Final Environmental Assessment
Jordanelle Dam Hydroelectric Project

U.S. Department of the Interior and
Central Utah Water Conservancy District

July 2005

U.S. Department of the Interior

Final Environmental Assessment
Jordanelle Dam Hydroelectric Project

Prepared by

Central Utah Water Conservancy District
July 2005

Don A. Christiansen, General Manager
Central Utah Water Conservancy District

Ronald Johnston, CUPCA Program Director
U.S. Department of the Interior

FINDING OF NO SIGNIFICANT IMPACT
Environmental Assessment
Jordanelle Dam Hydroelectric Project

Decision: It is my decision to approve the Proposed Action which includes the execution of a Lease of Power Privilege contract, to provide for the construction, operation, and maintenance of a non-federal hydroelectric generation facility on Jordanelle Dam as identified in this Final Environmental Assessment (EA). As described in the environmental commitments of chapters 2 and 3, construction of the Proposed Action will be according to best construction practices to avoid impacts. Operation of the Proposed Action will not impact or change the operations of Jordanelle Reservoir which will be in accordance with the 1987 M&I Final Supplement and the 2004 ULS EIS.

Finding of No Significant Impact: Based upon the analysis of potential environmental impacts contained in this Final EA, the Joint Lead Agencies have committed to use Best Management Practices (BMP) for construction and operation described in Section 2.10 and to implement the environmental commitments contained in the Final EA. Therefore, I have determined that the impacts are not expected to be significant and an environmental impact statement is not required.

Rationale for Decision: The decision to approve and implement the Proposed Action does not result in any undue or unnecessary environmental degradation.

Recommended by:

Terry J. Hickman JUL 5 2005
Environmental Programs Manager
Central Utah Water Conservancy District

Reed R. Murray JUL 5 2005
CUPCA Deputy Program Director
U.S. Department of the Interior

Approved by:

Ronald Johnston JUL 6 2005
CUPCA Program Director
U.S. Department of the Interior

Final Environmental Assessment
Jordanelle Dam Hydroelectric Project

Lead Agencies:	U.S. Department of the Interior / CUPCA Office Central Utah Water Conservancy District
Cooperating Agencies:	Bureau of Reclamation Utah Reclamation, Mitigation, and Conservation Commission
Responsible Official:	Terry J. Hickman Central Utah Water Conservancy District 355 W. University Parkway Orem, Utah 84058-7303 Reed Murray Department of Interior 302 East 1860 South Provo, UT 84606-7317
For Information Contact:	Terry J. Hickman Central Utah Water Conservancy District 355 W. University Parkway Orem, Utah 84058-7303 801 / 226-7174

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CHAPTER 1

General Overview

1.1 Introduction

This Environmental Assessment (EA) is being prepared pursuant to Section 102(2)(C) of the National Environmental Policy Act (NEPA) of 1969, as amended; Public Law 102-575, Central Utah Project Completion Act (CUPCA), as amended; the Council on Environmental Quality (CEQ) Regulations for Implementing the Procedural Provisions of the NEPA (40 CFR [Code of Federal Regulations] Part 1500-1508); and the revised Department of Interior (DOI) NEPA Implementing Procedures (Federal Register Vol. 69, No. 45, P. 10866-10887). The Department of the Interior (DOI) is proposing to enter into a Lease of Power Privilege contract, to provide for the construction, operation, and maintenance of a non-federal hydroelectric generation facility on Jordanelle Dam, of the Bonneville Unit, Central Utah Project (CUP), and associated power transmission lines and facilities. The DOI issued a notice of intent to accept proposals, select one or more lessees, and contract for hydroelectric power development at Jordanelle Dam. By letter dated August 16, 2000, DOI selected the Central Utah Water Conservancy District (CUWCD) and Heber Light and Power (HL&P) as the potential joint lessees for development of hydropower at Jordanelle Dam under a lease of power privilege contract.

The DOI/CUPCA Office and CUWCD are Joint Lead Agencies for preparation of this EA. The U.S. Bureau of Reclamation (Reclamation) and the Utah Reclamation, Mitigation, and Conservation Commission (URMCC) are serving as cooperating agencies for this NEPA analysis. In accordance with NEPA implementing regulations, if this EA finds no significant issues associated with implementing the proposed project, a Finding of No significant Impact (FONSI) would be prepared by the Lead Agencies. If however, significant impacts from implementing the proposed project are found, the preparation of an Environmental Impact Statement under NEPA would be warranted.

1.2 Purpose and Need

1.2.1 Purpose of the Proposed Project

Several purposes are addressed by the proposed project. They include the following:

- Allow the execution of a Lease of Power Privilege for the Jordanelle Dam Hydroelectric Project.
- Allow the construction, operation, and maintenance of facilities and transmission lines associated with the Jordanelle Dam Hydroelectric Project.
- Meet the objective of hydroelectric power potential at Jordanelle Dam, which is a CUP facility, as authorized through the Colorado River Storage Project (CRSP) Act of April 11, 1956 (Ch. 203, Stat. 105).

- Avoid impacts to natural resources (Jordanelle Reservoir and the Provo River).
- Avoid impacts to federal projects and facilities (Jordanelle Dam and associated features).
- Generate hydroelectric power as an incidental use to the delivery of water for CUP purposes, which include municipal and industrial water supply, irrigation supply, flood control, and fish and wildlife.
- Protect water quality in Jordanelle Reservoir and the Provo River.

1.2.2 Need for the Proposed Project

The proposed project is needed to develop hydroelectric power to meet increased power demands.

1.3 History and Background

The CUP's Bonneville Unit, located in northern Utah, was authorized as a participating project for construction, including hydroelectric power generation, by the CRSP Act of 1956. The 1979 Municipal and Industrial System (M&I) Final Environmental Impact Statement (EIS) first discussed the construction and operation of a hydroelectric facility below Jordanelle Dam (Reclamation, 1979). The 1987 Final Supplement to the M&I Final EIS deferred construction of the facility until non-federal participation could be achieved (Reclamation, 1987). The construction of Jordanelle Dam included provisions for hydroelectric power. The 2004 Final EIS for the Utah Lake Drainage Basin Water Delivery System (ULS) describes the completion of the Bonneville Unit deliveries (CUWCD, 2004) and although it does include Bonneville Unit power development in Diamond Fork Canyon, the ULS project does not change the provisions for non-federal development of hydroelectric power at Jordanelle Dam. This EA updates and uses information and data from the ULS EIS and 1987 M&I Final Supplement relative to the construction of a hydroelectric power plant and associated facilities. The operation of Jordanelle Dam and Reservoir with the proposed hydroelectric project in place would remain the same as described in the 2004 ULS EIS.

The CUPCA authorized the construction of other features of the Bonneville Unit. Section 208 of the CUPCA provides that CUP power facilities be developed and operated in accordance with the CRSP Act and states, "Use of Central Utah Project water diverted out of the Colorado River Basin for power purposes shall only be incidental to the delivery of water for other authorized project purposes. Diversion of such waters out of the Colorado River Basin exclusively for power purposes is prohibited." DOI, in consultation with the Western Area Power Administration, selected the joint proposal of CUWCD / HL&P to develop non-federal hydroelectric power at Jordanelle Dam through a lease of power privilege (Federal Register Vol. 64, No. 127, P. 36030-36032). The Federal Register notice stated that "any lease of power privilege at…Jordanelle Dam…must accommodate existing contractual commitments related to operation and maintenance of such existing facilities."

This lease of power privilege is an alternative to development of federal hydropower. A lease of power privilege grants a non-federal entity the right to utilize, consistent with CUP purpose, water power head and storage at and / or operationally in conjunction with the

CUP, for non-federal electric power generation and sale by the entity. The general authority for lease of power privilege under Bureau of Reclamation (Reclamation) legal statutes includes, among others, the Town Sites and Power Development Act of 1906 (43 U.S.C §522) and the Reclamation Project Act of 1939 (43 U.S.C. §485h(c)). A federal power project was not considered because by December 2002, when federal power was authorized for funding, DOI had already selected a potential lessee and entered into negotiations.

Negotiation for the lease of power privilege contract was announced in the Federal Register on October 25, 2000 (Vol. 64, No. 207, P. 63879-63880). The proposed execution of the lease contract would be subject to NEPA compliance. Power developed at Jordanelle Dam would be purchased by HL&P and sold to their customers.

1.4 Location of the Project

The proposed project is located on the downstream side of Jordanelle Dam below Jordanelle Reservoir. Jordanelle Dam and Jordanelle Reservoir are on the Provo River in Wasatch County Utah, approximately 4 miles north of Heber City, Utah (Figure 1). Figure 2 shows project features adjacent to Jordanelle Dam, including ownership. Figure 3 shows major project features including the proposed power plant and the transmission line to connect the power plant to the existing electric power distribution system of PacifiCorp (operating in Utah as Utah Power) or HL&P.

1.5 Authorizing Actions, Permits, and Licenses

As discussed in Section 1.3 above, the CRSP Act and the CUPCA authorized the proposed project. The lease of power privilege is authorized through a variety of legal statutes. Permits and approvals potentially required for the proposed project are shown in Table 1-1.

1.6 Interrelated Projects

1.6.1 Bonneville Unit, CUP

The ULS is the last of the six original systems of the Bonneville Unit of the Central Utah Project (CUP), authorized by the CRSP Act in 1956 and CUPCA in 1992, to develop central Utah's water resources for municipal and industrial supply, irrigation, flood control, hydroelectric power, fish and wildlife, and recreation. The Jordanelle Dam is a feature of the M&I System of the Bonneville Unit of the CUP. The Bonneville Unit includes facilities to develop and more fully utilize water tributary to the Duchesne River in the Uinta Basin of Utah, to facilitate a trans-basin diversion from the Colorado River Basin to the Bonneville Basin, and to develop and distribute project and local water supplies in the Colorado and Bonneville basins.

TABLE 1-1
Permits and Approvals Required by the CUWCD for Development, Construction, Operation, and Maintenance of the Proposed Project

Permits and Approvals	Issuing Entity
Approve Proposed Project for Construction	CUWCD Board of Directors
Approve Project Construction	U.S. Department of the Interior
Lease of Power Privilege Contract	U.S. Department of the Interior
Section 404 Clean Water Act General Permit 40	U.S. Army Corps of Engineers
Section 404 Permit Oversight Authority	U.S. Environmental Protection Agency
Fish and Wildlife Coordination Act	U.S. Fish and Wildlife Service
Endangered Species Act Section 7 Consultation	U.S. Fish and Wildlife Service
Approve a Contamination Evaluation/Assessment/Prevention Plan, if Necessary	U.S. Fish and Wildlife Service
Section 401 Water Quality Certificates and Section 402 NPDES Permits	Utah Division of Water Quality
Stream Channel Alteration Permit	Utah Division of Water Rights, State Engineer's Office
Utah Construction Activity Permit	Utah Department of Environmental Quality
Compliance with Utah Occupational Safety and Health Administration (OSHA) Regulations during Project Construction, Operation, and Maintenance	State of Utah OSHA
Section 106 National Historic Preservation Act and State Antiquities Consultation	Utah Division of State History, Utah State Archaeologist, and Utah State Historic Preservation Officer
Concurrence on Fish and Wildlife Coordination Act	Utah Division of Wildlife Resources
Migratory Bird Treaty Act of 1918	U.S. Fish and Wildlife Service
Heber Light and Power Agreement for Project Construction, Operation, and Maintenance	CUWCD and U.S. Department of the Interior
Wasatch County Building Permits and, if Necessary, Permits to Construct in County Road Right-of-Way	Wasatch County
Agreements for Easements, Rights-of-Way, Access, and Entry Permits, as Needed	CUWCD with U.S. Department of the Interior for federal property; CUWCD and HL&P with Wasatch County for easements off federal property; Landowners whose property is directly affected by project construction, operation, and/or maintenance

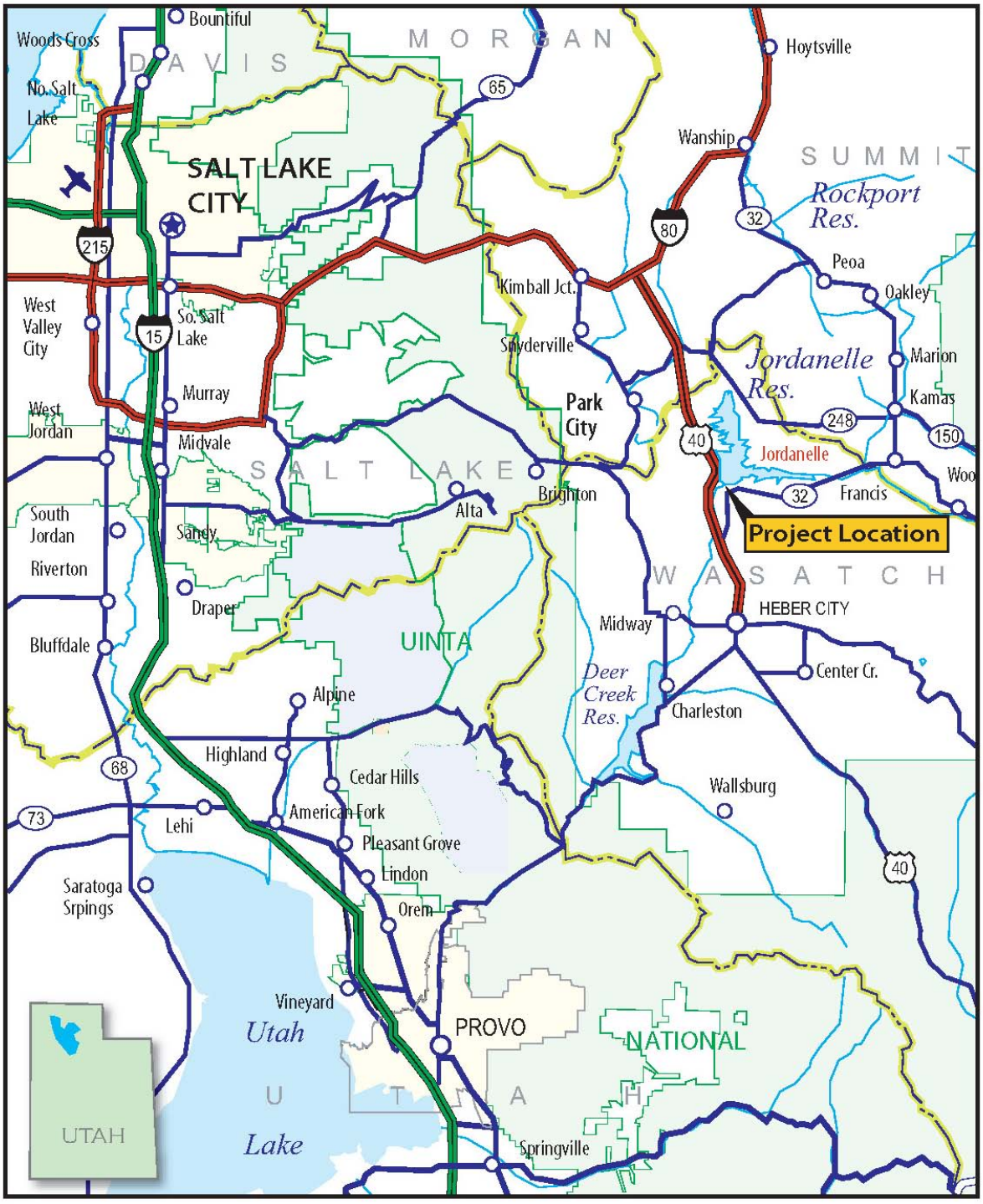

Figure 1

Project Location Map

JORDANELLE DAM HYDROELECTRIC PROJECT
ENVIRONMENTAL ASSESSMENT

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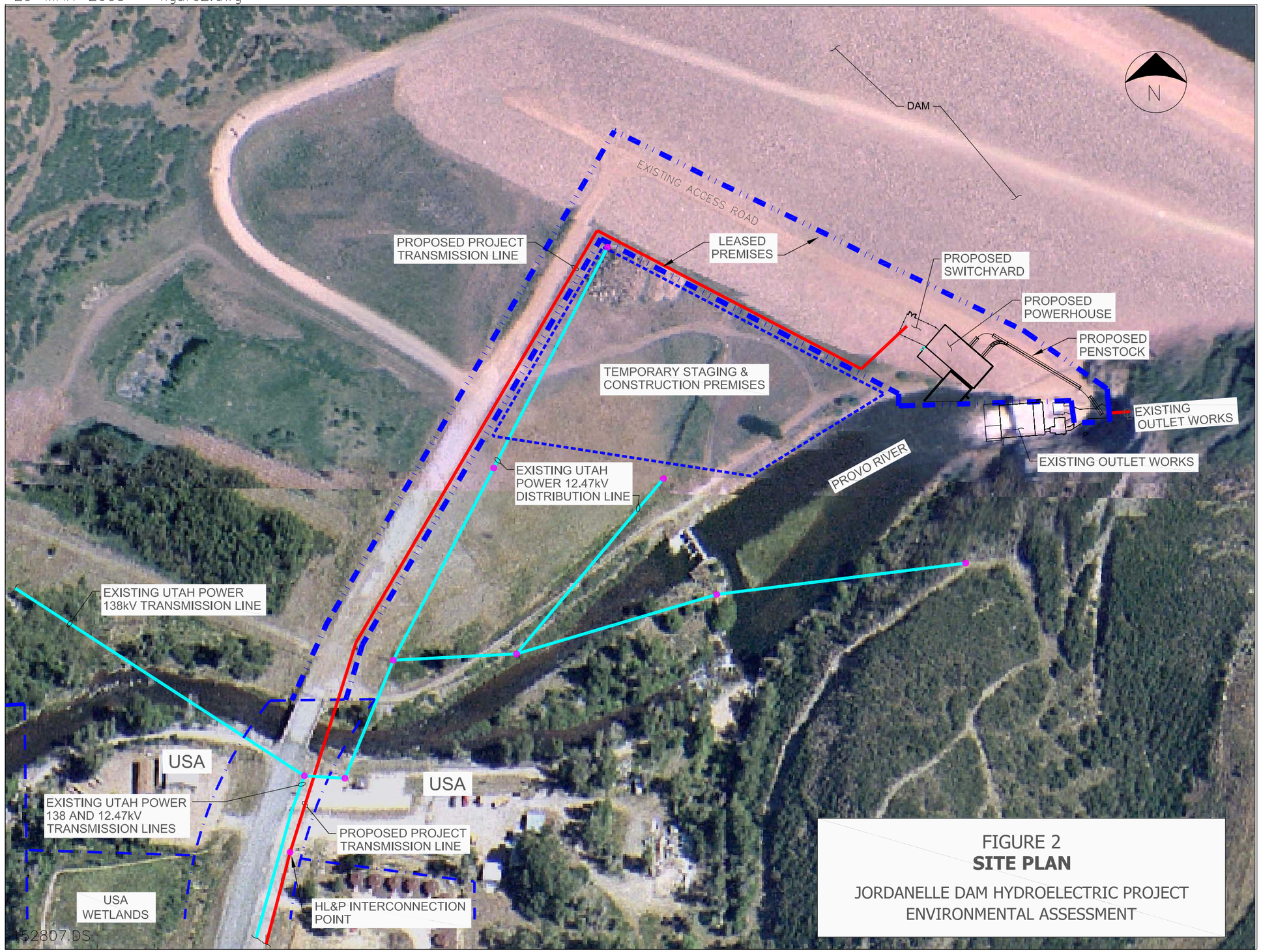


FIGURE 2
SITE PLAN

JORDANELLE DAM HYDROELECTRIC PROJECT
ENVIRONMENTAL ASSESSMENT

LEGEND

- ▲ Potential Interconnection Sites
- 1 County Road Bridge (Alternative 2)
- 2 Utah Power Jordanelle Substation (Alternative 3)
- 3 Heber Light & Power System (Alternative 4 - Preferred Alternative)

N

Approximate Scale in Feet

0 1000 2000 3000

Figure 3

PROJECT SITE MAP

JORDANELLE DAM HYDROELECTRIC PROJECT
ENVIRONMENTAL ASSESSMENT

1.6.2 Other Projects

Other projects interact with the Bonneville Unit projects. These include the Provo River Project, the Strawberry Valley Project, the Weber River Project, and the Jordanelle Reservoir Intake Pipeline Project. Another interrelated project is the Bonneville Unit Provo River Restoration Project.

