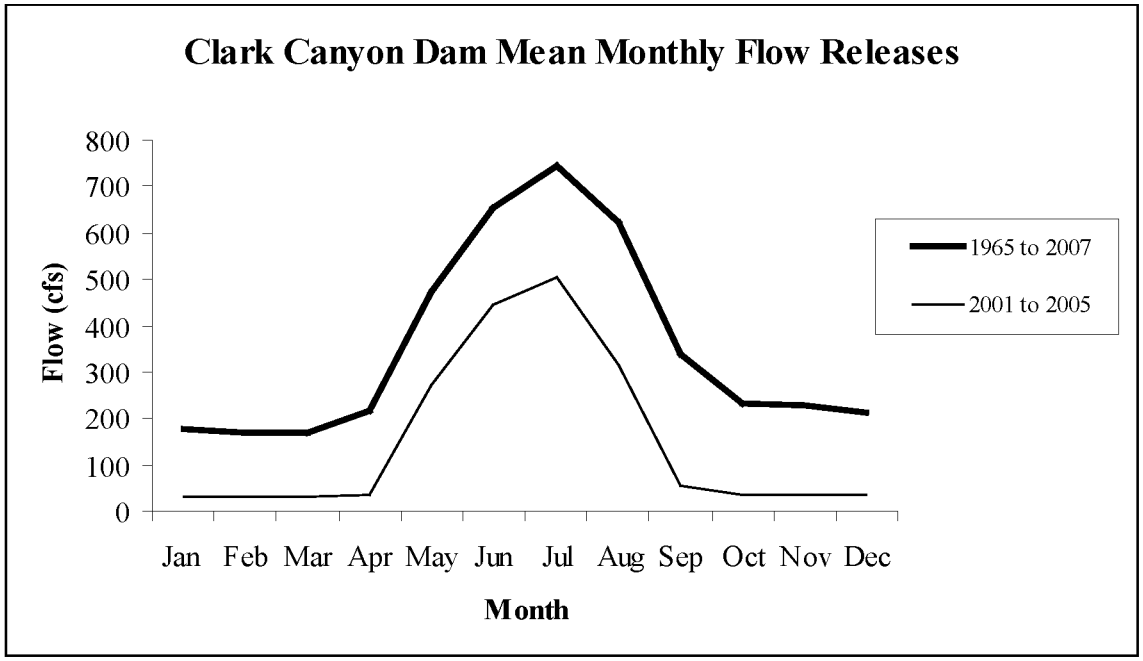

Figure 3. Beaverhead River hydrograph at Clark Canyon Dam, 1965 to 2007 and 2001 to 2005 (Source: staff).

Discharge from Clark Canyon Dam during the fall through winter period generally averaged between 200 to 300 cfs from 1965 to 2003. The maximum discharge recorded for the period of 1965 to 2003 for the fall and winter seasons ranged from a high of about 1,300 cfs in October to about 700 to 500 cfs from November through February.

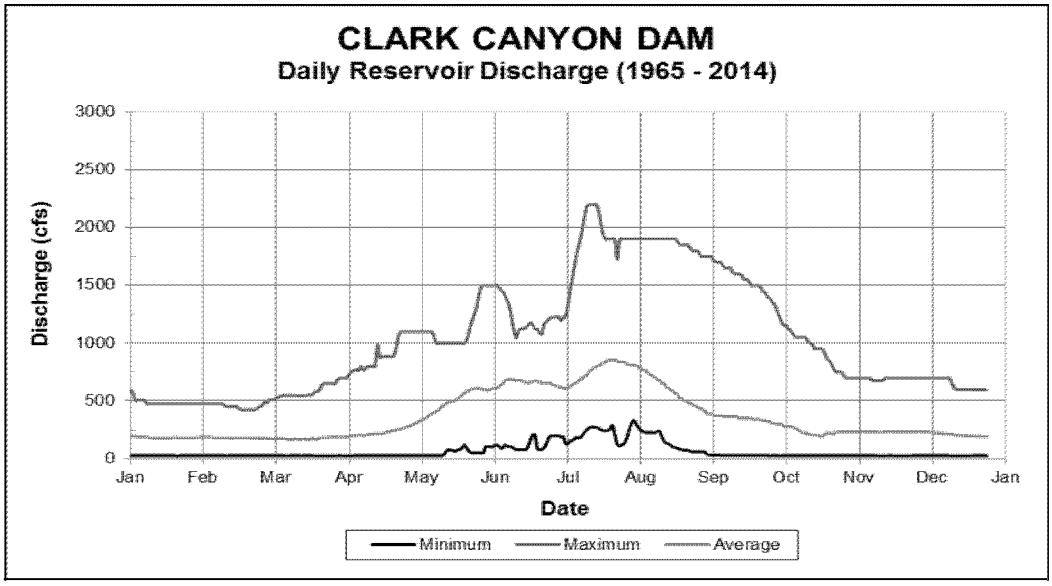

Figure 4. Clark Canyon Dam Daily Reservoir Discharge, 1965 to 2014 (Source: license application).

Minimum instream flow releases specified by existing water uses during non-irrigation (winter) seasons are 23 cfs during dry conditions.

Water Quality

Water quality standards applicable to Clark Canyon Reservoir and the Beaverhead River downstream of Clark Canyon Dam are shown in table 2. These waters are classified as B–1, which means they are to be maintained suitable 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 supply.

TABLE 2—NUMERIC WATER QUALITY CRITERIA APPLICABLE TO THE CLARK CANYON DAM HYDROELECTRIC PROJECT

[Source: License application as modified by staff]

Parameter	Background condition	Numeric criteria
Temperature [a]	32°F to 66 °F	1°F maximum increase above background.
	66°F to 66.5 °F	No discharge is allowed that will cause the water temperature to exceed 67 °F.
	>66.5 °F	The maximum allowable increase in water temperature is 0.5°F.
DO [b]	NA	At saturation (approximately 7.5 mg/L or higher) from June 1 through August 31 and 8.0 mg/L from September 1 through May 31 [c].
Total gas pressure	NA	110 percent saturation.
Turbidity	NA	5 NTU above background.

Notes: DO—dissolved oxygen; °F—degrees Fahrenheit; mg/L—milligram per liter; NA—not applicable; NTU—nephelometric turbidity unit.

[a] Montana does not have absolute standards for water temperature. Temperature regulation is relative and prohibits increases of various amounts above naturally occurring water temperature.

[b] The freshwater aquatic life standard for dissolved oxygen in Montana is contingent on the classification of the waterbody and the presence of early life stages of fish.

[c] These project-specific DO standards were stipulated by Montana DEQ's certification condition 3.

Red Rock River and Horse Prairie Creek (the primary tributaries to Clark Canyon Reservoir), as well as the Beaverhead River downstream to Grasshopper Creek (11.8 miles downstream from Clark Canyon Dam), are identified on the state of Montana's CWA section 303(d) list as being water quality impaired (EPA, 2008). The Red Rock River is listed as being impaired due to habitat alteration, flow alteration, sediment, temperature, lead and zinc. Horse Prairie Creek is impaired by flow alteration, arsenic, cadmium, copper, lead, mercury, and zinc. The Beaverhead River from Clark Canyon Dam to Grasshopper Creek is listed as being impaired due to flow and habitat alteration, as well as lead, and downstream from Grasshopper Creek, the river is listed as being impaired by flow and habitat alteration, sediment, and temperature. Montana DEQ is currently working on defining acceptable total maximum daily loads (TMDLs) for the Red Rock River and Beaverhead River Basins.

Clark Canyon Reservoir is included in Montana DEQ's 2014 Integrated Water Quality Report as impaired by a non-pollutant for alterations to flow regimes relating to drought impacts and irrigated crop production. These impacts cause impairments for the beneficial uses of primary contact recreation and aquatic life but because these impairments are not considered pollutants, no TMDL will be established (Montana DEQ 2014).

The causes of water quality impairment in the Beaverhead River Basin identified on the 303(d) list include grazing in riparian or shoreline zones, flow regulation and diversion for irrigated crop production, leaching of toxic materials from abandoned mines, and land clearing for development. Each of these sources likely contributes to a cumulative reduction in water quality in the project area, although water quality in Clark Canyon Reservoir and in the Beaverhead River downstream of Clark Canyon Dam is generally sufficient to support a high-quality trout fishery.

The applicant collected water quality data at six sites in the project vicinity between 2007 and 2009. The sites were chosen to provide baseline data for assessment of the potential effects of project construction and operation on water quality of the Beaverhead River. Monitoring efforts documented DO and temperature profiles in the forebay area of Clark Canyon Reservoir, as well as DO, temperature, TDG, and turbidity at five sites in the Beaverhead River downstream from the dam.

Clark Canyon Reservoir

Reservoir profiles reported by the applicant during the sampling period captured reservoir dynamics over a wide range of reservoir elevations. In 2007, reservoir surface elevations dropped about 15 feet during the sampling period from a high of about 5,535 feet during early May to a low of about 5,520 feet from August through October. The reservoir was cool but well stratified in May, with surface temperatures of approximately 14.5 degrees Celsius (°C), a thermocline depth of about 10 meters, and hypolimnion temperatures of approximately 10 °C. Surface temperatures continued to warm through July, but began to cool in August and were down to 12.5 °C by September. The maximum surface temperature observed was in early July when surface waters reached 22 °C. The thermocline was relatively constant at about 10 meters deep despite changes in reservoir elevations and reservoir temperatures. Stratification was strong from May through July, but lessened by mid-August and was completely absent by late September when the profile reflected complete mixing throughout the water column and a uniform temperature of approximately 12.5 °C.

DO patterns from data collected in 2007 reflected the temperature stratification of Clark Canyon Reservoir. Surface DO concentrations were highest in May at about 9 mg/L, but declined below the thermocline and were below the standard of 8 mg/L in the bottom 3 meters of the reservoir. Late June showed a similar pattern of stratification, with only slightly lower DO concentrations. In July and August, DO levels were below the 8 mg/L water quality standard at the surface, and fell below 4 mg/L at depths greater than 15 meters. By late September, however, the reservoir uniformly mixed and DO concentrations met and exceeded the standard of 8 mg/L. Reservoir profiles of DO were also performed in 2010. The 2010 reservoir profiles showed that fall turnover occurred during late September or early October. However, the lowest hypolimnion DO level was 1.3 mg/L in late July during that sampling year.

Additional information about reservoir stratification patterns is available from temperature and DO profiles measured by Reclamation in 2001, 2002, and 2003 (Reclamation, 2005). In 2001, a substantial degree of stratification was evident in late June and in mid-August, with complete mixing (as reflected by uniform temperature and DO profiles) occurring by the next measurement on October 14. In 2002, the reservoir exhibited

substantial stratification in mid-June, was weakly stratified in mid-September, and reflected complete mixing by the next measurement on October 8. In 2003, stratification was not evident in July, but no profiles were measured after July 28 in that year.

Beaverhead River

The applicant conducted continuous monitoring of water temperature, DO, TDG, and turbidity at a site approximately 300 feet downstream of Clark Canyon Dam from June 2007 through 2009 and also collected water temperature, DO, and turbidity data at this site again in 2013. In addition, the 2009 monitoring effort included four additional sites located 0.9, 3.0, 5.7, and 10.7 miles downstream from Clark Canyon Dam. Water temperature, DO, TDG and turbidity were monitored for a minimum period of 48 hours in each month at each of these sites.

Temperature—Water temperatures were monitored in the Beaverhead River from 2007–2009 and again in 2013. Water temperatures measured in 2007 at the site 300 feet downstream from the dam gradually increased from 14.3 °C in late June, peaked at just over 21 °C on August 4, and then gradually decreased to just over 16 °C in early September. The range of daily variation decreased as the summer progressed, but averaged just less than 1 °C. Water temperatures were highest around noon and lowest around midnight. Data collected in 2008 and 2009 showed similar patterns between years, with winter temperatures generally less than 5 °C and summer temperatures reaching 16 to 17 °C. Sites closest to the reservoir outlet were generally the coolest in the summer, due to the proximity to cool reservoir waters.

Temperature observations in 2013 were consistent with historical monitoring, with winter temperatures generally less than 5 °C and summer temperatures peaking at approximately 18 °C with a maximum daily average temperature of 18.6 °C recorded on August 25 (figure 5). The applicant states that the range of daily variation throughout the year averaged less than 1 °C in 2013 which is consistent with data collected in 2007.

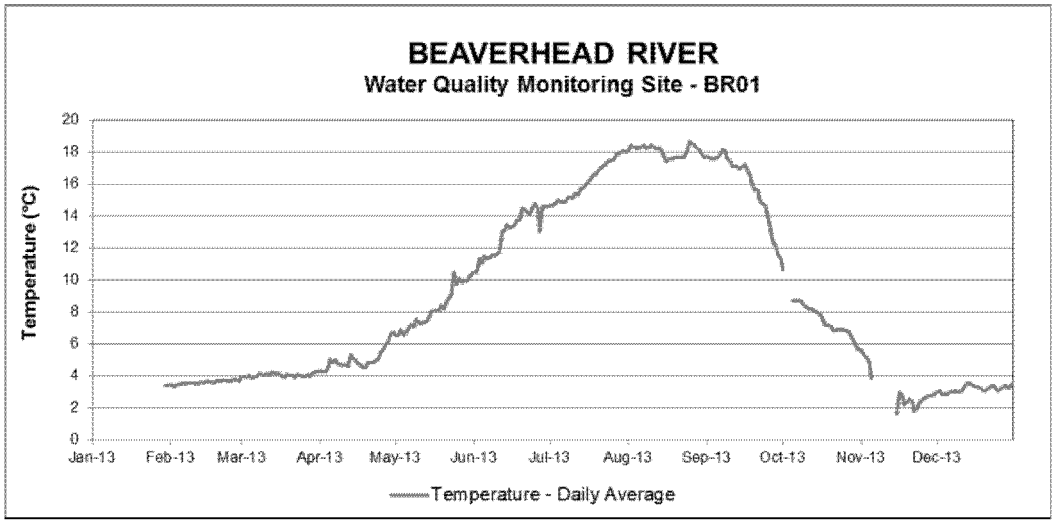

Figure 5. Daily average water temperatures in the Beaverhead River measured at the site located 300 feet downstream of Clark Canyon Dam in 2013 (Source: license application).

Dissolved Oxygen—Minimum DO values measured at the five monitoring sites from May 2007 through 2009 generally exceeded the 8-mg/L (March through September) and 4 mg/L (October through February) water quality standards in most months and locations, although measurements at sites closest to the reservoir did measure levels lower than the state standard of 8 mg/L at times during the late summer and early fall months (figure 6).

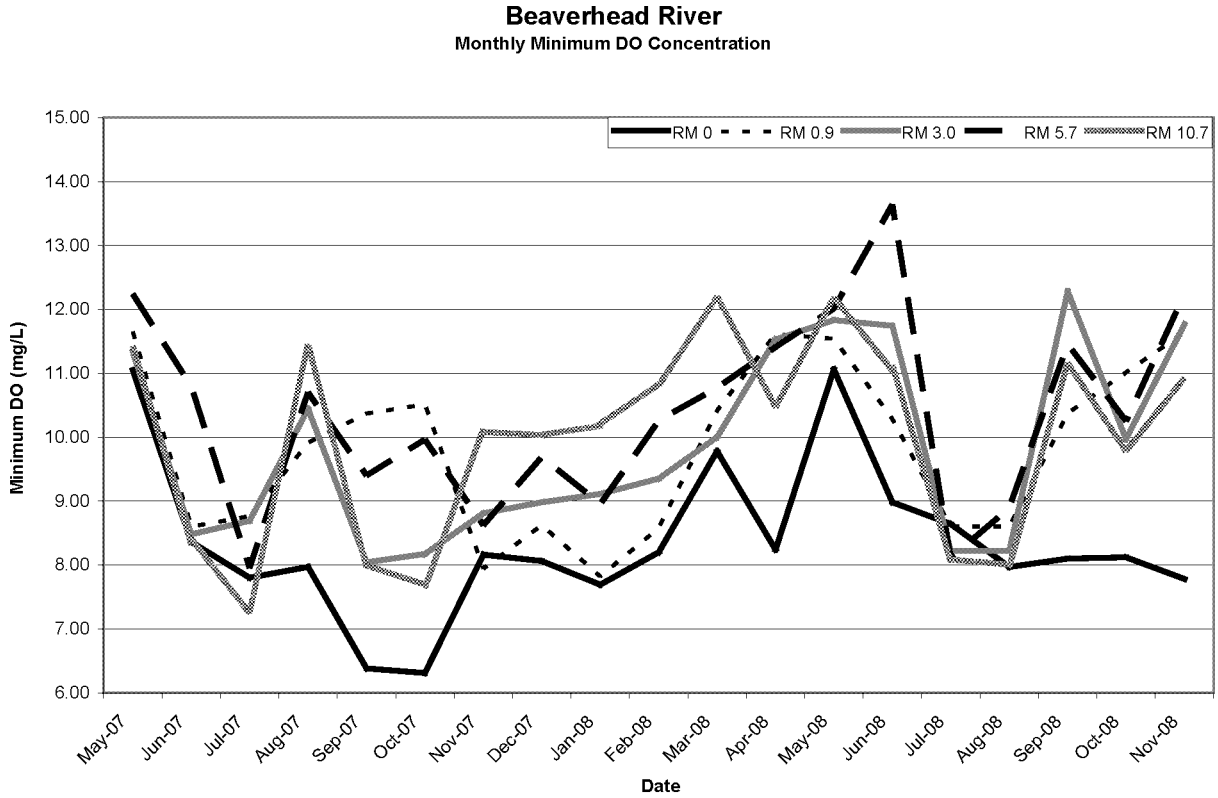

Figure 6. Minimum oxygen levels measured during monthly 48-hour continuous sampling periods at five sites in the lower Beaverhead River between May 2007 and November 2008 downstream from the Clark Canyon Dam[16] (Source: license application).

Monitoring conducted near the reservoir outlet in 2008 and 2009 revealed some diel DO patterns, primarily during the spring and winter months. For instance, DO generally increased during the day from morning to late afternoon before declining. The greatest amplitudes were observed during the spring. During the summer months, there was little or no diel pattern. The applicant stated that discharges during those times likely reduced the opportunity for DO to be absorbed into solution.

DO observations in 2013 were consistent with historical monitoring. Seasonal highs occurred during the spring and winter months, with a peak concentration in the month of May, and lowest concentrations occurring in late summer. DO concentrations were temporarily below the 8 mg/L standard during the month of June, and concentrations stayed below the standard continuously from mid-July through September during the 2013 sampling year (figure 7).

Upper Missouri Waterkeeper, Montana Trout Unlimited, Rhonda Sellers (on behalf of the International Federation of Fly Fishers), and several local residents filed comments stating concerns with recent algal blooms that occurred in the Beaverhead River downstream of the dam during the summers of 2014 and 2015.[17] Recent limnological data from Montana DFWP collected in the summer of 2015 indicate that the reservoir likely contributes to nitrogen and phosphorus loads being transported downstream (Selch, 2015). Downstream transport of nitrogen and phosphorous can feed algal growth in the summer which can also contribute to lower DO levels in the Beaverhead River during these months.

[16] The heavy dashed line applies to data collected at RM 5.7.

[17] *See* comment letters filed by Wade Fellin on February 26, 2016; Brian Wheeler on March 1, 2016; Michael Stack on March 8, 2016; Tim Hunt on March 11, 2016; Steve Hemkins on March 14, 2016; Kimball Leighton on March 17, 2016; Gregg B. Messel on March 21, 2016; Woody Bailey on March 22, 2016, Rhonda Sellers on March 24, 2016; Christian Appel on March 24, 2016, Cordell Appel on March 24, 2016, and Luke Massaro on March 24, 2016.

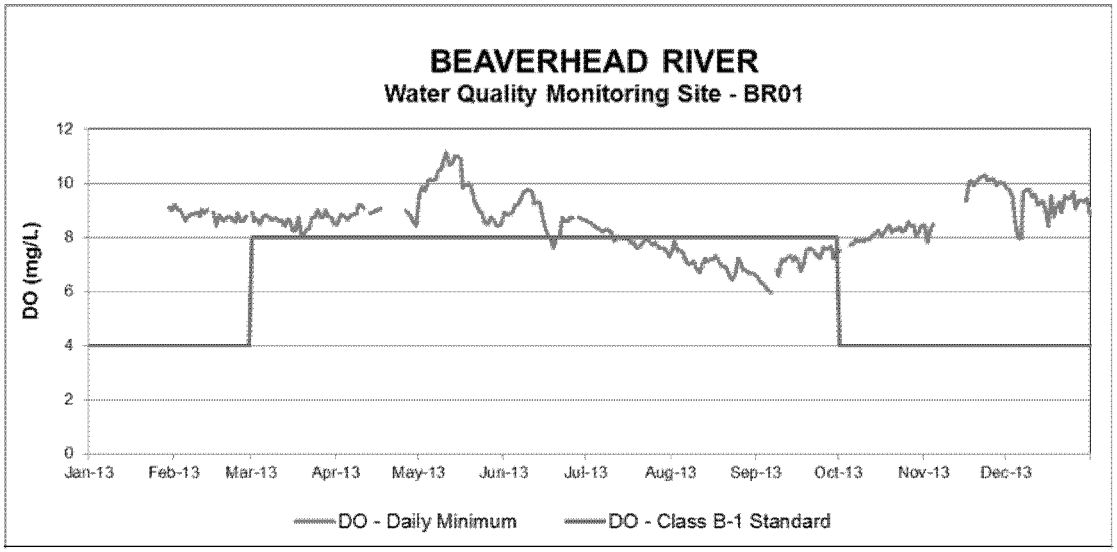

Figure 7. Daily minimum dissolved oxygen levels in the Beaverhead River measured at the site located 300 feet downstream of Clark Canyon Dam in 2013 (Source: license application).

Total Dissolved Gas—Current dam operations cause water to be vigorously aerated as highly pressurized flows exit the regulating outlet. As a result, the flow rate through the dam is highly correlated with TDG saturation. The highest flows can lead to oversaturation and TDG levels above 115 percent saturation which exceeds the state standard for TDG of 110 percent saturation and potentially harm fish.

Although no spill occurred over Clark Canyon Dam during the 2007 monitoring period, TDG saturation levels exceeded the state standard of 110 percent saturation during high flow periods in 2007, and did so again during the 2008 and 2009 monitoring years (figure 8). The applicant states that statistically, the 110 percent saturation standard was exceeded when flows were greater than about 360 cfs. Overall, TDG levels appeared to track discharge from Clark Canyon Dam and frequently exceeded state standards between June and September. Peak TDG levels exceeded 115–120 percent saturation during mid-summer in all years, when flows were in the range of 600 to 900 cfs. Measurements taken at downstream sites indicated that saturation levels were reduced as water moved downstream, although at times TDG levels remained above the 110 percent standard at the next three measurement sites, extending 5.7 miles downstream from Clark Canyon Dam.