The Provo River Project accepts water from the Duchesne Tunnel and the Weber-Provo Diversion Canal and delivers it for use in Utah and Salt Lake Counties. Water is stored in Deer Creek Reservoir, downstream of Jordanelle Dam on the Provo River. Waters developed by the CUP are developed and stored in Jordanelle Reservoir and Deer Creek Reservoir on a space available basis and the two reservoirs are operated in accordance with the Deer Creek – Jordanelle Operating Agreement.

The Weber River Project diverts approximately 5,400 acre-feet of Echo Reservoir storage water by exchange through the Weber-Provo Canal to the Provo River. Provo Reservoir Water Users Company also diverts Weber River natural flow water to the Provo River through the Weber-Provo Canal. These waters are used for irrigation in the Heber Valley as well as for irrigation and municipal and industrial purposes in Utah and Salt Lake Counties.

The proposed Jordanelle Reservoir Intake Pipeline Project plans to construct an intake on Jordanelle Reservoir and a 3,050-foot pipeline from the reservoir to the Jordanelle Special Service District's (JSSD) Keetley Water Treatment Plant (KWTP). The pipeline would cross Reclamation and JSSD property. JSSD currently treats 10 million gallons per day (GPD) of water from the Ontario Drain Tunnel No. 2. This project would allow diversion of up to 2,400 acre-feet of water from the reservoir to the KWTP. This project is currently being evaluated through a separate NEPA process.

The Provo River Restoration Project (PRRP), as detailed in the final EIS, December, 1997, reconstructed and realigned a majority of the existing Provo River channel and floodplain system between the Jordanelle and Deer Creek Reservoirs. The project is designed and intended to restore a more naturally functioning riverine ecosystem to the middle Provo River. A key component to the success of the project is the integration of CUP water delivery needs with ecosystem requirements to the extent possible within the opportunities and functional constraints of Bonneville Unit and the Deer Creek – Jordanelle Operating Agreement. The project mitigates past impacts of the CUP and other federal Reclamation projects by improving fish and riparian habitats in the 10-mile reach of Provo River. The project is under the direction of the Utah Reclamation Mitigation and Conservation Commission (Mitigation Commission).

1.6.3 Electric Power Transmission Line Projects

Utah Power (UP) has recently constructed a 138-kilovolt (kV) electrical transmission line and substation near the project. The purpose of these facilities is to support present and future load in the area. The transmission line has been extended south from the existing Silver Creek Substation along U.S. Highway 40 to the existing Jordanelle Substation located approximately 0.5 mile south of the project, as shown in Figure 3.

HL&P also operates electric power distribution facilities in the project area. These include a 12.47-kV power line, which extends to near the southern terminus of the new UP 138-kV line, about 2 miles south of the project. This circuit can be upgraded in capacity, protection, and controls suitable for interconnection with the project.

CHAPTER 2

Description of Alternatives

2.1 Introduction

This chapter describes and compares the alternatives considered for the Jordanelle Dam Hydroelectric Project proposal. These include the No Action Alternative (Alternative 1) and the three action alternatives (Alternatives 2 through 4). Alternative 4 has been selected as the Proposed Action. Chapter 2 includes a discussion of how the alternatives were developed, a description of each alternative, and a summary comparison of the effects of these alternatives that focuses on the issues addressed in this Final EA. Chapter 2 is intended to present the alternatives in comparable form, define the issues, and provide a clear basis for choice among options by the decision maker and the public (40 CFR 1502.140).

The focus of the description and evaluation of the effects of the alternatives in this document is the installation of: 1) the proposed powerhouse, downstream of the dam, and its associated facilities; 2) the routing of the transmission line leaving the proposed facilities and connecting to the power grid; and 3) upgrading 1.53 miles of the HL&P transmission line. All the proposed facilities are non-federal facilities. Section 208 of CUPCA states, "Use of Central Utah Project water diverted out of the Colorado River Basin for power purposes shall only be incidental to the delivery of water for other authorized project purposes. Diversion of such waters out of the Colorado River Basin exclusively for power purposes is prohibited." The installation of the hydroelectric facility was previously planned as a project feature as part of the construction of Jordanelle Dam (Reclamation, 1979) and the operation of a hydroelectric facility would be secondary and incidental to project purposes and would not change the operation of Jordanelle Dam and Jordanelle Reservoir. There are several project purposes and numerous factors which influence operation of Jordanelle Dam and Reservoir. However, potential effects of hydroelectric power generation would not be considered when operational decisions are made for CUP project purposes.

A federal power project was not considered for analysis because by December 2002, when federal power was authorized for funding, DOI had already selected a potential lessee and entered into negotiations.

2.2 Development of Alternatives

Alternatives considered in the implementation of the Jordanelle Dam Hydroelectric Project include the No Action Alternative and three action alternatives. The No Action Alternative maintains the existing conditions at the dam, includes no construction of a hydroelectric facility, and current effects of the dam and its operation remain unchanged. The action alternatives propose to connect a penstock to an existing connection on the outlet conduit from the dam. This connection was provided in the original construction of Jordanelle Dam for the purpose of adding a hydroelectric facility. The construction of the powerhouse is common to all action alternatives and is described below. The route and configuration of the

transmission line differ by action alternative, as do the sites for interconnection with the electric utility grid.

2.3 Alternative 1—No Action Alternative

Under the No Action Alternative, none of the features proposed in the action alternatives would be constructed. Existing dam releases would continue under current conditions without energy generation and the purposes of the proposed project would remain unmet. Finally, any anticipated environmental impacts of the action alternatives would not occur.

2.4 Project Features Common to All Action Alternatives

2.4.1 Powerhouse

The design of the powerhouse facility is the same under all action alternatives (Alternatives 2, 3, and 4). The powerhouse and penstock would be located a sufficient distance away from the toe of the dam so that the stability of the dam is not affected by the excavation for the powerhouse or the penstock.

The proposed powerhouse would be a reinforced concrete structure located partially within the rock berm at the toe of the dam, west of the existing outlet works. The penstock would be constructed from the 72-inch-diameter connection in the outlet conduit and then routed to the proposed powerhouse where it would bifurcate into two 66-inch-diameter pipes feeding the turbines. Penstock diameter would be 72 or 84 inches, depending upon final hydraulic analysis and equipment bids.

The floor of the powerhouse would be set at an elevation above the high tail-water elevation. This elevation would allow maintenance to be performed on the turbines without the need to de-water the tailrace. The turbines, generators, and all mechanical equipment would be located at this level. The turbines would discharge into a tailrace channel below the turbine floor. The final elevation of the turbines and tailrace channel would be determined when the turbines are selected.

The plan dimensions of the turbine floor are determined by the equipment size and the space required to maintain, disassemble, remove, or replace the equipment, and for other maintenance activities. The major equipment located on the turbine floor would include two turbine / generator units; turbine controllers; turbine inlet valves located on the penstock to each turbine; a hydraulic power unit for each unit and valve; and sump pumps.

The proposed powerhouse arrangement would include a control room area. A control room is required to house the control panels, switchgear, motor control center, panel boards, batteries, and battery chargers. The control room would be isolated from the turbine floor and sound-proofed to provide a quiet space for the operator. It would be located above the turbine floor to protect the equipment from potential flooding, and it would be located near the plant substation to minimize conduit and cable runs.

Powerhouse and area lighting will be provided for security, safety, and maintenance purposes. Offsite lighting will be minimized through use of cut-off luminaires. The District will take into account directional lighting, wherever possible.

2.4.2 Turbines and Generators

The power plant would house two horizontal Francis turbines, each rated at approximately 300 cubic feet per second (cfs). The turbines would drive synchronous generators with output ratings of about 6 megawatts (MW) each and speeds of 600 revolutions per minute (rpm). Each generating unit would be equipped with a butterfly inlet valve, manual and automatic controls, and electrical switchgear. Electric power would be generated at 4.16 or 12.47 kV, then stepped up via a transformer, as necessary, to the transmission voltage at the power plant's adjacent substation.

The proposed capacity of the power plant is based upon the installation of two turbine-generators, identical in size, and rated 6 MW at 300 cfs each. The ratings of these units were selected on the basis of analysis of the site flow and head conditions. Employing the ULS hydrology as the basis, the following considerations governed unit selection and rating:

- Optimal unit selection is based upon consideration of available head and flow, as both determine unit characteristics, and both vary independently. Overall power plant cost is likewise a factor in determining the most economical installation.
- Unit(s) were sized such that 125 cfs (normal site minimum flow) was within the minimum flow range of a single turbine. The number and relative sizing of turbine units was then selected based upon the maximum total flow that can be utilized economically. Multiple equipment manufacturers were consulted in order to predict the best turbine design for the site conditions. The planned capacity is an accurate estimate, with the final value determined by actual equipment supplier bids.
- The largest single unit that can operate with reasonable efficiency and stability at 125 cfs is one whose maximum flow rating is about 300 cfs and whose generator output is about 6 MW.
- Both single- and double-unit plant configurations were analyzed, along with equally and unequally sized units. Considerations of ease of maintenance, spare parts inventory, and operational redundancy favored equally-sized units. Twin 6-MW units were determined to be the most economical development for the anticipated site flow and head conditions. Larger installed capacities would capture higher flows, but the infrequency of such flows resulted in a less economical development.

2.4.3 Transmission Line and Utility Interconnection

The generated electric power would be transmitted to the site of interconnection with the utility's facilities via an overhead 3-phase power line. The voltage, configuration, and route of the line would vary by interconnection site, which comprise the three action alternatives. The interconnection site establishes the demarcation between project facilities and the utility's facilities.

The alternative interconnection sites are:

- At a location on county-managed lands south of the project near the county road bridge. This would provide interconnection at 138 kV with Utah Power facilities.

- At a location within the Utah Power Jordanelle Substation. This would provide interconnection at 12.47 kV with Utah Power facilities.
- At a location along the county road, near the southern terminus of the new UP 138-kV transmission line. Existing HL&P transmission line facilities extend north to this location. This would provide interconnection at 12. 47 kV with existing and upgraded HL&P facilities.

In each case, overhead pole assemblies would be of raptor-safe design, utilizing enhanced spacing between energized parts, in accordance with recognized standards.

Each of the transmission line alternatives can extend across the federally managed lands, from the power plant to a location near the county road bridge, by following one of two route options:

- Route Option A—West across the base of the dam, along the access road to an existing power line alignment following the main access road to the county bridge.
- Route Option B—Direct from the power plant area to the county bridge area along the existing levee.

2.5 Alternative No. 2—Transmission Line for 138-kV Interconnection with Utah Power

The elements of this alternative described below would be in addition to the elements common to all alternatives as described above in Sections 2.4.1 through 2.4.3.

Interconnection utility and site. Utah Power, at 138 kV. Metering and pole-mounted isolation switches would be installed at a location adjacent to the existing county road bridge (Figure 3, Site 1).

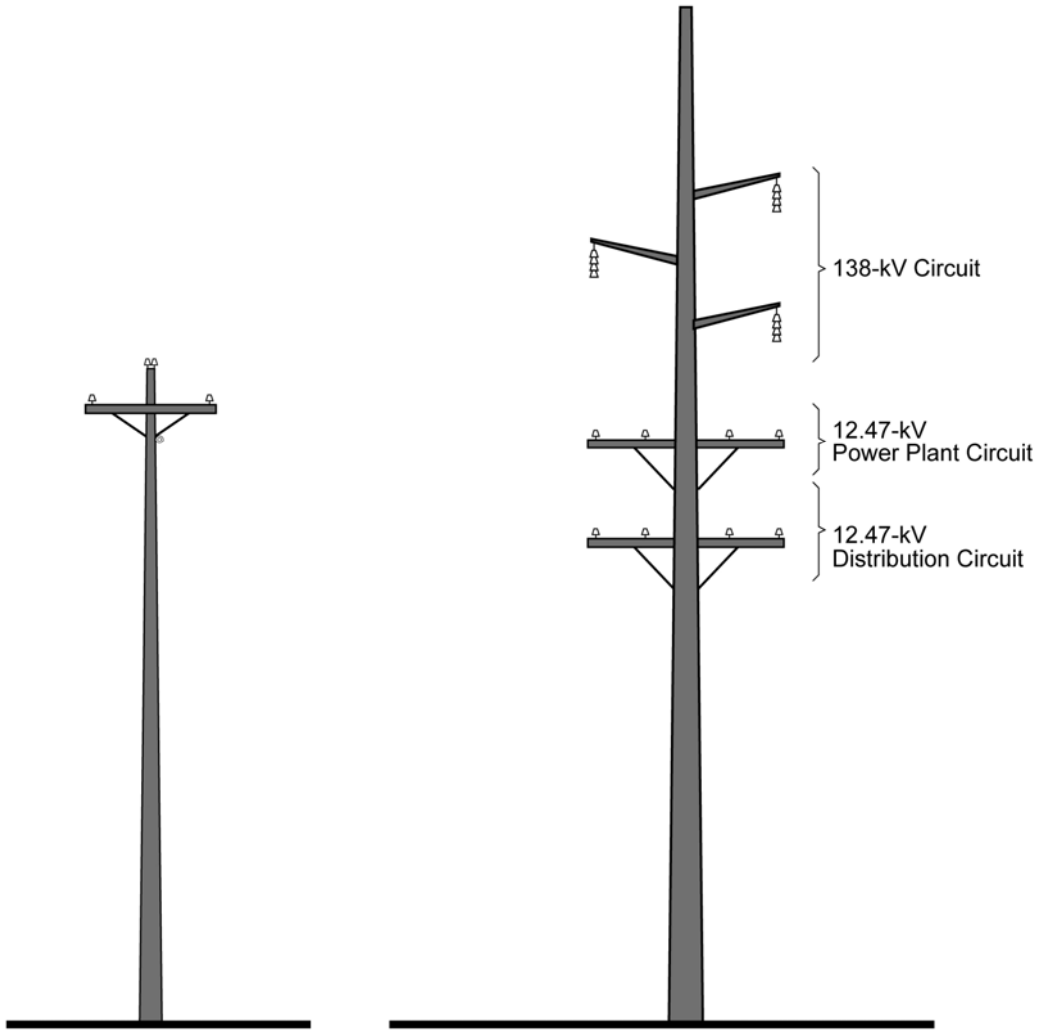
Line construction and description. New overhead 138-kV, 3-phase, wood or steel pole assemblies with davit insulator arms. Approximate height of the pole would be 60 feet. See Figure 4 for typical line structure profile.

Route. From power plant substation to interconnection site by way of federal property route Options A or B. Option A has been selected as the preferred route.

2.6 Alternative 3—Transmission Line for 12.47-kV Interconnection with Utah Power

The elements of this alternative described below would be in addition to the elements common to all alternatives as described above in Sections 2.4.1 through 2.4.3.

Interconnection utility and site. Utah Power, at 12.47 kV. Metering and metal-enclosed switchgear would be installed within the UP Jordanelle Substation (Figure 3, Site 2).



Approximate Scale in Feet

0 10 20

Figure 4

Typical Transmission Structures

JORDANELLE DAM HYDROELECTRIC PROJECT
ENVIRONMENTAL ASSESSMENT

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Line construction and description. New overhead 12.47-kV, 3-phase, wood pole assemblies with single cross-arms. Approximate height of the pole would be 45 feet. Where the route coincides with that of Utah Power 138-kV line, the new line may be supported on existing 138-kV poles structures. See Figure 4 for typical line structure profile.

Route. From power plant substation to county bridge area by way of federal property route Options A or B. Option A has been selected as the preferred route. Then, the route is south along the county road about 0.43 mile to UP's Jordanelle substation within existing power line easements.

2.7 Proposed Action (Alternative 4)—Transmission Line for 12.47-kV Interconnection with Heber Light & Power

The elements of the Proposed Action described below would be in addition to the elements common to all alternatives as described above in Sections 2.4.1 through 2.4.3.

Interconnection utility and site. Heber Light & Power, at 12.47 kV. A pole-mounted isolation switch would be installed at a location along the county road near the terminus of the new UP 138-kV transmission line, and at the northern end of an existing HL&P line (Figure 3, Site 3). Existing HL&P system metering, as well as that installed at the power plant, would be employed.

Line construction and description. New, and upgraded existing, overhead 12.47-kV, 3-phase, wood pole assemblies with single cross-arms. Approximate height of the pole would be 45 feet. Where the route coincides with that of Utah Power 138-kV line, new line may be supported on existing 138-kV pole structures. See Figure 4 for typical line structure profile.

Route. New line from power plant substation to county bridge area by way of federal property route Options A or B. Option A has been selected as the preferred route. Then, the route is south along the county road about 0.43 mile past UP's Jordanelle substation, then an additional 1.35 miles south to the interconnection site. Finally, power would be routed over 1.53 miles of line facilities to be upgraded by HL&P to an existing upgraded HL&P transmission line. All line construction would occur within existing power line easements. The line upgrades would consist of replacing any damaged or obsolete hardware with comparable hardware and installation of new conductors. All upgraded line facilities would be visually and structurally similar to existing facilities.

2.8 Construction Procedures

Specification of construction procedures has not been completed at this stage of the project. However, a conventional construction process of about 18 months duration is anticipated. The power plant work area would be immediately below the existing dam. A general contractor would complete the work, employing the services of excavation, concrete, building, mechanical, and electrical subcontractors. Standard operating procedures (SOPs) would be used to ensure compliance with all construction standards, and Best Management Practices (BMPs) would be employed (see Section 2.10). Construction inspection would be conducted by CUWCD and DOI to ensure quality construction, ensure environmental compliance, and to protect the federal investment. Construction would be employed so as not to impede or modify operational releases from the reservoir. Figure 2 shows the area where the staging areas/construction office would be located.

2.8.1 Construction Schedule

The proposed construction schedule for the project is presented on the following page. The schedule is preliminary and would vary based on many factors, including the schedule of this NEPA analysis.

2.9 Facility Operation

Existing facilities that would be used to pass the release water from Jordanelle Reservoir through Jordanelle Dam to the turbines include the selective level outlet works (SLOW), low-level outlet works (LLOW), tunnels and pipelines, and a gate chamber within the dam. The SLOW and LLOW are designed and used to mix water from different reservoir depths to control and meet water quality standards for phosphorus, temperature, and dissolved oxygen levels in water discharged to the Provo River downstream of Jordanelle Dam. Operations that mix and blend Jordanelle Reservoir water to meet requirements of the Water Quality Management plan (the Plan) for Deer Creek and Jordanelle Reservoirs would be unchanged under the proposed project (Psomas, 1999).

The SLOW intake tower has six 5-foot-wide by 8-foot-high gated openings at different depths for passing flow. Gate elevations vary from 6,125 feet (shallowest) to 6030 feet (deepest) (see Table 2-1). The gates in the SLOW tower are operated to limit the water velocity through each opening to 10 feet per second (fps). The SLOW tower leads to a shaft and 7-foot-diameter tunnel that connects to a gate chamber approximately 500 feet downstream.

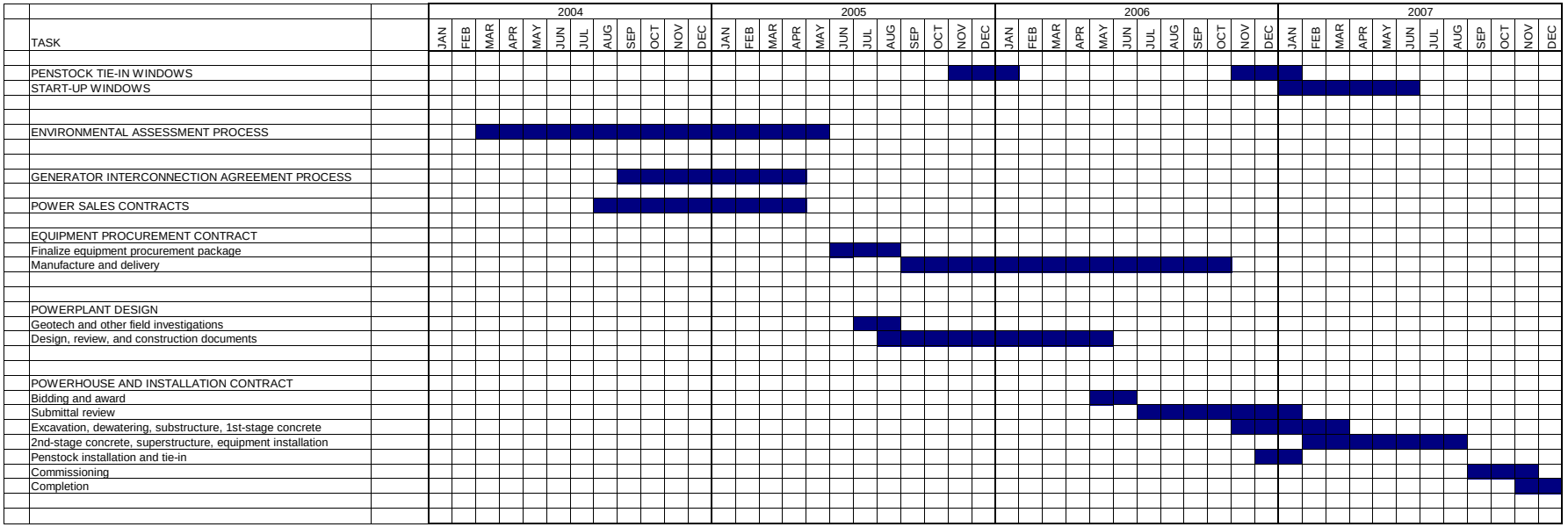
TABLE 2-1
Elevations of Principal Project Features

Principal Feature	Elevation (feet above mean sea level)
Dam crest	6,185
Spillway crest	6,182
Maximum reservoir	6,182 (flood)
Maximum joint use reservoir	6,166.4 (normal full pool)
Selective level intake (SLOW)	See Gates 1 to 6 below
Gate No. 1	6,125
Gate No. 2	6,106
Gate No. 3	6,087
Gate No. 4	6,068
Gate No. 5	6,052
Gate No. 6	6,030
Low level intake (LLOW)	5,902
Outlet works centerline	5,886.5
Tail water elevation	5,876 to 5,879

PROJECT SCHEDULE

JORDANELLE DAM HYDROELECTRIC PROJECT

CENTRAL UTAH WATER CONSERVANCY DISTRICT



The LLOW intake structure has a 9.5-foot by 9.5-foot bulkhead isolation gate. The gate elevation is 5902 feet, which is 128 feet deeper than the deepest SLOW gate opening (see Table 2-1). The LLOW intake structure leads to a 9.5-foot-diameter tunnel that connects to the gate chamber approximately 830 feet downstream of the intake structure. The LLOW intake is used whenever the discharge is greater than 1,200 cfs, or when the reservoir is below 6040 feet elevation.

Jordanelle Reservoir releases are made through the 7-foot-diameter SLOW tunnel or the 9.5-foot-diameter LLOW tunnel described above. The two tunnels come together at the gate chamber in the left abutment of the dam. When reservoir releases are greater than 300 cfs, the flow passes from the gate chamber to the outlet works through a single 9.5-foot-diameter, 1,000-foot long tunnel. This 9.5-foot-diameter tunnel bifurcates into two 78-inch-diameter pipes in the outlet works at the toe of the dam. Currently, this flow is discharged into the Provo River through fixed-cone valves at the downstream end of the 78-inch-diameter pipes. Lower flows are released through a separate 36-inch-diameter pipeline and jet-flow valve housed in the same outlet work structure as the larger valves.

Reservoir releases through the outlet works valves are discharged into the outflow channel. The outflow channel is an engineered channel constructed as part of the original Jordanelle Dam and extends about 600 feet downstream to the existing Timpanogos Canal diversion and dam. The channel's pool elevation is established by the operation of this diversion dam and its gated outlet.

Under the proposed project, the powerhouse penstock would connect to an existing 72-inch-diameter steel stub-out located upstream of the two outlet works pipes. A 72-inch-diameter penstock about 250 feet long would be constructed from the connection to the stub-out to the proposed powerhouse. The proposed project would utilize flows released for CUP purposes, including irrigation, M&I, and instream flow uses for fish and wildlife, together with non-project water being released to downstream users, in accordance with the Deer Creek-Jordanelle Operating Agreement and state water rights.

The proposed 12-MW project would operate throughout a range of reservoir elevations and release flows, as estimated within the ULS. Existing reservoir storage and release patterns would not be modified by the project. The proposed project would be able to utilize all of the flow released from the reservoir up to 600 cfs during periods when the reservoir is at elevation 6037 feet or higher. The estimated range of reservoir elevations and flows over which plant operation is effective would determine the exact design characteristics of the turbines. Whenever reservoir elevation and/or release flow fall outside the plant's operating range and subject to the downstream water quality criteria, releases would be made via the existing outlet works valves to increase dissolved oxygen by aerating the water.

The operating characteristics of the actual turbines have not yet been confirmed. However, it is anticipated that with turbines operating singly or together, the plant would effectively utilize flows between about 125 and 600 cfs. In addition, the plant would only be operated at reservoir elevations that fall within the turbine limits and wherein Water Quality Management Plan requirements are met. These conditions are expected to occur approximately 80 percent of the time, based on the flow duration and elevation duration curves developed from the PROSIM model.

The dissolved oxygen content of releases made through the turbines is expected to be lower than releases made through the outlet works valves because the aeration produced by the valves would not occur. It is anticipated that there may be times when the dissolved oxygen content of the releases made through the turbines may be below acceptable levels, particularly when the reservoir is below elevation 6070 feet. During these periods, dissolved oxygen in the river immediately downstream from the project would be maintained at acceptable levels by passing all or some of the reservoir discharge through the outlet works valves. It is anticipated that the project would be operated to minimize the head loss in the outlet work system to the greatest extent possible within the water quality constraints (the Plan). Reservoir releases under the proposed project would be the same as at present, varying from a minimum flow requirement of 125 cfs from October through March up to as much as 2,400 cfs from April to September. Tail water elevations would continue to be controlled by the Timpanogos Canal diversion dam on the Provo River several hundred feet downstream of Jordanelle Dam.

The proposed facilities will not introduce conditions of nitrogen supersaturation in water releases. No spillway structures, the most common source of this condition, are proposed. The existing reservoir intakes are not prone to air entrainment, and the turbines will discharge into a shallow tailrace where mixing and turbulence further prevent supersaturation conditions.

The Project Control System will provide protective functions as well as manual and automatic startup / shutdown of the generating units. In addition, it will provide remote control and monitoring of the operation of Jordanelle Dam facilities. The generating units and the existing outlet works control valves will be automatically controlled together to release required flows from the dam. Required releases will automatically be maintained during power plant startup and shutdown conditions. The control system will adjust flow division between outlet works and power plant in response to changing water quality conditions.

The CUWCD would work with the DOI to develop a security plan that will be consistent with and integrated into the present security program for Jordanelle Dam and Reservoir. Security measures would be included in the construction of the facilities.

2.10 Best Management Practices

A number of standard requirements (BMPs) that are intended to reduce short- and long-term impacts would be implemented during construction and operation of all Jordanelle Hydroelectric Project features. Certain procedures relate only to construction activities in the vicinity of the dam, roadways, waterways, or other sensitive habitats.

Adherence to standard and project-specific BMPs for the following activities would reduce short-term impacts during the construction of hydroelectric facilities at the dam, and the transmission line:

- Landscape preservation and impact avoidance
- Erosion and sediment control
- Biological and cultural resource site clearances
- Site restoration and revegetation
- Air quality protection
- Prevention of water pollution

Each of these procedures would be incorporated into all construction specifications and contract documents, as appropriate, and all contractors would be required to follow them.

2.10.1 Landscape Preservation and Impact Avoidance

Construction specifications would require contractors to preserve the natural landscape and prevent any unnecessary destruction, scarring, or defacing of the natural surroundings in the work vicinity. All trees, native shrubbery, and other vegetation would be preserved and protected from construction operations and equipment except where clearing operations are required for permanent structures, approved construction roads, or excavation operations. All maintenance yards, field offices, and staging areas would be arranged to preserve trees and vegetation to the maximum practicable extent.

Clearing operations would be limited to those needed for construction and borrow material sites. In critical habitat areas, such as riparian communities, clearing would be restricted to only a few feet beyond areas required for construction. Areas around structures would be backfilled and compacted, and all disturbed areas reclaimed to the native vegetation type.

To reduce environmental damage, critical environmental areas (stream corridors, riparian areas, and steep slopes) would not be used for equipment or material storage or stockpiling; construction staging or maintenance; field offices; hazardous material or fuel storage, handling, or transfer; or temporary access roads. Damage to critical area vegetation would be strictly limited only to areas required for construction activities and for which no practical alternative exists. Construction buffers would be identified during the design phase around sensitive resources to prevent damage to the resource. Buffer locations would be included in the final design package showing buffer locations. Orange or other high visibility fencing would be used to clearly define the limits of the buffers around critical areas.

Existing access roads would be used for all construction activities where possible. If new roads must be constructed, the width would be kept to the absolute minimum needed. Access roads would be situated to avoid all trees where possible, but especially trees greater than 10 inches in diameter, and to limit disturbance to vegetation. Riparian areas would be avoided where possible.

Designs for all new power lines, either temporary or permanent, would conform to designs shown in both the Avian Power Line Interaction Committee's 1994 and 1996 publications, *Mitigating Bird Collisions with Power Lines: The State of the Art in 1994* and *Suggested Practices for Raptor Protection on Power Lines: The State of the Art in 1996*, prepared for the Edison Electric Institute / Raptor Research Foundation, Washington, D.C.

2.10.2 Erosion and Sediment Control

Several procedures would be used as necessary to prevent and minimize erosion and siltation during construction and during the period needed to reestablish permanent vegetative cover on disturbed sites. These include planting native grasses, forbs, trees, or shrubs beneficial to wildlife or placement of riprap, sand bags, jute, sod, erosion mats, bale dikes, mulch, or excelsior blankets.

Clearing schedules would be arranged to minimize the practical exposure of soils. Final erosion control and site restoration measures would be initiated as soon as an area is no longer needed for construction, stockpiling, or access.

Cuts and fills on relocated and new roads would be appropriately sloped to prevent landslides and to facilitate revegetation. The identified areas would be stabilized or protected to prevent mass soil movement into reservoir pools or streams to the extent practicable. The existing maximum slope on site is the 1.5:1 slope on the berm along the river. No constructed slopes would exceed existing slopes (1.5:1).

Borrow areas would be contoured to prevent water from collecting, unless the borrow excavation is below groundwater level. Before borrow areas are abandoned, their sides would be brought to stable slopes with intersections shaped to carry the natural contour of adjacent undisturbed terrain into the borrow area.

No soil, rock stockpile, or excess soil materials would be placed near sensitive resource habitats, including water channels, wetlands, and riparian areas, where they may erode into these habitats, or where runoff from spoils could run into sensitive habitats. Waste piles would be revegetated after they are shaped to provide a natural appearance.

2.10.3 Site Restoration and Revegetation

Erosion control measures would be initiated as soon as an area is no longer needed for construction, stockpiling, or access. Upon completion of construction, any land disturbed, but not permanently occupied by new facilities would be graded to provide proper drainage and blend with the natural contours of the land, and restored to its pre-construction condition. Where such lands were vegetated, they would be covered with topsoil stripped from construction areas, and revegetated, as appropriate, with plants native to the area and beneficial to wildlife.

Upon project completion, all yards, offices, and construction buildings, including concrete footings and slabs, and all construction materials and debris would be removed from the site. Construction roads above the high-water elevation no longer needed for site operation and maintenance would be restored to the original contour and made impassable to vehicular traffic when no longer required by the contractor. Road surfaces, including all new access roads, would be scarified, as needed, to establish conditions suitable for proper drainage and erosion prevention. Culverts would be removed, as appropriate, and road escarpments contoured.

At all times, construction areas, including storage yards, would be kept free from accumulations of waste materials and trash. During the final phase of work, contractors would be required to remove all unused materials and trash, dump it in an approved sanitary landfill, and leave work areas neat to conform to the natural landscape.

2.10.4 Air Quality Protection

Contractors would be required to establish measures to protect air quality during construction. Air quality can be reduced during construction activities if proper controls are not in place. Dust shall be suppressed using appropriate technology during construction activities. All dirt-surfaced roads would be regularly watered during dry periods during

active construction periods to prevent fugitive dust emissions from the roads. All loads leaving the site that consist of material that could leave the bed of the truck during movement will be covered.

2.10.5 Prevention of Water Pollution

Contractors would be required to comply with all federal and state laws and regulations regarding control and abatement of water pollution. All waste materials and sewage from construction activities or project-constructed features would be disposed of as specified by federal and state health and pollution control regulations.

Contractors would be required to monitor water quality of discharges and receiving water (both background and below discharges) during any construction activities that could impact surface water quality.

Construction specifications would require construction activities to be performed using methods that would prevent entrance or accidental spillage of solid matter, contaminants, debris, and other objectionable pollutants and wastes into flowing or dry watercourses and underground water sources. Potential pollutants and wastes include refuse, garbage, cement, concrete, sewage effluent, industrial waste, oil, and other petroleum products, aggregate processing tailings, mineral salts, and thermal pollution.

Disturbance of streambeds beyond the zone of new structures within the steam channel would be avoided. Temporary construction site dewatering measures would be restricted to necessary areas of the existing channel. Damage to streambank vegetation would be minimized. Damaged streambanks outside reservoir areas would be revegetated using local native herbaceous and woody species that provide rapid bank stabilization.

Excavated materials would not be stockpiled or deposited near or on streambanks, wetlands, or other watercourse perimeters where they could be washed away by high water or storm runoff, or encroach upon the sensitive area.

Construction specifications would require riprap materials to be free of contaminants and not contribute measurably to the turbidity of the river.

2.10.6 Hazardous Material Storage, Handling, and Disposal

Contractors would be required to comply with Utah Hazardous Waste Management Regulations established under the authority of the Federal Resources Conservation and Recovery Act of 1976 (RCRA) and the Utah Hazardous Waste Act of 1979.

The potential for adverse impacts from oil and fuel spills would be reduced through careful handling and designation of specific equipment repair and fuel storage areas.

Oil, petroleum waste products, chemicals, and hazardous or potentially hazardous wastes would not be drained onto the soil, but confined in sealed containers or sealed sumps for removal to approved disposal sites. They would be transported in accordance with all applicable state and federal safety standards.

The contractor would be required to prepare a Spill Prevention Containment and Control (SPCC) plan for any construction site where oil from an accidental spillage could reasonably be expected to enter wetlands, groundwater, navigable waters, or adjoining shorelines, and

where aggregate oil storage exceeds 1,320 gallons or a single container can hold more than 660 gallons.

Waste materials known or found to be hazardous would be disposed of in approved treatment or disposal facilities in accordance with federal, state, and local regulations, standards, codes, and laws.

All hazardous materials used would be required to have a Material Safety Data Sheet (MSDS) filed onsite. A hazardous material safety and communication plan would be required from each contractor with special emphasis on preventing hazardous materials from entering wetlands and watercourses or contaminating the soil or groundwater.

Concrete trucks would not be washed at construction sites. All spilled concrete would be removed from construction areas and disposed of properly.

2.10.7 Cultural Clearance

Tribal and Utah State Historic Preservation Office (SHPO) consultations are complete. A cultural resources report (Appendix A) has been submitted to SHPO and a concurrence letter received from SHPO (Appendix B). Tribal Consultation with the Native American Tribes was initiated on April 14, 2005 (Appendix C). Follow-up phone calls were made to the Ute Indian Tribe and the Northwestern Band of the Shoshoni Tribe. The Northwestern Band of the Shoshoni Tribe indicated that they had no interest in the project because they had no Indian Trust Assets or involvement in the project area (personal communication between Terry J. Hickman and Bruce Perry, Executive Director, Northwest Band of the Shoshoni Tribe, April 18, 2005). The Ute Indian Tribe had no comment despite multiple efforts to contact them.

In accordance with 36 CFR 800.13(a) and (b) (1), the CUWCD is providing for the protection, evaluation, and treatment of any historic property discovered prior to or during construction. Should any archaeological or historical site or object be discovered within the Jordanelle Dam Project Area, which has not been documented and evaluated as part of the current project implementation or subsequent professional cultural resources evaluations, District shall immediately be verbally notified of the nature and exact locations of the findings. If the discovery resulted from construction or other ground disturbing activities, these activities will immediately cease until CUWCD, in consultation with the SHPO, have made an evaluation of the significance of said site or object and have determined a course of treatment. The Contractor, Engineer or other person responsible for the discovery shall not damage the discovered objects and shall provide written confirmation of the discovery to the CUWCD within two (2) calendar days.

The CUWCD will inform the Contractor or Engineer when the restriction is terminated, with written confirmation following within two (2) calendar days. If a changed condition is approved, it will be controlled in accordance with Subsection 104.2: Differing Site Conditions.

Should a discovery occur, the CUWCD will consult with the SHPO in accordance with 36 CFR 800.14(b)(3) toward developing and implementing an appropriate treatment plan prior to allowing further ground disturbance.

2.11 Comparison of Alternatives and Effects

2.11.1 Alternative Comparison

Differences among the No Action and the action alternatives are shown in Table 2-2. The major difference among the action alternatives is the length and route of the transmission line.

TABLE 2-2
Comparison of Alternatives

Feature	No Action Alternative	Action Alternative 2	Action Alternative 3	Proposed Action (Action Alternative 4)
Connect Penstock to Dam's Outlet Conduit	No	Yes	Yes	Yes
Construct Power Plant	No	Yes	Yes	Yes
Upgraded Existing Transmission Line	None	None	None	1.53 miles
New Transmission Line (using Federal Property Route Option A)	None	650 feet	0.55 mile	1.9 miles
Federal Property Route Options				
Option A–Along existing roads	No	Yes	Yes	Yes
Option B–Along river levee	No	No	No	No
Tailrace Channel	No	Yes	Yes	Yes

2.11.2 Comparison of Effects

Effects of implementing the No Action and action alternatives are summarized and compared in Table 2-3. Effects are described in detail, together with mitigation measures, in Chapter 3. The visual resource area is the only resource exhibiting different impacts among the alternatives. All impacts listed in Table 2-3 are residual after implementation of BMPs (Section 2.10) and mitigation measures described in Chapter 3.

TABLE 2-3
Comparison of Effects Among Alternatives

Resource Area	No Action Alternative	Action Alternative 2	Action Alternative 3	Proposed Action (Action Alternative 4)
Air Quality	No impact	Short-term fugitive dust during construction	Same as Alternative 2	Same as Alternative 2
Noise	No impact	Short-term noise increase during construction	Same as Alternative 2	Same as Alternative 2
Vegetation	No impact	No native plant community or wetland/riparian impacts	Same as Alternative 2	Same as Alternative 2

TABLE 2-3
Comparison of Effects Among Alternatives

Resource Area	No Action Alternative	Action Alternative 2	Action Alternative 3	Proposed Action (Action Alternative 4)
Wildlife	No impact	Limited disturbance of ruderal, low quality habitat No spotted frog habitat No osprey impacts	Same as Alternative 2	Same as Alternative 2
Fisheries	No impact	No impacts	Same as Alternative 2	Same as Alternative 2
Threatened and Endangered Species	No impact	No Effect	Same as Alternative 2	Same as Alternative 2
Bald eagle	No impact	No Effect	Same as Alternative 2	Same as Alternative 2
Black-footed ferret	No impact	No Effect	Same as Alternative 2	Same as Alternative 2
Canada lynx	No impact	No Effect	Same as Alternative 2	Same as Alternative 2
Yellow-billed cuckoo	No impact	No Effect	Same as Alternative 2	Same as Alternative 2
Surface water quantity	No impact	No change in quantity	Same as Alternative 2	Same as Alternative 2
Surface water quality	No impact	No Impact—Meets requirements of the Provo River Water Quality Management Plan	Same as Alternative 2	Same as Alternative 2
Visual Resources	No impact	Slight, but insignificant impact from power plant and additions to existing poles and lines	Same as Alternative 2, plus additional overhead line extending to the Jordanelle Substation	Same as Alternative 2, plus additional overhead line extending to the upgraded HL&P line
Socioeconomic				
County population	No impact	Potential short-term increase due to out-of-area construction workers	Same as Alternative 2	Same as Alternative 2
County employment	No impact	Possible short-term employment for local construction workers	Same as Alternative 2	Same as Alternative 2
County income	No impact	Short-term beneficial increase, due to construction workers spending money in the County	Same as Alternative 2	Same as Alternative 2
Infrastructure	No impact	May be some traffic delays during construction	Same as Alternative 2	Same as Alternative 2
Environmental justice	No impact	No impacts	Same as Alternative 2	Same as Alternative 2

CHAPTER 3

Affected Environment and Environmental Consequences

3.1 Introduction

This chapter describes the affected environment and environmental consequences that would result from the construction, operation, and maintenance of project features associated with implementation of the Jordanelle Dam Hydroelectric Project. The affected environment discussions describe existing conditions for resources within the project area of influence, which is shown in Figures 1, 2, and 3 in Chapter 1. The area of influence generally includes the area below Jordanelle Dam where construction of the power plant and transmission line would occur. The area of interest for surface water resources, water quality, and fisheries extends downstream of the dam in the Provo River. The area of influence for wildlife species extends around the construction site to a distance that construction activities would disturb wildlife. Economic effects could extend throughout the county and state.