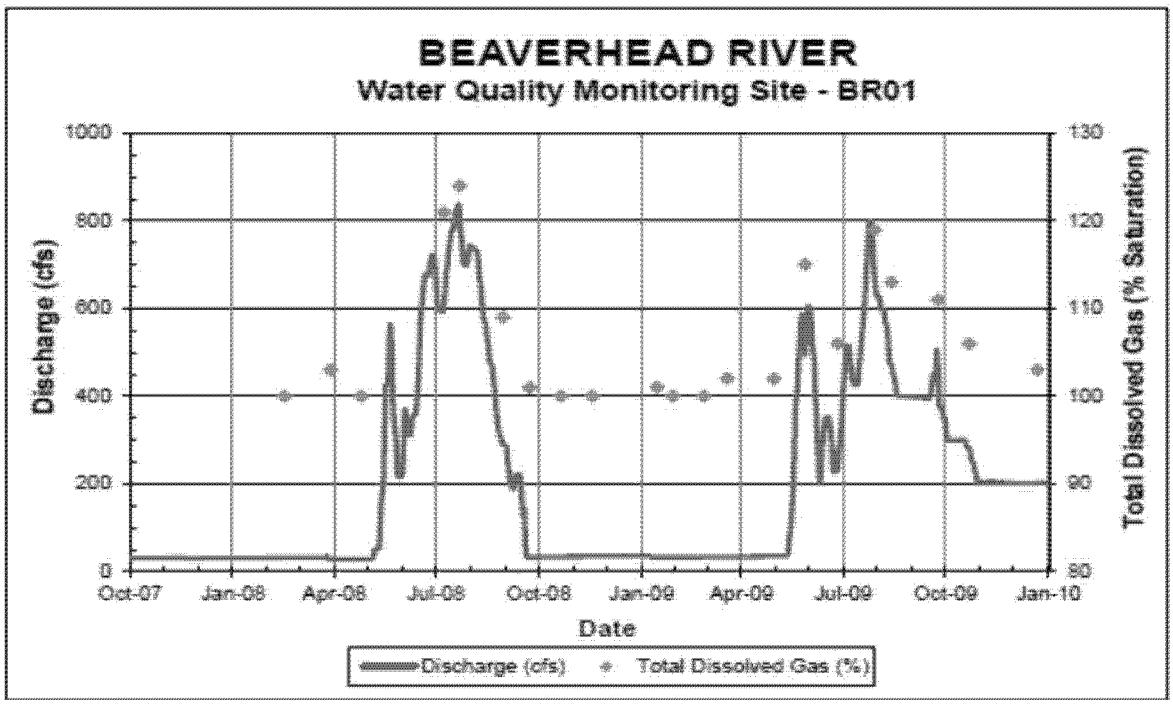

Figure 8 Discharge and total dissolved gas concentrations in the Beaverhead River downstream of Clark Canyon Dam during periodic sampling, October 2007 through December 2009 (Source: license application).

Turbidity—Turbidity measurements reported by the applicant indicate that turbidity levels in the Beaverhead River downstream of Clark Canyon Dam are generally low (*i.e.,* below 5 NTU per every 48-hour sampling event), but do show some seasonal variation. For example, in 2007, average turbidity values measured 300 feet downstream from the dam ranged from a low of 0.02 NTU in July to a high of 4.7 NTU in September (figure 9). Overall, turbidity levels measured at the site closest to the dam were highest in the fall when reservoir levels were low, which may be attributable to re-suspension of sediment deposits due to wave action as the elevation of the reservoir was lowered over the irrigation season. Peak instantaneous turbidity levels of between 11 and 13 NTU occurred in mid-August and in late September, respectively. Longitudinal sampling at the four downstream sites showed relatively low average turbidity levels at all sites except in May, when the 48-hour average turbidity level increased from less than 2.7 NTU at the first three sites to 7.33 and 21.48 NTU at the sites located 5.7 and 10.7 miles downstream of Clark Canyon Dam, respectively. Elevated turbidity levels at the downstream sites were most likely attributable to suspended sediment contributed from tributary inflows.

In 2008, average turbidity levels ranged between 0.2 and 29.3 NTU. The 29.3–NTU peak in turbidity reported in March 2008 at station RM 0 is of questionable accuracy because this peak is not reflected in measurements taken at the downstream monitoring stations (figure 9). In its CWQMP, the applicant states that such spikes may be due to the gradual buildup of algae on the sensor or to debris becoming lodged in the probe casing near the sensor, thus causing a faulty reading.

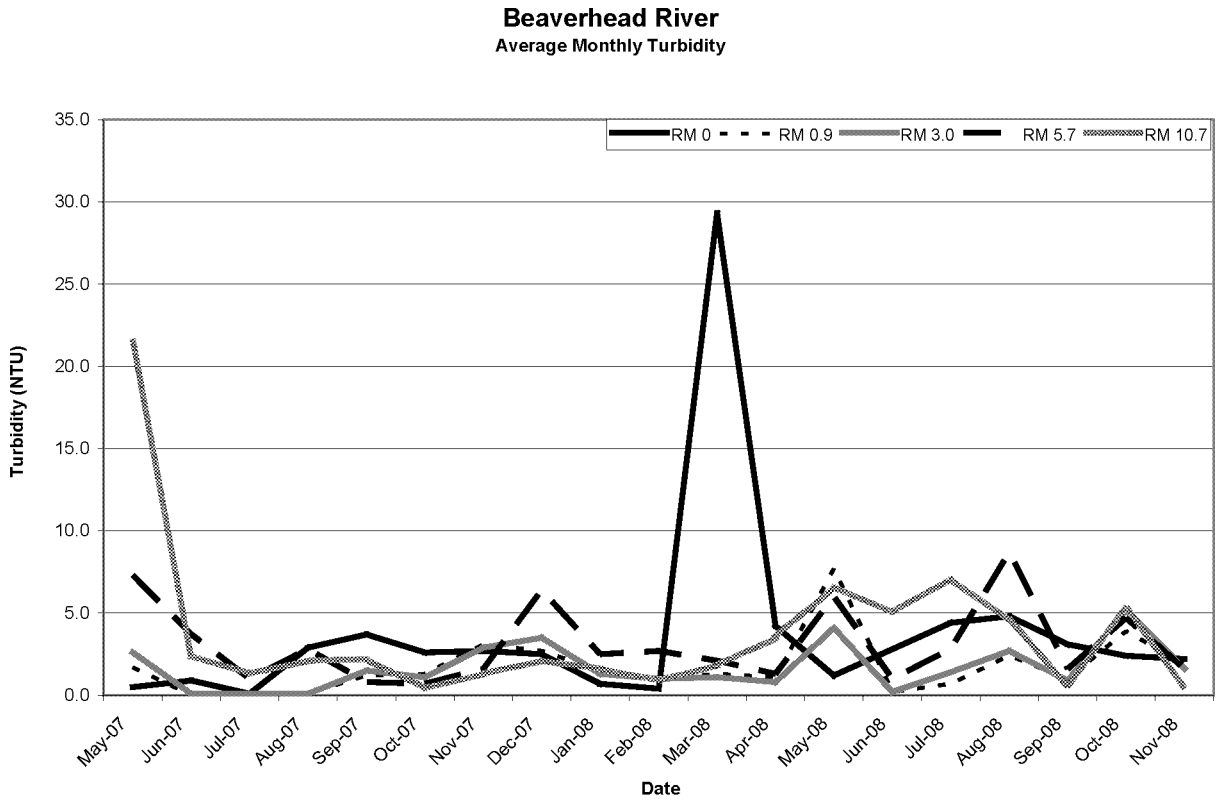

Figure 9. Average turbidity values measured during monthly 48-hour continuous sampling periods at five sites in the lower Beaverhead River between May 2007 and November 2008 (Source: Symbiotics, 2009, as modified by staff).

Except for the questionable spike in turbidity observed at the site closest to the dam in March 2008, turbidity remained generally below 5 NTU at all sites throughout the majority of the 2008 and 2009 monitoring years. Exceptions to this were most often recorded at the monitoring site located the furthest downstream of the dam. For example, during May 2009, a measurement of about 20 NTU was recorded at this site. The applicant noted that this site occurs below several tributaries and irrigation returns and is downstream of river portions that may be more vulnerable to shoreline erosion, all of which can elevate turbidity in the river.

In addition to tributary inflow and irrigation sources, turbidity may also be affected in Clark Canyon Reservoir and in the Beaverhead downstream due to algal blooms. Recent limnological and bathymetric survey data from Montana DFWP and Montana DEQ collected in 2015 indicated that both inorganic fine sediments and concentrations of nitrogen and phosphorus are likely being transported downstream through the existing outlet works (Selch, 2015; Flynn, 2015). Downstream transport of nitrogen and phosphorous can feed algal growth and, along with other sediment sources, contribute to turbid conditions in the Beaverhead River downstream of Clark Canyon Dam.

Fishery Resources

Fish Community

The Beaverhead River is recognized as one of the most popular and productive trout fisheries in North America and is designated as a blue ribbon fishery by Montana DFWP. Native fish species occurring in the Beaverhead River and in Clark Canyon Reservoir include mountain whitefish, burbot, mottled sculpin, mountain sucker, longnose sucker, and white sucker. Introduced fish species include rainbow trout, brown trout, brook trout, redside shiner, and common carp. Brown and rainbow trout are well established, and often attain trophy size in the Beaverhead River. Special status species that may occur in the project area include the westslope cutthroat trout (*Oncorhynchus clarki lewisi*) and Montana Arctic grayling (*Thymallus arcticus montanus*).

The westslope cutthroat trout is a subspecies that occurred historically throughout the Northern Rocky Mountain states, including the Beaverhead River Basin. Genetically pure and near-pure populations have been documented in portions of the Beaverhead River in recent years, and some individuals may occur in the project vicinity. The U.S. Bureau of Land Management (BLM) categorizes the westslope cutthroat trout as having special status, which indicates that the species is imperiled throughout at least part of its range and documented to occur on BLM lands. It is currently listed as a S2 [18] species by Montana

[18] S1 species are at high risk because of extremely limited and/or rapidly declining population numbers, range and/or habitat, making it highly vulnerable to global extinction or extirpation in the state. S2 species are at risk because of very limited and/or potentially declining population numbers, range and/or habitat, making it vulnerable to global extinction or extirpation in the state. S3 species are potentially at risk because of limited and/or declining numbers, range and/or habitat, even

DFWP, meaning that it is at risk because of very limited and potentially declining numbers, extent, and/or habitat, making it highly vulnerable to global extinction or extirpation in the state. Current management actions for the westslope cutthroat trout by federal and state agencies include the identification and protection of remaining populations; the evaluation of areas that provide suitable habitat for range expansion; and the expansion of the distribution of genetically pure strains (Sloat, 2001). Montana DFWP and sister state agencies have signed a Memorandum of Understanding (MOU) and Conservation Agreement that is part of a coordinated multi-state, range wide effort to conserve westslope cutthroat trout (Montana DFWP, 2007). Genetically pure strains of westslope cutthroat trout persist in some of the headwaters of unobstructed tributaries within their former range where colder temperatures appear to provide them with a competitive advantage over introduced species that require higher temperatures to reach optimal growth, such as stocked rainbow trout (Sloat, 2001).

The Montana Arctic grayling historically occurred throughout the upper Missouri River Basin upstream of Great Falls, Montana, including the Beaverhead River. In recent years, the Montana Arctic grayling has been stocked into the Beaverhead River downstream of the city of Dillon in an attempt to re-establish the species. The species is listed as sensitive by the U.S. Forest Service, indicating there is a concern for population viability within the state due to a significant current or predicted downward trend in populations or habitat. The species has also been petitioned for listing under the ESA several times since 1991 although the FWS determined it was not warranted for listing in 2014 (79 FR 49384). BLM affords the species special status and Montana DFWP lists it as G1–S1 species, indicating it is at high risk because of extremely limited and potentially declining numbers, extent, and/or habitat, making it highly vulnerable to global extinction or extirpation in the state.

Fisheries in the Beaverhead River Basin have been cumulatively affected by grazing in riparian or shoreline zones, flow regulation and diversion for irrigated crop production, land clearing for development, and cumulative effects on water quality from these and other sources.

Beaverhead River Fishery

The Beaverhead River between Clark Canyon Dam and Barrett's Diversion Dam is a productive tailwater fishery. This portion of the river is designated as a blue ribbon fishery and angler use can be very high from May through November. The dominant fish species in the Beaverhead River are brown trout and, to a lesser degree, rainbow trout. While neither of these species is native to the river, their populations are considered to be wild and self-sustaining.

Surveys to determine the abundance of age 1+ rainbow and brown trout have been conducted by Montana DFWP within the project vicinity annually since 1986. Survey data collected by between RM 74.9 to RM 73.3 in the Beaverhead River below Clark Canyon Dam between 1991 and 2013 are shown on figure 10 below. Brown trout abundance was observed to range from 473 fish per mile to 2,619 fish per mile and averaged 1,369 fish per mile between 1991 and 2013. Rainbow trout abundance was observed to range from 99 fish per mile to 680 fish per mile and averaged 305 fish per mile between 1991 and 2013. Oswald (2003) reports that rainbow trout in the reach downstream of Clark Canyon Dam have declined as the population of brown trout has expanded.

though it may be abundant in some areas (Montana NHP and Montana DFWP, 2016).

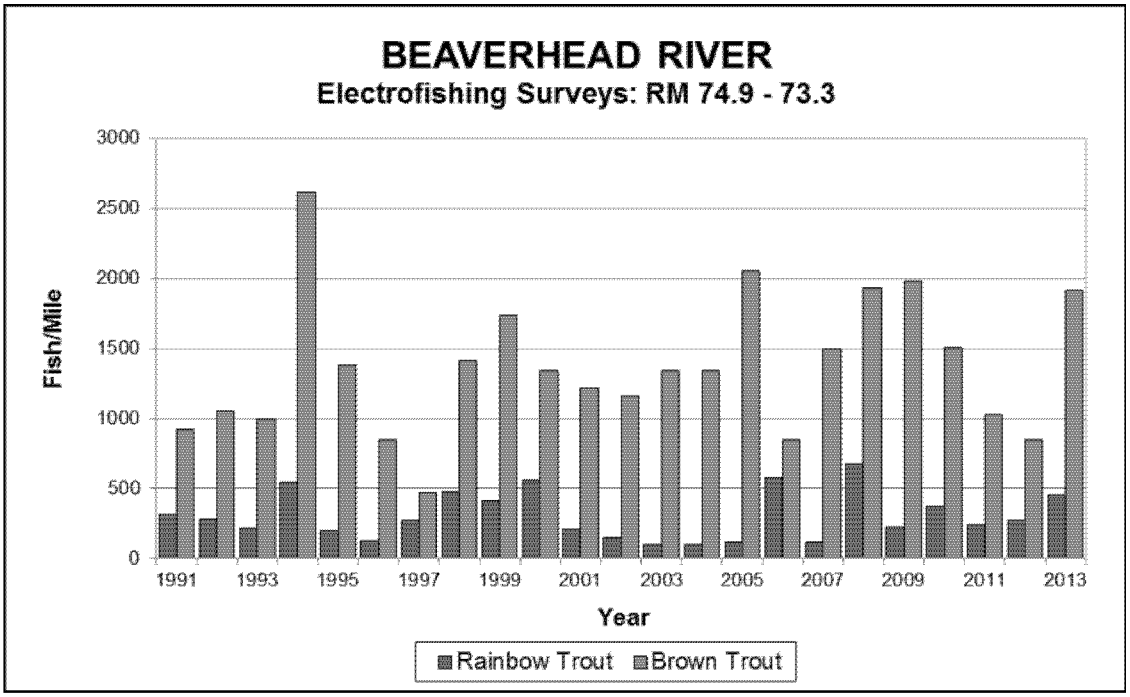

Figure 10. Relative abundance of age 1+ rainbow and brown trout in the Hildreth section (RM 74.9 and 73.3 of the Beaverhead River below Clark Canyon Dam, 1991-2013 (Source: license application).

Trout abundance in the survey area of the Beaverhead River has been observed to fluctuate with discharge flows which are generally attributable to regional weather conditions. Populations of both species appear to be adversely affected in dry water years, when the minimum flow released from Clark Canyon Dam may be reduced substantially during the winter (non-irrigation) season. Oswald (2006) reported that the number of brown trout greater than 18 inches in length in the Beaverhead River exceeded 600 fish per mile from 1998 to 2000, after a series of wet water years when the mean winter flow releases were over 200 cfs. Dry water years from 2001 through 2006 resulted in winter flow releases of less than 50 cfs, and the estimated number of brown trout greater than 18 inches in length subsequently declined to about 400 fish per mile by 2002, to 300 fish per mile by 2004, and to 100 fish per mile by 2006.

Gas bubble trauma has been documented in trout populations in the Beaverhead River (Oswald, 1985, as cited by Clark Canyon Hydro, LLC, 2015a). The primary cause of gas bubble trauma in regulated systems is TDG supersaturation from water spilled at dams, which commonly occurs when entrained air is dissolved in water under pressure at depth in plunge pools (Beeman et al., 2003). Gas bubble trauma induces a variety of sub-lethal and lethal effects in fish and other aquatic species (EPRI, 1990; Weitkamp and Katz, 1980). Gas bubble trauma is characterized by the formation of gas bubbles in the body cavities of fish, such as behind the eyes or between layers of skin tissue. Small bubbles can form within the vascular system, blocking the flow of blood and causing tissue death. Bubbles can also form in the gill lamellae and block blood flow, occasionally resulting in death by asphyxiation. The effects of gas bubble trauma can range from mild to fatal depending on the level of TDG supersaturation, species, life stage, depth, condition of the aquatic organism, and temperature of the water (Beeman et al., 2003).

In 1983, elevated TDG levels and gas bubble trauma were observed for the first time in the Beaverhead River downstream of Clark Canyon Dam. It was originally believed that the elevated TDG levels were caused by very high flows that included releasing the maximum quantity of flow through the outlet works and—for the first and only time since construction—releasing water through the spillway. Data collected by Oswald (1985) indicated that 8.8 percent of brown trout and 3 percent of the rainbow trout sampled downstream of the dam exhibited gas bubble trauma symptoms. Data collected by Falter and Bennett (1987) during a non-spill period, however, also found elevated levels of TDG in the river. In fact, the highest TDG concentration observed for the non-spill period was 126 percent of saturation compared to 127 percent of saturation during the spill event. Falter and Bennett (1987) suggested that the primary cause of TDG supersaturation downstream of Clark Canyon Dam is the turbulent mixing and plunging of flows released through the existing outlet structure of the dam. Data reported by the applicant indicate that TDG levels continue to remain above state standards, even in the absence of spills.

Other factors that may adversely affect trout populations in the Beaverhead River include outbreaks of bacterial furunculosis, and the more recent introductions of New Zealand mud snail (an exotic nuisance species that may displace species of greater forage value to trout) and whirling disease (Reclamation, 2006).

Clark Canyon Reservoir Fishery

Clark Canyon Reservoir supports a popular fishery for rainbow trout. Other common or abundant fish species include white sucker, redside shiner, brown trout and burbot. Rare species present in the reservoir include brook

trout, mountain whitefish, carp, and westslope cutthroat trout.

Relative abundance of rainbow and brown trout in Clark Canyon Reservoir has been documented since 1980 by gill netting. Rainbow trout abundance in fall surveys conducted between 1989 and 2011 was observed to range from 1.2 fish per net to 50 fish per net in 2004 and 2006, respectively. Rainbow trout abundance in spring surveys conducted between 1980 and 2006 was observed to range from 2.9 fish per net to 18.7 fish per net in 1991 and 2006, respectively. Brown trout abundance in spring and fall surveys has remained fairly low and stable; generally ranging between 1 fish per net and 10 fish per net. To augment the existing rainbow trout population in Clark Canyon Reservoir, Montana DFWP collects and spawns broodstock from Red Rock River. Fertilized eggs from these fish are incubated and reared in hatcheries and then are released into the reservoir as fingerlings or yearlings. Between 100,000 and 300,000 fingerling trout are stocked into the reservoir in most years, and approximately 70,000 additional yearling fish have been released in most years since 2002. Broodstock collection has not been undertaken in some drought years, when flows in the Red Rock River were too low to support a spawning migration of rainbow trout (Reclamation, 2006).

The health of the Clark Canyon Reservoir fishery has been linked to reservoir operation. Reclamation (2006) reports that fish populations typically remain healthy in years where storage remains over 60,000 acre-feet at the end of the summer irrigation season, with year-end storage levels of 100,000 acre-feet or greater providing optimum habitat conditions.

3.3.2.2 Environmental Effects

Flow Releases During Project Construction

Aquatic resources downstream of the dam may be affected during construction if project construction impairs the ability of streamflows to be released downstream into the Beaverhead River, or if it alters water quality compared to existing conditions. Because the existing outlet works would not be available to provide flow releases during part of the construction period, the applicant developed a plan for maintaining the continuity of flow releases during construction in consultation with Reclamation, FWS, Montana DFWP, District, Clark Canyon Water Supply Company, and Montana DEQ. The final Instream Flow Release Plan, incorporating comments received from the consulted agencies, was filed with the license application.

During installation and pressure-grouting of the steel penstock liner, construction of the trifurcation leading to the powerhouse turbines, and installation of associated valves, minimum flows to the Beaverhead River would need to be bypassed around the existing penstock. The applicant estimates that this phase of the construction process would require approximately 8 to 12 weeks, extending from October into December. In its Final Instream Flow Release Plan, the applicant proposes to provide streamflows during this period using electric pumps mounted on a barge anchored in the project forebay. After this phase of the construction has been completed, flow would be released through the existing penstock.

Prior to the start of construction, the number of primary and backup pumps would be determined based on the minimum flow release that would be required by Reclamation during the construction period. The number of primary and backup pump units would be a function of the final construction specifications and bypass flow requirements. The applicant anticipates that one or two pumps would most likely be required, but it proposes to provide as many pumps as are needed to pass the minimum flow specified by Reclamation. The applicant provided cost estimates for the installation of up to four pumps. The applicant proposes to mount the primary and backup pump units on a platform anchored in the forebay near the spillway, and to screen the pump intakes to meet resource agency requirements for fish exclusion.

Magnetic flow measuring equipment would be installed on each discharge pipe so that the discharge from each pump can be measured. In addition, the applicant proposes to install a gaging station immediately downstream of the project prior to construction. Reclamation would be consulted prior to construction regarding how the exchange of flow releases from the regulating outlet to the pumps and back again would occur, and continuous contact would be maintained between representatives of the applicant and Reclamation during this period.

A diesel generator located above the reservoir shoreline would be available to provide backup power in the event of a power outage. The generator would be enclosed in a spill containment unit of sufficient capacity to handle the diesel generator fuel storage. Additionally, an earthen berm would be placed around the generator site. The diesel generator would provide controls for automatic startup and electrical transfer if an outage occurs. The applicant also proposes to provide full-time/24-hour staff attendance of the pumping system when flows are being bypassed around Reclamation's existing intake and outlet works during construction of the proposed penstock.

Our Analysis

The applicant's proposal to implement its Final Instream Flow Release Plan, with provisions to pump flows around the existing penstock to the Beaverhead River at flows dictated by Reclamation, would ensure that streamflows and water quality suitable to protect aquatic life are maintained in the Beaverhead River downstream of the dam during project construction. Providing stable flow releases would be especially important to brown trout and mountain whitefish, which spawn in the Beaverhead River in October and November and rely on stable river flows for reproductive success.

The applicant estimates that this phase of the construction process would require approximately 8 to 12 weeks, extending from October into December. Elevated flows associated with irrigation demands have typically ended by late September. The timing of irrigation releases and the amount of minimum flow to be released after irrigation releases end are determined jointly by Reclamation and the East Bench Joint Board of Control, which is composed of the District and the Clark Canyon Water Supply Company. Minimum flows released during the post-irrigation season are determined using guidelines based on the amount of reservoir storage at the beginning of September plus the total inflow that occurs during July and August (table 3).

TABLE 3—CLARK CANYON RESERVOIR RELEASE GUIDELINES (SOURCE: RECLAMATION, 2006)

September 1 Storage Plus July–August Inflow (acre-feet)	Minimum Flow (cfs)
Less than 80,000	25
80,000–130,000	50
130,000–160,000	100
Greater than 160,000	200

Staff examined the end-of-month storage for Clark Canyon Reservoir for the years 1965–2016. Over the period of record, end-of-month storage for the month of September was generally less than 160,000 acre-feet with very few exceptions (Reclamation, 2016). Data for the most recent three years showed that storage for September ranged from 47,983–59,215 acre-feet (Reclamation,

2016). Given the data, we do not expect that the applicant would be required to provide a minimum flow above 100 cfs during the pumping stage of construction. Nevertheless, the applicant commits to being prepared to release whatever flow is required by Reclamation during the construction period. Consultation with Reclamation prior to the start of construction to determine what minimum flows would be required during the construction period, as the applicant proposes, would ensure that a sufficient number of primary and backup pumps are installed to maintain the required minimum release flows. Provision of backup pumps and a backup generator, as proposed by the applicant, would help to ensure that the required minimum flow is maintained in the event of a mechanical failure or power outage. Installation of the backup generator and fuel storage in a containment unit would help to ensure that any spills of diesel fuel are contained and do not enter the waterway.

Additional provisions proposed by the applicant that would help ensure flow continuity during project operation include:

- When flows drop below 87.5 cfs (the minimum hydraulic capacity of the powerhouse), the flow would be gradually transferred to the main penstock through synchronization between the powerhouse and the penstock valves. As flow is reduced through the powerhouse valves, flow would increase correspondingly through the penstock valve, and vice versa.
- The project is being engineered such that, in the event of emergency shut down or during a drop in flows that precludes power generation, the closure of the powerhouse valves and the return of flows to the normal outlet works would be automatically synchronized to eliminate the potential for unintended ramping. There would be no transition between pressurized and non-pressurized flows through the regulating outlet once the project is operational. Upon completion of the project, flows exiting the dam would be pressurized at all exit points except for the spillway.
- A project operator would be on site daily and Reclamation personnel would be notified immediately in the event of an unplanned shutdown or in case of any other type of emergency.

Implementing these measures would help ensure a very low likelihood of unintended ramping or dewatering of aquatic habitat as a result of project operation. Also informing Montana DFWP of any unplanned shutdown would provide that agency with information relevant to its management of fishery resources downstream of the project.

Providing 24-hour attendance of the pumping system for the duration of time that minimum flows are to be maintained by pumping would help avoid or minimize any adverse effects on aquatic resources caused by failure or malfunction of any component of the pumping system. Failure of the pumping system could have catastrophic consequences on fish and aquatic resources, especially brown trout and whitefish that are known to spawn during October and November in areas downstream of the dam. Because the pumps would provide the only means to transfer water from the reservoir to the river, it is anticipated that streamflows downstream of the dam would immediately begin to recede in the event of a pumping system failure. Any potential adverse effects of a pumping failure would be minimized by having properly trained staff on site to ensure a return to normal operations as quickly as possible. Further, installing a water level alarm to detect falling water levels in the Beaverhead River near the instream flow release point could help alert onsite staff of any need to activate back-up pumps or address any unforeseen problems with the pumping system.

Notifying Montana DEQ and Montana DFWP within 24 hours of any unauthorized discharge of pollutants, as the applicant proposes in its CWQMP, would help ensure that best management practices are adhered to and that any spills are addressed in a timely and thorough manner.

Construction Water Quality Monitoring

Montana DEQ's condition 2 stipulates the applicant submit a plan to monitor turbidity, temperature, DO, and TDG during construction. In its CWQMP, the applicant proposes to monitor DO, temperature, and turbidity at a site approximately 300 feet downstream of the proposed powerhouse and parking construction areas while TDG would be monitored immediately below the spillway pool when flows are being bypassed around Reclamation's existing intake and outlet works during construction of the proposed penstock.

If monitoring indicates that the state of Montana standard for TDG of 110 percent saturation is exceeded during pumping, the applicant would reposition the pump outlets until the state standard is met. Data would be transmitted in real time to the construction manager's trailer at the construction site, with mean values recorded at 15-minute intervals. Routine calibration and maintenance of field equipment would be accomplished in accordance with the manufacturer's guidelines.

The applicant's plan also includes provisions to take a vertical profile of dissolved oxygen levels and water temperatures in Clark Canyon Reservoir prior to commencement of pumping activities to ensure that reservoir mixing has occurred. If mixing has not occurred, then the applicant would delay modifying Reclamation's penstock and inlet works until this determination is made; thereby ensuring that any water pumped around Reclamation's penstock does not degrade water quality conditions below the dam.

For turbidity monitoring, the applicant proposes to use 5 NTU as background from which to evaluate turbidity levels generated by construction activities. Should this level be exceeded by more than 5 NTU during construction, the applicant would conduct a ground survey to determine if there is noticeable sedimentation arising from the construction area, take a water sample to verify the reading, and also determine if the probe is functioning properly and clear of algae or other debris. Any event resulting in a discharge of sediment would be reported within 24 hours to Montana DEQ and Montana DFWP to determine the need for corrective measures.

The applicant proposes to submit annual water quality monitoring reports to Reclamation, FWS, Montana DFWP, and Montana DEQ by February 15 following each year of construction. Agencies would have 60 days to review the draft reports and the applicant would submit a final report to the Commission each year addressing agency comments. The reports would include the raw data, documentation of any deviations from water quality criteria, and documentation of procedures to correct any deviations. In addition to annual reporting, the applicant proposes and Montana DEQ's condition 7 stipulates that the applicant notify Montana DEQ and Montana DFWP within 24 hours of any event that results in the discharge of sediment or pollutants as described above. The applicant also proposes to file an incident report with the Commission following the event.

Our Analysis

Monitoring water temperature, DO, TDG, and turbidity prior to and during construction as the applicant proposes and as stipulated by Montana DEQ's condition 2 would ensure that any adverse effects on water quality are

identified and that appropriate actions are undertaken to protect aquatic resources in Clark Canyon Reservoir and in the Beaverhead River downstream of the dam during all phases of construction.

Available information on water temperature and DO levels in Clark Canyon Reservoir indicate that the reservoir is typically well-mixed by late September so that the depth at which water is drawn from the reservoir during the October start date for pumping flows around the existing intake and outlet works should have no effect on downstream water quality conditions. Collecting reservoir profile data prior to the start of project construction, as the applicant proposes, would help to determine whether reservoir mixing has occurred and to assess whether project construction can be initiated without causing any adverse changes in downstream water quality. If pre-construction water quality monitoring indicates that temperature and DO are not uniform by the proposed October start date, delaying the start date of construction would further ensure that downstream water quality is protected prior to initiating pumping activities.

There is some potential that the pumping system used to bypass flows around the existing intake and outlet works during construction of the proposed penstock would provide a different level of aeration than currently occurs in the existing outlet structure, which could affect DO and TDG concentrations. If the pump discharge lines do not extend to the base of the spillway, aeration that would occur as flows pass down the spillway should ensure that DO and TDG concentrations equilibrate with atmospheric conditions, which would likely improve water quality for a temporary period compared to existing conditions. In the unlikely event that water quality conditions during pumping activities are adversely affected and water quality standards are not met, this would be detected by the proposed water quality monitoring program and appropriate measures could be taken (*e.g.,* repositioning the pump outlets) until Montana DEQ's water quality standards for DO and TDG are met.

The proposed temporary pumping facility could affect turbidity levels downstream by taking in sediment through its intake in the reservoir, or by disturbance during installation or removal of the intake. Monitoring turbidity levels downstream of the construction footprint immediately prior to and during construction as described in the applicant's CWQMP would alert the construction manager of a spike in turbidity and the need to determine the cause of the event and any necessary corrective measures to protect water quality. Because turbidity levels near the proposed construction footprint are generally less than 5 NTU during the year, using 5 NTU as a background turbidity level as the applicant proposes would be more than adequate to identify when a spike in turbidity has occurred beyond naturally occurring background levels. Notifying Montana DFWP and Montana DEQ within 24 hours of a discharge of sediment or pollutants would alert the agencies of these events as they occur and allow for these agencies to provide timely recommendations to protect water quality and fish resources downstream during construction.

Providing annual water quality monitoring reports to the agencies and the Commission during construction as the applicant proposes would provide a mechanism to evaluate whether any changes are needed to achieve water quality standards on a year-to-year basis during construction. However, in addition to annual reporting, notifying the agencies within 24 hours of a deviation from water quality criteria, and submitting an incident report to the Commission following the incident would enable the Commission and agencies to determine whether best management practices are being followed and that any needed corrective actions are addressed in a timely manner.

Also, notifying Montana DEQ and Montana DFWP within 24 hours of any discharge of pollutants and submitting an incident report with the Commission following the event would help ensure that best management practices are adhered to and that any spills are addressed in a timely and thorough manner.

Minimum Instream Flows

The applicant proposes that the project be operated as a run-of-release project, in which the flows downstream of the project powerhouse would be dictated by Reclamation, thus the flows would be identical to the flows that would be released by Reclamation in the absence of the project. This is consistent with Reclamation's 4(e) condition 9, which states that the timing, quantity, and location of water releases and release changes from the facilities would be at the sole discretion of Reclamation.

Interior, Upper Missouri Waterkeeper, and Montana Trout Unlimited recommend that the applicant work closely with water users and federal and state agencies to improve minimum instream flow conditions in the Beaverhead River, and support the implementation of the 2006 MOU between Reclamation and Montana DFWP entitled Betterment of the Beaverhead River and Valley.

Interior and Montana Trout Unlimited also recommend that the applicant contribute to improvements in water use efficiency to enhance instream flows for fisheries and environmental health of the river. They recommend that the applicant dedicate 4 percent of the gross hydropower revenues to funding independent technical studies of water efficiency improvements or funding on-the-ground water conservation measures designed to result in instream flow improvements. Interior and Montana Trout Unlimited recommend that the applicant prepare annual reports that explain the uses and expenditures of such funds, and the expected benefits of funded activities. In advance of submitting the annual report to the Commission, the applicant would provide the report to Montana DFWP and FWS for a 30-day review, and attach any comments received on the report when filing it with the Commission.

Our Analysis

Available information indicates that trout populations in the Beaverhead River are adversely affected by low flows that occur during the non-irrigation season and that fish populations in Clark Canyon Reservoir are adversely affected by low reservoir levels during periods of drought. Encouraging the implementation of water conservation strategies in the basin could alleviate adverse conditions that occur in Clark Canyon Reservoir and in the Beaverhead River during drought conditions. However, we note that operation of the project as proposed by the applicant would not cause any changes in the flows in the Beaverhead River or on water storage levels in Clark Canyon Reservoir.

The 2006 Reclamation/Montana DFWP MOU includes the following elements: (1) Identify environmental degradation issues of the Beaverhead River; (2) investigate possible solutions to correct degradation issues; (3) review Clark Canyon Reservoir operation to increase river and reservoir environmental health; (4) explore water conservation projects; (5) describe fishery goals and fish management objectives; and (6) work through a collaborative process with interested groups to develop resource management strategies to improve the environmental health of Clark Canyon Reservoir and the Beaverhead River. Implementing the applicant's proposed water quality

monitoring program would assist with identifying any environmental impacts associated with project construction and operation, and determine whether measures are needed to address project effects. The monitoring program would also contribute information on water quality conditions that would be useful to Reclamation and Montana DFWP as they pursue implementation of the MOU.

The applicant's proposal to operate the project to provide flows determined by Reclamation, consistent with Reclamation's 4(e) condition 9, would ensure that any changes in reservoir operation or flow regimes implemented under the MOU or through any other agreements that Reclamation enters into would not be impeded by operation of the project.

We make our final recommendation for water efficiency improvements in section 5.2, *Comprehensive Development and Recommended Alternative.*

Water Quality Operation Effects

Montana DEQ's condition 3 stipulates that the applicant maintain DO levels at saturation (approximately 7.5 mg/L or higher, depending on the temperature of the reservoir water at the intakes) from June 1 through August 31 and 8.0 mg/L the rest of the year while operating. Condition 5 stipulates that the applicant submit a plan prior to construction describing any project design engineering modifications for maintaining DO at these levels. Condition 4 stipulates that the applicant maintain TDG levels at 110 percent or lower downstream of the project while operating.

Diverting water through the applicant's proposed penstock and turbines at Clark Canyon Dam has the potential to reduce DO concentrations downstream compared to current conditions by reducing the turbulence and the entrainment of gases in water exiting the powerhouse. Reduced DO concentrations may limit salmonid growth and reproduction and delay embryonic development and hatching of juveniles if concentrations remain low for extended periods (EPRI, 1990). In order to address potential DO and other water quality concerns during project operation and to comply with Montana DEQ's certification conditions, the applicant proposes to construct and operate an aeration basin downstream of the powerhouse and to implement its Revised DOEP during project operation which includes: (1) Procedures for monitoring and reporting temperature, DO, and TDG levels in project waters for a minimum of five years following initial project operation; (2) procedures for enhancing DO concentrations for water exiting the tailrace; and (3) corrective measures and emergency shutdown procedures to be implemented if deviations from state water quality criteria occur during project operation. The applicant states that the plan was developed in consultation with Reclamation, FWS, Montana DFWP, and Montana DEQ. Water quality monitoring provisions included in the plan are evaluated in section 3.3.2.2, *Post-Construction Water Quality Monitoring.*

The proposed aeration basin would consist of three 45-foot-long, 10-foot-wide frames containing 330 diffusers with the capacity to add additional frames if needed. The diffuser system would feature two mechanical blowers, an electronic control system, and ducted aeration diffuser disks to inject fine bubbles of air into the water column to provide the additional aeration. The applicant states that the blower and diffuser system would be designed with the capacity to elevate DO levels by a maximum of 7.5 mg/L before the water enters the Beaverhead River and could be adjusted based on the level of aeration needed to meet state criteria. The applicant anticipates that operation of the aeration basin would likely occur from June through mid-September each year, which is the time that DO concentrations at the bottom of the reservoir (*i.e.,* near the depth of the intake) are expected to be at their lowest levels of the year.

The blower for the aeration basin would include sensors to monitor flow rates and could be adjusted by the operator using controls located both remotely and in the powerhouse. The volume of air supplied by the blower would be based on the level of DO enhancement that is required for a given volume of water and would take into account empirically observed oxygen transfer rates. The applicant states that in early summer, as DO levels decline, the air diffusers in the aeration basin would be gradually brought online to maintain DO concentrations in the Beaverhead River downstream. If DO concentrations decline to such levels that the diffusers are insufficient to meet Montana DEQ's DO criteria (*i.e.,* 7.5–8.0 mg/L) during these months, then flows would be gradually shifted through the cone valves to the existing project works to provide additional aeration beyond that provided by the aeration basin alone.[19] This shift in flow would occur either automatically based on feedback from the applicant's water quality monitoring probes or manually by an operator as needed.

In an emergency shutdown or if probes at compliance monitoring Site 3 located approximately 300 feet downstream of the project in the Beaverhead River (described further below in section 3.3.2.2 *Post-Construction Water Quality Monitoring*) show that Montana DEQ's DO criteria cannot be met, the project would automatically trip offline, triggering the closing of the wicket gates on the turbines and simultaneously opening the cone valve, transferring all flows through the cone valves at the existing project works. If blowers malfunction during the time that the applicant needs to provide additional aeration, the project would remain offline until the backup blower is connected or the blowers are replaced. The applicant also proposes to notify Reclamation immediately in the event of an unplanned shutdown or any other type of emergency that occurs during project operation.

Montana DFWP recommends that the applicant's aeration system be designed to achieve water quality standards downstream when water entering the project works has DO concentrations of 0 mg/L or the applicant should be willing to shut the project down. In its reply comments, the applicant reiterated that its proposed aeration basin is designed to provide the necessary level of DO enhancement downstream, but in any case it would shift flows through the existing outlet works or shut the project down as a last resort to meet water quality standards.

In addition, Montana DFWP and Upper Missouri Waterkeeper recommend that the applicant evaluate the need for dam infrastructure alterations and/or changes in long-term operations to minimize downstream turbidity resulting from entrainment of organic material or inorganic fine sediment from the reservoir into the project works. In its reply comments, the applicant stated that the Clark Canyon Project would not alter the depth of the reservoir intake, or the rate, volume, or velocity of water withdrawn. As a result, the applicant contends that minimizing entrainment of suspended organic and inorganic material is not within its operational control.

[19] The applicant states the shift of partial flows to the cone valve can function to aerate water using the existing outlet works in addition to the proposed aeration basin thereby potentially further enhancing DO levels beyond what the aeration basin would provide alone.

Our Analysis

Installation of turbines at the outlet works as proposed by the applicant has the potential to alter TDG levels downstream of the project. Under existing conditions, water leaving the outlet structures is subject to aeration and plunging as it exits the outlet works, which likely causes supersaturated TDG levels that have been documented in the dam tailrace during the months of June through September (*see* Figure 8). Elevated TDG levels may injure or kill fish that are exposed depending on the level of TDG supersaturation, species, life stage, depth, condition of the aquatic organism, and temperature of the water (Beeman et al., 2003). Passing water through the turbines would reduce the plunging effect and turbulence that occur under existing conditions, as well as the potential for entrained air to enter solution under pressure in the outlet works and in the spillway pool, thereby reducing the potential for TDG supersaturation. Thus, when flows are within the operating range of the project (*i.e.,* between 87.5 and 700 cfs), we expect that the potential for TDG supersaturation would be reduced compared to existing conditions which would benefit aquatic resources in the Beaverhead River downstream of the dam. Based on mean monthly flow release data for Clark Canyon Dam, we expect flow releases to be within this range a majority of the time (see figures 3 and 4). While it is reasonable to expect that TDG levels would be lowered during project operation (as compared to not operating the project), it is difficult to predict whether Montana DEQ's criteria of 110 percent saturation could be maintained at all times during project operation.

This would especially be the case when flow release requirements exceed the 700-cfs hydraulic capacity of the powerhouse. Under this scenario, additional flows would bypass the powerhouse penstock at the trifurcation and would be discharged through the existing outlet works, and in rare circumstances, through the spillway. As previously noted, TDG supersaturation frequently occurs when flows are released through the existing outlet works at the dam. Therefore, any time that flows exceed the 700-cfs capacity of the powerhouse which can occur at times during the peak summer irrigation season (*see* figures 3 and 4), it would not be unreasonable to expect that TDG supersaturation could occur. We would also expect that TDG supersaturation may occur if flows are partially shifted through the existing outlet works to enhance DO beyond what the applicant's proposed aeration basin would provide alone or if the project is shut down and all flows are released through the existing outlet works.

According to its Revised DOEP, the applicant plans to take an adaptive management approach to correct any deviations from state water quality criteria, including TDG levels that occur during operation. At this time, we are not aware of any additional potential measures that could be implemented at the project to minimize TDG levels; therefore, we assume that the project would be required to cease operation should TDG levels exceed the 110 percent saturation criteria stipulated by Montana DEQ's condition 4 similar to what would occur if DO criteria aren't met. Under a shutdown scenario, supersaturation of gases may occur at times during the summer and early fall as is typical under existing conditions until any future corrective actions are identified and implemented.

Although reduced turbulence in the tailrace area could benefit aquatic resources by reducing the frequency and extent of gas supersaturation, it could also decrease DO concentrations in the Beaverhead River by reducing the degree of aeration that occurs to water that is discharged downstream of the dam. Water currently discharges through the dam's outlet works under turbulent conditions, which tend to entrain atmospheric gases, thus increasing DO concentrations relative to Clark Canyon reservoir background levels. In contrast, discharging water through a powerhouse would reduce the turbulence and plunging effect and thus capacity for DO entrainment. The potential to pass water with decreased DO concentrations would be greatest in July, August, and September when DO concentrations at the bottom of the reservoir (near the depth of the intake) would be expected to be at the lowest levels of the year (*i.e.,* approaching 0 mg/L). Since baseline information indicates that DO levels in the upper Beaverhead River can fall below the 7.5–8.0 mg/L criteria for trout under existing aeration conditions, it appears likely that some level of DO enhancement would be necessary to ensure compliance with the state DO criteria during project operation.

Early life stages of trout begin to see declines in their growth rates when DO levels fall below 8 mg/L and cannot survive in extremely hypoxic conditions when DO levels fall below 1–3 mg/L (EPRI, 1990). Because baseline information indicates that DO levels in the upper Beaverhead River can at times fall below the 7.5–8.0 mg/L criteria in the summer months, providing the necessary aeration to achieve this criteria throughout the summer would enhance water quality and provide a benefit to aquatic resources during these months, particularly early life stages of trout that are typically more vulnerable to low DO levels (EPRI, 1990). Foust et al. (2008) determined that an air admission system is a particularly cost-effective method for improving DO conditions in a hydroelectric project tailrace and EPRI (2002) states that tailrace diffusers are widely accepted as devices capable of providing supplemental aeration. A similar aeration basin and diffuser array was built and operating effectively at the Island Park Hydroelectric Project (FERC Project No. 2973) in Idaho. Water quality monitoring reports filed from 2001–2016 confirmed that the Island Park Hydroelectric Project was successful at meeting state DO standards of 7.0 mg/L approximately 99 percent of the time during that period.[20] Given the information available, we anticipate that using a similar aeration basin and tailrace diffuser array to inject air into the water column to provide at least 7.5 mg/L of DO as the applicant proposes would maintain DO concentrations downstream to support all life stages of trout even when source reservoir levels are approaching 0 mg/L. Shifting flows to the existing outlet structures as needed to either achieve a level of 8.0 mg/L or shutting the project down and passing all flows through Reclamation's outlet works would ensure that project operation does not degrade water quality conditions relative to existing conditions and ensure that the applicant complies with DO levels stipulated by Montana DEQ's condition 3 while operating. Diverting all flows through the existing project works in the event of a blower failure or during an emergency shutdown would further ensure that existing water quality conditions are maintained downstream consistent with Montana DFWP's recommendation.

In regard to Montana DFWP's and Upper Missouri Waterkeeper's recommendations that the applicant evaluate the need for dam infrastructure alterations and/or changes in long-term operations to minimize downstream turbidity, we echo the applicant's reply comment that it wouldn't alter the depth of the reservoir intake, or the rate,

[20] *See* annual water quality monitoring reports for the Island Park Hydroelectric Project (FERC Project No. 2973) filed on November 2, 2001; April 22, 2002; August 25, 2003; July 9, 2004; August 8, 2005; June 27, 2006; October 3, 2007; December 31, 2008; November 12, 2009; December 6, 2010; and March 16, 2016.

volume, or velocity of water withdrawn as these are determined solely by Reclamation. Therefore, we are not aware of what changes to dam infrastructure or operations would result from the recommended evaluation to be able to sufficiently evaluate this measure. The applicant already proposes to implement other soil and erosion control measures during construction (*i.e.,* implementing its ESCP and CWQMP) which should inform how construction of the proposed penstock and outlet works affects downstream turbidity. Given these measures and the restrictions listed above, it is unclear what additional water quality benefit would be gained by requiring the applicant to conduct the recommended evaluation.