The impact analyses focus on direct, indirect, and cumulative impacts on project area resources. All issues identified during scoping that are relevant to this Final EA were considered in the impact analyses. The final section of this chapter describes the irreversible and irretrievable commitment of resources that would occur if one of the action alternatives is implemented.

Except for resources having specific legal requirements, resources that would not be affected or would be only negligibly affected by the alternatives are not discussed further in this document. They are as follows:

- Groundwater Resources
- Land Use
- Indian Trust Assets
- Recreation Resources
- Cultural Resources (see Appendix A)
- Health and Safety
- Soils

3.2 Air Quality

3.2.1 Introduction

This section addresses the effects to air quality from implementation of the No Action Alternative and action alternatives.

3.2.2 Issues Addressed in the Impact Analysis

The major air quality issue addressed in this section is short-term impacts from construction activities.

3.2.3 Affected Environment

No air quality non-attainment areas exist in the project area. Although air quality along the Wasatch Front (Salt Lake City, Orem, Provo, and Ogden) can deteriorate during certain climatic conditions, this effect is not felt in the Heber Valley area. Agricultural activities and construction are sources of air pollutants in the Heber Valley in the summer. Wasatch County has experienced a boom in housing that is likely to continue contributing fugitive dust during the construction season. Wood-burning stoves contribute to air quality impacts in the winter.

3.2.4 Impact Analysis

Alternative 1—No Action

No change from existing conditions would occur under this alternative.

Alternative 2

No long-term air quality effects would result from operation and maintenance of the proposed Jordanelle Dam Hydroelectric Project under this alternative. However, there would be short-term air quality effects during construction. Movement of construction equipment on non-paved roads and excavation activities would both contribute fugitive dust. This impact would only be noticeable during construction, would be limited in extent, and would cease when ground-disturbing activities end.

Alternative 3

Impacts under Alternative 3 would be the same as those described above for Alternative 2.

Alternative 4—Proposed Action

Impacts under the Proposed Action would be the same as those described above for Alternative 2.

3.2.5 Cumulative Impacts

Construction of the Jordanelle Hydroelectric facility would interact with other construction activities in the Heber Valley to slightly increase the concentration of fugitive dust over existing levels. This would only occur during the summer and fall construction season.

3.2.6 Mitigation

Dust abatement measures such as watering non-paved travel routes would be used to minimize the amount of fugitive dust generated during construction.

3.3 Noise

3.3.1 Introduction

This section addresses noise effects from implementation of the No Action Alternative and action alternatives.

3.3.2 Issues Addressed in the Impact Analysis

Noise issues addressed in this section include short-term effects during construction and long-term effects during operation and maintenance.

3.3.3 Affected Environment

The Heber Valley is a mostly rural area, with a rapidly expanding semi-rural and small-town population base. There are no major noise-generating industries. The major noise sources include traffic, occasional airplanes landing at the Heber City Airport, and farm machinery. The main noise receptors near the proposed project include a few residences and a campground downstream of Jordanelle Dam.

3.3.4 Impact Analysis

Alternative 1—No Action

No change from existing conditions would occur under this alternative.

Alternative 2

Traffic noise would increase over background levels during construction. Noise would be generated by construction traffic passing residences to access the construction site and by equipment operating during construction. This elevated noise level would cease daily after normal working hours, on weekends, and after the facility is constructed.

During operation, the turbines and generators would produce machinery noise. However, all such equipment would be fully enclosed within the power plant structure, and is located at considerable distance from residences. The river itself, and its associated sound level, is located immediately adjacent to all nearby residences and the campground, and should dominate perceived noise levels. Sound levels produced by the operation of existing outlet works valves far exceed any produced by power plant operation. No long-term noise impacts are anticipated.

Alternative 3

Impacts under Alternative 3 would be the same as those described above for Alternative 2.

Alternative 4—Proposed Action

Impacts under the Proposed Action would be the same as those described above for Alternative 2.

3.3.5 Cumulative Impacts

No cumulative noise impacts would be associated with the proposed project.

3.3.6 Mitigation

No mitigation is anticipated to be required. However, if noise above background is apparent after operation of the power plant begins, a noise barrier consisting of native trees and shrubs would be installed along the south side of the property to shield the residences.

3.4 Vegetation

3.4.1 Introduction

This section addresses potential impacts on vegetation from implementation of the No Action Alternative and action alternatives.

3.4.2 Issues Addressed in the Impact Analysis

The primary issue of concern relative to vegetation is the removal of native plant communities during construction. Impacts on riparian and wetland habitat adjacent to the river are also a concern.

3.4.3 Affected Environment

The proposed locations for project features have been extensively altered and cleared during construction of Jordanelle Dam. The location of the power plant is mostly cobble and fill (see Photo 1 below, and Figure 2 in Appendix A). The route for the power line under Federal Property Route Option B is a slightly bermed corridor with boulders and compacted soil, that was constructed during construction of Jordanelle Dam (see Figure 4 in Appendix A). A few scattered, low-growing sagebrush and an occasional small cottonwood exist on the site. The disturbed areas are dominated by ruderal vegetation, with some native and some introduced species.

A short concrete tailrace channel would be constructed from the proposed power plant, and would extend to the existing Jordanelle Dam outflow channel. Although the outflow channel could be considered the Provo River, it is a completely engineered channel (Photo 2). Wetland plant communities and hydric soils have not developed along this channel, and is, therefore, not a jurisdictional wetland. However, it would be considered a Water of the U.S. for purposes of Section 404 of the Clean Water Act.

Transmission corridors off the federal property consist of: 1) the road shoulder right-of-way from the county road bridge to the Jordanelle substation; and 2) the same right-of-way to the HL&P transmission line. From this point the HL&P transmission line runs south to the Utah Valley State College's Heber Campus. This corridor is regularly maintained as a transmission line corridor. Vegetation consists of seedling and sapling sized trees, shrubs, and native and introduced grasses and forbs. Vegetation is managed to keep it short to not interfere with the power line.

3.4.4 Impact Analysis

Alternative 1—No Action

No change from existing conditions would occur under this alternative.

Alternative 2

Power plant. Native plant communities do not exist at the construction locations and, therefore, would not be disturbed through implementation of this alternative. No wetland or riparian areas exist in construction areas, and these habitats would not be impacted. The riprap covered north bank of the outflow channel would be disturbed where the new tailrace channel from the proposed power plant enters the existing channel.

Federal Property Route Option A for transmission line. Native plant communities do not exist at the construction locations for the transmission line route and, therefore, would not be disturbed through implementation of this alternative. No wetland or riparian areas exist in construction areas, and these habitats would not be impacted.

Federal Property Route Option B for Transmission Line. Impacts would be the same as those described above for Route Option A, except new power poles would be constructed along the river levee. As shown in Figure 4 in Appendix A, this route follows a berm built along the river during construction of Jordanelle Dam. There would be no impacts on native plant communities, wetlands, or riparian areas from implementation.

Federal Riparian Corridor Along Provo River. There would be no impacts to riparian vegetation along the Provo River corridor downstream of Jordanelle Dam because operation of Jordanelle Dam and Reservoir would not be altered or influenced by the construction, management, and maintenance of the proposed Jordanelle Hydroelectric Power Project. Successful recruitment and maintenance of most riparian vegetation communities is determined in large part by hydrology of a riverine ecosystem interacting with the geomorphology of the river and its floodplain. The Provo River Restoration Project has been planned, designed, and constructed to restore and create a functional riparian ecosystem. Certain magnitudes, patterns, and timing of water need to be released from Jordanelle Dam in order to scour and deposit fine sediments from the stream onto adjacent floodplain and near-bank surfaces; to moisten the soil; and to support germination and growth of seedling plants through a flow recession rate that is slow enough to prevent desiccation of developing seedlings because of low groundwater levels. Although many operational factors may constrain the ability of Jordanelle Dam operators to meet target flows for riparian vegetation support, hydroelectric power generation potential at the Jordanelle Hydroelectric Project would not be one of the factors considered. Therefore, there would be no impact on riparian vegetation resources downstream of Jordanelle Dam due to the Jordanelle Hydroelectric Project.

Alternative 3

Impacts under Alternative 3 would be the same as those described above for Alternative 2, except new power poles would be installed along the county road down to the Utah Power Jordanelle Substation. All new line construction would occur within already-disturbed areas of existing transmission line easements. There would be no impacts on native plant communities, wetlands, or riparian areas from implementation.

Alternative 4—Proposed Action

Impacts under the Proposed Action would be the same as those described above for Alternative 3, except new power poles would be installed along the county road, past Utah Power's Jordanelle substation for an additional 1.35 miles south to the interconnection site.

However, the new line could be installed on the new upgraded poles installed by UP&L. Then an additional, 1.53 miles of existing line facilities would be upgraded to a location near the Utah Valley State College campus. All line construction would occur within already-disturbed areas of existing transmission line easements. There would be no impacts on native plant communities, wetlands, or riparian areas from implementation.

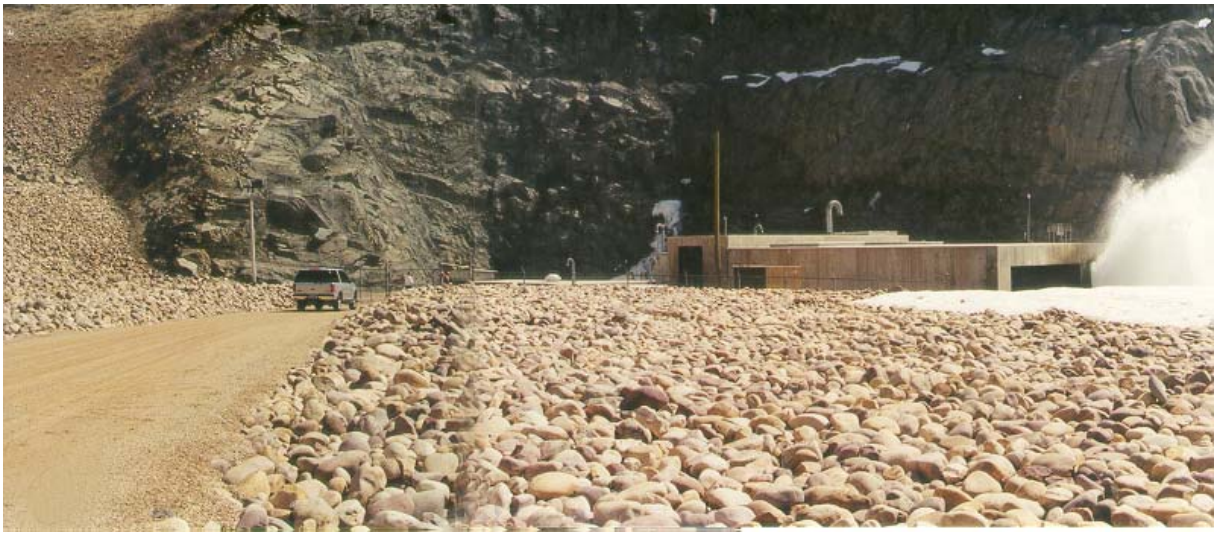


PHOTO 1
Power Plant Site

PHOTO 2
River Channel

3.4.5 Cumulative Impacts

No impacts on vegetation would result from this project or synergistic impacts with other projects and, therefore, no cumulative impacts would occur.

3.4.6 Mitigation

Woody vegetation would be protected and avoided to the extent practicable during construction. Any remaining patches of native vegetation would also be avoided, where possible. Patches of native vegetation near construction footprints would be encircled with orange construction fences and the construction footprints would be minimized to the extent practicable at these locations. Areas to be avoided would be shown on construction design drawings.

3.5 Wildlife

3.5.1 Introduction

This section addresses potential impacts on wildlife from implementation of the No Action Alternative and action alternatives.

3.5.2 Issues Addressed in the Impact Analysis

Osprey nesting, bird strikes on electrical lines, raptor electrocution, the Columbia spotted frog (*Rana luteiventris*), and migratory birds are the wildlife issues addressed in this impact analysis.

3.5.3 Affected Environment

The project area has been disturbed from construction of Jordanelle Dam and facilities. Native habitat has been removed, except for sparse vegetation along the outflow channel downstream of the site and scattered sagebrush and cottonwoods. Birds and mammals may occasionally move through or forage in the project area, but nesting and cover habitat is lacking. Amphibians would be expected to inhabit the river's edge.

An osprey pair is nesting along the reservoir, farther than 0.5 mile upstream of the dam. An osprey nest box is located below the dam, but it has not been used in 2 years.

The Columbia spotted frog, which is on the Utah Sensitive Species List, ranges from southeast Alaska through Alberta, Canada into Washington, Idaho, Wyoming, and disjunct areas of Nevada and Utah (Stebbins, 1985). Isolated populations are found in Utah in the West Desert and along the Wasatch Front (Bailey, 2003). It occurs upstream and downstream of Jordanelle Reservoir, with the largest Utah concentration located in wetlands near to the Provo River downstream of Jordanelle Dam (Bailey, 2003). This species was proposed for listing under the Endangered Species Act (ESA) in 1989. The U.S. Fish and Wildlife Service (FWS) determined that the species warranted listing in 1999, but was excluded as a candidate for listing under ESA, because of conservation efforts. The Wasatch Front population was removed from consideration for listing under ESA in 2002. The Mitigation Commission is working with several government agencies under a Conservation Agreement to reduce or eliminate threats to this species. The Provo River Restoration Project (PRRP) is part of the conservation effort. The PRRP is restoring the Provo River between Jordanelle Dam and Deer Creek Reservoir.

Many species of birds are found in the project area. Some are year-round residents, a few migrate south into the planning area during the winter, some breed in the planning area and

winter to the south, and many pass through the area during spring and fall migration. Nearly all of these species are protected by the Migratory Bird Treaty Act of 1918 (MBTA) to which the U.S. is a signatory. All raptors are protected by the MBTA. Very little suitable habitat for migratory birds, other than raptors, would be directly or indirectly affected by any of the alternatives. Species richness and breeding bird densities are highest in riparian woodlands located along the major rivers, and somewhat lower in local wetland habitats due to their smaller size. It is unlikely that any nesting migratory birds other than raptors would be found in areas disturbed through project construction.

3.5.4 Impact Analysis

Alternative 1—No Action

No change from existing conditions would occur under this alternative.

Alternative 2

As discussed in *Section 3.4, Vegetation*, habitat at the project location is highly disturbed and of low quality. Nesting or other critical activities would not be expected to occur on the site. Human presence is currently well-established at the site and species that avoid humans are already excluded from use of the site. Those species using the site are habituated to human use or are not perturbed by human use. Therefore, additional impacts on wildlife would be minimal.

As discussed in *Section 3.5.6, Mitigation*, measures to avoid avian electrocution and transmission line strike hazards would be installed. This would minimize electrocution impacts on raptors perching on power poles and help birds avoid striking power lines.

The construction area is farther than 0.5 mile from the osprey nest as recommended by the FWS, and the construction area is not in the line of sight of the osprey nest. The construction site is not adjacent to preferred foraging habitat (reservoir). Impacts on osprey are not expected.

The spotted frog would not be expected to occur in the constructed river channel immediately downstream of the dam. There would be no change in water quality or quantity downstream of the dam. Lack of presence and no change in river conditions would result in no impacts to the spotted frog.

The densely populated areas in wetlands adjacent to Provo River downstream of Jordanelle Dam would not be affected. No direct construction or O&M impacts would occur in occupied or potentially suitable habitats. No effects on wetland habitats associated with the Provo River corridor would occur because the project would not alter or influence the operation of Jordanelle Dam and Reservoir for its CUP purposes. Placement of new power poles would not affect the frog, as new poles would be placed in the same locations as existing poles and there would be no wetland impacts associated with pole placement.

If new fences were to be constructed within the project area, they may act as minor barriers to movement by some migratory bird species, depending on the design. Migratory and resident birds will occasionally be killed by flying into fences. Fence posts also provide perch sites that are often used by foraging raptors that are attracted to mowed or open areas of the project where prey may be more visible than in surrounding areas. These perches and

possibly increased visibility of prey are beneficial. However, raptors attracted to locations near moving vehicles can be killed by passing vehicles as they cross a road from one low fence post perch to another, as they pursue prey onto a road, or as they scavenge road-killed animals.

Alternative 3

Impacts under Alternative 3 would be the same as those described above for Alternative 2.

Alternative 4—Proposed Action

Impacts under the Proposed Action would be the same as those described above for Alternative 2.

3.5.5 Cumulative Impacts

Construction of the hydroelectric facilities would not contribute additional impacts on wildlife over those already existing through residential development and recreational use of the reservoir area.

3.5.6 Mitigation

All new power lines, either temporary or permanent, would conform with designs shown in the Avian Power Line Interaction Committee's 1994 and 1996 publications, released by the Edison Electric Institute / Raptor Research Foundation, Washington, D.C. These two publications, *Mitigating Bird Collisions with Power Lines: The State of the Art in 1994* and *Suggested Practices for Raptor Protection on Power Lines: The State of the Art in 1996*, detail methods to avoid avian electrocution and strike hazards associated with power lines.

A wire cage would be constructed over the osprey nest below the dam before the start of construction. This will prevent osprey from trying to establish a nest in this location before construction starts. The cage would be removed following construction.

If migratory bird nests are located, construction will be timed to the extent practicable to avoid disturbance to the active nests. Appropriate permits would be acquired and nest searches would be conducted in accordance with MBTA requirements of the FWS, if suitable nesting habitat is located before construction.

3.6 Fishery Resources

3.6.1 Introduction

This section addresses the effects to fishery resources from the implementation of the No Action Alternative and action alternatives.

3.6.2 Issues Addressed in the Impact Analysis

The major issue associated with the fishery resource is how the project would affect downstream water quality and quantity. Any reduction in the existing water quality and quantity could negatively impact the blue-ribbon fishery.

3.6.3 Affected Environment

Jordanelle Reservoir

Jordanelle Reservoir is an impoundment of the Provo River that was completed in 1993. The dam and reservoir were originally constructed to provide long-term storage for water users and to create recreational opportunities, along with provisions for a hydroelectric facility. The recreation facilities on the reservoir were completed in 1995 and the reservoir currently meets its recreation capacity on busy weekends (UDEQ, 2004).

Fishing is a very popular recreation activity on the reservoir. The Utah Division of Wildlife Resources (UDWR) currently stocks the reservoir with rainbow trout (*Oncorhynchus mykiss)* and smallmouth bass (*Micropterus dolomieui;* UDEQ, 2004). The reservoir is most popular for its smallmouth bass and brown trout (*Salmo trutta)* fishery and is considered a world-class smallmouth bass fishery. Angler surveys conducted in 2003 estimated angler use that averaged 846 hours / day (Hepworth, 2004). The reservoir is listed by the State of Utah as a Blue-Ribbon fishery and holds the record for a catch-and-release brown trout captured in 2001 (UDWR, 2004a). Other fishes found within the reservoir include yellow perch (*Perca flavescens),* walleye (*Sander vitreus*, formerly *Stizostedion vitreum*), rainbow trout, cutthroat trout (*Oncorhynchus clarki),* Utah chub (*Gila atraria*), Utah sucker (*Catostomus ardens*), black crappie (*Pomoxis nigromaculatus)* (Hepworth, 2004), and brook trout (*Salvelinus fontinalis*; UDEQ, 2004).

Fish habitat within the reservoir is not well described, but the water quality within Jordanelle Reservoir is considered good (UDEQ, 2004). The trophic status within the reservoir is currently described as mesotrophic (moderately productive), but still in the process of stabilizing, given the young age of the reservoir (UDEQ, 2004). Macrophytes are not abundant and debris is still surfacing from lands that were inundated for this Provo River impoundment. Although little descriptive information is available to provide insight into fish habitat, the success and popularity of the reservoir suggests that, currently, habitat adequately supports the game fish sought by anglers.

Provo River Below Jordanelle Reservoir

Impounding the Provo River above Jordanelle Dam modified the hydrologic regime of the river below the dam. The waters downstream of a reservoir are influenced by the quantity and timing of reservoir discharge as well as the released water temperatures, dissolved oxygen, and gas pressure (Summerfelt, 1999).