Post-Construction Water Quality Monitoring

Montana DEQ's condition 1 stipulates that the applicant conduct water quality monitoring for temperature, DO, and TDG for a minimum of the first five years of project operation and each year thereafter while discharging from July through October, unless Montana DEQ determines that additional monitoring is not warranted based on a review of the monitoring results for the first five years of project operation. Condition 6 stipulates that the project shut down automatically if DO levels fall below Montana DEQ standards and that a second, redundant DO probe be deployed at site 3 to ensure compliance with DO criteria during project operation. Condition 6 also stipulates that in the event that automated alarms indicate that water quality standards may have been exceeded (*i.e.,* TDG or temperature criteria), that an on-call operator be required to arrive within 30 minutes to evaluate the causes of the non-compliance reading. Condition 11 stipulates that the applicant meet annually with all watershed stakeholders to discuss water quality monitoring efforts associated with project operation.[21]

In its Revised DOEP, the applicant proposes to continuously monitor TDG, DO and water temperature for at least the first five years of project operation consistent with Montana DEQ's condition 1. The applicant would monitor DO and temperature at three sites and TDG at two sites during this initial monitoring period (table 4).

TABLE 4—WATER QUALITY MONITORING DURING OPERATION

[Source: License application as modified by staff]

Parameter	Monitoring site [a]	Frequency and duration
Temperature (°C)	1, 2, 3	Continuous for a minimum of first five years of project operation.
Dissolved Oxygen (mg/L and percent saturation) [b]	1, 2, 3	Continuous for a minimum of first five years of project operation.
Total Dissolved Gas (percent saturation)	2, 3	Continuous for a minimum of first five years of project operation.

Notes: °C—degrees Celsius; mg/L—milligram per liter.

[a] Site 1 is small chamber located upstream of proposed turbines. Site 2 is located in the proposed aeration basin. Site 3 is located about 300 feet downstream of the project in the Beaverhead River.

[b] Site 3 would also contain a second redundant probe to monitor DO levels in the Beaverhead River for the first year of project operation and then each year thereafter from June 1–September 14, subject to approval from Montana DEQ and Montana DFWP.

Temperature and DO levels of the intake water would be monitored by diverting small amounts of water from the project penstock upstream of the turbines into a small pressurized chamber containing a monitoring probe (Site 1) that would continuously transmit data to the powerhouse. Probes would also be deployed in the aeration basin (Site 2) and at a site approximately 300 feet downstream of the project in the Beaverhead River (Site 3). A second redundant probe to ''double-check'' DO concentrations would also be deployed at Site 3 consistent with Montana DEQ's condition 6 for the first monitoring year and then from June 1 through September 15 each year thereafter or until the DO criteria is met for 14 consecutive days without supplemental aeration, whichever date is later, subject to approval from Montana DEQ and Montana DFWP. The applicant also states that Montana DEQ or Montana DFWP can request to extended or shortened deployment of the redundant probe at Site 3 if necessary.

As discussed in section 3.3.2.2, *Water Quality Operation Effects,* blower controls would include a bypass that would allow full flows to be automatically routed through the existing cone valves in the event of an emergency shutdown, or if DO criteria cannot be met. If probes at Site 3 indicate that DO levels are lowering and approaching Montana DEQ's DO criteria, flows would gradually shift to the cone valves in the existing outlet works to provide additional aeration beyond what the aeration basin could provide alone. If either probe at Site 3 registers DO levels that fall below compliance levels, the project would automatically trip offline, and all water would be diverted through the cone valves consistent with Montana DEQ's condition 6.

In addition to the automatic shutdown procedures described above, a powerhouse operator would oversee compliance with Montana DEQ's water quality standards and would take action in the event of a non-compliance reading for temperature, TDG, or if only one of the probes at Site 3 indicate that DO criteria is not being met. The operator would visit the powerhouse at least once daily during all phases of operation and would determine the ability of the aeration basin to provide sufficient aeration. If a non-compliance reading for temperature or TDG occurs at Site 3 or if only one probe indicates non-compliance with DO criteria, the operator would immediately investigate and determine if corrective actions, such as shutting the project down, is warranted.

Whenever the operator is not at the powerhouse, a series of automated alarms would dispatch an on-call operator to the powerhouse within 30 minutes following a non-compliance reading consistent with the procedures stipulated by Montana DEQ's condition 6. If the operator is not able to reach the powerhouse for any reason, or if the cause of any noncompliance reading cannot be determined, the project would be manually shut down either at the powerhouse or remotely and all water would be diverted through the cone valves at the existing project works. Thus, the applicant states that whenever

[21] Montana DEQ clarified in a phone conversation with staff that ''watershed stakeholders'' includes state and federal agencies, non-governmental organizations, and any interested members of the public. *See* telephone record summary between FERC and Montana DEQ filed on June 9, 2016.

compliance with state water quality standards for DO, TDG, and temperature cannot be met due to project operations, the project would be offline and all flows would be diverted through the existing project works until further corrective actions, in consultation with the agencies, could be identified and implemented.

Although water quality would be monitored continuously, the applicant proposes to log and store hourly data for reporting purposes and to submit annual monitoring reports to Reclamation, Montana DEQ, Montana DFWP, and FWS for review by March 1 for the prior calendar year.[22] The reports would include the raw data, identify any deviations from water quality criteria, and recommended actions to correct any deviations. At the end of the five-year monitoring period, the applicant would file a report that includes recommendations for any potential future monitoring, and identify which parameters, if any, should be monitored. The applicant's Revised DOEP states that monitoring of any parameter could be extended beyond the initial five-year monitoring period at the discretion of Montana DEQ following review of the five-year monitoring results. In addition, the applicant includes a provision in its Revised DOEP to notify Reclamation, Montana DEQ, and Montana DFWP within 24 hours of any deviation from water quality criteria.

Upper Missouri Waterkeeper recommends that the applicant tier operation of oxygen supplementation systems to ongoing monitoring of hypolimnion conditions in the reservoir to ensure the system in fact discharges water that achieves water quality standards and to consider immediate shutdown of diversions if water quality is shown through monitoring to be negatively affected downstream. In its reply comments, the applicant states that implementation of its Revised DOEP, which includes water quality monitoring compliance sites and corrective measures that would be taken, would ensure that adequate DO concentrations are maintained during project operation.

Upper Missouri Waterkeeper recommends that the applicant support ongoing studies evaluating turbidity and nutrient pollution events occurring in the project vicinity and to develop and implement an adaptive management plan that addresses these concerns based on the results of those studies. In its reply comments, the applicant states that the proposed project has no nexus to the upstream land-use practices and subsequent nutrient loading to the Clark Canyon Reservoir and that it is beyond their control to eliminate or mitigate water quality impacts manifested from upstream land-use practices and reservoir operations.

Montana DFWP recommends that the applicant conduct water quality monitoring at three additional sites for a minimum of three years to empirically assess water quality dynamics within the mixing zone in the Beaverhead River downstream of the project prior to selecting a permanent site in consultation with Montana DEQ and Montana DFWP. Specifically, Montana DFWP recommends the additional sites be located: (1) Immediately downstream of the cone valve; (2) 100 feet downstream of the project; and (3) 200 feet downstream of the project. Upper Missouri Waterkeeper also recommends that the applicant consider additional upstream and downstream monitoring sites as part of its water quality monitoring program. In its reply comments, the applicant states that its water quality compliance sites were selected in consultation with Montana DEQ under the previous licensing process but that it would collaborate with Montana DFWP and Montana DEQ as needed.

Our Analysis

Monitoring TDG, DO, and water temperature for a minimum of five years during project operation as proposed by the applicant and as stipulated by Montana DEQ's condition 1 would document compliance with state water quality criteria and help identify whether the project is adequately protecting and enhancing water quality conditions and aquatic resources of the Beaverhead River over a range of hydrologic and meteorological conditions encountered during the monitoring period. This would be especially important for TDG and DO, two parameters that are expected to be affected by project operation.

Monitoring DO concentrations of reservoir water at Site 1 as the applicant proposes and as recommended by Upper Missouri Waterkeeper would alert the project operator of the need to operate the aeration basin to maintain adequate water quality downstream. Monitoring DO at Site 2 in the aeration basin would confirm the amount of additional aeration being provided by the diffusers when the aeration basin is operating. Monitoring DO at Site 3 in the Beaverhead River downstream of the project would help confirm that DO enhancement measures are effective at maintaining adequate DO levels downstream of the project. Deploying a redundant probe at Site 3 as proposed by the applicant and as stipulated by Montana DEQ's condition 6 would ensure that the equipment is working properly for the first year of project operation and each additional year it is deployed.

However, if monitoring ceases after the first five years of project operation, it is unclear how the applicant would ensure compliance with Montana DEQ's DO, TDG and temperature criteria beyond the initial monitoring period. The applicant and Montana DEQ did not identify what criteria would be used to determine that further monitoring would not be necessary, leaving that to occur in consultation with the agencies based on the five-year monitoring results. Presumably, the annual reports would show that with supplemental aeration that DO and TDG levels are always meeting or better than state water quality criteria. Consequently, the applicant would then be able to identify a set timeframe for operating the diffusers each year rather than tying operation of the diffusers to the results of DO monitoring. Operating the diffusers on this as-yet unidentified set schedule may cause DO levels to fall below state standards at certain times outside of this set period. Thus, extending the DO monitoring period through the term of any license issued would provide a means to track that DO enhancement equipment is working properly and that adequate DO levels are maintained at all times downstream for the protection of aquatic resources.

Monitoring TDG levels in the aeration basin at Site 2 and in the Beaverhead River downstream of the project at Site 3 would confirm whether the project reduces TDG levels from October through April and also determine whether the project complies with Montana DEQ's TDG standard at other times to protect fish and other aquatic resources downstream. Our analysis in section 3.3.2.2, *Water Quality Operation Effects,* indicates that the project may still cause exceedances of Montana DEQ's TDG criteria during certain times of the year (*i.e.,* when DO enhancement is occurring and when flow release requirements exceed the 700 cfs capacity of the project). Thus, extending the monitoring period for TDG through the license term would allow the applicant, resource agencies and Commission staff track these events as they occur, and make informed decisions on the need for corrective measures.

[22] The applicant agreed to send all post-construction annual water quality monitoring reports to FWS in addition to the other agencies in their reply comments filed on April 8, 2016.

Deploying probes at the cone valve and 100, 200, and 300 feet below the project, as recommended by Montana DFW and Upper Missouri Waterkeeper would permit the applicant to determine the extent of the mixing zone and potentially the best place to document compliance with DO and TDG levels. According to Urban et al (2008), the factors contributing to TDG concentrations in river systems downstream of a dam changes with distance. Elevated TDG levels in hydropower releases are generally caused by the entrainment of air in spillway releases and the subsequent exchange of atmospheric gasses into solution during passage through the stilling basin. Aerated water plunging off steep drops into pools is the typical mechanism by which entrained air is forced into solution causing gas supersaturation. These interactions cause TDG to fluctuate for a short distance downstream of the plunge or release point before TDG levels plateau and remain plateaued often for several miles downstream. This was consistent with the applicant's water quality sampling results from 2009 which showed that TDG saturation levels slightly reduced as water moved downstream from the dam but quickly plateaued and still remained above state criteria at times as much as 5.7 miles downstream of the project. Given the documented small changes in TDG levels and because conditions downstream are likely to be better represented by the applicant's proposed monitoring site than the turbulent mixing zone, it is unclear what additional benefits to aquatic resources would be derived from monitoring DO and TDG levels within the mixing zone.

Because the project would be operated run-of-release and would withdraw water from the same depth and through the existing intake structure, operation of the project should not cause any change in water temperature in the Beaverhead River downstream of the project. If initial project operation causes any unforeseen adverse effects on downstream water temperatures, consulting with the agencies on the annual reports and extending the monitoring program beyond the initial five-year monitoring period would help ensure that any modifications needed to protect beneficial uses could be developed and implemented, if warranted.

Conducting additional water quality monitoring at upstream sites as recommended by Upper Missouri Waterkeeper would provide general information on water quality conditions within the Clark Canyon Reservoir above the intake as well as possibly in tributaries feeding the reservoir but it is unclear what nexus this would have to the project as these areas would not be affected by the project.

Supporting ongoing studies evaluating turbidity and nutrient pollution events occurring in the watershed and participating in the development of an adaptive management plan with other regional entities as recommended by Upper Missouri Waterkeeper would likely provide some information on specific land-use practices and upstream sources of nutrient loading of project waters to support ongoing watershed management efforts. However, it is unclear what nexus this effort has to the effects of the project and at this time we are not able to evaluate specific actions that would be required by the as-yet undeveloped adaptive management plan. However, implementing the applicant's proposed water quality monitoring program would assist with identifying any effects associated with project construction and operation, and determine whether measures are needed to address project effects. The monitoring program would also contribute information on water quality conditions that would be useful to entities as they conduct future studies addressing nutrient pollution events and their effects on aquatic resources in the project area.

Also, the applicant's proposal to operate the project to provide flows determined by Reclamation, consistent with Reclamation's 4(e) condition 9, would ensure that any changes in reservoir operation or flow regimes implemented under any future adaptive management plan that Reclamation enters into would not be impeded by operation of the project.

Submitting annual water quality monitoring reports to the agencies would provide a mechanism to evaluate whether any changes are needed to achieve water quality standards on a year-to-year basis during the initial few years of project operation. Holding an annual meeting with watershed stakeholders to discuss water quality monitoring efforts as stipulated by Montana DEQ's condition 11 would provide another mechanism to evaluate whether any changes are needed on a yearly basis.

Notifying Reclamation, Montana DEQ, and Montana DFWP within 24 hours of any deviation from water temperature, DO, or TDG requirements as the applicant proposes would allow the agencies to provide timely input on corrective actions needed to protect aquatic resources as they occur. However, also submitting an incident report with the Commission within 30 days following any deviation from water quality criteria would enable the Commission to review actions taken by the applicant in the short-term when these deviations occur and would facilitate Commission administration of the license.

Also, notifying Montana DFWP in addition to Reclamation immediately in the event of an unplanned shutdown or other operating emergency would ensure that Montana DFWP provides input on any corrective actions needed to protect water quality and fish resources in the event of an unplanned shutdown.

Fish Entrainment

Entrainment of fish from Clark Canyon Reservoir during project construction and operation could cause some reduction in fish populations in Clark Canyon Reservoir, and installation of the proposed Francis turbines could increase the mortality rate of entrained fish and reduce the number of fish that are recruited to downstream fish populations.

During project construction, the applicant proposes to screen the pump intakes to meet resource agency requirements for fish exclusion using 0.5-inch mesh screens of sufficient size to limit approach velocities to a maximum of 1.0 foot per second.

Interior and Montana Trout Unlimited recommend that the applicant prepare, in consultation with Montana DFWP and FWS, a feasibility assessment of technical procedures to evaluate the effects of fish entrainment (including pressure differential effects) and impingement of the dam outlet and project works, to include monitoring a range of water supply and operating conditions. These entities recommend that, based on the feasibility assessment, the reviewing agencies and the Commission determine whether monitoring or preventive measures to avoid or minimize damage and mortality of native fish would be required.

Our Analysis

Although the applicant does not specify the depth from which the pumps would withdraw water from Clark Canyon Reservoir during project construction, it is expected that the water would likely be withdrawn from a shallow depth to minimize pipe length and pumping costs and to facilitate the inspection and maintenance of the proposed intake screens. Because the depth of the intakes would be much shallower than the existing dam intake, the potential for fish entrainment would

differ from existing conditions and from project operation, when flows would pass through the existing dam intake structure.

Screening the pump intakes as proposed by the applicant would limit the potential for increasing the entrainment rates of fish species that use shallower areas of the reservoir, and would limit the potential for adversely affecting fish populations in the reservoir during project construction.

The fish entrainment feasibility assessment recommended by Interior and Montana Trout Unlimited would determine what, if any, procedures are possible to study the magnitude of fish entrainment and the mortality rate of fish passing through the outlet works, with the ultimate goal of determining whether measures to reduce entrainment are warranted to minimize injury and mortality of fish.

Numerous studies of resident fish entrainment and mortality have been conducted at hydroelectric projects over the past several decades. Comprehensive reviews of these studies have been done by FERC (1995), the Electric Power Research Institute (EPRI, 1997, 1992), and Winchell et al. (2000). While none of these studies specifically evaluated the entrainment potential of resident trout, CH2M HILL (2007) summarized the results of several trout entrainment studies conducted at hydropower projects in the Pacific Northwest. The study reports summarized in the document suggest that the type of analysis requested by Interior and Montana Trout Unlimited could be conducted at the Clark Canyon Dam Project, and may be effective at developing estimates of entrainment and mortality if baseline information is lacking. In this instance, however, sufficient information appears to exist to describe how entrainment rates might change between baseline conditions and proposed project operation. Project operation would have no effect on the rate of fish entrained from Clark Canyon Reservoir because the project would not alter the timing, rate, or volume of water withdrawals, and all water passing the dam would pass via the existing deep intake and outlet structure (and by the spillway during spill events), as it does under existing conditions. During project operation, however, it is possible that the mortality rate of fish that are entrained into the intake facilities on the dam may increase due to the routing of fish through the turbines instead of the existing outlet works.

The best available information suggests that the mortality rate of entrained fish under existing conditions appears to be quite high. In its comments under the previous license issued for the Clark Canyon project (*i.e.,* P–12429), Montana DFWP stated that adult burbot entrained and sampled in 1984 exhibited a very high incidence of mortality, with most of the dead fish exhibiting extremely distended swim bladders. Further, Montana DFWP indicated that it is highly unlikely that brown or rainbow trout entrained under existing conditions can survive the pressure differential that occurs when fish are entrained into the deep intake in the reservoir and discharged through the existing outlet works (Clark Canyon Hydro, LLC, 2006).[23]

It is unlikely that the addition of a penstock and turbines would alter the existing pressure-induced mortality rates of fish entrained into the dam. As previously noted, the project would not alter the depth of the intake, or the rate, volume, or velocity of water withdrawal. Therefore, similar to existing conditions, fish would pass through the turbines having been acclimated to the pressures of the deep reservoir and would experience rapid depressurization when they are exposed to atmospheric pressures in the relatively shallow tailrace. Because the mortality rate of fish passing through the existing outlet works likely approaches 100 percent based on the available information, any additional turbine-induced injury caused by mechanical strike or shear effects would not result in additional fish losses.

The fish entrainment feasibility assessment recommended by Interior and Montana Trout Unlimited would ultimately determine whether measures to reduce entrainment are warranted to minimize damage and mortality of native fish. The probable outcome of this evaluation would be to determine whether a fish screen to preclude fish from exiting the reservoir would be appropriate. However, installing and maintaining a fish screen at the existing intake structure would be a substantial undertaking given the depth of the intake.

Finally, the fishery in the Beaverhead River consists of self-reproducing populations of brown and rainbow trout. Any increase in the mortality rate of fish that are entrained from Clark Canyon Reservoir, if it were to occur, is unlikely to affect the fishery for these species. Brown trout, the dominant trout species in the Beaverhead River, are not abundant in Clark Canyon Reservoir, and as a result, only small numbers of this species are likely to be entrained. Any rainbow trout that survived passage through the existing outlet works would likely be stocked fish that were hatched and reared in a hatchery environment, and are not likely to be as well adapted to conditions in the Beaverhead River as naturally spawned fish recruited from the existing, self-sustaining population.

Cumulative Effects

Montana DEQ put the Beaverhead River as well as several tributaries to Clark Canyon Reservoir on the list of impaired waterbodies (CWA section 303[d]) for violations of state water quality standards. The listing of these waterbodies on the 303(d) list triggered the development of a TMDL for each parameter listed. TMDLs are designed to limit the inputs of potentially degrading agents to waterbodies by limiting the sources responsible for the degradation. Future implementation of TMDLs for tributaries to Clark Canyon Reservoir and the Beaverhead River could have a cumulative benefit of reducing harmful algal blooms caused by excessive nutrient inputs from several upstream and downstream sources within the watershed. However, because the project would not contribute to or affect such inputs, constructing and operating the project would not directly or cumulatively affect nutrient levels within the tributaries or the reservoir that may cause algal blooms.

DO in the tailrace has been shown to fall below the state criteria of 8 mg/L at times during the summer and early fall when early life stages of fish are present. Project operation could further reduce DO concentrations in the tailrace. However, implementing the applicant's DO enhancement program would maintain adequate DO concentrations in the project tailrace throughout the year and potentially enhance DO levels in the summer months compared to existing conditions. Monitoring DO levels in the aeration basin and downstream would ensure that DO enhancement measures are successful at meeting state DO criteria during project operation.

The proposed project would likely cumulatively contribute to efforts to improve water quality in the Beaverhead River by lowering TDG concentrations in the project tailrace at least during the months of October through April. Monitoring TDG levels within the aeration basin and downstream would inform whether additional corrective actions need to be taken to maintain compliance with state TDG criteria.

Overall, construction and operation of the project is likely to cause cumulative enhancement to aquatic resources within the area defined for our

[23] See section E.4 of the final license application filed on July 7, 2006 under FERC Project No. 12429.

cumulative analysis due to DO enhancement in the summer months and the lowering of harmful TDG concentrations during the late fall compared to existing conditions.

3.3.3 Terrestrial Resources

3.3.3.1 Affected Environment

Vegetation

Clark Canyon Dam and Reservoir are located within the Beaverhead Mountains Ecoregion, which extends from the Centennial Mountains south of Red Rock Lakes National Wildlife Refuge in southwestern Montana, west to the Continental divide along the Beaverhead Mountains, and includes the headwaters for the Beaverhead, Madison, and Big Hole rivers.

Shrub steppe is the prevalent vegetation type in the Clark Canyon Reservoir area. Big sagebrush and green rabbitbrush are common shrubs. Rocky areas support mountain mahogany and broom snake weed. Perennial bunch grasses such as bluebunch wheatgrass, fescue, and Indian ricegrass occupy the understory alongside drought-adapted forbs.

The proposed powerhouse site, at the base of Clark Canyon Dam, is characterized by low to mid-height grasses and forbs.

The proposed transmission line route would extend over 7.9 miles to the south to the Peterson Flat substation. This area consists primarily of basin big sagebrush and bluebunch wheatgrasss. Other vegetation types found along the right-of-way (ROW) are Rocky Mountain juniper/bluebunch wheatgrass woodland, quackgrass herbaceous vegetation, and wetland areas along the two small creeks west of the reservoir. Hayfields occur at the western end of the proposed transmission line ROW.

The Montana Natural Heritage Program (Montana NHP) lists 93 plant species within Beaverhead County that are species of concern or potential species of concern. Eleven of these species are listed as sensitive species by BLM. Five of these plant species occur near the project: bitterroot milkvetch, scallop-leaf lousewort (at high risk of extirpation in Montana), hoary phacilia (a BLM watch species), chicken sage, and limestone larkspur. The known populations of bitterroot milkvetch, chicken sage, limestone larkspur, and hoary phacilia are located outside of the area that would be affected by the project. The scallop-leaf lousewort, which is known to occur in wetland and river bottom areas, is located along the Beaverhead River riparian zone downstream of Clark Canyon Dam.

Wetlands

Wetlands are transitional land areas between terrestrial and aquatic systems where the water table is usually at or near the land surface or the land is covered by shallow water.

The Beaverhead River at the base of the dam consists of a mix of open water and emergent and shrub-scrub wetland habitats. A narrow riparian corridor with a diversity of wetland plants along the river bottom land borders the Beaverhead River downstream of Clark Canyon Dam. Common riparian species include Baltic rush, hardstem bulrush, and coyote willow. Immediately downstream of the tailrace and along the original river channel, seepage has created a marsh wetland adjacent to the Beaverhead River.

Wetlands within the bottomlands of Horse Prairie Creek and Medicine Lodge Creek along the transmission line ROW are dominated by cultivated grasses such as quack grass, Kentucky bluegrass, and redtop, as well as native species such as Baltic rush, sedges, and cattail. Coyote willow was also present in the Horse Prairie Creek bottomland wetlands.

Wildlife

The marsh wetland and riparian areas provide feeding and nesting habitat for gulls, cormorants, sandhill cranes, and waterfowl. The open water of Clark Canyon Reservoir and the Beaverhead River provide feeding areas for waterfowl, bald eagles, and osprey, as well as breeding habitat for amphibians. Mule deer, moose, pronghorn antelope, and elk occasionally use the riparian meadows along the river and are commonly found in the upland sagebrush steppe. Song birds nest and feed in these habitats. The upland steppe provides feeding, breeding, and nesting habitat for songbirds, game birds such as sage grouse, and raptors such as ferruginous hawk.

Common big game mammals in the area include mule deer, white-tailed deer, elk, pronghorn, moose, and black bear. Mule deer comprise most of the big game take in management districts of Montana DFWP Region 3, which includes the project area. Pronghorn and mule deer also feed and rear young in sage steppe habitats. Upland game birds popular with hunters in the region include blue grouse and sage grouse. Other upland game birds include chuckar, ruffed grouse, spruce grouse, Hungarian partridge, pheasant, and sharp tailed grouse.

Several furbearing mammals that occur in the region include coyote, beaver, mountain lion, bobcat, wolverine, otter, marten, skunk, weasel, mink, muskrat, raccoon, badger, and fox. Many of these species are highly mobile, with large home ranges incorporating many habitat types. Mink and muskrat and rodents such as voles may den along the banks of the tailrace and meadow habitats. Others such as beaver, muskrat, and otter are more restricted to the riparian corridor.

The ferruginous hawk is a BLM special status species, a Montana DFWP S2 species of concern (SOC), and is considered at risk for extirpation from the state by Montana NHP. In Montana, ferruginous hawks breed in the shortgrass foothills and steppe-habitat east of the Rocky Mountains. These hawks commonly migrate south in the fall. Ferruginous hawks are found on semi-arid plains and in arid steppe habitats and prefer relatively unbroken terrain. In Montana they inhabit shrub steppe and shortgrass prairie. Ferruginous hawks prefer tall trees for nesting, but will use a variety of structures including mounds, short cliffs, cutbacks, low hills, haystacks, and human structures. Ferruginous hawks feed on ground squirrels, rabbits, pocket gophers, kangaroo rats, mice, voles, lizards, and snakes. Populations can be adversely influenced by agricultural activities. The Montana NHP has records of 14 nest locations in the vicinity of the proposed transmission ROW; however, no breeding birds have been documented by the Montana NHP database since 2000. Nonetheless, there is suitable nesting habitat in the project vicinity, and breeding pairs may use the area for foraging. Call (1978 *in* Travsky and Beauvais, 2005) identified the breeding season of ferruginous hawks to be March 10–July 2 with nest building taking place from 10–16 March; egg laying from 17 March–1April; incubation from 21 March–21 May; hatching from 16 April–21 May; and fledging from 4 June–2 July.

Montana NHP has one local record of occurrence of a sagebrush sparrow (S2 SOC in Montana and a BLM sensitive species) from a couple of miles north of the proposed transmission ROW in 2002. Southwestern Montana is near the northern extent of the species' breeding range, and sagebrush sparrows are generally uncommon. Nonetheless, there is abundant suitable habitat in the vicinity of the proposed transmission ROW and sagebrush sparrows could be present in the area during the breeding season.

Trumpeter swans are a Montana S2 and BLM sensitive species that utilize the Clark Canyon reservoir as migration stopover and winter habitat. A great

blue heron (S3 SOC in Montana) rookery is known from the east side of the reservoir, but was last observed active in 1999. The only wetland habitats found within the transmission line ROW that could support nesting, wintering, and migrating birds are associated with Horse Prairie Creek, Medicine Lodge Creek, and the Beaverhead River.

The pygmy rabbit, a BLM special status species and a Beaverhead National Forest sensitive species, is found from the Great Basin region north to extreme southwestern Montana. Isolated populations are known from east central Washington and Oregon. The project is located within the range of pygmy rabbits, but pygmy rabbits have not been documented in the vicinity of the project. The Great Basin pocket mouse is another BLM sensitive species and a S1 SOC for Montana FWP. Southwestern Montana is near the northern extent of the species' range. Occupied habitats in Montana are arid and sometimes sparsely vegetated. They include grassland-shrubland, stabilized sandhills, and other landscapes with sandy soils where sagebrush cover exceeds 25 percent. Elsewhere, they are also known to occur in pine woodlands, juniper-sagebrush scablands, shortgrass steppes, and shrublands. They tend not to occur in heavily forested habitats. The Montana NHP does not have records of occurrence near the project, but there are known populations in Beaverhead County and suitable habitat nearby.

Preble's shrew and Merriam's shrew, both S2 SOC in Montana, have not been documented in the project area, but have been known to occur in Beaverhead County and have suitable habitat that exists in the project area. Similarly, Southwestern Montana is at the western edge of the known range for the Dwarf shrew, another S2 SOC in Montana. It is possible, but unlikely, that this species occurs in the project area.

The bald eagle is a Montana DFWP S1 species. Bald eagles continue to be protected at the federal level under the Bald and Golden Eagle Protection Act of 1940 and the Migratory Bird Treaty Act. The State of Montana also has regulations that protect bald eagles. The 1994 Montana Bald Eagle Management Plan developed by the Montana Bald Eagle Working Group, and their addendum, the 2010 Bald Eagle Management Guidelines, detail restrictions on human activities near known nest sites. Bald eagles are found primarily near coastlines, rivers, reservoirs, and lakes. Eagles principally eat fish, but also feed on carrion, waterfowl, and small mammals. They use large trees as nest sites and hunting perches. Eagles winter throughout much of the United States; both wintering and nesting eagles can be found in the project vicinity.

Bald eagles are known to nest near the proposed transmission line ROW and downstream of Clark Canyon Dam. The Montana NHP has one record of a bald eagle nest attempt in 2011 about 334 feet north of the proposed project transmission ROW in the Horse Prairie Creek drainage, west of the reservoir and a pair of eagles were observed at the nest tree in February 2012. Montana DFW assumes the territory to be occupied yearly. Bald eagle nests also have been observed downstream of the dam, one of which was last documented in 2014. Bald eagles also utilize the Clark Canyon Reservoir area in winter and during migration.

The golden eagle is a BLM sensitive species, a Montana DFWP S2 SOC, and a FWS Bird of Conservation Concern that is protected under the federal Bald and Golden Eagle Protection Act. They are common year round in open rangelands and mountainous habitats throughout Montana. Golden eagles prey primarily on small mammals, particularly rabbits and ground squirrels, but are also known to eat a wide variety of prey, including birds, snakes, insects, and carrion. They usually nest in large trees or on cliffs. Since the year 2000, there are no records of active breeding territories for golden eagles within 0.5 mile of the proposed project. However, the Clark Canyon Reservoir area does provide suitable nesting and wintering habitat, and golden eagles may be present at any time of year.

On September 22, 2015, FWS determined that the greater sage-grouse does not warrant protection under the ESA. A landmark landscape-scale conservation initiative was started with conservation partnerships instituted between federal and state governments, private land owners, and others that provided sufficient protections to prevent listing (FWS, 2015). However, the greater sage-grouse remains a Montana DFWP S1 SOC and a BLM sensitive species. It is the largest grouse species in North America and a sagebrush-obligate, depending on sagebrush communities for breeding, nesting, brood-rearing, and winter habitat. Seasonal habitat characteristics vary considerably and greater sage-grouse frequently move over large areas annually to meet their seasonal needs. Populations are found scattered throughout Montana, excluding the northwest and extreme northeast portions of the state. Greater sage-grouse leks generally occur in open areas with sparse shrub cover, while nests are usually located under sagebrush. Brood-rearing habitat tends to have higher cover of herbaceous vegetation and abundant insects, which are an important food resource for juveniles. Greater sage-grouse move to more mesic habitats as herbaceous vegetation dries out and late summer brood-rearing habitats become more variable.

In winter, greater sage-grouse feed almost exclusively on sagebrush, which they also rely on for thermal and escape cover. Winter habitat is often in areas with moderate cover of tall sagebrush that emerges at least 10 to 12 inches from snow cover. Predators of adults and juveniles include hawks, eagles, ravens, weasels, coyotes, and foxes. Common nest predators include ground squirrels, badgers, coyotes, ravens, and snakes. Predation can cause low rates of nest success and juvenile survival.

The greater sage-grouse population within the project area is designated as part of the Southwest Montana Population, which occurs in Madison and Beaverhead Counties. FWS developed a report titled *Greater Sage-grouse Conservation Objectives: Final Report* (FWS, 2013). The FWS (2013) considers the Southwest Montana population populations, which includes Madison and Beaverhead Counties, to be at a low level of risk considering the population size, limited habitat threats, and ties to Idaho's birds. The proposed transmission ROW runs alongside Highway 324 and through the Montana DFWP-designated greater sage-grouse core area identified as ''Beaverhead 3.'' Active and historic leks are known to exist within four miles of the highway.

As of 2012, greater sage-grouse had not been observed close to Highway 324 and the proposed transmission ROW; however, they may utilize the area during the late brooding season, when food resources become scarce in more xeric habitats, or during migration to and from breeding grounds. Any movement between breeding grounds in the Horse Prairie and Medicine Lodge drainages would entail crossing the highway and proposed transmission ROW. Movement to and from breeding grounds in Montana and wintering areas in Idaho would also entail crossing through the project area.

3.3.3.2 Environmental Effects

Vegetation and Wetlands

Approximately 0.10 acres of upland habitat near the dam would be permanently converted for project features: 0.07 acres for the powerhouse

and 0.03 acres for the substation. A staging area of approximately 8,000 square feet located adjacent to the access road would be used to store materials, equipment, and fuels during the construction period. A 200 square foot area located near the east end of the downstream side of the dam would be designated for the temporary containment of spoils until it is either used as backfill or permanently removed from the project site. The existing access roads would be improved for use during project construction, operation, and maintenance. Vegetation would be temporarily removed from this area until vegetation is re-established following construction.

The proposed access road currently appears to be little more than an infrequently used track through perennial grasses and sagebrush steppe vegetation. The increase in traffic associated with the project, including heavy construction vehicle traffic, would likely cause soil compaction and remove the existing perennial grasses from the roadway. The increase in traffic during construction would temporarily disturb wildlife in the vicinity of the road.

The buried transmission line segment between the powerhouse and powerhouse substation would roughly follow the south and east side of the access road for about 0.3 mile. Transmission line construction would require excavation of a 3-foot-wide by 3-foot-deep trench, placement of conductor, and backfilling. The applicant states that removed material would likely be temporarily placed alongside the trench and would be replaced in the trench following placement of the conductor. The buried transmission line would temporarily disturb about 8,000 square feet of perennial grasses and sagebrush steppe vegetation.

Approximately five miles of the 7.9-mile long transmission line would be located 100 to 200 feet north of Highway 324. The westernmost two miles and several shorter sections (generally at road curves) would be located closer to the highway. The proposed ROW would be 80 feet wide. The applicant proposes to construct the transmission line as single pole structures with an average span distance of 428 feet between the poles. Clark Canyon Hydro estimates that 13 poles would be required per mile and that each pole would displace approximately three square feet of vegetation and temporarily disturb an additional 22 square feet. Less than 0.01 ac of vegetation would be permanently removed to construct the proposed transmission line and approximately 0.05 acre could be temporarily disturbed by construction activities. No trees would be removed within the proposed ROW.

Construction activities, including pole placement for the transmission line, would avoid wetlands to the extent practicable. The wetland areas adjacent to the original river channel, tailrace channel, and along the river would be protected from adverse construction effects by avoidance and the installation of a silt fence to prevent sediments from reaching the wetland areas.

The applicant proposes to implement its Vegetation Management Plan (VMP) to minimize effects to wetland, riparian, and upland vegetation. The plan also includes measure to control noxious weeds. The VMP includes the following best management practices to minimize vegetation disturbance and loss and promote quick recovery of disturbed areas:

- Avoid driving off designated access routes whenever possible, use existing developed and primitive roads;
- Clearly mark wetland/riparian areas with signs and/or highly visible flagging during construction;
- Do not drive equipment, or stage materials in wetland/riparian areas;
- Limit ground disturbance and grading to where absolutely necessary;
- Educate equipment operators through: Review of this plan; explicit delineation of all sensitive areas (*e.g.* wetland areas); the presence of an on-site construction supervisor trained in environmental protection; and frequent site walks to confirm all equipment operators are familiar with the location of sensitive areas;
- Visually inspect of all construction and disturbance areas a minimum of every seven days throughout the entirety of construction activity;
- Minimize compaction by heavy equipment in previously undisturbed off-road areas;
- Do not temporarily or permanently place fill material within the channel in the delineated wetland area, unless specifically permitted as part of the project design;
- Install biodegradable erosion control logs as needed (*e.g.,* every 200 feet) in any sloped areas to minimize erosion until vegetation has established;
- Place biodegradable erosion control mats (coir fabric) on slopes exceeding 5% (*e.g.* along the transmission line right-of-way, or on the dam face) as needed to minimize erosion until vegetation has established;
- Employ silt fence as needed if working during rain events that may cause excess sediment to be washed into the Beaverhead River, or into wetland areas; and
- Reclaim and revegetate temporarily disturbed areas as soon as practicable after construction.

The VMP also includes the following revegetation measures, which would be applied to all construction areas on and below the dam, the staging and spoil areas, temporary vehicle use and parking areas, and areas temporarily disturbed by installation of the transmission line poles:

- Preserving existing topography wherever possible;
- Following construction, ripping to a depth of 6 inches any soils compacted by construction equipment;
- Removing noxious weeds around areas to be reseeded;
- Reseeding or replanting all disturbed soils using a mix of native plants that meets Reclamation and BLM requirements; and
- Spreading certified weed-free mulch over seeded areas to retain moisture and protect from soil erosion.

The applicant proposes to use native topsoil for all revegetation efforts. However, if this is not possible (*e.g.* if revegetation needs to occur in an area that was excavated and re-filled), then topsoil stripping and stockpiling would need to occur to ensure a proper topsoil seed bed. Fertilizer would not be used during the initial plantings. The species selected for planting would be adapted to conditions at the site. Seeding would occur ideally in spring, early summer (June-early July), or fall, within three months of construction.

The applicant also proposes measures to treat and prevent the spread of invasive weeds in the project area. Gravel and fill material would be obtained from inspected and certified weed-free sources, and all equipment would be cleaned and inspected prior to arrival at the project area. Invasive weeds found prior to construction would be flagged and treated manually (for small infestations), and larger infestations would be treated with herbicides by an applicator certified by the Montana Department of Agriculture. Flagging would remain in place to designate the site as an area where additional weed precautions must be taken. Access roads leading to construction areas would also be inspected and weeds would be treated to preclude their spread by equipment moving through the area.

Under the proposed VMP, the applicant would monitor the revegetation and invasive weed control efforts for a minimum of three years post-construction, and until the

following performance standards are achieved:

- Vegetation cover would be comparable to conditions in the adjacent, undisturbed reference area (within 70 percent of adjacent cover) within five years of revegetation.
- Soil stability would be evident based on the absence of rills, sediment fans, and other indicators of soil movement.

The applicant would provide annual monitoring reports to Reclamation and BLM by December 31 of each year. The reports would include at a minimum:

- Description of each monitoring location including vegetation cover, species composition, condition, and any evidence of soil erosion;
- Discussion comparing revegetated versus reference plots with regards to performance criteria;
- Declaration of any performance criteria that have been met and a description of the progress made toward reaching any criteria that are not yet attained; and
- Maintenance recommendations to be implemented to achieve performance criteria.

Our Analysis

The measures identified in the proposed VMP, if properly implemented, would minimize adverse effects of vegetation loss and disturbance and minimize the potential introduction and spread of invasive weeds. Wetlands adjacent to the original river channel, tailrace channel, along the river, and within the transmission line ROW would be protected from negative construction effects by avoidance and the installation of a silt fence to prevent sediments from reaching the wetland areas.

There would be a loss of perennial grassland habitat during the construction period. Because the applicant would reseed this area with native grass species from the area, this impact would be temporary. Using certified weed-free mulch, as well as removing invasive weeds from the areas to be revegetated, would aid in the success of these mitigation efforts.

Revegetation with native species, and using biodegradable erosion control mats and logs until these efforts are established would prevent revegetation material, such as seed and mulch, from being released into wetlands or the river. Post-construction stabilization and effective site restoration with native plants would minimize long-term effects on environmental resources.

Wildlife

Constructing the project would mostly be in an area already disturbed by construction and operation of Reclamation's facilities. The project transmission line may pose an electrocution risk to perching birds and a collision risk to birds in flight. Raptors are at risk of electrocution due to their use of power line poles as perching structures. Species that are less maneuverable such as cranes, pelicans, and large waterfowl are also susceptible to power line collision. Birds that fly fast and low, such as geese, ducks, and smaller flocking birds, are also at higher risk. Lines that pose a high risk of collision include those over water, those that cross draws or other natural flyways, and those placed immediately above tree tops and ridgelines. Transmission lines that bisect areas of high bird movement, such as lines placed between nesting and feeding habitats, also pose a collision risk. The Montana DFWP identified three segments of the proposed transmission right-of-way where bird activity is concentrated and relatively high, including the portions within the Beaverhead River corridor and where the lines cross Horse Prairie and Medicine Lodge creeks.

The applicant proposes to conduct pre-construction raptor surveys within the transmission line ROW and coordinate with FWS, BLM, and Montana DFWP on nest locations and nesting activity prior to and during construction. Based on the survey results and agency consultation, the applicant would incorporate any recommended construction buffers or seasonal constraints to protect raptors. The applicant would construct the transmission line in accordance with Avian Power Line Interaction Committee (APLIC) standards [24] and include visual markers on the wires to prevent collisions as outlined in *Reducing Avian Collisions with Power Lines: The State of the Art in 2012* (APLIC, 2012). In addition, the applicant proposes to coordinate with relevant agencies involved in greater sage-grouse management in southwest Montana, including Montana DFWP, the Montana Sage-Grouse Habitat Conservation Manager within the Montana Department of Natural Resources and Conservation (Montana DNRC), BLM, and FWS. As practicable, the transmission towers would also include perch deterrents to reduce or eliminate use by avian predators for nesting and perching on the transmission line infrastructure. The applicant also proposes that any recommended buffers seasonal constraints related to avian protection would be incorporated into the project design.

In their letter filed March 17, 2016, Interior recommended that to the maximum extent practicable, project construction shall be scheduled so as not to disrupt nesting raptors or other birds during the breeding season. This includes a 0.5-mile no construction buffer during the breeding season (species-specific) for most nesting raptor species, including ferruginous hawks that nest in the project area. If work is proposed to take place during the breeding season or at any other time which may result in take of migratory birds, their eggs, or active nests, the licensee shall take all practicable measures to avoid and minimize take, such as maintaining adequate buffers, to protect the birds until the young have fledged. Active nests may not be removed. If field surveys for nesting birds are conducted with the intent of avoiding take during construction, any documentation of the presence of migratory birds, eggs, and active nests, along with information regarding the qualifications of the biologist(s) performing the surveys, and any avoidance measures implemented at the project site shall be maintained

In addition, they recommended that if any active bald eagle nests occur within 0.5 mile of the project during construction, the licensee shall comply with the temporary seasonal disturbance restrictions (generally February 1–August 15) and distance buffer (0.5 mile) specified in *the 2010 Montana Bald Eagle Management Guidelines: An Addendum to Montana Bald Eagle Management Plan* (Montana Bald Eagle Working Group, 2010) during construction. To minimize the electrocution and collision hazard to eagles in the project area, the licensee shall ensure that: (1) Any newly constructed power lines or substations adhere to the APLIC standards in *Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006;* and, (2) all new power lines shall include visual markers on the wires to prevent collisions per techniques outlined in *Reducing Avian Collisions with Power Lines: The State of the Art in 2012.* In its reply comments, the applicant reiterated its proposed environmental measures, as mentioned previously.

[24] In their reply comments, Clark Canyon Hydro, LLC explicitly stated their intent to use APLIC's *Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006* (APLIC, 2006), which are the most current guidelines to date for transmission line construction (Clark Canyon Hydro, LLC, 2016).

In addition, Interior recommended that the applicant coordinate with Montana DNRC and BLM regarding compliance with the Montana Executive Order 12–2015 and the Idaho Southwestern Montana Greater Sage-Grouse Land Use Plan Amendment, where applicable. Interior also recommended that the applicant provide compensatory mitigation to offset any unavoidable effects that remain after implementing avoidance and minimization measures for greater sage-grouse. In its reply comments, the applicant stated that no effects to greater sage-grouse were anticipated, and did not expect compensatory mitigation to be required after implementation if its proposed avoidance and mitigation measures.

Our Analysis

Project construction would temporarily disturb and displace wildlife in the immediate vicinity of construction activities. The population of ferruginous hawks in the vicinity may use the area of the access road and transmission line ROW for foraging. This activity would be unavoidably but temporarily lost during the construction period.

Because most construction would occur in areas disturbed from constructing and operating Reclamation's dam, the greatest potential for disturbing and displacing nesting birds would be during construction of the transmission line. Highway 324 already fragments wildlife habitat. Locating the transmission line within the road ROW would minimize further habitat losses, but it would also add a new vertical dimension to that fragmentation. Conducting pre-construction raptor nest surveys in coordination with FWS, BLM, and Montana DFWP would identify any raptor nests that might be disturbed during construction of the project. Disturbance and displacement of nesting raptors would be avoided if construction activities are scheduled to avoid the nesting period or through the use of 0.5-mile construction buffer as recommended by Interior and agreed to by the applicant. However, because the nesting period for the ferruginous hawks (March 10–July 2) and the seasonal disturbance restrictions (generally February 1–August 15) and distance buffers (0.5 mile) for the bald eagle overlap significantly with the available construction season, implementing these construction limits could significantly delay construction, particular for the transmission line.

Therefore, avoidance of the entire breeding season for all birds may not be practicable. Maintaining records of the pre-construction survey results and the measures taken to avoid disturbing nesting raptors and birds during construction would allow the applicant to document its efforts to minimize and avoid adverse effects on migratory birds. Those records should include the reproductive status of any identified nests, qualifications of the surveyor, and the applicant's proposed avoidance measures.

The applicant's proposal to adhere to APLIC guidance in the design and construction of the transmission line, including installing flight diverters and perch deterrents to prevent perching, would reduce the risk of avian collision and electrocution, as well as predation of sage grouse.