Riverine ecosystem function is determined in large part by hydrology of a riverine ecosystem interacting with the geomorphology of the river and its floodplain. The Provo River Restoration Project has been planned, designed and constructed to restore and create a functional riparian ecosystem. Certain magnitudes, patterns and timing of water need to be released from Jordanelle Dam in order to scour and deposit fine sediments from the stream onto adjacent floodplain and near-bank surfaces; to moisten the soil; to support germination and growth of seedling plants through a flow recession rate that is slow enough to prevent desiccation of developing seedlings because of low groundwater levels; and to support aquatic invertebrate, plant and fish communities. Hydroelectric power generation potential at the Jordanelle Hydroelectric Project would not constrain the ability of Jordanelle Dam operators to meet target flows for riparian vegetation support. Therefore, there would be no

impact on riparian vegetation resources downstream of Jordanelle Dam because of the Jordanelle Hydroelectric Project.

The Mitigation Commission begun implementing the PRRP in 1999 to restore the natural pattern and function of the Provo River below Jordanelle Dam, focusing on improving ecosystem function and increasing biological diversity, including game fish habitat (URMCC, 2002). The studies by the Mitigation Commission include biological (fish and macro-invertebrate communities, bird, spotted frog, and vegetation studies) and physical studies (geology, hydrology, and river mechanics) and will be used in management decisions related to restoration activities (URMCC, 2002).

Four game fishes are known to exist in the Provo River below Jordanelle Dam. These are brown trout, rainbow trout, Bonneville cutthroat trout (*Oncorhynchus clarki utah)*, and mountain whitefish (*Prosopium williamsoni*) (Hepworth, 2004). Other native fishes include leatherside chub (*Gila copei*), redside shiner (*Richardsonius balteatus*), mountain sucker (*Catostomus platyrhynchus*), Utah sucker, mottled sculpin (*Cottus bairdi*), and longnose dace (*Rhinichthus cataractae)* (Hepworth, 2004). Further, the June sucker (*Chasmistes liorus*) may be found in the lower reaches of the Provo River, immediately upstream of Utah Lake (Reclamation and COE, 1987). Bonneville cutthroat trout and leatherside chub are both Utah State sensitive species (UDWR, 2004c). Fish surveys conducted in 2004, below White Bridge, found that brown trout comprised over 90 percent of the sample with mottled sculpin, mountain whitefish, longnose dace, and a single Bonneville cutthroat trout comprising the remainder of the species present. Surveys of this study have demonstrated that the river restoration work of the PRRP has resulted in significant biomass and density increases of brown trout over the past 3 years (Hepworth, 2004a).

The Provo River below Jordanelle Reservoir is a very popular section of river with anglers and is considered a world-class fishery (Hepworth, 2004). The reach is listed by the State of Utah as a Blue-Ribbon fishery (UDWR, 2004b). UDWR conducted angler surveys in 2002 and estimated angler use at 436 hours / day (Hepworth, 2004).

Finally, in 2000 a bacteria was found to be responsible for a brown trout kill on the Provo River below Jordanelle Reservoir. Factors such as overcrowding, injury, water quality, spawning, or lack of food can result in a weakened condition that makes brown trout more susceptible to the bacteria (UDWR, 2000).

3.6.4 Impact Analysis

Alternative 1—No Action

No change in existing conditions would occur under this alternative.

Alternative 2

As discussed in *Section 3.4.4, Vegetation Impact Analysis* and *Section 3.8.4, Surface Water and Water Quality Impact Analysis*, there would be no change in downstream aquatic or riparian habitats or communities or water quality or quantity. Therefore, there would be no fishery impacts from implementation of Alternative 2. Hydroelectric power generation potential at the Jordanelle Hydroelectric Project would not constrain the ability of Jordanelle Dam operators to meet target flows for aquatic community and riparian vegetation support.

Therefore, no impact on aquatic habitats and communities downstream of Jordanelle Dam would result from the Jordanelle Hydroelectric Project.

Alternative 3

No impacts would occur under Alternative 3, as described above for Alternative 2.

Alternative 4—Proposed Action

No impacts would occur under the Proposed Action, as described above for Alternative 2.

3.6.5 Cumulative Impacts

No cumulative impacts would result from implementation of this project because there are no action alternative impacts or synergetic impacts with other projects.

3.6.6 Mitigation

Mitigation would consist of the measures presented in Section 3.8.6, *Surface Water and Water Quality Mitigation*, that would be implemented to ensure water quality or quantity impacts do not occur.

3.7 Threatened and Endangered Species

3.7.1 Introduction

This section addresses federal threatened and endangered (T&E) species effects from implementation of the No Action Alternative and action alternatives. Appendix D contains a letter from the FWS that lists the species to be addressed in this document and analysis. The species addressed include the threatened bald eagle (*Haliaeetus leucocephalus*), the endangered black-footed ferret (*Mestelo nigripes*), and the threatened Canada lynx (*Lynx canadensis*). Although not specifically required by law, and having no protection under the ESA, a candidate species, the western yellow-billed cuckoo (*Coccyzus americanus occidentalis*) will also be addressed. Addressing this species now could reduce scheduling impacts to the project in the event it is listed under the ESA during the project's construction period. Appendix E shows the letter received from UDWR that provides occurrence information for some special-status species in the project area.

The FWS also listed three sensitive species that have potential to occur in the project area and are managed under Conservation Agreements / Strategies. They are the Bonneville cutthroat trout, Colorado River cutthroat trout (*Oncorhynchus clarki pleuriticus*), and the spotted frog. The Bonneville cutthroat trout and spotted frog are known to occur in or along the Provo River downstream of the project area. These species are discussed above in *Sections 3.5, Wildlife and 3.6 Fisheries* and will not be discussed further in this section. The Colorado River cutthroat trout is not known to exist between the Jordanelle Dam and Deer Creek Reservoir.

3.7.2 Issues Addressed in the Impact Analysis

The issue addressed in this section is whether the proposed project would effect federally listed or candidate T&E species.

3.7.3 Affected Environment

Bald Eagle

The bald eagle was listed as Endangered under the ESA in 1978 in the lower 48 states. This species was reclassified from Endangered to Threatened, because of recovery status on July 12, 1995. The FWS has proposed to de-list the bald eagle (1999), because of long-term positive population trends that are expected to continue.

Bald eagles concentrate in and around areas of open water where waterfowl and fish are available. They prefer solitude, late-successional forests, shorelines adjacent to open water, a large prey base for successful brood rearing, and large, mature trees for nesting and resting.

Threats to the bald eagle throughout its range are primarily from shooting or poisoning; however, these threats have been reduced since the species was federally listed in the 1970s. An additional threat to the species is from disturbance during nesting and fledging, which may cause reproductive failure. Individual birds vary widely in their response to human disturbance at nesting and roosting sites. Losing large trees for nesting and roosting habitat near large water bodies is a moderate threat (FWS, 1995).

The bald eagle is dispersed throughout Utah from October to April as a winter visitor and includes birds from many areas from Utah to Canada. Wintering eagles have been observed along the Provo River and Jordanelle Reservoir from Kamas to Utah Lake (Reclamation, 1977; USFS, 1973 and 1974). Historical records show that eagles have been observed within 1 mile of the project site (Appendix D). No communal winter roosts or areas of sizable winter concentration are known to exist in the project area. No listed critical habitat or known nest sites exist in the project area.

Annual surveys since 1997 tend to support this finding. For example, only 1 or 2 bald eagles have been observed each year during the annual survey for the last 3 years.

Black-Footed Ferret

The black-footed ferret was designated as Endangered on March 11, 1967, except where listed as an experimental, nonessential (XN) population. The black-footed ferret was designated as a XN population on March 11, 1967, in portions of Arizona, Colorado, Montana, South Dakota, Utah, and Wyoming.

Historically, black-footed ferrets inhabited grassland plains (shortgrass and midgrass prairies) surrounded by mountain basins up to 10,663 feet in elevation (FWS, 1998). This species is always found in association with another grassland species, the prairie dog (*Cynomys spp.*) (Burt and Grossenheider, 1980; Cahalane, 1954). Prairie dogs are the principal food of the black-footed ferret and prairie dog burrows provide the ferret's principal shelter, as they do not dig their own burrows (Anderson et al., 1986; Biggins et al., 1986; Clark et al., 1982; Forrest et al., 1988; Hillman, 1968; Miller et al., 1996). Data suggest that a ferret needs a prairie dog colony of at least 30.9 acres to survive for 1 year and a minimum of 123.5 acres to raise a litter (Caughley and Gunn, 1996). Ferret range is coincident with that of prairie dogs (Anderson et al., 1986). No documentation exists of black-footed ferrets breeding outside of prairie dog colonies. Specimen records of black-footed ferrets are available from ranges of three species of prairie dogs: the black-tailed prairie dog (*Cynomys ludovicianus*), white-tailed

prairie dog (*Cynomys leucurus*), and Gunnison's prairie dog (*Cynomys gunnisoni*) (Anderson et al., 1986).

Ferrets have been decimated from all of their former range, and distribution is now limited to introduced populations in Arizona, Colorado, Wyoming, Montana, Utah, South Dakota, and Chihuahua, Mexico (FWS, 2004). Reintroduction efforts have been concentrated in these states because they still have protected areas with large prairie dog colonies. Although the Wyoming effort has been hampered by disease problems, the other states have shown some success (FWS, 1996). Ferret introduction was authorized for Utah on October 1, 1998 (Federal Register Vol. 63, No. 190, p.52824-52841), to include establishment of a XN in Duchesne and Uinta Counties. No ferrets have been introduced in the vicinity of this project, and ferrets are not known to occur in the project area.

Canada Lynx

The Canada lynx (*Lynx canadensis*) was federally listed as Threatened on March 24, 2000. In the contiguous U.S., the distribution of lynx is associated with the southern boreal forest, consisting of subalpine coniferous forest in the West and primarily mixed coniferous / deciduous forest in the East (Aubry et al., 1999). In Canada and Alaska, lynx habitat is the classic boreal forest ecosystem known as the taiga (McCord and Cardoza, 1982; Quinn and Parker, 1987; Ruggiero et al., 1999). Within these general forest types, lynx are most likely to persist in areas that receive deep snow, for which the lynx is highly adapted (Ruggiero et al., 1999).

According to the Forest Service (1993), lynx in the southern extension of their range require three primary habitat components. These include the following:

- Foraging habitat (15- to 35-year-old lodgepole pine) to support snowshoe hare, the primary food source, and provide hunting cover.
- Denning sites with patches of spruce and fir greater than 200 years old that provide abundant large woody debris.
- Dispersal and travel cover that is variable in vegetative composition and structure.

When the Canada lynx was federally listed as Threatened, the FWS concluded that the chief threat to the lynx in the contiguous U.S. was the "lack of guidance to conserve the species" in federal land management plans. In February 2000, the Forest Service and FWS signed a Lynx Conservation Agreement to implement the management standards contained in the Lynx Conservation Assessment Strategy (LCAS) and thus to promote the conservation of lynx and its habitat. The LCAS was prepared by a group of inter-agency biologists and provides detailed descriptions of lynx habitat, potential risk factors affecting lynx, and potential conservation measures. The Forest Service and Bureau of Land Management (BLM) are jointly preparing an EIS on a proposal to implement management direction contained in the LCAS for Canada lynx habitat on national forests and BLM units within the Northern Rocky Mountain area. The proposal would amend 18 land and resource management plans for national forests in Idaho, Montana, Utah, and Wyoming, and 18 BLM land use plans in Idaho and Utah.

Lynx are usually more active at night than during the day. The eyes of lynx are well adapted for night hunting. Preferred winter food consists primarily of snowshoe hares, along with

rodents such as red squirrels and birds. Abundance of snowshoe hare is the limiting factor for lynx (Koehler, 1990; Reichel et al., 1992). Snowshoe hare distribution is limited by the availability of winter habitat that includes early successional lodgepole pine with trees that exceed the mean snow depths and provide snow interception and are interlocking canopy above the snow.

Denning habitat for lynx occurs in mature and late structural boreal forests with locally abundant large woody debris present. Fire suppression and logging have altered the mosaic of habitats needed for prey species and denning sites (FWS, 2000; Wisdom et al., 2000).

Canada lynx have not been reported in the project area. However, a recent sighting of a single individual on Heber Mountain has been reported (UDWR, 2004e). There have been historical sightings of lynx with the nearest occurrence located approximately 20 miles east of the project location (Appendix D).

Yellow-Billed Cuckoo (*Coccyzus americanus occidentalis*)

A petition to list this species was filed in 1998. The petitioners stated that "habitat loss, overgrazing, tamarisk invasion of riparian areas, river management, logging, and pesticides have caused declines in yellow-billed cuckoo." In the 90-day finding published on February 17, 2000 (Federal Register Vol. 65, p. 8104-8107), the FWS indicated that these factors may have caused loss, degradation, and fragmentation of riparian habitat in the western U.S., and that the loss of wintering habitat may be adversely affecting the cuckoo. Therefore, the yellow-billed cuckoo has status of Candidate species for protection under the ESA. In July 2001, the FWS announced a 12-month finding for a petition to list the yellow-billed cuckoo as threatened or endangered in the western U.S. As of August 1, 2002, this species continues to have Candidate status (Federal Register Vol. 67, p.40657-40679).

This species may go unnoticed because it is slow-moving and prefers dense vegetation. In the West, it favors areas with a dense understory of willow (*Salix* spp.) combined with mature cottonwoods (*Populus* spp.) and generally within 300 feet of slow or standing water (Gaines, 1974; Gaines, 1977; Gaines and Laymon, 1984). The yellow-billed cuckoo is also known to use non-riparian, dense vegetation such as wooded parks, cemeteries, farmsteads, tree islands, Great Basin shrub-steppe, and high elevation willow thickets (Finch, 1992; DeGraaf et al., 1991). It feeds on insects, mostly caterpillars, but also beetles, fall webworms, cicadas, and fruit (especially berries). Populations seem to fluctuate dramatically in response to fluctuations in caterpillar abundance. These fluctuations are erratic, but not necessarily cyclic (Kingery, 1981).

This secretive bird is a neo-tropical species that breeds in North America and winters primarily south of the U.S.-Mexico border. It once flourished in western cottonwood and willow riparian forests and thickets. However, it is now nearly extinct west of the Continental Divide, where it has disappeared from large portions of its former range and is extremely rare in the interior West. Most records are of isolated, non-breeding individuals or solitary unknown breeding status individuals. Historically, cuckoos were probably common to uncommon summer residents in Utah and across the Great Basin (Ryser, 1985 in UDWR, 2004d; Hayward et al., 1976 in UDWR, 2004d). The current distribution of yellow-billed cuckoos in Utah is poorly understood, though they appear to be an extremely rare

breeder in lowland riparian habitats statewide (Walters, 1983 in UDWR, 2004d; Behle et al., 1985 in UDWR, 2004d; Benton, 1987 in UDWR, 2004d).

Yellow-billed cuckoos have not been observed in the Heber Valley (UDWR, 2004e). Mist-netting for the past 3-years has not resulted in the capture of any individuals and none have been heard (UDWR, 2004e). The nearest location that a yellow-billed cuckoo has been observed is along the Provo River approximately 4 miles south of the project area (Appendix D).

3.7.4 Impact Analysis

Alternative 1—No Action

There would be **"No Effect"** to any listed species from implementation of this alternative.

Alternative 2

Bald Eagle. Although Jordanelle Reservoir and the Provo River are suitable habitat for bald eagle, there are no known concentrations of bald eagles, no known nesting sites, no known night roost sites, and no critical habitat for bald eagle in the project area. Use of the project area is periodic for foraging activities or over-wintering. Implementation of the proposed project would not affect these activities. Therefore, there would be "**No Effect**" to bald eagle from implementation of this alternative.

Black-Footed Ferret. No known individuals exist in the project area and no extensive prairie dog towns required for their presence. There would be "**No Effect**" to black-footed ferret from implementation of this alternative.

Canada Lynx. Canada lynx habitat does not occur in the project area. There may be occasional individuals moving between habitats, but this in not likely to occur during the "outside" construction season. There would be "**No Effect**" to Canada lynx from implementation of this alternative.

Yellow-Billed Cuckoo. Dense woody vegetation required by this species is not present in the project area. Operation of Jordanelle Reservoir would not change with implementation of this alternative and potential changes in downstream water quality or quantity would not occur (see *Section 3.8.4, Surface Water and Water Quality Impact Analysis).* Therefore, suitable habitat supported by Jordanelle Reservoir or the Provo River would not be affected. There would be "**No Effect**" to yellow-billed cuckoo from implementation of this alternative.

Alternative 3

There would be **"No Effect"** to any T&E or Candidate species under Alternative 3, as described above for Alternative 2.

Alternative 4—Proposed Action

There would be **"No Effect"** to any T&E or Candidate species under the Proposed Action, as described above for Alternative 2.

3.7.5 Cumulative Impacts

No cumulative impacts would be associated with this proposed project, as there are no impacts on T&E or Candidate species from the project or synergistic impacts with other projects.

3.7.6 Mitigation

No mitigation is necessary for T&E or Candidate species.

3.8 Surface Water Resources and Water Quality

3.8.1 Introduction

This section addresses the effects to surface water resources and surface water quality from the implementation of the No Action Alternative and action alternatives.

3.8.2 Issues Addressed in the Impact Analysis

Major issues addressed in this section include long-term effects on downstream water quantity and quality during project operation and maintenance. Potential short-term effects during project construction are also addressed.

3.8.3 Affected Environment

Surface Water Resources and Existing Facilities

Surface water resources in the project area include Jordanelle Reservoir and the Provo River immediately downstream of Jordanelle Dam. Jordanelle Dam was completed in 1993, is approximately 3,500 feet long, and rises nearly 300 feet above the river's original streambed. Jordanelle Reservoir is L-shaped with two principal arms. The eastern arm extends about 5 miles up the Provo River and the northern arm extends about 4 miles up Drain Tunnel Creek and Ross Creek. The surface area of the reservoir is approximately 3,070 acres at a total storage capacity of 320,300 acre-feet, and approximately 37 acres at a minimum (conservation) pool of 200 acre-feet.

The facilities that would be used to release water from Jordanelle Reservoir through Jordanelle Dam to the turbines include the SLOW and LLOW as discussed in *Section 2.9, Facility Operation*. The minimum flow that can be discharged through one 78-inch valve is 300 cfs. When flows are less than 300 cfs, gates in the gate chamber are closed and the flow is discharged through a 36-inch bypass pipe that extends from the gate chamber to the outlet works of the dam, and then into the Provo River through a jet-flow valve.

Table 3-1 presents expected Provo River monthly average flows immediately downstream of Jordanelle Dam. River flows would typically range from a monthly minimum of 125 cfs from October through March to a monthly maximum of 1643 cfs in June. Typical average monthly river flows vary from 138 cfs in January to 909 cfs in June. The 125 cfs represents the minimum flow commitment of 125 cfs for the Provo River below Jordanelle Dam downstream to Deer Creek Reservoir. Some minimal releases for necessary irrigation or stock water rights are not included in these amounts. Historical daily reservoir releases have ranged as high as 2,400 cfs. Outflow channel elevations are controlled by the Timpanogos

Canal diversion dam on the Provo River several hundred feet downstream of the dam outlet works.

The estimated average monthly Provo River flows from releases from Jordanelle Reservoir for the proposed ULS alternative (in cfs and acre feet) are in Appendix F (CUWCD, ULS-FEIS Final Surface Water Hydrology Technical Report, Volume 2, Appendix B). These estimated flows are common for all Alternatives and the No Action Alternative. On an annual basis, flows under the proposed alternative remain the same as the No Action Alternative's conditions and the monthly flows would also remain the same.

TABLE 3-1
Expected Provo River Flows Immediately Downstream of Jordanelle Dam

Month	Average (cfs)	Maximum (cfs)	Minimum (cfs)
January	138	150	125
February	141	278	125
March	186	1204	125
April	206	768	127
May	648	1333	234
June	909	1643	318
July	634	1427	326
August	482	915	288
September	330	508	224
October	157	172	133
November	144	164	126
December	141	162	126
Average	344	516	210

Source: Table P-1a, Page 2, Section 2. – Surface Water Hydrology Technical Report, Volume 2, Appendix B.

Current Operation to Maintain Surface Water Quality

A Water Quality Management Plan (the Plan) was developed for the Provo River Basin in 1984 because of concerns regarding development potential around the proposed Jordanelle Reservoir, and because of eutrophication problems identified in 1976 in a Water Quality Management Plan prepared by the Mountainlands Association of Governments and the State of Utah. As a result, the Governor of Utah, Bureau of Reclamation, and Mountainlands Association of Governments prepared a plan to protect and improve the water quality of Deer Creek Reservoir and the proposed Jordanelle Reservoir.

The Jordanelle Technical Advisory Committee (JTAC) and a Political Policy and Oversight Committee were established to develop and implement the Plan. The Plan was formally approved and implemented in 1984. The primary operational objective of the Plan is to eliminate blue-green algae and reduce total productivity in Deer Creek Reservoir. The

secondary objective is to provide optimum temperatures for trout over as much of the Provo River between Jordanelle and Deer Creek Reservoirs as possible. These objectives are achieved by controlling the quality of water released to the Provo River from Jordanelle Reservoir.