Greater sage grouse may abandon leks if repeatedly disturbed by raptors perching on power lines or other tall vertical structures near leks (Ellis 1984), by vehicular traffic on roads (Lyon and Anderson 2003), or by noise and human activity associated with energy development (Braun *et al.* 2002; Holloran 2005; Kaiser 2006). Indirect effects could also occur from habitat degradation. Because the project would be constructed in habitats that have already been disturbed and subject to frequent human use (*e.g.,* construction and operation of Reclamation's dam and Highway 324), greater sage grouse habitat in the project area is considered poor and any degradation of habitat conditions from project construction minimal. Reestablishing native vegetation and controlling invasive weeds through the VMP would further minimize any adverse effects on sage grouse habitat.

Because the project would be co-located with existing development, it is unlikely that any greater sage grouse leks or breeding habitat occur near any project facility, except possibly where the proposed transmission line crosses Horse Prairie and Medicine Lodge drainages. Scheduling construction of these segments of the transmission line outside of the greater sage grouse breeding season would avoid disturbing sage grouse. The breeding season for greater sage-grouse is highly dependent on elevation and the length of winter conditions, and leks occurring in higher elevations may continue through early to mid-May (Connelly *et al.,* 2003). In southeast Montana the breeding season is from March 1- April 15 and nesting and brood-rearing occurs between April 16-July 15 (Montana DFWP and BLM, undated). In the Montana DFWP and BLM study, nests were located at an average elevation of 3,442 feet, which is lower than the elevation of the proposed project. As such, the breeding season for the greater sage-grouse in the project area may be later in the spring, or early summer. This could delay construction of these segments of the transmission line until mid- to late-summer, but would not affect the post-construction revegetation effort, as the VMP states that the revegetation efforts may be carried out in the fall. The VMP also states that seeding should not occur during hot, dry, summer conditions (late July through August), or after if there is a significant amount of snow on the ground. Including seasonal restrictions on transmission line construction would still allow time for the transmission line to be constructed and the revegetation mitigation to take place before weather conditions become unfavorable. The avoidance and mitigation measures proposed by the applicant, as well as constructing segments of the transmission line outside of the breeding season, would ensure that the project would have minimal effects on the greater sage-grouse.

3.3.4 Threatened and Endangered Species

3.3.4.1 Affected Environment

Commission staff accessed the IPaC Web site on April 15, 2016, and generated the following list of threatened and endangered species with the potential to occur in the vicinity of the project: the threatened plant Ute ladies'-tresses (ULT), threatened grizzly bear, and the threatened Canada lynx. There are no critical habitats present in or around the project area.

Ute Ladies'-Tresses

ULT was listed as threatened under the ESA on January 17, 1992 (50 CFR part 17, Vol. 57, No. 12). Clark Canyon Hydro conducted a survey for ULT in 2007 and 2011 in support of application for prior proceedings. No UTL were found and no suitable habitat was found within the areas that would be subject to disturbance from project construction and operation (ERM, 2015).

Grizzly Bear

FWS listed the grizzly bear as threatened on July 28, 1975. Grizzly bears are normally solitary, except during breeding season or when caring for cubs. Home ranges for individual bears vary depending on food availability, weather conditions, other bears, and season. Female bears need large home ranges to support their offspring. Grizzly bears are opportunistic in their eating habits and will feed on prey items like small mammals or fish, but will also forage for

plants, berries, roots, and fungi. They will also scavenge on carrion and garbage. They prefer habitats with significant forest cover, especially for beds (FWS, 1993). This habitat is not present in the project area, and the project area is outside of its historical range and present distribution (FWS, 1993); therefore, grizzly bears are not expected to occur in the project site.

Canada Lynx

Canada lynx are medium-sized cats that inhabit boreal forests and feed almost exclusively on snowshoe hare. The United States, primarily the Northeast, western Great Lakes, northern and southern Rockies, and northern Cascades, is the southern-most extent of its range. Populations of snowshoe hare have a direct effect on local lynx populations, which fluctuate in response to its prey. In the United States, Canada lynx prefer conifer-hardwood forests that support snowshoe hare. The Canada lynx was listed under the ESA as threatened on March 24, 2000 (FWS, 2005). The Canada lynx is not expected to occur at the project site due to the lack of habitat.

3.3.4.2 Environmental Effects

No effects to threatened or endangered species are anticipated as a result of project construction and operation. ULT was not found during surveys in the project area in 2007 or 2011. Although the proposed transmission line route has a slightly different alignment than surveyed in 2011, surveys covered habitats that might support the species such as Medicine Lodge Creek, Horse Prairie Creek, and the wetlands near Beaverhead Creek below the dam.

With respect to grizzly bears and Canada lynx, the project area does not contain suitable habitat for either species. Suitable habitat for the snowshoe hare, the primary prey species for Canada lynx, is also not available in the project area. Therefore, constructing and operating the project would have no effect on Ute ladies'-tresses, grizzly bears or Canada lynx, and no further action is warranted.

3.3.5 Recreation, Land Use, and Aesthetics

3.3.5.1 Affected Environment

Recreation

Reclamation manages approximately 15 recreation sites at Clark Canyon Reservoir and just downstream of the dam (figure 11). The sites include fishing access, campgrounds, day-use areas, boat ramps, and an overlook. Recreational opportunities at the reservoir include boating, visiting cultural/historic sites, camping, fishing, hiking, hunting, picnicking, water sports, wildlife viewing, and using recreational vehicles. According to Reclamation's Great Plains Region Clark Canyon Web site (Reclamation, 2016), the reservoir, at full pool, has 4,935 surface acres and 17 miles of shoreline offering good fishing for rainbow and brown trout. There are several concrete boat ramps, picnic shelters, and a marina, along with 9 campgrounds, including one recreational vehicle-only site, for a total of 96 campsites. The Cattail Marsh Nature Trail offers wildlife watching opportunities for seasonal waterfowl. Montana DFWP also manages several fishing access areas (figure 11) on the Beaverhead River downstream of the dam that are used by wading and bank anglers as well as by anglers on both guided and unguided float trips (Montana DFWP, 2003). In a letter filed September 19, 2007, during review of the prior license application, the Park Service stated that the Montana DFWP-managed Henneberry fishing access is an L&WCF site. The site is about 5 miles downstream of the proposed project (figure 11).

As noted in section 3.3.2.1, the Beaverhead River is recognized as one of the most popular and productive trout fisheries in North America, and is designated as a blue ribbon fishery by Montana DFWP. Brown and rainbow trout are well established, and often attain trophy size in the Beaverhead River. Recreational use of the reservoir is also quite high, with heavy use from personal watercraft, water-skiers and pleasure boaters, as well as from anglers due to the high quality of the fishing.

Of the recreational sites at the reservoir and immediately downstream of the dam (figure 11), those closest to the proposed project area include Beaverhead Campground (17.08 acres), Buffalo Bridge fishing access area, High Bridge fishing access area (0.18 acres), and Clark Canyon Dam fishing access area (also known as Beaverhead River fishing access area, 3.27 acres). Use figures from a 2004 recreation survey of the area indicated that the Beaverhead Campground and Beaverhead River fishing access area are frequently used by campers (10,423 visitors per year) and anglers (3,042 visitors per year), respectively (Dvorak et al., 2004). The survey did not include the Buffalo Bridge or High Bridge fishing access areas. Traffic count data from Reclamation for 2007 and 2008 indicated that more than 75 percent of the vehicle use of the Clark Canyon Dam and Buffalo Bridge fishing access areas occurred from March through October (email from Steve Davies, Reclamation, to FERC staff, filed on March 25, 2009). During those two years, the greatest use at Clark Canyon Dam fishing access area occurred in June (781 vehicles in 2007 and 789 in 2008). At Buffalo Bridge fishing access area, the greatest use occurred in June (728 vehicles in 2008) or July (647 vehicles in 2007). Reclamation did not have traffic count data for the High Bridge fishing access area, which is managed by Montana DFWP.

In 2009, the Beaverhead River had 38,706 angler days in 2009 (Montana DFWP, 2015). Fishing regulations are in place to help manage heavy use, and fishing closures have occurred in drought years.

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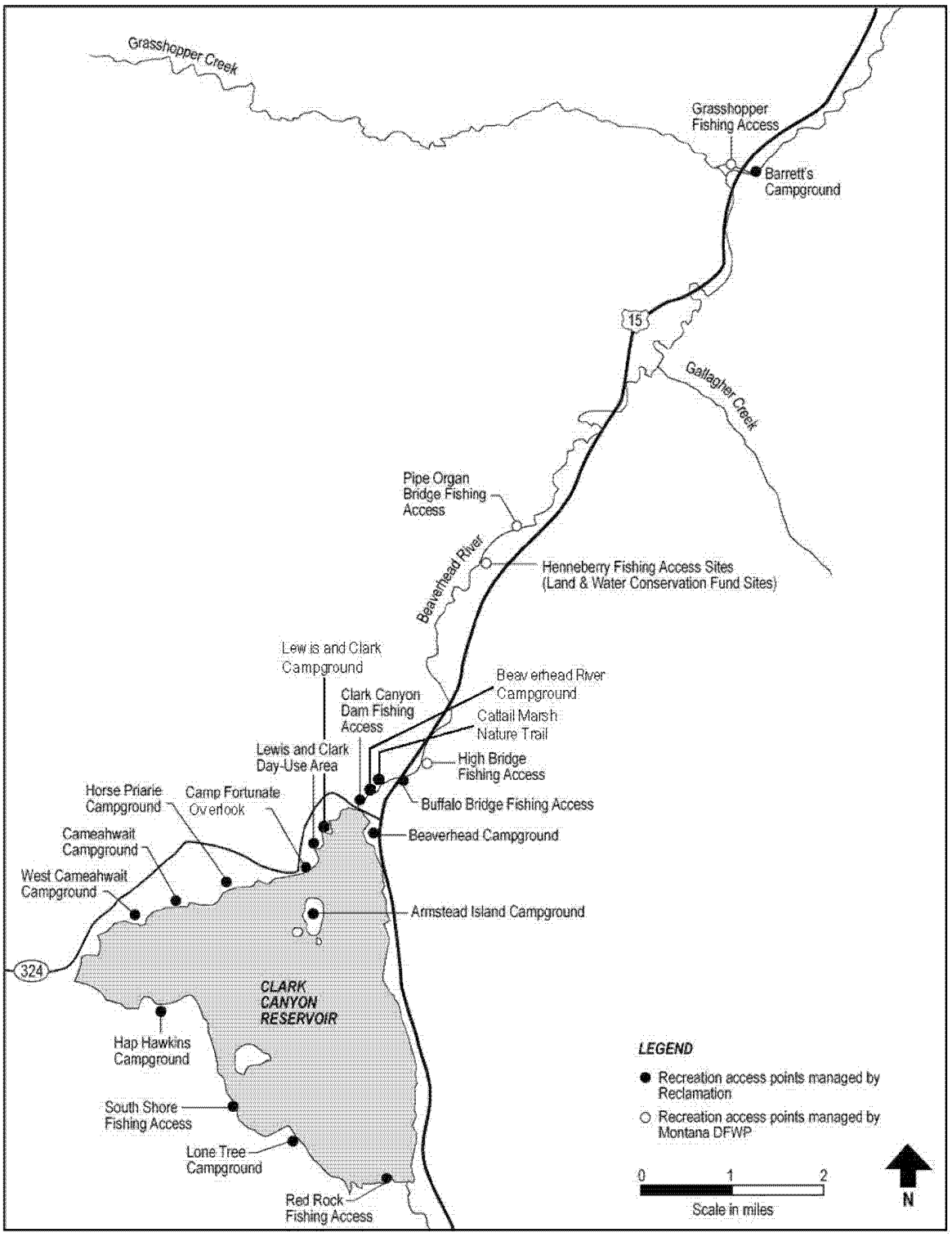

Figure 11. Recreation access sites in the vicinity of the proposed Clark Canyon Dam Hydroelectric Project (Source: Clark Canyon Dam Hydroelectric Project EA, FERC, 2009; staff).

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Land Use

The proposed project, including most of the transmission line corridor, would occupy 62.1 acres of federal lands within the Pick-Sloan Missouri Basin Program, East Bench Unit, administered by Reclamation. It would also occupy 0.2 acres of federal land administered by BLM. In addition to substantial recreation opportunities, the dam and reservoir provide for irrigation and flood control across a wide area downstream of the project.

Aesthetics

The Clark Canyon Dam and Reservoir present a relatively natural appearance in a broad, open valley of scenic, rolling landscape, with low vegetation cover of grasses and shrubs with a few patches of taller, thicker vegetation. The dam and reservoir are dominant landscape features that are quite visible to motorists traveling on Interstate Highway 15 (I–15) and very visible from adjacent lands. Dominant features include the dam structure, the reservoir, Armstead Island (see figure 11), and several recreation facilities. Wildlife viewing areas include a developed bird watching trail, as well as the delta areas near the mouths of Horse Prairie Creek and Red Rock River (see figure 1). A 3.2-mile-long section of the Beaverhead River between the I–15 bridge at Pipe Organ Rock and the Dalys highway exit has been evaluated for eligibility for ''Recreation'' classification of the Wild and Scenic River Act and is considered ''outstandingly remarkable'' for recreation, fish and historic values (BLM, 2005). This section of the river starts about 6 miles downstream of the project area.

Several transmission lines are present in the vicinity of the project; however, transmission lines are absent along approximately five miles of Montana Highway 324, north and west of the Clark Canyon Reservoir. The proposed new transmission line would parallel this portion of the highway.

3.3.5.2 Environmental Effects

Recreation

Issues that have been identified with respect to recreation apply primarily to the year-long construction period. Construction equipment activity could generate temporary disturbance to recreational use, including noise and dust, which could diminish the quality of the recreation experience in the vicinity of the proposed project, particularly at the Clark Canyon Dam/Beaverhead River fishing access site (figure 11). Additionally, there could be safety concerns where recreational users and construction vehicles use the same roadways to access areas near the dam. Construction access would use the Buffalo Bridge approach and could affect fishing access to the river at that location, although regular use of the road by construction vehicles is not expected.

To reduce effects on fishing access, the applicant proposes to implement its Buffalo Bridge Fishing Access Road Management Plan. The plan provides for alerting the public to potential traffic hazards during construction and specifies the contents of a public notice, locations for posting, the number, type, and locations of any barriers that would be installed, a process to evaluate effectiveness of the plan and modify the plan if needed, and an implementation schedule. Flagging, traffic control devices, and signs would be used to further reduce effects on traffic and traffic safety. During project operation, minor noise and nighttime security light from the powerhouse could be noticeable to recreational users nearby.

To minimize the effects of construction activities on nearby recreation users, the applicant proposes to limit construction activities in summer (Memorial Day through Labor Day) to daytime hours (7:00 a.m. to 8:00 p.m.). The applicant also proposes to have no construction taking place over peak summer holiday weekends (Memorial Day, Independence Day, and Labor Day), including the day before and day after those weekends. A sign with contact information would be posted at a location approved by Reclamation and would provide dates and hours of construction.

The southbound exit ramp from I–15 to Montana Route 324 is proposed as a secondary access route for construction vehicles. This route is also an existing access route to the dam site and is gated to prevent unauthorized access. Construction traffic on the secondary route may affect exit ramp traffic.

The applicant's proposal also includes installation and maintenance of an interpretive sign near the dam to inform visitors of the concept and function of the project, its relationship to aquatic resources and the recreational fishery, and measures taken to reduce adverse effects. The sign would be placed at a location acceptable to Reclamation.

Our Analysis

During project construction, the applicant's proposed limits on construction hours, days, and locations would reduce conflicts with recreational users, and its proposed construction access routes and vehicle staging would reduce potential conflicts with other motorists. If public notices, signage, and barriers are used where appropriate, and the Buffalo Bridge Fishing Access Road Management Plan is implemented, this would further reduce potential concerns about traffic safety and effects on fishing access.

Secondary use of the I–5 exit ramp for construction vehicles would have little effect on traffic or recreational use, including the two nearest recreational sites, due to relatively light traffic and only occasional use of the ramp and access route for construction. The entrance to Beaverhead Campground is located at the top of Exit 44 on Route 324, and the access to the Clark Canyon Dam/Beaverhead River fishing access site is located on the opposite side of the river from the construction access routes, which would minimize any potential disturbance to recreation users in the areas that are nearest the construction activity.

During project operation, minor noise and light from the powerhouse could be noticeable to recreational users nearby, particularly those fishing or camping immediately below the dam, but the proximity of I–15 to both the project site and the nearby recreation sites suggests that this effect would be minimal. All existing recreation sites would remain accessible to the public during project operation.

The applicant proposes to operate the project in run-of-release mode, consistent with the current method of operation employed by Reclamation. Run-of-release operation would maintain the existing water surface elevations. Therefore, fishing and boating on the reservoir would not be affected, and neither would fishing opportunities downstream of the dam in the Beaverhead River be affected.

With respect to the potential effects of the project on the Henneberry Fishing Access, the applicant does not propose any project-related activities that would result in water quantity or quality effects at the site or interfere with access during construction or operation. The site would continue to be available for recreational use.

The applicant's proposed interpretive sign would enhance the recreational experience for users and would also assist the public in understanding the project's potential effects on the prized fishery (see section, 3.3.2.2, *Aquatic Resources*).

Land Use

Except for the footprint of the hydropower facilities and transmission line, land uses and public access in the vicinity of the project would remain

unchanged. Excluding the proposed transmission line, the project footprint would be small (approximately 0.10 acres at the dam), and the effect on land use would be minor.

Aesthetics

Project construction activities would be visible from I–15, Highway 324, recreation sites below the dam, and from other sites near the dam and along the transmission line corridor. Once construction is complete, the permanent presence of above-ground facilities, including the powerhouse, transformer, parking area, and transmission line would alter the current visual environment.

A major portion of the new overhead transmission line would be located along approximately five miles of Montana Highway 324 west of the Camp Fortunate Overlook, where no transmission line currently exists. This could affect the aesthetic quality of nearby recreation and cultural resources, including the Clark Canyon Reservoir, the Lewis and Clark Trail, Camp Fortunate Overlook, several campgrounds, and a day-use area that are located along this stretch of the highway and above the shore of the reservoir.

As part of its Visual Resources Management Plan (VRMP), the applicant proposes to address short-term impacts by limiting disturbance or displacement of vegetation to the extent possible. To reduce long-term effects, the applicant proposes to bury a short, 0.3-mile-long transmission line between the proposed powerhouse and substation; use contouring and replanting to help the areas disturbed by construction, including the transmission line corridor, blend with the surrounding terrain; and consult with Reclamation on the design of project features, including color and construction materials. The applicant also states that it would use relevant comprehensive management plans to ensure that all new features of the proposed hydroelectric project meet established visual quality objectives.

The applicant's VRMP, filed with the Commission on February 1, 2016, lists the following as basic design criteria:

- Prevention of adverse visual impacts, whenever possible, by means of preconstruction planning and design, particularly in the selection of facility locations;
- Reduction of adverse visual impacts that cannot be completely prevented, by designing features with appearances consistent with existing structures;
- Reduction of adverse visual impacts to existing vegetation during construction by means of post-construction vegetation rehabilitation; and
- Quality control during construction, operation, and construction rehabilitation to ensure that the preceding objectives are achieved.

After license issuance but prior to the start of construction activities, including any land-disturbing or land-clearing activities, the VRMP calls for the applicant to file with the Commission a pre-construction visual impact assessment of the project area. That assessment would include photographs taken from three proposed key observation points (the parking area at the Clark Canyon Dam/Beaverhead River fishing access area, Highway 324 immediately above the power house, and the secondary access point on I–15 north of Clark Canyon Dam). The plan also includes the filing of post-construction photographic assessments annually for the first three years of project operation. If a license is issued for the project, the applicant would consult with Reclamation during the design phase to identify appropriate colors for structures on Reclamation lands and to identify appropriate vegetation mixes for disturbed areas of the project.

Our Analysis

As noted by the applicant, the proposed hydropower facility would be designed to blend in with the existing dam structure as much as possible. Implementation of the applicant's VRMP, including consultation with Reclamation concerning structure color and appropriate vegetation mixes, would minimize any long-term effect on the aesthetic character of the project site.

The previously altered landscape, including construction of the existing dam and its appurtenant features is highly visible to people using area roads and recreation sites. The proposed hydroelectric facility would be generally out of view from areas above the dam, but would be conspicuous below the dam. However, the proposed facilities would not be inconsistent with the existing or associated landscape features.

The overhead portion of the transmission line would have a modest effect on the visual character of the area west of the Camp Fortunate Overlook, where no transmission line currently exists. Scenic and cultural values in the vicinity are associated with the extensive recreational amenities around the reservoir and near the highway. However, the transmission line would be generally located on the uphill side of the highway and away from the reservoir and recreation sites. Much of the transmission line would be located 100 to 200 feet from the highway, which would reduce its visibility to highway motorists and recreation users on or near the reservoir. As described above, the use of a single-pole design and unobtrusive materials and colors would further reduce its visibility and would be consistent with the criteria of VRMP. However, the transmission line was not specifically identified as a project facility that would be addressed by the proposed VRMP. While no additional measures are necessary, any deviation from the proposed design could have more of a negative effect on the aesthetic landscape. Applying the criteria and consultation procedures in the VRMP to the transmission line would ensure that visual effects are kept to a minimum.

3.3.6 Cultural Resources

3.3.6.1 Affected Environment

NHPA section 106 requires that the Commission evaluate the potential effects on properties listed or eligible for listing in the National Register. Such properties listed or eligible for listing in the National Register are called historic properties. In this document, we also use the term ''cultural resources'' for properties that have not been evaluated for eligibility for listing in the National Register. Cultural resources represent things, structures, places, or archeological sites that can be either prehistoric or historic in origin. In most cases, cultural resources less than 50 years old are not considered historic. Section 106 also requires that the Commission seek concurrence with the SHPO on any finding involving effects or no effects to historic properties, and allow the Advisory Council on Historic Preservation (Council) an opportunity to comment on any finding of effects to historic properties. If Native American (*i.e.,* aboriginal) properties have been identified, section 106 also requires that the Commission consult with interested Indian tribes that might attach religious or cultural significance to such properties. In this case, the Commission must take into account whether any historic property could be affected by a proposed new license within the project's area of potential effect (APE), and allow the Council an opportunity to comment prior to issuance of any new license for the project.

Area of Potential Effect

Pursuant to section 106, the Commission must take into account whether any historic property could be affected by the issuance of a proposed

new license within a project's APE. The APE is determined in consultation with the SHPO and is defined as the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist.

The APE includes all lands within the project boundary and construction footprint, as well as the 7.9-mile-long, 80-feet-wide transmission line corridor and a portion of the Clark Canyon Dam, including the spillway. The APE is defined in the February 2016 HPMP. In an amendment to the HPMP filed on March 11, 2016, the applicant corrected the total area of the APE to 88.6 acres, including 68.3 acres of federal land owned by Reclamation.

Cultural History Overview

The immediate area within the vicinity of the proposed project was an important prehistoric and historic travel route. During the ethnographic period (pre-European contact), the Clark Canyon watershed was occupied seasonally by the Lemhi-Shoshone Tribes. Lewis and Clark were the first Euro-Americans to pass through the Beaverhead Valley on August 13, 1805.

The Lewis and Clark expedition made its first contact with Sacagawea's Shoshone Tribe at a location that is currently inundated by Clark Canyon Reservoir. The location was named ''Camp Fortunate'' due to the hospitality of the tribe and its willingness to trade for horses, a necessity for crossing the Rockies.[25]

In 1862, gold was discovered near the town of Bannock, Montana, and caused the first wave of rapid Euro-American settlement in the area. At the height of the area's gold rush, Bannock, about 175 miles from the proposed project site, had a population of more than 3,000 and was the first Montana territorial capital. The period was short lived, however, and old mining camps and ghost towns are all that remain.

In 1877, approximately 750 Nez Perce Native Americans fled north out of Idaho because of the demands of the U.S. Army that they move onto a reservation. On August 9, 1877, the U.S. Army attacked the Nez Perce along the north fork of the Big Hole River, about 50 miles from the proposed project site. Although the Battle of Big Hole lasted less than 36 hours, significant casualties were suffered on both sides. In 1992, legislation incorporated Big Hole National Battlefield with the Nez Perce National Historical Park.

The city of Dillon, about 20 miles from the proposed project site, originated during construction of the Utah and Northern Railroad. The city was the site of a construction camp during the winter of 1880. The railroad was pushing north toward Butte, but winter conditions halted progress until the spring of 1881. When construction resumed in the spring, the town remained. The city was named in honor of Sidney Dillon, the president of the Union Pacific Railroad.

Prehistoric and Historic Archaeological Resources

An archaeological survey of the applicant's cultural resources inventory area for the prior license application identified one prehistoric artifact, a single chert flake. As an isolated find, this artifact does not meet the criteria for listing on the National Register. No prehistoric or historic-era sites were documented at that time.

The project APE contains a single structure that is considered eligible for listing on the National Register—Clark Canyon Dam. Clark Canyon Dam (24BE1740) is an earthen dam constructed in 1964 by Reclamation. This structure meets the 50-year age requirement for listing on the National Register. Although the Clark Canyon Dam was potentially eligible for listing on the National Register as a contributing element to a broad, but undefined Pick-Sloan Missouri Basin historic district, the dam was also determined to be individually eligible for listing on the National Register. Commission staff and the Montana SHPO concurred that the dam was individually eligible, as discussed in a letter and Programmatic Agreement (PA) issued on May 5, 2016. Six additional sites that may or may not be eligible for listing were identified in 2012 during a cultural resources inventory for the proposed transmission line corridor.

Additionally, the Commission contacted the Shoshone-Bannock, Eastern Shoshone, Nez Perce, and Salish-Kootenai tribes inviting comments and consultation. No comments or requests for consultation were received from the tribes.

Traditional Cultural Properties

The Commission consulted with the Nez Perce, Salish-Kootenai, Eastern Shoshone, Shoshone-Bannock, and Northern Arapaho tribes regarding the project. None of these tribes expressed concern about potential TCPs that might be present within the project APE.

3.3.6.2 Environmental Effects

Commission staff and the Montana SHPO concurred that the Clark Canyon Dam would be adversely affected by constructing and operating the project, as stated in the PA and HPMP. Construction of the project, including retrofitting project features on or adjacent to the dam, or other alteration, would diminish the historical integrity of the structure's location, design, setting, materials, workmanship, feeling, or association. The applicant would consult with the SHPO and Reclamation to develop a Memorandum of Agreement that would include measures to address adverse effects to Clark Canyon Dam. A final PA has been signed that requires the licensee, if a license is issued, to revise its proposed HPMP to include a Treatment Plan to resolve effects on the dam prior to construction.

The SHPO concurred in 2012 that none of the six sites along the transmission line corridor would be adversely affected by the project. To ensure that a specific rock feature was not affected, the applicant proposed to maintain a buffer around that area so that construction activity would not inadvertently disturb the site.

Our Analysis

Alterations to the Clark Canyon Dam that would result from construction of the proposed project require specific measures to avoid or reduce adverse effects. The HPMP was originally developed by the applicant for the prior license before the Clark Canyon Dam was determined to be eligible for listing on the National Register. The HPMP filed on February 9, 2016 does not indicate what specific measures would be developed or how or when they might be implemented. Revising the HPMP, as required by the PA, to include these measures in a Treatment Plan for the dam before construction begins would resolve the adverse effects.

The February HPMP defines consultation procedures for maintenance activities that would and would not affect the dam and what steps would be taken if human remains are discovered during project construction and operation. The PA requires the applicant to revise the HPMP to allow the SHPO and Reclamation to review and comment on maintenance activities that the licensee may determine have no effect on the dam, and clarifies the process to be followed in the event of an unanticipated discovery of human remains. Revising the HPMP accordingly, in consultation with the

[25] The Lewis and Clark expedition crossed the Continental Divide at Lemhi Pass on August 12, 1805. Approximately 208 acres in the vicinity of Lemhi Pass, about 35 miles from the proposed project site, are designated as a registered historic landmark by Interior.

SHPO and Reclamation, would ensure that cultural resources are protected.

The February HPMP also defines procedures, in the event that cultural resources are inadvertently discovered during the course of constructing or developing project works or other facilities at the project. Those procedures include stopping all land-clearing and land-disturbing activities in the vicinity of the discoveries and consulting with both Reclamation and the SHPO to determine next steps. Implementing the procedures in an approved, revised HPMP would prevent adverse effects on any newly identified cultural resources.

3.4 No-Action Alternative

Under the no-action alternative, the project would not be constructed. There would be no changes to the physical, biological, or cultural resources of the area and electrical generation from the project would not occur. The power that would have been developed from a renewable resource would have to be replaced with other sources, and the anticipated benefits of reduced TDG supersaturation on aquatic resources would not be realized.

4.0 DEVELOPMENTAL ANALYSIS

In this section, we look at the Clark Canyon Dam Hydroelectric Project's use of the Beaverhead River for hydropower purposes to see what effect various environmental measures would have on the project's costs and power generation. Consistent with the Commission's approach to evaluating the economics of hydropower projects, as articulated in *Mead Corp.,*[26] the Commission compares the project cost to an estimate of the cost of obtaining the same amount of power using the likely alternative source of power for the region (cost of alternative power). As described in *Mead Corp.,* our economic analysis is based on current electric power cost conditions and does not consider future escalation of fuel prices in valuing the hydropower project's power benefits.

For each of the licensing alternatives, our analysis includes an estimate of: (1) The cost of individual measures considered in the EA for the protection, mitigation and enhancement of environmental resources affected by the project; (2) the cost of alternative power; (3) the total project cost (*i.e.* for construction, operation, maintenance, and environmental measures); and (4) the difference between the cost of alternative power and total project cost. If the difference between the cost of alternative power and total project cost is positive, the project produces power for less than the cost of alternative power. If the difference between the cost of alternative power and total project cost is negative, the project produces power for more than the cost of alternative power. This estimate helps to support an informed decision concerning what is in the public interest with respect to a proposed license. However, project economics is only one of many public interest factors the Commission considers in determining whether, and under what conditions, to issue a license.

4.1 Power and Developmental Benefits of the Project

As proposed, the 4.7–MW project would generate an average of 15,400 MWh annually. We have assumed the project would have a dependable capacity of 4.7 MW; however, because the project inflow is dependent on releases from the Clark Canyon Dam, which is directed by Reclamation and beyond the control of the applicant, the actual dependable capacity of the project could be lower.

Table 5 summarizes the assumptions and economic information we use in our analysis. This information was provided by the applicant in its license application and supplemental submittals, or estimated by staff. We find that the values provided by the applicant are reasonable for the purposes of our analysis. Cost items common to all alternatives include; licensing costs; and normal operation and maintenance cost.

TABLE 5—PARAMETERS FOR THE ECONOMIC ANALYSIS OF THE CLARK CANYON DAM HYDROELECTRIC PROJECT

[Source: Staff]

Assumption	Value	Source
Period of analysis (years)	30	Staff.
Term of financing (years)	20	Staff.
License application cost	$160,000	Clark Canyon Hydro.
Construction cost	$32,500,000	Clark Canyon Hydro.
Annual operation and maintenance	$365,088	Clark Canyon Hydro.
Power value [a]	$80.87/MWh	Clark Canyon Hydro.
Interest rate	8 percent	Staff.
Discount rate	8 percent	Staff.

Note: All costs are in 2015 dollars.

[a] Average of on- and off-peak seasonal values of project power since the project would be producing power during the summer representing 55% of the project's total annual production.

4.2 Comparison of Alternatives

4.2.1 No-Action Alternative

Under the no-action alternative, the project would not be constructed as proposed and would not produce any electricity. No costs for construction, operation and maintenance, or proposed environmental protection, mitigation, or enhancement measures would be incurred by the applicant.

4.2.2 Applicant's Proposal

Under the applicant's proposal, the project would require construction of a new hydroelectric facility at the existing Clark Canyon Dam. The proposed project would have a total capacity of 4.7 MW, an average annual generation of 15,400 MWh, and an average annual power value of $1,245,398 ($80.87/MWh). With an annual production cost (levelized over the 30-year period of analysis) of $3,576,910 ($232.27/MWh), the project would produce energy at a cost which is $2,331,512, or about $151.40/MWh, more than the cost of alternative power.

4.2.3 Staff Alternative

Table 6 shows the staff's recommended additions, deletions, and modifications to the applicant's proposed environmental protection and

[26] See *Mead Corporation, Publishing Paper Division,* 72 FERC ¶ 61,027 (July 13, 1995). In most cases, electricity from hydropower would displace some form of fossil-fueled generation, in which fuel cost is the largest component of the cost of electricity production.

enhancement measures and the estimated cost of each.

Based on the same total capacity and average annual generation, the project under the staff alternative would have an average annual power value of $1,245,398 ($80.87/MWh). With an annual production cost (levelized over the 30-year period of our analysis) of $3,580,760 ($232.52/MWh), the project would produce energy at a cost which is $2,335,362, or about $151.65/MWh, more than the cost of alternative power.

The staff alternative also included all mandatory conditions specified by Montana DEQ section 401 certification, except for the except for condition 11 which stipulates that the applicant meet annually with all watershed stakeholders to discuss water quality monitoring efforts associated with project operation.

4.3 Cost of Environmental Measures

Table 6 gives the cost for each of the environmental enhancement measures considered in our analysis. We convert all costs to equal annual (levelized) costs over a 30-year period of analysis to give a uniform basis for comparing the benefits of a measure to its cost.

TABLE 6—COSTS OF ENVIRONMENTAL MITIGATION AND ENHANCEMENT MEASURES CONSIDERED IN ASSESSING THE ENVIRONMENTAL EFFECTS OF CONSTRUCTING AND OPERATING THE CLARK CANYON DAM HYDROELECTRIC PROJECT

[Sources: Applicant and Staff]

Environmental measure	Entity	Capital cost (2015$)	Annual cost (2015$)	Levelized annual cost (2015$)
1. Implement the Erosion and Sediment Control Plan	Applicant, Staff	[a] $5,900	$0	$500
2. Implement the Final Instream Flow Release Plan including pump on floating barge.	Applicant, Staff	[a] 424,600	0	31,770
3. Implement the Construction Water Quality Monitoring Plan (CWQMP) including installation of monitoring equipment.	Applicant, Montana DEQ, FWS, Montana Trout Unlimited, Staff.	[b] 100,000	75,000 for years 1 & 2 [b]	4,400
4. Notify Montana DEQ and Montana DFWP within 24 hours of a deviation from state water quality criteria during construction and operation and file a report with the Commission within 30 days of the deviation.	Staff	0	1,000 [c]	1,000
5. Conduct total dissolved gas and dissolved oxygen compliance monitoring for the term of the license.	Staff	[c] 20,000	3,000 [c]	1,530
6. Implement the Revised DOEP with an additional provision to send the annual water quality monitoring reports to FWS in addition to the other agencies specified in the plan.	Applicant, Montana DEQ, FWS, Montana Trout Unlimited, Upper Missouri Waterkeeper, Staff.	[d] 1,000,000	75,000 for years 1–5, $20,000 for rest of license term [b].	80,300
6a. Consult with Montana DFWP and FWS in addition to Montana DEQ after the first five years of operation and, after consulting with the agencies, file a proposal for Commission approval regarding possible cessation of the temperature monitoring program after the first five years.	Staff	0	1,000 in year 6 [c]	80
7. Install pressure transducer and water level alarm	Staff	[d] 2,000	0	160
8. Maintain compliance monitoring staff on site 24 hours a day and 7 days a week when flows are bypassed around the existing intake and outlet works during construction of the proposed penstock.	Applicant, Staff	[d] 25,800	0	2,180
9. Notify Montana DFWP in addition to Reclamation in the event of an unplanned shutdown.	Staff	0	0	0
10. Support water conservation strategies	Interior, Upper Missouri Waterkeeper, Montana Trout Unlimited.	0	0	0
11. Fund water conservation measures	Interior, Upper Missouri Waterkeeper, Montana Trout Unlimited.	0	37,000 [e]	37,000
12. Assess impacts of fish entrainment and impingement.	Interior, Montana Trout Unlimited.	[c] 10,000	100,000 for years 1 & 2 [c]	4,540
13. Support ongoing agency turbidity and nutrient pollution studies and participate in developing an adaptive management plan to address pollution concerns.	Upper Missouri Waterkeeper.	N/A	N/A	[f] N/A
14. Evaluate the need for dam infrastructure alterations or changes in operation to minimize downstream turbidity.	Montana DFWP, Upper Missouri Waterkeeper.	N/A	N/A	[f] N/A
15. Consider additional upstream and downstream water quality monitoring sites to determine compliance with state water quality criteria.	Upper Missouri Waterkeeper.	N/A	N/A	[f] N/A
16. Monitor water quality at three additional sites downstream of the cone valve for 3 years to evaluate the dynamics of the mixing zone.	Montana DFWP	[c] 60,000	3,000 for years 1–3 [c]	3,500

TABLE 6—COSTS OF ENVIRONMENTAL MITIGATION AND ENHANCEMENT MEASURES CONSIDERED IN ASSESSING THE ENVIRONMENTAL EFFECTS OF CONSTRUCTING AND OPERATING THE CLARK CANYON DAM HYDROELECTRIC PROJECT—Continued

[Sources: Applicant and Staff]

Environmental measure	Entity	Capital cost (2015$)	Annual cost (2015$)	Levelized annual cost (2015$)
17. Hold annual meetings with watershed stakeholders to discuss water quality monitoring efforts associated with project operation.	Montana DEQ	0	1,000 [c]	1,000
18. Survey for raptor nests prior to beginning construction of the transmission line.	Applicant, Staff	[b] 20,000	0	1,690
18a. Maintain a record of the raptor surveys, including documentation of the presence of migratory birds, eggs, and active nests, along with information regarding the qualifications of the biologist(s) performing the surveys, and any avoidance measures implemented at the project site.	Interior, Staff	0	0	[c] 0
19. Coordinate (including sequential impact avoidance, minimization, reclamation, and compensation) with federal and state greater-sage grouse plans and provide compensatory mitigation to offset any unavoidable impacts remaining after application of greater sage-grouse impact avoidance and minimization measures.	Interior, Staff (except compensatory mitigation).	N/A	N/A	[g] N/A
20. Construct the transmission line segments that cross the Horse Prairie and Medicine Lodge drainages outside of the greater sage-grouse breeding season (March 1–April 15).	Staff	0	0	[h] 0
21. Construct the transmission line in accordance with APLIC guidelines, schedule construction to avoid nesting season for raptors (including bald eagles and ferruginous hawk) and other birds, establish a 0.5-mile construction buffer around raptor nests (including any bald eagle nest) to avoid disturbing any raptors during project construction, and include avoidance and mitigation measures for breeding migratory birds to the extent practicable.	Applicant, Interior, Staff	0	0	[i] 0
22. Install avian flight diverters and perch deterrents on the transmission line.	Applicant, Interior, Staff	[b] 200,000	0	16,870
23. Implement the Vegetation Management Plan	Applicant, Staff	[c] 50,000	10,000 for years 1–3 [c]	3,6800
24. Revise the HPMP to include a Treatment Plan and consultation procedures; stop work, consult with SHPO, and prepare action plan if previously unidentified cultural materials are found.	Applicant, Staff	0	0	[j] 0
25. Implement the Buffalo Bridge Fishing Access Road Management Plan and other signage and traffic measures for local roads used by construction vehicles.	Staff	[c] 2,000	0	160
26. Implement signage and limit construction times to reduce conflicts with recreational use.	Applicant	[b] 0	0	0
27. Develop, install, and maintain an interpretive display.	Applicant, Staff	[b] 10,000	100 [c]	840
28. Implement the Visual Resources Management Plan.	Applicant, Staff	[a] 65,200	0	5,500
29. Use a single-pole design for the transmission line, and materials and colors that reduce visibility.	Applicant	[b] 0	0	0

[a] Cost estimated by applicant in the original license application escalated to 2015 dollars.
[b] Cost estimated by the applicant.
[c] Cost estimated by staff.
[d] Cost estimated by the applicant for its aeration basin.
[e] Cost estimated by entity based on 4 percent of projected annual generation.
[f] Cost cannot be determined because the measure lacks specificity.
[g] Cost unavailable as it includes compensatory mitigation for effects after avoidance and mitigation efforts have been applied. Costs and measures are unknown.
[h] Cost included with general and construction costs.
[i] Cost for designing and constructing the transmission line in accordance with APLIC standards included in the construction cost. Additional costs (construction delay or implementing buffers) are unknown because it would depend on the nature and extent of the find.
[j] The Treatment Plan would replace the Memorandum of Agreement approach proposed by the applicant; no additional cost is anticipated.

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 Comparison of Alternatives

In this section we compare the developmental and non-developmental effects of the applicant's proposal, the applicant's proposal as modified by staff, the staff alternative with all agency mandatory conditions, and the no-action alternative. The major differences between the applicant's proposal and our staff-recommended modifications are that we recommend monitoring TDG and DO at all times during project operation rather than just potentially the first five years of project operation and the following additional measures: Installing and maintaining a pressure transducer and water level alarm in the Beaverhead River during construction when flows are bypassed around Reclamation's existing intake and outlet works; notifying Montana DFWP in addition to Reclamation in the event of an unplanned shutdown; notifying Montana DEQ and Montana DFWP within 24 hours of any deviation from water temperature, DO, TDG, or turbidity requirements during construction and operation and filing a report with the Commission within 30 days describing the deviation, any adverse effects resulting from the deviation, the corrective actions taken, any proposed measures to avoid future deviations; and maintaining records of pre-construction raptor surveys that includes presence of birds, eggs, and active nests, information regarding the qualifications of the biologist performing the survey, and measures implemented to avoid disturbing nesting birds. The staff alternative also includes all of the mandatory conditions specified by Reclamation under FPA section 4(e) and all of Montana DEQ's section 401 water quality certification conditions except for condition 11 which stipulates that the applicant meet annually with watershed stakeholders to discuss water quality monitoring efforts associated with project operation.

The environmental effects of the staff alternative and applicant's proposal are essentially the same. Both alternatives would result in short-term changes in water quality from erosion and sedimentation and minor impacts from vegetation removal and disturbance of wildlife during construction. Proposed measures would minimize the adverse effects to greatest extent practicable. Both alternatives would also result in long-term benefits to water quality and aquatic resources from increased oxygen through the aeration basin in the summer and reduced potential for TDG supersaturation in the late fall. Staff's recommended measures would improve Commission administration of the license and ensure timely identification of any needed corrective actions.

5.2 Comprehensive Development and Recommended Alternative

Sections 4(e) and 10(a)(1) of the FPA require the Commission to give equal consideration to the power development purposes and to the purposes of energy conservation, the protection, mitigation of damage to, and enhancement of fish and wildlife, the protection of recreational opportunities, and the preservation of other aspects of environmental quality. Any license issued shall be such as in the Commission's judgment will be best adapted to a comprehensive plan for improving or developing a waterway or waterways for all beneficial public uses. This section contains the basis for, and a summary of, our recommendations for licensing the Clark Canyon Dam Hydroelectric Project. We weigh the costs and benefits of our recommended alternative against other proposed measures.

Based on our independent review of agency and public comments filed on this project and our review of the environmental and economic effects of the proposed project and its alternatives, we selected the staff alternative as the preferred alternative. This alternative includes elements of the applicant's proposal, all of the section 4(e) conditions, most of the section 401 water quality certification conditions, most of the resource agency recommendations, and some additional measures.

We recommend this alternative because: (1) The 4.7–MW project would save the equivalent amount of fossil-fueled generation and capacity, thereby helping to conserve non-renewable energy resources and reduce atmospheric pollution; (2) the recommended environmental measures proposed by the applicant, as modified by staff, would adequately protect and enhance environmental resources affected by the project; and (3) it includes all agency mandatory conditions. The overall benefits of the staff alternative would be worth the cost of the proposed and recommended environmental measures.

In the following section, we make recommendations as to which environmental measures proposed by the applicant or recommended or required by agencies and other entities should be included in any license issued for the project. In addition to the applicant's proposed environmental measures, we recommend additional staff-recommended environmental measures to be included in any license issued for the project. We also discuss which measures we do not recommend including in the license.

Measures Proposed by the Applicant

Based on our environmental analysis of the applicant's proposal discussed in section 3 and the costs discussed in section 4, we recommend including the following environmental measures proposed by the applicant in any license issued for the project.

The applicant proposes the following environmental measures:

- Implement the ESCP filed with the license application to minimize soil erosion and dust, protect water quality, and minimize turbidity in the Beaverhead River;
- Implement the Instream Flow Release Plan filed with license application that includes provisions to temporarily pump flows around Reclamation's existing intake and outlet works to prevent interrupting Reclamation's flow releases into the Beaverhead River during installation of the proposed project's penstock;
- Maintain qualified compliance monitoring staff on site 24 hours per day and 7 days per week during construction when flows are bypassing Reclamation's outlet works to ensure staff promptly responds to a pumping equipment failure or malfunction and ensure Reclamation's flow releases are maintained in the Beaverhead River downstream;
- Implement the CWQMP filed with the license application that includes monitoring and reporting water temperature, DO, total dissolved gas (TDG), and turbidity levels during construction;
- Implement the Revised DOEP filed with the license application that includes installing and operating an aeration basin to increase DO levels of water exiting the powerhouse and monitoring and reporting water temperature, DO, and TDG levels for a minimum of the first five years of project operation to ensure water quality does not degrade during project operation;
- Implement the Vegetation Management Plan filed with the license application that includes provisions for revegetating disturbed areas, wetland protection, and invasive weed control to be implemented before, during, and after construction;
- Conduct a pre-construction survey for raptor nests and schedule construction activities or establish a 0.5-mile construction buffer as appropriate to minimize disturbing nesting raptors;

• Design and construct the project transmission line in accordance with current avian protection guidelines, including installing flight diverters and perch deterrents;

• Implement the Visual Resources Management Plan filed with the license application that includes measures to design and select materials to minimize visual effects of the project;

• Post signs and public notice, limit construction hours, days, and locations, and stage construction traffic to reduce conflicts with recreational users and other motorists;

• Implement the Buffalo Bridge Fishing Access Road Management Plan filed with the license application, including provisions for flagging, traffic control devices, and public notice of construction activities to maintain traffic safety and minimize effects on fishing access;

• Install and maintain an interpretive sign near the dam that describes the concept and function of the hydroelectric project and how it affects the sport fisheries, including any measures taken to eliminate or reduce adverse effects;

• Use a single-pole design for the transmission line, along with materials and colors that reduce visibility and blend with the surroundings; and

• Implement the revised Historic Properties Management Plan (HPMP) filed February 9, 2016. Stop work if any unanticipated cultural materials or human remains are found.