To meet the operational objectives of the Plan, water for Jordanelle Reservoir enters the outlet tunnel of the dam through either the SLOW or the LLOW, depending on the reservoir elevation and water quality characteristics. The SLOW and LLOW are designed to mix and blend water from different reservoir depths to control and meet water quality standards for phosphorus, temperature, and dissolved oxygen levels in water discharged to the Provo River downstream of the dam. Currently, the valves in the outlet works oxygenate releases to the Provo River. The goal for water temperature in the Provo River downstream of Jordanelle Dam has been maintained between 50 and 55 degrees F by making flow releases through the gates in the SLOW when the reservoir is above elevation 6070 feet. When the reservoir is below elevation 6070 feet, releases made from the SLOW may have to be supplemented by releases from the LLOW to maintain the temperature requirements in the Provo River.

The Jordanelle outlet works have not been operated with the reservoir as low as elevation 6070 feet since the reservoir has been filled and historical monitoring has not found the LLOW level dissolved oxygen levels to be extremely low. However, it is anticipated that dissolved oxygen levels at the LLOW intake elevation of 5902 feet could be close to zero milligrams per liter (mg/L) under certain conditions. Under those conditions, supplemental flow from the SLOW as well as re-aeration of the water by the outlet works valves would be required to increase the dissolved oxygen content of the water.

Various operational efforts that have been, or would be, implemented under current conditions to achieve Plan objectives for water temperature and phosphorus control, and to meet dissolved oxygen standards for the protection of cold water aquatic life, are outlined below.

Water Temperature and Phosphorus. Normal summer operation of the Jordanelle SLOW can accomplish the objectives for phosphorus and water temperature when the reservoir exceeds elevation 6100 feet. The reservoir is anticipated to be above elevation 6100 feet 85 percent of the time, based on the PROSIM model of reservoir operation, which was developed by the CUWCD and Reclamation based on water years 1950 to 1989. Operation of any combination of full or partially open SLOW gates that provides river temperatures between 50 and 54 degrees F at a reservoir elevation above 6100 feet would achieve both objectives.

Water temperature objectives for Jordanelle Dam discharges in September and October can be met by releasing water from depths exceeding 100 feet. Therefore, both the primary and secondary Plan objectives for phosphorus and water temperature can be achieved by the same SLOW operating criteria under the present mesotrophic condition and phosphorus status in Jordanelle Reservoir. After irrigation deliveries to Heber Valley stop in September, the uppermost submerged gate on the SLOW would be closed to avoid exportation of any blue-green algae present in Jordanelle Reservoir. From December to April, any combination of SLOW and LLOW gates should be acceptable to meet temperature and phosphorus water quality objectives.

When the reservoir is below 6100 feet from mid-July through September, it may be necessary to blend water from the LLOW to keep discharge temperatures below approximately 56 degrees F. This may result in higher concentrations of phosphorus being released. Under these conditions, the Water Quality Management Plan calls for the use of monitoring and adaptive management to decide how soon and how long it would be beneficial to blend at least a portion of the flow from the LLOW.

Dissolved Oxygen. The State of Utah dissolved oxygen standard for cold water fishery (early and all other life stages, 30-day average) is 6.5 mg/L and the Environmental Protection Agency (EPA) has identified 5 mg/L dissolved oxygen as the minimum chronic standard for the protection of freshwater, cold water aquatic life. Under present operations, the release of water from the outlet works valves is re-aerated and dissolved oxygen exceeds water quality standards (8 to 9 mg/L monthly mean) as measured at a continuous monitoring station downstream of the dam outlet and Timpanogos Canal diversion. Some additional aeration between the dam releases and current monitoring station can occur from water dropping over the Timpanogos Diversion Dam and flows in the stream.

3.8.4 Impact Analysis

Alternative 1—No Action

There would be no change from existing conditions under this alternative.

Alternative 2

Surface Water Quantity. The volume of water stored in Jordanelle Reservoir, as well as the timing and volume of reservoir releases to the Provo River throughout the year would be the same under Alternative 2 as under existing conditions (the No Action Alternative). Reservoir water releases would be the same with or without the proposed project in place (see Chapter 2 for a description of proposed project operation). The minimum instream flow requirement of 125 cfs for the Provo River between Jordanelle Dam and Deer Creek Reservoir would remain in effect and would continue to be met under Alternative 2. Expected average, minimum, and maximum flows in the Provo River downstream of Jordanelle Dam would also be the same as under existing conditions or the No Action Alternative.

For these reasons, operation and maintenance of the proposed project under Alternative 2 is not expected to have any effect on surface water resources or quantity compared to existing conditions or the No Action Alternative. No large quantity of water would be needed or used from the Provo River during project construction that would adversely impact river flows.

Surface Water Quality. Two elements of surface water quality are considered: dissolved oxygen levels in water discharged to the river, and passage of phosphorus and algal blooms during low reservoir levels.

The proposed power plant would be operated during periods when the following two conditions are met: when reservoir elevation is high enough to permit effective turbine operation, and when such reservoir releases can meet the requirements of the Water Quality Management Plan.

Dissolved oxygen levels in water discharged to the river would be at the concentrations that exist in the reservoir, which may, at times, be 2 to 3 mg/L less than the present downstream concentrations because the dam releases through the outlet valves would no longer be re-aerated. Dissolved oxygen levels in the reservoir should exceed 5 mg/L when the reservoir is above elevation 6100 feet. This is because of the dissolved oxygen characteristics of the blended water that would have to be released to meet the low phosphorus and cool water temperature requirements.

At reservoir elevations below 6100 feet from mid-July to September, and below about 6070 feet anytime during the summer, water would typically have to be blended from the SLOW and the LLOW to satisfy fish water temperature requirements. A mix of SLOW and LLOW water would result in temperatures between 52 and 56 degrees F, with dissolved oxygen levels in the reservoir releases of approximately 2 to 4 mg/L. At reservoir levels below about 6052 feet, most of the water would be routed through the LLOW. In that case, the dissolved oxygen in reservoir releases could be as low as zero to 2 mg/L.

Based upon the PROSIM model results, the reservoir would be drawn down below elevation 6100 feet about 15 percent of the time, and below 6070 feet about 10 percent of the time. This would occur with or without the proposed project in place.

During such periods, power plant operation would be modified or curtailed, bypassing some or all of the release flow through the existing outlet works valves, as necessary to meet the Water Quality Management Plan's requirements. Conditions can occur wherein 5 mg/L dissolved oxygen may not be available in the reservoir but would probably be achieved under fully bypassed operation (all flow directed through the outlet works valves, which is the existing condition—the No Action Alternative). With flow fully bypassed to the outlet works valves, maximum possible re-aeration of the release is provided.

Monthly reservoir monitoring would continue to assess dissolved oxygen concentrations in the water column to determine potential dissolved oxygen concentration in the release. In addition, dissolved oxygen would be monitored at a nearby downstream location to determine in-stream re-aeration and compliance with water quality standards as the stream leaves the federal restrictive access boundary.

The passage of phosphorus and algal blooms through the SLOW when the reservoir is low is the second water quality consideration. As described above under Current Operation, closure of upper SLOW gates and/or LLOW operation would be employed in order to prevent this from occurring during some periods. The likelihood of such an occurrence would be the same under Alternative 2 as under existing conditions or the No Action Alternative, and is unaffected by power plant operation.

For the above reasons, operation and maintenance of the proposed project under Alternative 2 is not expected to have any negative impact on resources compared to existing conditions or the No Action Alternative. During construction of project facilities, BMPs would be used to avoid or minimize the potential for sediment delivery or the introduction of foreign substances (for example, oil, diesel, gas, and grease) to the Provo River.

Alternative 3

Impacts under Alternative 3 would be the same as those described above for Alternative 2.

Alternative 4—Proposed Action

Impacts under the Proposed Action would be the same as those described above for Alternative 2.

3.8.5 Cumulative Impacts

No cumulative impacts on surface water resources or surface water quality would be associated with the proposed project.

3.8.6 Mitigation

BMPs described in Chapter 2 would be implemented during project construction to avoid or minimize the potential for sediment delivery or the introduction of foreign substances to the Provo River. The proposed project would be operated in a manner to avoid water quality impacts as described above. Therefore, water quality mitigation would not be necessary during project operation.

3.9 Visual Resources

3.9.1 Introduction

This section addresses the effects to visual resources from the implementation of the No Action Alternative and action alternatives.

3.9.2 Issues Addressed in the Impact Analysis

The main visual resources issue addressed in this analysis is the effect of the new power plant and transmission line on the visual quality of the project area.

3.9.3 Affected Environment

Although the project area is a developed dam site, the surrounding area provides a vista of high mountains in the background, brush covered smaller hills in the foreground, and contrasts with Jordanelle Reservoir. The mountains surround the Heber Valley, a high mountain valley containing several small towns. The Provo River runs through the valley and flows into Deer Creek Reservoir at the southern end of the valley.

One major power line is located in the southern end of the valley. A Utah Power 138-kV line extends up the Provo Canyon, traverses north of Deer Creek Reservoir, and terminates at the Midway substation. Another 138-kV line extends from the Midway substation to Heber City.

In the dam's immediate vicinity, Highway 40 passes by Jordanelle Reservoir and Dam, continues south through Heber City, and exits the valley to the south towards Strawberry Valley and Duchesne.

In addition, Utah Power operates, or will operate, a variety of overhead power lines in the immediate project vicinity. An existing 12.47-kV line extends across the project site to the base of the dam. A new 138-kV transmission line is being constructed from the nearby

Highway 40 alignment, down across the dam's west abutment to the county road, south to the new Jordanelle Substation, and then south along the road for an additional 1.35 miles.

3.9.4 Impact Analysis

Alternative 1—No Action

The visual quality of the Heber Valley and the project area would remain unchanged under this alternative.

Alternative 2

A power plant would be constructed at the foot of Jordanelle Dam. The power plant would not stand out to the casual viewer, because the dam would dwarf the power plant and would tend to dominate the viewscape.

The visual impact of the project's transmission line facilities would likewise be dwarfed by the dam, as well as be minimized by the presence of the existing Utah Power transmission lines that traverse the same area. Except for the segment along the base of the dam or along the river levee, it is expected that all transmission line facilities would follow the alignments of existing Utah Power transmission lines. While pole locations would remain the same or similar, size of conductors, poles, and cross-arm construction would change.

The impact would be minimal, given the distance most of the public would be from the transmission lines and the visual similarity of the new and existing facilities. Guests at the RV park and neighboring residences would experience more of an impact because they are closer to the lines. However, the visual impression of the project's line would be minor in relation to that of the existing 138-kV line that follows the county road immediately past the park. Closer to the dam, the height and visual scale of the dam would tend to pull the gaze upwards and away from the line structures. Impact would not be significant in relation to that of the existing facilities.

Alternative 3

The impacts under Alternative 3 would be the same as those described for Alternative 2, except as described below.

New or upgraded existing transmission line facilities would follow the county road past the RV park and would be visible to the guests in the park. The impact would be minimal in relation to that of the much larger existing 138-kV transmission line that passes immediately by the park, as well as due to the visual similarity of the new and existing facilities.

Alternative 4—Proposed Action

The impacts under the Proposed Action would be the same as those described for Alternative 3, except as described below.

New or upgraded existing transmission line facilities would continue to follow the county road past the Jordanelle Substation. The impact would be minimal in relation to that of the much larger existing 138-kV transmission line that follows the same corridor, as well as due to the visual similarity of the new and existing facilities. Upgraded existing facilities would then extend beyond the interconnection site, at the end of the 138-kV line, to the UVSC

campus. Along the latter alignment, the line would consist of upgraded existing HL&P facilities. The upgraded facility would appear to be the same as the existing facility and, therefore, the impact would not be significant in relation to that of the existing facility.

3.9.5 Cumulative Impacts

The short length of new transmission lines would not present a cumulative visual impact in relation to the visual impact of the new homes being constructed on the hillsides around the valley. The length and scale of the new Utah Power 138-kV line would overpower the visual impact of the smaller power line associated with this project and not represent a significant cumulative impact.

3.9.6 Mitigation

The transmission line components and structures would be no larger than needed for the capacity of the project. The concrete exterior of the power plant, along with the roofing, would be a neutral color that would blend with the surrounding landscape.

3.10 Socioeconomics

3.10.1 Introduction

This section addresses socioeconomic effects from the implementation of the No Action Alternative and action alternatives.

3.10.2 Issues Addressed in the Impact Analysis

Issues discussed in this section include population, employment, income, and infrastructure.

3.10.3 Affected Environment

County Population

In view of the fact that Wasatch County lies on the perimeter of the Wasatch Front, which is a socioeconomic unit that contains over 2,000,000 people, the county will increase in population as a place of residence for those commuting to the Wasatch Front. It is currently estimated that 50 percent of the workforce leaves Wasatch County to work at other locations. This increase in commuters is due to the number of people moving into the county for lifestyle reasons while maintaining their higher paying jobs along the Wasatch Front (Wasatch County, 2004). Projections for Wasatch County estimate the population to grow from 15,215 in 2000 to 21,785 in 2010.

County Employment

To determine the overall economic health of the county, the latest information available from the Utah Department of Workforce Services and Utah State Tax Commission for 1999 was used instead of information from the 1997 Economic Census (cited in Wasatch County, 2004). Overall employment in the county increased from 5,275 in 1996 to 5,975 in 1999 (an increase of 656 or a 12.4 percent change). Non-agricultural jobs increased from 4,104 in 1996

to 4,686 in 1999 (an increase of 522 or 14.2 percent). The civilian labor force of the county in 1996 was 5,498. In 1999 it was 6,227 (Wasatch County, 2004).

One of the major factors in the development of the county is the availability of employment opportunities within a reasonable distance. An increase in commuters within Wasatch County is a result of people moving into the county for lifestyle reasons while maintaining their jobs along the Wasatch Front. One of the fears of an increasing commuter work force is the county is becoming a bedroom community where there is not an adequate tax base from non-residential activities to help support the needs of the community (Wasatch County, 2004).

County Income

The wages of Wasatch County have been and continue to be lower than the state-wide average over the last 10 years (1989-1999). According to the most recent census data, the average monthly wages of residents in 1999 was $1,689.00 with those in the transportation / communication / utilities segment earning the highest monthly wages at $2,527.00 per month. However, the household income within the county is the fourth highest in the state because it is estimated that up to 50 percent of the Wasatch County work force commutes to adjacent counties for their jobs (Wasatch County, 2004).

3.10.4 Impact Analysis

Alternative 1—No Action

There would be no socioeconomic impacts from selection of the No Action Alternative.

Alternative 2

County Population. No long-term growth in population would result from implementation of Alternative 2. The local population could increase over the short-term, however, during construction. A small number of construction workers is likely to move to the county during the construction period. The workers may stay in travel trailers, rent motel rooms, or rent housing during this period.

County Employment. No additional permanent staff to operate or maintain the new facilities is anticipated. Short-term employment opportunities for local workers would be available during the construction period. These jobs would end with the completion of construction.

County Income. The overall level of income in the county would increase during construction. The increase would come from local construction worker wages and from spending in the county by construction workers. This would benefit local communities and businesses, as well as increase taxes collected on these purchases. There would be no long-term income effect.

Infrastructure. There are no plans at this time to develop permanent sanitary facilities at the powerhouse. A porta-potty facility may be added for use by maintenance workers and operators. A potable water supply would need to be developed for use by maintenance workers and operators. The supply would most likely be bottled water dispensers.

No new transportation infrastructure would be constructed for this alternative. Existing roadways would be used to move construction equipment, supplies, and workers. The level of traffic is not expected to damage current transportation facilities. Some traffic delays would occur during construction, but these are most likely to affect local residences and campers along the county road. There is also a possibility that some dirt would be deposited on local roads from construction equipment. However, mitigation measures discussed in *Section 3.10.6, Mitigation*, would prevent this from becoming a significant impact.

Alternative 3

Socioeconomic impacts from implementation of Alternative 3 would be the same as those described above for Alternative 2.

Alternative 4—Proposed Action

Socioeconomic impacts from implementation of the Proposed Action would be the same as those described above for Alternative 2.

3.10.5 Cumulative Impacts

County Population

The addition of new construction workers, in addition to those already working in construction in the valley, would increase the population over the short-term to a level higher than would be observed without the project.

County Employment

County employment levels would rise faster than predicted from normal growth in the short-term. There would be no long-term cumulative effects.

County Income

Short-term income from construction of this project would have a beneficial cumulative effect on total county income. There would be no long-term cumulative effects.

Infrastructure

This project would increase an already elevated level of construction traffic in the valley. This effect would be short-lived and there would be no long-term effect.

3.10.6 Mitigation

Construction-related traffic delays would be kept to a minimum through proactive scheduling. The tires of all vehicles leaving the site during wet weather or when mud is clinging to tires would be washed prior to exiting the site. No waste concrete or concrete washing water would be deposited on local roads.

3.11 Environmental Justice

3.11.1 Introduction

This section addresses the environmental justice effects from the implementation of the No Action Alternative and action alternatives.

3.11.2 Issues Addressed in the Impact Analysis

The issue addressed in this section is the effect the proposed project would have on disadvantaged populations, such as minorities and low-income individuals.

3.11.3 Affected Environment

On February 11, 1994, the President issued Executive Order 12898 on Environmental Justice in Minority Populations and Low Income Populations. This Executive Order requires agencies to identify and address disproportionately high and adverse human health or environmental effects of their actions on minorities and low-income populations and communities as well as the equity of the distribution of the benefits and risks of their decisions.

A total of 15,215 people lived in Wasatch County in 2000. Table 3-2 shows the ethnic breakdown of that population. As shown in the table, the majority of individuals (14,549 persons) are white (95.6 percent), with Hispanic/Latino being the second largest ethnic group (775 persons or 5.1 percent). Other identified races included African American, American Indian, Asian, and Pacific Islander. Some individuals were identified with two or more races, and some individuals were in the listed categories. In total, 4.4 percent of the population are non-Hispanic or Latino minorities.

TABLE 3-2
Wasatch County Population by Race or Latino Origin

Total Population	White	African American	American Indian	Asian	Pacific Islander	Other Race	Two or More Races	Hispanic
15,215	14,549	33	65	45	15	298	210	775

Source: U.S. Census Bureau (2000)

3.11.4 Impact Analysis

Alternative 1—No Action

No impacts would occur under this alternative.

Alternative 2

There would be the potential for employment for members of the minority groups during construction. There would be no disruption of minority groups by construction of the proposed project, because the construction would take place in rural areas where the population is very dispersed. No disproportionate negative impacts on minorities or low-income communities are expected.

Alternative 3

Environmental justice impacts would not occur under this alternative, as described above for Alternative 2.

Alternative 4—Proposed Action

Environmental justice impacts would not occur under the Proposed Action, as described above for Alternative 2.

3.11.5 Cumulative Impacts

There would be no cumulative impacts.

3.11.6 Mitigation

No mitigation is necessary.

3.12 Irreversible and Irretrievable Commitment of Resources

3.12.1 Introduction

This section describes the irreversible and irretrievable commitment of resources that would occur under the action alternatives. No resources would be committed for the No Action Alternative.

3.12.2 Alternative 2—Transmission Line for 138-kV Interconnection with Utah Power

There would be an irreversible and irretrievable commitment of energy and material from constructing and operating the power plant. These would include materials used to construct the facilities, such as concrete, and petroleum products (such as diesel, grease and gasoline) used in construction.

Funds used to construct, maintain, and operate the proposed project would be permanently committed to the project. They would not be available for other purposes.

Additional irreversible and irretrievable commitments of resources would include a loss of soil productivity under proposed project facilities, because of construction of the power house and tailrace channel. This land would no longer be available for production of ecological services, such as carbon removal through photosynthesis and plant growth.

3.12.3 Alternative 3—Transmission Line for 12.47-kV Interconnection with Utah Power

The irreversible and irretrievable commitment of resources under Alternative 3 would be the same as those described for Alternative 2 above.

3.12.4 Proposed Action (Alternative 4)—Transmission Line for 12.47-kV Interconnection with Heber Light & Power

The irreversible and irretrievable commitment of resources under the Proposed Action would be the same as those described for Alternative 2 above.

3.13 Mineral and Energy Resources

3.13.1 Introduction

This section addresses the effects to mineral and energy resources from construction and operation of the No Action Alternative and action alternatives.

3.13.2 Issues Addressed in the Impact Analysis

Major Issues addressed in this section include long-term effects on downstream mineral and energy resources during project operation and maintenance. Potential short-term effects during construction are also addressed.

3.13.3 Affected Environment

The mineral resources impact area of influence would include the immediate area around the construction and power transmission lines. The overall impact area of influence is shown in Figure 3.

The impact area of influence related to energy resources would primarily be Wasatch County, Utah County, and Salt Lake County. In addition it would include the Heber Light and Power Company distribution area.

3.13.4 Impact Analysis

Alternative 1—No Action

There would be no change from existing conditions under this alternative.

Alternative 2

Mineral resources would not be impacted by construction, operation, or maintenance of this alternative because all of the areas impacted by construction have previously been disturbed and now contain imported materials.

Energy resources would be impacted by the addition of power generated at the Jordanelle Dam Hydroelectric Facility into the Heber Light and Power distribution area. The facility would generate approximately 38,000 MWh annually.

Downstream power generation includes a Provo River Project facility at Deer Creek Dam and a Central Utah Project facility on the Olmsted flow line. Power generation at Jordanelle Dam would be secondary and incidental to Jordanelle Dam and Reservoir operation and would not alter or impact the hydrology as described in Appendix F. There would be no impact to the Provo River Project or Olmsted facilities.

Alternative 3

Impacts under Alternative 3 would be the same as those described above for Alternative 2.

Alternative 4—Proposed Action

Impacts under Alternative 4 would be the same as those described above for Alternative 3.

CHAPTER 4

Coordination and Consultation

NEPA regulations provided by the Council on Environmental Quality (CEQ) direct project sponsors to involve agencies and the general public in preparing an EA or Environmental Impact Statement (EIS). This chapter documents coordination and consultation that has occurred with agencies and the public during development of this Final EA.

The DOI published a Notice of Intent (NOI) in the Federal Register on March 19, 2004, regarding the proposed project. The NOI announced plans to prepare an EA relative to the execution of a Lease of Power Privilege contract and the construction, operation, and maintenance of a non-federal hydroelectric generation facility on Jordanelle Dam, Bonneville Unit, CUP. The CUWCD placed a public notice in local newspapers announcing an open house on April 22, 2004, to identify and discuss any issues and concerns on the construction, operation, and maintenance of the proposed Jordanelle Dam Hydroelectric Project.

The public open house was held on April 22, 2004, from 4:00 p.m. to 7:00 p.m. in the conference room of the Jordanelle State Park, Hailstone Visitor Center located off Exit 8 (Mayflower Exit) of Highway 40. Informational displays and opportunity for public comments and discussion were available throughout the meeting. Displays included posters describing the proposed project, facilities, and alternative locations for certain project features; project purpose and need; project schedule; and NEPA components and the NEPA process. Visitors signed in as they entered the conference room and were encouraged to ask questions and identify any issues or concerns they had regarding the proposed project, and to fill out and sign a comment form prior to leaving the meeting.

Fifteen individuals signed the attendance list at the open house, and three comment forms or e-mails commenting on the proposed project were received following the public meeting. Comments received are summarized as follows:

- What security arrangements are being made and who would be responsible for them?
- Would the public be adversely affected by noise or visual impacts from the power lines?
- Would water quality (dissolved oxygen, temperature) be monitored at the bridge below the dam where current measurements are taken?
- Would the facility affect water quality or quantity?
- Would the new facility adversely affect the blue-ribbon fishery below the dam?

Consultation with agencies that has occurred during the preparation of this Final EA includes the following:

- The FWS has been contacted to obtain a threatened and endangered species list. This request initiates informal consultation with FWS as required by the ESA.

- Consultation has been completed with SHPO, the Northern Ute Indian Tribes, and the Northwestern Band of Shoshoni Tribe (see Appendix C and 2.10.7).

One hundred twenty-five copies of the Draft EA were sent to agencies, organizations, and individuals for review and comment.

The comment period for the Draft EA began on April 20, 2005, and ended on May 25, 2005. Seven comment letters were received that contained 35 comments. Appendix G contains the letters with comments marked and responses to those comments.

Table 4-1 lists the comment letters and the date of each letter.

TABLE 4-1
Comment Letters

Agency	Date
Salt Lake County Fish and Game Association	April 24, 2005
Division of State History/Utah State Historical Society	May 13, 2005
Governor's Office of Planning and Budget	May 23, 2005
Utah Council, Trout Unlimited	May 24, 2005
U.S. Bureau of Reclamation	May 25, 2005
Provo River Water Users Association	June 1, 2005
U.S. Fish and Wildlife Service	June 1, 2005

CHAPTER 5

References

Anderson, E., S. C. Forrest, T. W. Clark, and L. Richardson. 1986. "Paleobiology, Biogeography, and Systematics of the Black-Footed Ferret, *Mustela nigripes*. (Audubon and Bachman), 1851." *Great Basin Naturalist Memoirs* 8:11-62.

Bailey, C. L. 2003. "The Columbia Spotted Frog." In: *Species on the Edge*. Utah Division of Wildlife Resources. Salt Lake City. Utah.

Biggins, D. E., M. H. Schroeder, S. C. Forrest, and L. Richardson. 1986. Activity of Radio-Tagged Black-Footed Ferrets. *Great Basin Naturalist Memoirs*. 8:135-140.

Burt, W. H. and R. P. Grossenheider. 1980. *Peterson Field Guides: Mammals*. Houghton-Mifflin, New York, NY. 289 pp.

Cahalane, V. H. 1954. "Status of the Black-Footed Ferret." *Journal of Mammalogy* 35:418-424.

Caughley, G. and A. Gunn (ed). 1996. *Conservation Biology in Theory and Practice*. Blackwell Science, Cambridge, MA. 459 pp.

Central Utah Water Conservancy District (CUWCD). 2004. *Final Environmental Impact Statement, Utah Lake Drainage Basin Water Delivery System*.

Clark, T. W., T. M. Campbell III, D. G. Socha, and D. E. Casey. 1982. "Prairie Dog Colony Attributes and Associated Species." *Great Basin Naturalist*. 42:572-582.

DeGraaf, R. M., V. E. Scott, R. H. Hamre, L. Ernst, and S. H. Anderson. 1991. *Forest and Rangeland Birds of the United States, Natural History and Habitat Use*. USDA, Forest Service Agricultural Handbook 688. 625 pp.

Forrest, S. C., D. E. Biggins, L. Richardson, T. W. Clark, T. M. Campbell, K. A. Fagerstone, and E. T. Thorne. 1988. "Population Attributes for Black-Footed Ferret (*Mustela nigripes*) at Meeteetse, Wyoming, 1981-1985." *Journal of Mammalogy* 69:261-273.

Finch, D. M. 1992. *Threatened, Endangered, and Vulnerable Species of Terrestrial Vertebrates in the Rocky Mountain Region*. USDA Forest Service. GTR-RM-215.

FWS. See U.S. Fish and Wildlife Service.

Gaines, D. 1974. *Distribution, Density, and Habitat Requirements of the Yellow-Billed Cuckoo in the Sacramento Valley: 1972-1973*. California Department of Fish and Game, Nongame Wildlife Investigations, W-54-R Progress Report.

Gaines, D. 1977. *Current Status and Habitat Requirements of the Yellow-Billed Cuckoo in California.* 1977 Endangered Wildlife Program, Nongame Wildlife Investigations, California Department of Fish and Game.

Gaines, D. and S. A. Laymon. 1984. "Decline, Status and Preservation of the Yellow-Billed Cuckoo in California." *Western Birds* 15:49- 80.

Hepworth, Richard / UDWR. 2004. Personal Communication by e-mail to Doug Bradley of CH2M HILL. June 14.

Hepworth, R.D. 2004a. *Middle Provo River Fish Population Response to Regulation Change-Year 1, 2004*. Utah Department of Natural Resources, Salt Lake City, Utah.

Hillman, C. N. 1968. "Field Observations of Black-Footed Ferrets in South Dakota." *Transactions of the North American Wildlife and Natural Resources Conference.* 33:433-443.

Kingery, H. E. 1981. "1980: The Year of the Cuckoo." *C. F. O. Journal* 15(3):86-87.

Koehler, G. M. 1990. "Population and Habitat Characteristics of Lynx and Snowshoe Hares in North Central Washington." *Canadian Journal of Zoology*. 68:85-851.

McCord, C. M. and J. E. Cardoza. 1982. "Bobcat and Lynx." In: J. A. Chapman and G. A. Feldhamer, eds. *Wild Mammals of North America Biology, Management, and Economics*. Johns Hopkins University Press, Baltimore, Maryland.

Miller, B., R. P. Reading, and S. Forrest. 1996. *Prairie Night: Black-Footed Ferrets and the Recovery of Endangered Species.* Smithsonian Institution Press. Washington and London. 254 pp.

Psomas. 1999. *Upper Provo River Water Quality Management Plan*. Salt Lake City, Utah.

Quinn, N. W. S. and G. Parker. 1987. "Lynx." In M. Novak, J. A. Barber, M. E. Obbard, and B. Malloch, eds. *Wild Furbearer Management and Conservation in North America.* Ontario Ministry of Natural Resources.

Raptor Research Foundation. 1994. *Mitigating Bird Collisions with Power Lines: The State of the Art in 1994*. Prepared by Avian Power Line Interaction Committee for Edison Electric Institute. Washington, D.C.

Raptor Research Foundation. 1996. *Suggested Practices for Raptor Protection on Power Lines: The State of the Art in 1996.* Prepared by Avian Power Line Interaction Committee for Edison Electric Institute. Washington, D.C.

Reclamation. See U.S. Bureau of Reclamation.

Reichel, J. D., D. L. Genter, and E. Atkinson. 1992. *Sensitive Animal Species in the Elkhorn and Big Belt Mountains of the Helena National Forest.* Montana Natural Heritage Program. Helena, MT. 102 pp.

Rice, J (URMCC). 2005. Personal communication with Denny Mengel (CH2M HILL). April 11.

Ruggiero, L. F., K. B. Aubry, S. W. Buskirk, G. M. Koehler, C. J. Krebs, K. S. McKelvey, and J. R. Squires. 1999. "The Scientific Basis for Lynx Conservation: Qualified Insights." In Ruggiero, L. F., K. B. Aubry, S. W. Buskirk, tech. eds. *The Scientific Basis for Lynx Conservation in the Contiguous United States.* USDA-Forest Service. RMRS-GTR-30. 167 p.

Stebbins, R. C. 1985. *A Field Guide to Western Reptiles and Amphibians.* Houghton Mifflin Company. Boston. Mass.

Summerfelt, R. C. 1999. "Land and Reservoir Habitat Management." in *Inland Fisheries Management in North America*. 2nd edition, C. C. Kohler and W. Hubert eds. American Fisheries Society, Bethesda, MD. p 285-320. 718 p.

UDEQ. See Utah Department of Environmental Quality.

UDWR. See Utah Division of Wildlife Resources.

URMCC. See Utah Reclamation Mitigation and Conservation Commission.

U.S. Bureau of Reclamation. 1977. *Biological Inventory, Final Report, Wildlife. Jordanelle-Provo River System, Bonneville Unit, Central Utah Project*. Prepared by Utah Division of Wildlife Resources. Salt Lake City, Utah.

U.S. Bureau of Reclamation and U.S. Army Corps of Engineers. 1979. *Central Utah Project, Bonneville Unit; Municipal and Industrial System; Final Environmental Impact Statement.*

U.S. Bureau of Reclamation and U.S. Army Corps of Engineers. 1987. *Central Utah Project, Bonneville Unit; Municipal and Industrial System; Final Supplement to the Final Environmental Impact Statement.*

U.S. Census Bureau. 2000. http://factfinder.census.gov Accessed on July 26, 2004.

U.S. Fish and Wildlife Service. 1995. *Final Rule to Reclassify the Bald Eagle from Endangered to Threatened*. Federal Register Volume 60, Number 133, Wednesday, July 12, 1995, pages 36000-36010.

U.S. Fish and Wildlife Service. 1996. In: News Release: August 20, 1996, Gober P. and S. Rose. More Endangered Black-Footed Ferrets Born in the Wild in Montana and South Dakota. Lakewood, Colorado. http://www.r6.fws.gov/pressrel/96-53.html

U.S. Fish and Wildlife Service. 1998. Threatened and Endangered Species in New Mexico. Ecological Services Field Office. Albuquerque, New Mexico. 93 pp.

U.S. Fish and Wildlife Service. 2000. *Biological Opinion on the Effects of National Forest Land and Resource Management Plans and Bureau of Land Management Land Use Plans on Canada Lynx (Lynx Canadensis) in the Contiguous United States.*

U.S. Fish and Wildlife Service. 2004. http://ecos.fws.gov/species_profile Accessed on July 24, 2004.

U.S.D.A. Forest Service. 1973 and 1974. *Study of Rare or Endangered Raptors in Uinta National Forest.* Prepared by J. S. Mosher, J. R. Murphy, and C. M. White, Zoology Department, Brigham Young University, Provo, Utah.

U.S.D.A. Forest Service. 1993. *Draft Supplemental Environmental Impact Statement on Management of Habitat for Late-Successional and Old-Growth-Related Species Within the Range of the Northern Spotted Owl.* Appendix A: Forest Ecosystem Management: an Ecological, Economic, and Social Assessment.

USFS. See U.S.D.A. Forest Service.

Utah Department of Environmental Quality. 2004. "Jordanelle Reservoir Description." http://waterquality.utah.gov/watersheds/lakes/JORDANEL.pdf Accessed on June 10, 2004.

Utah Division of Wildlife Resources. 2000. "Utah Wildlife News." December 1, 2000. http://www.wildlife.utah.gov/news/oldarchive/dec00.htm Accessed on June 10, 2004.

Utah Division of Wildlife Resources. 2004a. "Record Fish Caught in Utah." http://www.wildlife.utah.gov/fishing/recfish.html Accessed on June 10, 2004.

Utah Division of Wildlife Resources. 2004b. "Utah Fishing Proclamation and Information." 2004. http://www.wildlife.utah.gov/proclamations/2004_fishing/2004_proclamation.pdf Accessed on June 10, 2004.

Utah Division of Wildlife Resources. 2004c. "Utah Sensitive Species List 2003." http://dwrcdc.nr.utah.gov/ucdc/ViewReports/SSL121803.pdf Accessed on June 14, 2004.

Utah Division of Wildlife Resources. 2004d. http://dwrcdc.nr.utah.gov/rsgis2/search Accessed on July 25, 2004.

Utah Division of Wildlife Resources. 2004e. Personal Communication with Jackee Alston, Springville Office. July 26, 2004.

Utah Reclamation Mitigation and Conservation Commission. 2002. "Provo River Restoration Project: Fish and Wildlife Studies." http://www.mitigationcommission.gov/prrp/pdf/fact_fish_wildstudies.pdf. Accessed June 10, 2004.

Wasatch County, State of Utah. 2004. "Wasatch County General Plan 2001-2016." http://www.co.wasatch.ut.us/plan/index.html Accessed on June 21, 2004.

Wisdom, M. J., R. S. Holthausen, B. C. Wales, [and others] 2000. *Source Habitats for Terrestrial Vertebrates of Focus in the Interior Columbia Basin: Broad-Scale Trends and Management Implications*. Volumes 1 – 3. Gen. Tech. Rep. PNW-GTR-485. Portland, Oregon: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 3 vol. (Quigley, Thomas M., tech. Ed.; Interior Columbia Basin Ecosystem Management Project: scientific assessment).

CHAPTER 6

List of Preparers

Name/Title	Degree(s)	Role
Central Utah Water Conservancy District		
Dave Pitcher, P.E./Project Manager	M.S. Civil and Environmental Engineering B.S. Civil Engineering	Project Coordination and Management
Rich Tullis, P.E./Assistant General Manager	M.S. Civil Engineering B.S. Civil Engineering	Project Review
Daryl Devey/Operations Coordinator	N/A	Project Review
Terry Hickman/Environmental Program Manager	M.S. Fish and Wildlife Biology B.S. Zoology	NEPA Compliance Management
CH2M HILL Consultant Team		
Doug Bradley/Fisheries Biologist	M.S. Fish Ecology B.S. Environmental Biology	Fishery Resources Analysis, Socioeconomic Analysis
Jody Fagan/Graphic Designer	B.F.A., Fine Arts A.S., Drafting	Graphic Design and Figure Preparation
Lynn Foster/Fishery Biologist	M.S., Fisheries B.S., Biological Sciences	Technical Coordinator, Senior Review, Surface Water and Water Quality Analysis
Denny Mengel/Terrestrial Ecologist	Ph.D., Soils M.S., Forestry B.S., Wildlife Biology	NEPA Coordinator, Wildlife Resources Analysis, Vegetation Resources Analysis, Environmental Justice Analysis, Visual Resources Analysis, Noise Analysis, Air Quality Analysis, Threatened and Endangered Species Analysis
Mike Mickelson/Agricultural Engineer	M.S., Agricultural/Irrigation Engineering B.S., Civil Engineering	Project Coordinator, Senior Review
Kate Getchell/Document Processor		Document Processor
Eric Oden/Technical Editor	M.A., Education B.A., Education	Project Editor
Eric Schulz/Electrical Engineer	M.S., Electrical Engineering B.S., Electrical Engineering	Project Design Consultant
Wendy Simmons Johnson/Senior Archaeologist	M.A., Anthropology B.A., International Relations	Cultural Resources Analysis
Sagebrush Archaeological Consultants		

Appendix A

Cultural Resources Report

May 19, 2004

Mr. Terry Hickman
Central Utah Water Conservancy District
355 West University Parkway
Orem, Utah 84058-7303

RE: Jordanelle Dam Hydroelectric Project, Wasatch County, Utah. Sagebrush Consultants, L.L.C. Report No. 1335.

Dear Terry,

This document represents a letter report on the cultural resources survey for the Central Utah Water Conservancy District (CUWCD), Jordanelle Dam Hydroelectric Project in Wasatch County, Utah. The project area is located in T. 2S., R. 5E., Sec 31 on the USGS 7.5' Quadrangle Heber City, Utah (1955) (Figure 1). The proposed project consists of the construction of a hydroelectric power plant, at the base of the Jordanelle Dam, where water is released into the Provo River. From the power plant, there are two proposed alternative powerline corridors. The first alternative powerline consists of approximately 1130 ft of new powerline. The second alternative consists of 570 feet of new powerline and 1004 ft following existing powerlines. Fieldwork for this project was undertaken on May 19, 2004, under the authority of Utah State Antiquities Project Permit No. U-04-SJ-0459w.

The entire project area was surveyed by the Bureau of Reclamation in 1987, prior to the construction of the Jordanelle Reservoir Project (McCarty et al. 1987). There were no cultural resources found in the current project area during that survey. Since 1987, the landscape has been greatly altered at the proposed site from the construction of the Jordanelle Dam. Although it was not likely that any intact cultural resources would be found in the proposed project area, due to the drastic alteration of the landscape during construction, Sagebrush conducted a field visit to the project area to determine if there were any existing cultural resources in the project area.

The proposed project area is located in the northern end of the Heber Valley on the east side of the Wasatch Mountain Range. The elevation of the proposed site is approximately 1791 m (5875 ft) a.s.l. The project area falls within the Wasatch Hinterlands subdivision of the Middle Rocky Mountains Physiographic Province. The climate of the Heber Valley is relatively mild, characterized by cool summers and cold winters. Soils are represented primarily by brown clay silt alluvial deposits with medium to large rounded cobbles. The proposed site is relatively flat, except for areas built up along the banks of the Provo River and areas where boulders were placed during dam construction. Because of the extensive clearing and construction in the

project area, much of the native vegetation has been significantly altered. The site is either cleared of vegetation or consists of medium height marsh grasses with one or two low sagebrush growing in the project area.

Fifty foot wide corridors were surveyed for the two powerline alternatives. The pad where the hydroelectric power plant will be constructed lies at the base of the dam in an area covered with small boulders (part of the dam construction) (Figure 2). The powerline corridors are located just south of the Jordanelle Dam structure in an area that was used as a staging area for the construction of the dam (Figure 3). Additionally, the Provo River runs along the eastern extent of the project area. Banks have been built up along the river and the course has been somewhat altered with the dam construction (Figure 4).

The project area was assessed and surveyed by the author on May 19, 2004. No cultural resources were observed in the project area.

Sincerely,

Wendy Simmons Johnson
Senior Archaeologist

Attachment

References Cited

McCarty, Tara, Richard McCarty, Denise Evans and Carol Wiens
1987 *Cultural Resources Survey of the Jordanelle Reservoir Area, Wasatch and Summit Counties, Utah.* Bureau of Reclamation, Upper Colorado Region. Manuscript on file at the Utah State Historic Preservation Office.