Additional Measures Proposed by Staff

Under the staff alternative, the project would include Reclamation's 4(e) conditions, the applicant's proposals, all of the section 401 water quality certification conditions except for condition 11, and the following additional measures:

• Conduct TDG and DO compliance monitoring at all times during project operation;

• Conduct water temperature monitoring for the first five years of project operation and, after consultation with Montana DFWP, Montana DEQ, and FWS, file a proposal for Commission approval regarding the possible cessation of the temperature monitoring program;

• Install and maintain a pressure transducer and water level alarm in the Beaverhead River during construction when flows are being bypassed around Reclamation's existing intake and outlet works to alert compliance monitoring staff if water levels downstream of the dam are reduced;

• During project operation, notify Montana DFWP in addition to Reclamation in the event of an unplanned shutdown;

• Notify Montana DEQ and Montana DFWP within 24 hours of any deviation from water temperature, DO, TDG, or turbidity requirements during construction and operation and file a report with the Commission within 30 days describing the deviation, any adverse effects resulting from the deviation, the corrective actions taken, any proposed measures to avoid future deviations, and comments or correspondence, if any, received from the agencies;

• Document the results of the pre-construction raptor survey and the measures taken to avoid disturbing raptors by maintaining a record that includes nesting bird survey data, including the presence of migratory birds, eggs, and active nests, the qualifications of the biologist performing the survey, and any avoidance measures implemented;

• Construct the transmission line segments that cross the Horse Prairie and Medicine Lodge drainages outside of the greater sage-grouse breeding season (March 1–April 15); and

• Revise the Historic Properties Management Plan (HPMP) in consultation with the Montana SHPO and Reclamation to include a Treatment Plan to resolve project effects on the Clark Canyon Dam and to clarify consultation procedures in the plan (see section 3.3.6). File the HPMP with the Commission for approval prior to construction.

The following is a discussion of the basis for the additional staff-recommended measures that would have significant effects on project economics or environmental resources, as well as the basis for not recommending some measures proposed by agencies.

Construction Water Quality Monitoring and Reporting

The applicant proposes in its CWQMP to provide Reclamation, Montana DEQ, Montana DFWP, and FWS annual water quality monitoring reports during construction. Because the applicant proposes to prepare monitoring reports on an annual basis, any deviations from state water quality criteria for turbidity, temperature, DO, and TDG that occur during construction would not be reported to the Commission until the annual report is submitted. The applicant's proposal does not sufficiently protect water quality in the short term. If water quality monitoring in the reservoir or in the Beaverhead River indicates that deviations from water quality criteria are occurring during project construction, the applicant should take immediate reasonable action to remediate the deviation, and should notify Montana DEQ and Montana DFWP within 24 hours of the deviation. This would give the agencies the opportunity to visit the site quickly, assess the effects of the deviation, and provide the applicant and the Commission with recommendations for ways to prevent future deviations from occurring. Thus, we also recommend that the applicant file a report with the Commission within 30 days of the deviation that describes: (a) The cause, severity, and duration of the incident; (b) any observed or reported adverse environmental impacts resulting from the incident; (c) operational data necessary to determine compliance; (d) a description of any corrective measures implemented at the time of the incident and the measures implemented or proposed to ensure that similar incidents do not recur; and (e) comments or correspondence, if any, received from interested parties regarding the incident.

We estimate that these additional notification and reporting measures would have minimal costs and conclude that the compliance monitoring benefits as well as benefits to aquatic resources during project construction would justify the cost.

Post-Construction Monitoring and Reporting

Temperature Compliance Monitoring

The applicant proposes to consult with Montana DEQ on whether to extend the water temperature monitoring program beyond the first 5 years of operation. We recommend this measure but also recommend that the applicant consult with Montana DFWP and FWS and allow the agencies 30 days to review the report before filing a proposal to modify the temperature monitoring requirements for Commission approval. Given their trust responsibilities, also consulting with Montana DFWP and FWS would allow them to weigh in on whether a sufficient record has been established to document the project's compliance with state water temperature criteria during project operation, and to determine if additional temperature monitoring is needed beyond the initial five-year monitoring period. We estimate that this additional coordination and reporting measure would have minimal costs and conclude that the compliance monitoring and aquatic resource protection benefits would justify the minor costs.

Dissolved Oxygen and Total Dissolved Gas Compliance Monitoring

We recommend that the applicant continue to monitor TDG and DO for the term of any license issued. Our analysis in section 3.3.2.2 indicates that it would be necessary to monitor these parameters for the term of the license to ensure that adequate DO enhancement is occurring throughout the year as needed, that DO aeration equipment is functioning properly, and to track compliance with TDG and DO criteria. We estimate the annualized cost of this measure would be $1,530, and conclude that the compliance monitoring and aquatic resource protection benefits would justify its costs.

Reporting Deviations From Water Quality Criteria

The applicant proposes to provide annual water quality monitoring reports for the first five years of project operation to Reclamation, Montana DFWP, Montana DEQ, and FWS within 60 days following each calendar year (*i.e.,* by March 1) and includes a provision within its Revised DOEP to report deviations from water quality criteria to Reclamation, Montana DEQ, and Montana DFWP within 24 hours of the deviation. We recommend the applicant implement its proposed reporting provisions but also recommend that the applicant file a report with the Commission within 30 days of any deviation from water quality criteria that describes: (a) The cause, severity, and duration of the incident; (b) any observed or reported adverse environmental impacts resulting from the incident; (c) operational data necessary to determine compliance; (d) a description of any corrective measures implemented at the time of the incident and the measures implemented or proposed to ensure that similar incidents do not recur; and (e) comments or correspondence, if any, received from interested parties regarding the incident. Filing a report with the Commission would facilitate the Commission's administration of the license and ensure that corrective actions taken to protect water quality during operation are reported to the Commission in a timely manner.

We estimate that these additional notification and reporting measures would have minimal costs and conclude that the compliance monitoring benefits as well as benefits to aquatic resources during project operation would justify the cost.

Flow Alarm

During construction of the project's inlet works, use of Reclamation's intake and outlet works would not be available to release flows to the Beaverhead River. During that construction period, the applicant would pump flows from a barge over Reclamation's spillway to discharge into the river. We recommend that the applicant install and operate a minimum flow protection alarm system to alert compliance monitoring staff in the event of a pumping system failure and subsequent water level drop in the tailrace. Our analysis in section 3.3.2.2 indicates that the alarm system would ensure that minimum flows are maintained and backup pumps are brought on-line as rapidly as possible in the event of a pumping system failure. We envision that the alarm system would include: (1) Installation of a pressure transducer at the proposed water quality monitoring station located approximately 300 feet downstream of the dam; and (2) an alarm that would sound in the event that water levels measured by the transducer begin to drop. We estimate the annualized costs of this measure would be $160, and conclude the benefits of ensuring minimum instream flow releases and protecting fish resources when flows are being bypassed during construction would justify the cost.

Agency Notification of Unplanned Shutdowns

We recommend that the applicant inform Montana DFWP in addition to Reclamation in the event of an unplanned shutdown or other operating emergency during project operation. We estimate this additional notification would have minimal costs and therefore recommend this measure as it would allow Montana DFWP to provide input on any corrective measures needed to protect aquatic resources during any unplanned shutdowns that occur during operation.

Cultural Resources

To resolve adverse effects on the Clark Canyon Dam, we recommend that the HPMP be revised to include a Treatment Plan for the dam, as well as address other concerns raised by the SHPO and Reclamation regarding consultation procedures. The Treatment Plan and revised HPMP should be developed by the licensee in consultation with the SHPO and Reclamation, and filed with the Commission for approval within 90 days of license issuance and prior to construction. Because the Treatment Plan essentially replaces the proposed MOA, no additional cost is anticipated.

Measures Not Recommended by Staff

Staff finds that some of the measures recommended by other interested parties would not contribute to the best comprehensive use of Clark Canyon reservoir and Beaverhead River water resources, do not exhibit a sufficient relationship to project environmental effects, or would not result in benefits to non-power resources that would be worth their cost. The following discusses the basis for staff's conclusion not to recommend such measures.

Water Efficiency Improvements, Conservation Planning, and Pollution Adaptive Management Plan

Interior, Upper Missouri Waterkeeper, and Montana Trout Unlimited recommend that the applicant be required to: (1) Provide 4 percent of the project's gross revenue to fund independent technical studies of Beaverhead River Basin water efficiency improvements or water conservation measures; and (2) support implementation of the 2006 MOU between Reclamation and Montana DFWP for the *Betterment of the Beaverhead River and Valley.* In addition, Missouri Waterkeeper recommends the applicant be required to support ongoing agency studies evaluating turbidity and nutrient pollution events occurring in the watershed and participate in developing and implementing an adaptive management plan that addresses those concerns.

Available information indicates that trout populations in the Beaverhead River are adversely affected by low flows that occur during the non-irrigation season, and that fish populations in Clark Canyon Reservoir are adversely affected by low reservoir levels during periods of drought. Funding water conservation measures could help alleviate some adverse conditions to fish that occur in Clark Canyon Reservoir and the Beaverhead River, particularly during drought conditions. Our analysis in section 3.3.2.2, however, indicates that operation of the project as proposed by the applicant would not cause any changes in the water levels of Clark Canyon Reservoir, the quantity of water released by Reclamation into the Beaverhead River for instream flows, or the quality of tributaries entering the reservoir or within the reservoir.

Although we agree that providing funds or support for water efficiency improvements and participating in watershed management and conservation planning activities may provide some benefits to fisheries in

Clark Canyon Reservoir and the Beaverhead River through increased potential for enhanced water storage, instream flows, and water quality, we find that these measures bear no relationship to project effects or purposes.

For these reasons we conclude that Interior's, Montana Trout Unlimited's, and Upper Missouri Waterkeeper's recommended measures would be inconsistent with the comprehensive planning standard of section 10(a)(1) of the FPA, and therefore would not be in the public interest.

Annual Meeting With Watershed Stakeholders

Montana DEQ's condition 11 stipulates that the applicant hold an annual meeting with watershed stakeholders (*i.e.,* state and federal agencies, non-governmental organizations, and any interested members of the public) to discuss water quality monitoring efforts associated with project operation. Our analysis in section 3.3.2.2 indicates that we do not expect project operation to result in frequent deviations from the state water quality standards. Instead, our analysis indicates that operating the project would improve water quality in the Beaverhead River downstream of the project by enhancing DO levels in the summer months and reducing the potential for TDG supersaturation in the summer and early fall compared to existing conditions. While an annual meeting would provide another mechanism to evaluate whether any changes are needed to achieve water quality standards during project operation, it is not needed because the applicants proposed annual reporting and staff's recommended notification procedures (notifying the agencies within 24 hours of a deviation) would be adequate to identify problems and any need for corrective actions. Although the costs of organizing and holding such meetings would be small ($1,000), the benefits would not be worth the cost. For these reasons, we do not recommend the annual meeting stipulated by Montana DEQ's condition 11.

Fish Entrainment, Impingement, and Mortality

Interior and Montana Trout Unlimited recommend that the applicant evaluate the effects of the project on fish entrainment and impingement. The recommended entrainment evaluation may be useful at assessing the entrainment, impingement, and mortality rates of fish at the dam. However, we believe that sufficient information exists to evaluate the effects of the project on fish entrainment and mortality.

Our analysis in section 3.3.2.2 found that operation of the proposed project would have no effect on the rate of fish entrainment from Clark Canyon Reservoir because the project would not alter the timing or volume of water withdrawals, and all water passing the dam would do so via the existing intake structure (and by the spillway during spill events), as it does under existing conditions. Further, our analysis suggests that the mortality rates of entrained fish under proposed project operation would be similar to existing conditions. During project operation fish would still be subject to high mortality levels when they are exposed to rapid depressurization as they exit the pressure conditions of the deep reservoir and enter the relatively shallow conditions in the tailrace of the dam; therefore, the proposed project would not substantially add to the losses of fish currently occurring at the existing outlet works at mortality rates approaching 100 percent of entrained fishes. The continued high mortality through the dam would limit the potential that fish entrained from the reservoir contribute substantially to the fishery downstream of the reservoir, which consists of self-reproducing trout populations. For these reasons, collecting additional information on entrainment and mortality would have only minimal benefits to the fishery resource.

We estimate that the annualized costs of the entrainment assessment would be $4,540, not including the additional costs of any future measures that could be implemented to reduce entrainment. We conclude that the potential benefits of the entrainment assessment would not justify the cost, and therefore would not be in the public interest.

Dam Infrastructure and Operation Evaluation

Montana DFWP and Upper Missouri Waterkeeper recommend that the applicant evaluate the need for alterations to dam infrastructure or operations to minimize downstream turbidity effects resulting from entrainment of organic material or inorganic fine sediment from the reservoir into the project works. The recommended measure is non-specific, and therefore, we are unable to evaluate the benefits and costs of the measure. Because the project would be operated run-of-release, the project would not alter the depth of the reservoir intake, or the rate, volume, or velocity of water withdrawn from the reservoir, nor does the Commission have the authority to require changes to Reclamation's facilities or operations; therefore it is unclear what specific changes in dam infrastructure or operations would be available to the applicant to address Montana DFWP and Upper Missouri Waterkeeper's concerns.

For these reasons, we do not recommend requiring Montana DFWP and Upper Missouri Waterkeeper's recommended evaluation.

Downstream Water Quality Compliance Monitoring

The applicant proposes to continuously monitor TDG, DO and water temperature for at least the first five years of project operation. The applicant would monitor DO and temperature in a small chamber located upstream of proposed turbines (Site 1), at a site located in the proposed aeration basin (Site 2), and at a site located about 300 feet downstream of the project in the Beaverhead River (Site 3). The applicant would monitor TDG levels at Sites 2 and 3.

Montana DFWP recommends that the applicant deploy probes at the cone valve and 100, 200, and 300 feet below the project, in addition to the sites proposed by the applicant, and to monitor water quality parameters at these sites for a minimum of three consecutive years. The additional probes would permit the applicant to determine the water quality dynamics within the mixing zone and potentially the best place to document compliance with DO and TDG levels over the long term.

In addition, Upper Missouri Waterkeeper recommends that the applicant evaluate the need for additional monitoring downstream of the project during operation.

Our analysis in section 3.3.2.2 indicates that although TDG and DO may change slightly within the mixing zone, the site recommended by the applicant is likely to be most representative of water quality conditions downstream of the project and would be sufficient to document compliance with water quality conditions. Given the anticipated small changes within so short a distance, there would be little benefit to downstream aquatic resources by conducting this additional monitoring.

We estimate that the annualized costs of monitoring at these additional compliance sites would be $3,500 and conclude that the limited benefits of the additional downstream monitoring would not justify the cost.

Upstream Water Quality Monitoring

Upper Missouri Waterkeeper recommends that the applicant evaluate the need for additional monitoring upstream of Clark Canyon Dam during project operation. The recommended measure is non-specific, and therefore, we are unable to determine the benefits and costs of the measure. The applicant already proposes to collect water temperature and DO concentrations levels of source reservoir water in order to monitor the need for DO enhancement downstream. Conducting monitoring at additional sites upstream would provide general information on water quality conditions within the Clark Canyon Reservoir above the intake or in tributaries feeding the reservoir. However, the project would not affect these upstream areas. Therefore, the recommended monitoring does not have sufficient nexus to the project effects and we do not recommend that additional upstream monitoring be included as a license requirement.

Compensatory Mitigation for Greater Sage-Grouse

We recommend adopting Interior's recommendation to coordinate with BLM and Montana DNRC for the purposes of complying with federal and state greater sage-grouse plans; however, we do not recommend adopting Interior's recommendation to provide compensatory mitigation to offset any remaining impacts after application of avoidance and mitigation measures. We cannot evaluate the cost or benefits of compensatory mitigation requirements because the agencies have not defined those requirements. Regardless, compensatory mitigation would not be warranted because the applicant's and staff proposed measures adequately minimize potential adverse effects on greater sage grouse for several reasons.

First, the applicant's proposal to prevent perching of predators on the transmission line, and the revegetation measures under the VMP, would deter increased predation and minimize habitat loss. Second, staff's recommended measure to construct the transmission line segments that cross the Horse Prairie and Medicine Lodge drainages outside of the greater sage-grouse breeding season (March 1–April 15) would reduce the risk of project-related disturbances on breeding greater sage-grouse.

The avoidance and mitigation measures recommended in the staff alternative would ensure that the project would have minimal effects on greater sage-grouse and would not affect the population.

5.3 Unavoidable Adverse Effects

Land-disturbing activities associated with the proposed construction and operation of the project would require the removal of vegetation and disturbance of soil. These activities would disrupt the topsoil and result in some temporary erosion in the construction areas that would be largely controlled by implementation of the applicant's proposed ESCP and VMP.

During the construction period there would be an unavoidable loss of habitat along the access road and transmission line right-of way. Bald eagles and ferruginous hawks may be displaced from foraging areas in the stilling basin and along the access road and transmission line ROW during the period of construction and for a short time afterward until vegetation becomes reestablished.

Noise and dust from land-disturbing activities, other construction activities, and construction traffic would diminish the quality of the recreational experience in the vicinity of Clark Canyon Dam and the project site. Project construction traffic would conflict with recreational traffic. The transmission line would introduce a new structural feature within view of several nearby recreation sites and along five miles of Montana Highway 324 where no transmission line currently exists.

Some long-term fish entrainment into project facilities and subsequent injury would occur similar to existing conditions.

5.4 Summary of Section 10(j) Recommendations and 4(e) Conditions

5.4.1 Recommendations of Fish and Wildlife Agencies

Under the provisions of section 10(j) of the FPA, each hydroelectric license issued by the Commission shall include conditions based on recommendations provided by federal and state fish and wildlife agencies for the protection, mitigation, or enhancement of fish and wildlife resources affected by the project. In response to our Ready for Environmental Analysis notice, Interior, on behalf of FWS, submitted 10(j) recommendations for the project on March 17, 2016.

Section 10(j) of the FPA states that whenever the Commission believes that any fish and wildlife agency recommendation is inconsistent with the purposes and the requirements of the FPA or other applicable law, the Commission and the agency shall attempt to resolve any such inconsistency, giving due weight to the recommendations, expertise, and statutory responsibilities of such agency. Table 7 lists Interior's recommendations filed pursuant to section 10(j) and indicates whether the recommendations are adopted under the staff alternative. Environmental recommendations that we consider outside the scope of section 10(j) have been considered under section 10(a) of the FPA and are addressed in the specific resource sections of this document.

Of the 5 recommendations that we consider to be within the scope of section 10(j), we wholly include 3, include 1 in part, and do not include 1. We discuss the reasons for not including those recommendations in section 5.1, *Comprehensive Development and Recommended Alternative.* Table 7 indicates the basis for our preliminary determinations concerning measures that we consider inconsistent with section 10(j).

TABLE 7—FISH AND WILDLIFE AGENCY RECOMMENDATIONS

[Source: Staff]

Recommendation	Agency	Within scope of section 10(j)	Levelized annual cost	Adopted?
1. Support water conservation strategies to improve Beaverhead River instream flows.	Interior	No. Not a specific measure to protect fish and wildlife.	$0	Not adopted. Because the measure is not related to project effects, we have no justification for recommending the measure.

TABLE 7—FISH AND WILDLIFE AGENCY RECOMMENDATIONS—Continued

[Source: Staff]

Recommendation	Agency	Within scope of section 10(j)	Levelized annual cost	Adopted?
2. Fund studies of water efficiency improvements or water conservation measures.	Interior	No. A funding commitment for these purposes is not a specific measure to protect fish and wildlife. Additionally, there is no relationship between this measure and project effects—project operation would not affect the quantity of Beaverhead River instream flow releases or reservoir levels.	$37,000	Not adopted. Because the measure is not related to project effects, we have no justification for recommending the measure.
3. Submit water quality monitoring reports during construction and operation to FWS.	Interior	No. Not a specific measure to protect fish and wildlife.	[a] 0	Adopted.
4. Assess impacts of entrainment and impingement.	Interior	Yes	$4,540	Not adopted.[b] Benefits of monitoring program would not justify the cost.
5. Coordinate (including sequential impact avoidance, minimization, reclamation, and compensation) with federal and state agencies on any applicable compliance procedures and stipulations in greater-sage grouse recovery plans. Provide compensatory mitigation for any unavoidable impacts.	Interior	No. Not a specific fish and wildlife mitigation measure.	[c] N/A	Adopted in part. We recommend that the applicant coordinate with state and federal resource agencies for greater sage-grouse conservation, but we do not recommend a requirement to provide compensatory funds for unavoidable effects.
6(a). Construct power lines and substation in accordance with APLIC standards, including installing visual markers on the wires.	Interior	Yes	[d] $0	Adopted.
6(b). To the extent practicable, schedule construction to avoid nesting season for raptors (including ferruginous hawk) and other birds, and establish a 0.5-mile no-construction buffer around raptor nests.	Interior	Yes	[d] $0	Adopted.
If field surveys are conducted to avoid take during construction, maintain nesting bird survey data, including the presence of migratory birds, eggs, and active nests, as well as information regarding the qualifications of the biologist performing the survey, and any avoidance measures implemented.	Interior	Yes	[d] $0	Adopted.
7. Apply temporary seasonal disturbance restrictions (February 1–August 15) and 0.5-mile buffer for any bald eagle nest that occur within 0.5-mile of the project.	Interior	Yes	$0	Adopted.

[c] Cost included in implementing the applicant's CWQMP and Revised DOEP.

[b] Preliminary findings that recommendations found to be within the scope of section 10(j) are inconsistent with the comprehensive planning standard of section 10(a) of the FPA, including the equal consideration provision of section 4(e) of the FPA, are based on staff's determination that the costs of the measures outweigh the expected benefits.

[c] Cost unavailable as it includes unidentified compensatory mitigation for effects after avoidance and mitigation efforts have been applied. Therefore, costs and measures are unknown.

[c] Cost included in applicant's construction design.

5.4.2 Land Management Agency's Section 4(e) Conditions

Of Reclamation's 9 preliminary conditions, we consider 8 (conditions 1 through 3 and conditions 5 through 9) to be administrative or legal in nature and not specific environmental measures. We therefore do not analyze these conditions in this EA. Condition 4 requires the applicant to revegetate all newly disturbed land areas with plant species indigenous to the area within 6 months of the completion of the project's construction. All of

Reclamation's section 4(e) conditions are included in the staff alternative.

5.5 Consistency With Comprehensive Plans

Section 10(a)(2)(A) of the FPA, 16 U.S.C.§ 803(a)(2)(A), requires the Commission to consider the extent to which a project is consistent with federal or state comprehensive plans for improving, developing, or conserving a waterway or waterways affected by the project. We reviewed nine comprehensive plans that are applicable to the Clark Canyon Dam Project, located in Montana.[27] No inconsistencies were found.

6.0 FINDING OF NO SIGNIFICANT IMPACT

On the basis of our independent analysis, we conclude that approval of the proposed action, with our recommended measures, would not constitute a major federal action significantly affecting the quality of the human environment. Preparation of an environmental impact statement is not required.

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