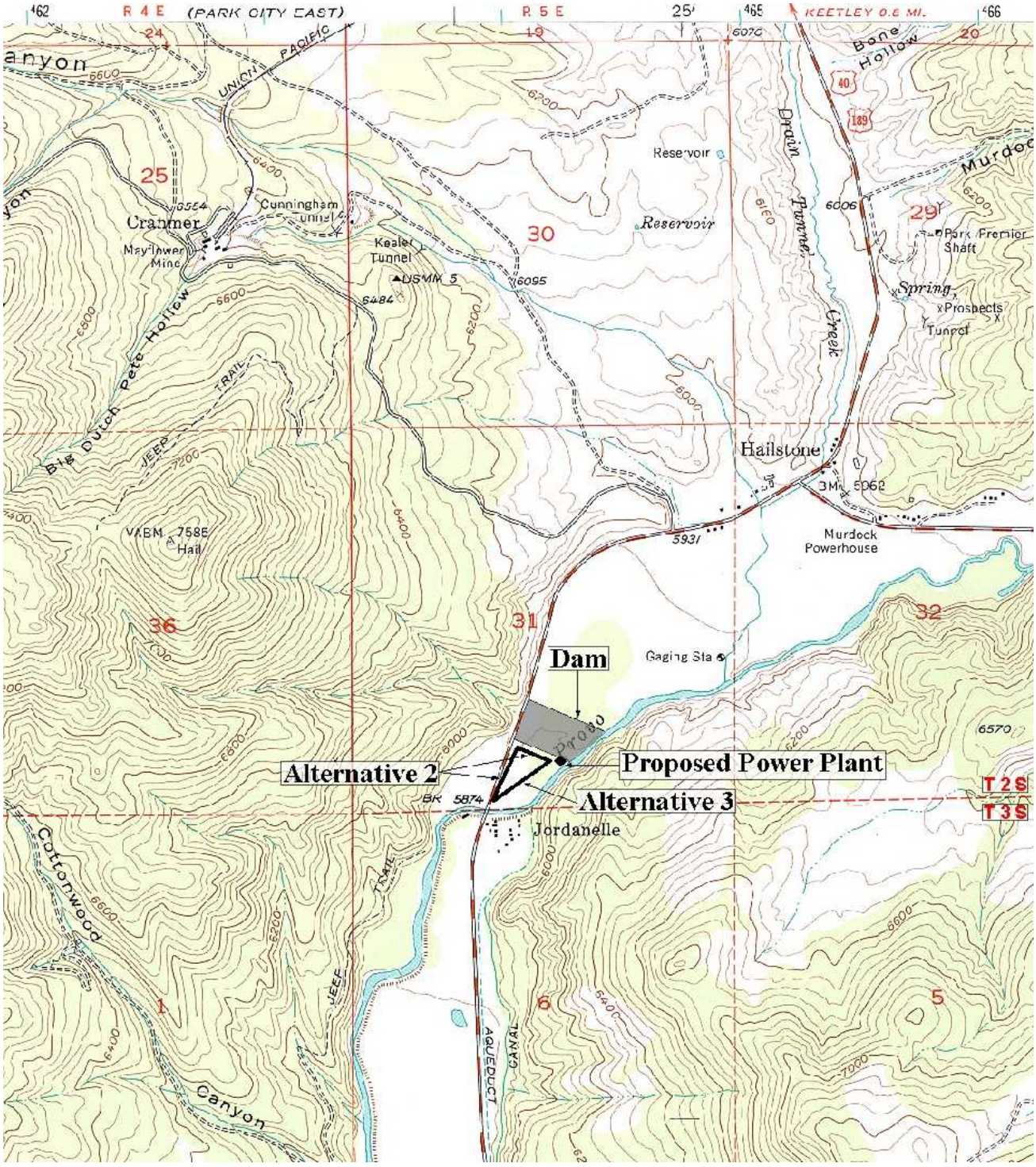

R 4 E (PARK CITY EAST)
R 5 E
KEETLEY 0.6 MI.
Bone Hollow
Drain Tunnel
Reservoir
Cranmer
Cunningham Tunnel
Keeler Tunnel
Mayflower Mine
USMM 5
Big Dutch Pete Hollow
TRAIL
JEEP
Hailstone
Murdock Powerhouse
Park Premier Shaft
Spring
Prospects
Tunnel
Creek
VABM 7585 Hail
Dam
Gaging Sta
Proposed Power Plant
Alternative 2
Alternative 3
BR 5874
Jordanelle
Cottonwood Canyon
AQUEDUCT
CANAL
T 2 S
T 3 S

Figure 2. View of the proposed hydroelectric power plant construction site; view to the north-northeast.

Figure 3. Overview of the project area; view to the north.

Figure 4. View of the Alternative 3 powerline corridor; view to the south-southwest.

Appendix B

Utah SHPO Letter

State of Utah

JON M. HUNTSMAN, JR.
Governor

GARY R. HERBERT
Lieutenant Governor

Department of Community and Culture
YVETTE DONOSSO DIAZ
Executive Director

Division of State History / Utah State Historical Society
PHILIP F. NOTARIANNI
Division Director

April 4, 2005

Terry J. Hickman
Environmental Programs Manager
Central Utah Water Conservancy District
355 West University Parkway
Orem UT 84058-7303

RE: Jordanelle Dam Hydroelectric Project Sagebrush Report 1335 U-04-Sj-0459

In Reply Please Refer to Case No. 05-0413

Dear M. Hickman:

The Utah State Historic Preservation Office received the above information on March 29, 2005. The report states that no cultural resources were located in the project area. We, therefore, concur with the report's recommendation of No Historic Properties Affected.

This information is provided on request to assist with Section 106 responsibilities as specified in §36CFR800. If you have questions, please contact me at (801) 533-3555. My email address is: jdykman@utah.gov

As ever,

James L. Dykmann
Deputy State Historic
Preservation Officer - Archaeology

JLD:05-0413 OFR/NPA

c: Sagebrush Archaeological Consultants, 3670 Quincy Avenue, Suite 203, Ogden UT 84403

Appendix C

Tribal Consultation with Native American Tribes

Central Utah Water Conservancy District

355 WEST UNIVERSITY PARKWAY, OREM, UTAH 84058-7303
TELEPHONE (801) 226-7100, FAX (801) 226-7107
TOLL FREE 1-800-281-7103
WEBSITE www.cuwcd.com

OFFICERS
E. Tim Doxey, President
R. Roscoe Garrett, Vice President

Don A. Christiansen, General Manager
Secretary/Treasurer

April 14, 2005

Betsy Chapoose
Cultural Rights and Protection Department
Ute Indian Tribe
P.O. Box 190
Fort Duchesne, Utah 84026

RE: Jordanelle Hydroelectric Project in Wasatch County, Utah

Dear Ms. Chapoose,

The Central Utah Water Conservancy District (CUWCD) is planning to carry out the development of a hydroelectric facility at the base of the Jordanelle Dam in Wasatch County, Utah. We are contacting you to ask whether you have any concerns relating to possible traditional cultural properties or sacred sites in the project area. Also, we are interested in determining if there are Indian Trust Assets that may exist in the project area.

I have enclosed a copy of the Environmental Assessment as well as the Cultural Resources study for this project. Please let me know if you have any comments concerning this project or report. I can be reached at 801-226-7100. Thank you for taking the time look into this manner, and we look forward to hearing from you.

Sincerely,

Terry J. Hickman

Terry Hickman
Environmental Programs Manager

enclosures

Central Utah Water Conservancy District

355 WEST UNIVERSITY PARKWAY, OREM, UTAH 84058-7303
TELEPHONE (801) 226-7100, FAX (801) 226-7107
TOLL FREE 1-800-281-7103
WEBSITE www.cuwcd.com

OFFICERS
E. Tim Doxey, President
R. Roscoe Garrett, Vice President

Don A. Christiansen, General Manager
Secretary/Treasurer

April 14, 2005

Bruce Parry, Executive Director
Satellite Office: Northwestern Band of Shoshoni Tribe
862 South Main St., Suite 6
Brigham City, Utah 84302-3000

RE: Jordanelle Hydroelectric Project in Wasatch County, Utah

Dear Mr. Parry,

The Central Utah Water Conservancy District (CUWCD) is planning to carry out the development of a hydroelectric facility at the base of the Jordanelle Dam in Wasatch County, Utah. We are contacting you to ask whether you have any concerns relating to possible traditional cultural properties or sacred sites in the project area. Also, we are interested in determining if there are Indian Trust Assets that may exist in the project area.

I have enclosed a copy of the Environmental Assessment as well as the Cultural Resources study for this project. Please let me know if you have any comments concerning this project or report. I can be reached at 801-226-7100. Thank you for taking the time look into this manner, and we look forward to hearing from you.

Sincerely,

Terry J. Hickman

Terry Hickman
Environmental Programs Manager

enclosures

Central Utah Water Conservancy District

355 WEST UNIVERSITY PARKWAY, OREM, UTAH 84058-7303
TELEPHONE (801) 226-7100, FAX (801) 226-7107
TOLL FREE 1-800-281-7103
WEBSITE www.cuwcd.com

OFFICERS
E. Tim Doxey, President
R. Roscoe Garrett, Vice President

Don A. Christiansen, General Manager
Secretary/Treasurer

April 14, 2005

Gwen Davis, Chairwoman
Northwestern Band of Shoshoni Tribe
427 N. Main Street, Suite 101
Pocatello, Idaho 83204-3016

RE: Jordanelle Hydroelectric Project in Wasatch County, Utah

Dear Ms. Davis,

The Central Utah Water Conservancy District (CUWCD) is planning to carry out the development of a hydroelectric facility at the base of the Jordanelle Dam in Wasatch County, Utah. We are contacting you to ask whether you have any concerns relating to possible traditional cultural properties or sacred sites in the project area. Also, we are interested in determining if there are Indian Trust Assets that may exist in the project area.

I have enclosed a copy of the Environmental Assessment as well as the Cultural Resources study for this project. Please let me know if you have any comments concerning this project or report. I can be reached at 801-226-7100. Thank you for taking the time look into this manner, and we look forward to hearing from you.

Sincerely,

Terry J Hickman

Terry Hickman
Environmental Programs Manager

enclosures

Central Utah Water Conservancy District

355 WEST UNIVERSITY PARKWAY, OREM, UTAH 84058-7303
TELEPHONE (801) 226-7100, FAX (801) 226-7107
TOLL FREE 1-800-281-7103
WEBSITE www.cuwcd.com

April 14, 2005

Maxine Natchees, Chairwoman
Ute Indian Tribe
P.O. Box 190
Fort Duchesne, Utah 84026

RE: Jordanelle Hydroelectric Project in Wasatch County, Utah

Dear Ms. Natchees,

The Central Utah Water Conservancy District (CUWCD) is planning to carry out the development of a hydroelectric facility at the base of the Jordanelle Dam in Wasatch County, Utah. We are contacting you to ask whether you have any concerns relating to possible traditional cultural properties or sacred sites in the project area. Also, we are interested in determining if there are Indian Trust Assets that may exist in the project area.

I have enclosed a copy of the Environmental Assessment as well as the Cultural Resources study for this project. Please let me know if you have any comments concerning this project or report. I can be reached at 801-226-7100. Thank you for taking the time look into this manner, and we look forward to hearing from you.

Sincerely,

Terry J Hickman

Terry Hickman
Environmental Programs Manager

enclosures

Appendix D

FWS Letter

United States Department of the Interior
FISH AND WILDLIFE SERVICE
UTAH FIELD OFFICE
2369 WEST ORTON CIRCLE, SUITE 50
WEST VALLEY CITY, UTAH 84119

In Reply Refer To
FWS/R6
ES/UT
04-1028

June 29, 2004

Denny Mengel, Ph.D.
CH2MHill
700 Clearwater Lane
Boise, Idaho 83712-7708

RE: Jordanelle Dam Hydroelectric Project Species List, Wasatch County, Utah

Dear Dr. Mengel:

Based on information provided in your letter of June 21, 2004, below is a list of endangered (E), threatened (T), and candidate (C) species that may occur in the area of influence of your proposed action.

Common Name	Scientific Name	Status
Bald Eagle[3]	*Haliaeetus leucocephalus*	T
Western Yellow-billed Cuckoo	*Coccyzus americanus occidentalis*	C
Black-footed Ferret[6]	*Mustela nigripes*	E
Canada Lynx	*Lynx canadensis*	T

[3] Wintering populations (only five known nesting pairs in Utah).
[6] Historical range.

The proposed action should be reviewed and a determination made if the action will affect any listed species or their critical habitat. If it is determined by the Federal agency, with the written concurrence of the Service, that the action is not likely to adversely affect listed species or critical habitat, the consultation process is complete, and no further action is necessary.

Formal consultation (50 CFR 402.14) is required if the Federal agency determines that an action is "likely to adversely affect" a listed species or will result in jeopardy or adverse modification of critical habitat (50 CFR 402.02). Federal agencies should also confer with the Service on any action which is likely to jeopardize the continued existence of any proposed species or result in the destruction or adverse modification of proposed critical habitat (50 CFR 402.10). A written request for formal consultation or conference should be submitted to the Service with a completed biological assessment and any other relevant information (50 CFR 402.12).

Candidate species have no legal protection under the Endangered Species Act (ESA). Candidate species are those species for which we have on file sufficient information to support issuance of a proposed rule to list under the ESA. Identification of candidate species can assist environmental planning efforts by providing advance notice of potential listings, allowing resource managers to alleviate threats and, thereby, possibly remove the need to list species as endangered or threatened. Even if we subsequently list this candidate species, the early notice provided here could result in fewer restrictions on activities by prompting candidate conservation measures to alleviate threats to this species.

Only a Federal agency can enter into formal Endangered Species Act (ESA) section 7 consultation with the Service. A Federal agency may designate a non-Federal representative to conduct informal consultation or prepare a biological assessment by giving written notice to the Service of such a designation. The ultimate responsibility for compliance with ESA section 7, however, remains with the Federal agency.

Your attention is also directed to section 7(d) of the ESA, as amended, which underscores the requirement that the Federal agency or the applicant shall not make any irreversible or irretrievable commitment of resources during the consultation period which, in effect, would deny the formulation or implementation of reasonable and prudent alternatives regarding their actions on any endangered or threatened species.

Please note that the peregrine falcon which occurs in all counties of Utah was removed from the federal list of endangered and threatened species per Final Rule of August 25, 1999 (64 FR 46542). Protection is still provided for this species under authority of the Migratory Bird Treaty Act which makes it unlawful to pursue, hunt, take, capture, or kill migratory birds, their parts, nests, or eggs (16 U.S.C. 703-712). When taking of raptors or other migratory birds is determined by the applicant to be the only alternative, application for federal and state permits must be made through the appropriate authorities. For take of raptors; nests occupied by eggs or nestlings; nests still essential to the survival of the juvenile bird; nestlings; or eggs, Migratory Bird Permits pursuant to 50 CFR parts 13 and 21 must be obtained through the Service's Migratory Bird Permit Office in Denver at (303) 236-8171.

We recommend use of the *Utah Field Office Guidelines for Raptor Protection from Human and Land Use Disturbances* which were developed in part to provide consistent application of raptor protection measures statewide and provide full compliance with environmental laws regarding raptor protection. Raptor surveys and mitigation measures are provided in the Raptor Guidelines as recommendations to ensure that proposed projects will avoid adverse impacts to raptors, including the peregrine falcon.

The following is a list of species that may occur within the project area and are managed under Conservation Agreements/Strategies. Conservation Agreements are voluntary cooperative plans among resource agencies that identify threats to a species and implement conservation measures to proactively conserve and protect species in decline. Threats that warrant a species listing as a sensitive species by state and federal agencies and as threatened or endangered under the ESA should be significantly reduced or eliminated through implementation of the Conservation

Agreement. Project plans should be designed to meet the goals and objectives of these Conservation Agreements.

Common Name	Scientific Name
Bonneville Cutthroat Trout	*Oncorhynchus clarki utah*
Colorado River Cutthroat Trout	*Oncorhynchus clarki pleuriticus*
Spotted Frog	*Rana luteiventris*

If we can be of further assistance or if you have any questions, please feel free to contact Marianne Crawford of our office at (801)975-3330 extension 134.

Sincerely,

Henry R. Maddux
Utah Field Supervisor

cc: Terry Hickman, Central Utah Water Conservancy District, 355 W. University Parkway, Orem, Utah 84058

Appendix E

UDWR Special Status Letter

State of Utah

Department of Natural Resources

Division of Wildlife Resources

ROBERT L. MORGAN
Executive Director

KEVIN K. CONWAY
Division Director

OLENE S. WALKER
Governor

GAYLE F. McKEACHNIE
Lieutenant Governor

July 27, 2004

Denny Mengel, Ph.D., C.P.S.S., C.F.
Senior Habitat Management and Planning Technologist
CH2M Hill
Boise, ID

Dear Dr. Mengel:

I am writing in response to your request dated July 27, 2004 for information regarding species of special concern proximal to a proposed hydroelectric project site at Jordanelle Dam in Heber City, Utah (T2S, R5E, Section 31).

The Utah Division of Wildlife Resources (UDWR) does not have records of occurrence for any threatened, endangered, or sensitive species within the proposed project area; however, there are recent records of occurrence within one mile of the project area for Columbia spotted frog and within two miles of the project area for bobolink and leatherside chub. In addition, there are historic records of occurrence within one mile of the project area for bald eagle. All of the aforementioned animal species are included on the *Utah Sensitive Species List*.

UDWR has recent records of occurrence for yellow-billed cuckoo with the nearest located approximately 4 miles south of the project area. In addition, there are historic records of occurrence for Canada lynx with the nearest located approximately 20 miles east of the project area.

UDWR also has recent records of occurrence for Ute Ladies' tresses (a federally-listed, threatened plant) within a two-mile radius of the proposed project area.

The information provided in this letter is based on data existing in the Utah Division of Wildlife Resources' central database at the time of the request. It should not be regarded as a final statement on the occurrence of any species on or near the designated site, nor should it be considered a substitute for on-the-ground biological surveys. Moreover, because the Utah Division of Wildlife Resources' central database is continually updated, and because data requests are evaluated for the specific type of proposed action, any given response is only appropriate for its respective request.

In addition to the information you requested, other significant wildlife values might also be present on the designated site. Please contact UDWR's habitat manager for the northern region, Mike Welch, at (801) 476-2776 if you have any questions.

Please contact our office at (801) 538-4759 if you require further assistance.

Sincerely,

Lenora B. Sullivan

Lenora B. Sullivan
Information Manager
Utah Natural Heritage Program

cc: Mike Welch, NRO

1594 West North Temple, Suite 2110, PO Box 146301, Salt Lake City, UT 84114-6301
telephone (801) 538-4700 • facsimile (801) 538-4709 • TTY (801) 538-7458 • *www.wildlife.utah.gov*

Appendix F

Release from Jordanelle in Provo River—ULS Data

P-1a

Spanish Fork - Provo Reservoir Canal Alternative (cfs)

Provo River Release from Jordanelle

Total

Water Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Average
1950	144	150	131	125	126	125	171	944	1,188	487	443	306	363
1951	143	150	150	150	150	150	141	1,160	1,234	470	435	376	394
1952	149	150	150	150	150	190	362	1,333	1,301	381	379	321	418
1953	149	127	133	127	128	130	153	427	1,435	531	464	316	343
1954	159	141	143	138	134	153	236	522	318	460	471	322	268
1955	157	140	139	139	140	133	150	405	572	574	478	333	281
1956	148	136	129	131	132	132	177	406	983	1,023	747	378	378
1957	161	132	131	129	126	134	154	288	1,313	902	566	322	364
1958	161	149	150	138	138	127	146	783	714	582	482	313	325
1959	159	132	135	134	132	131	185	465	696	549	482	293	292
1960	165	152	138	135	134	130	145	417	648	601	520	367	297
1961	151	150	137	137	136	133	154	300	422	465	423	265	240
1962	154	146	143	141	126	132	148	350	707	1,102	896	508	382
1963	164	138	143	141	136	134	147	449	813	895	542	279	333
1964	164	138	140	141	136	136	135	281	684	1,143	915	502	378
1965	152	143	130	136	130	139	136	392	1,142	769	392	415	340
1966	154	142	150	144	136	150	224	743	451	541	457	299	301
1967	161	133	132	133	132	128	142	355	774	610	541	433	307
1968	166	150	150	140	132	150	139	348	1,418	530	409	337	338
1969	165	150	150	142	150	137	136	1,283	1,105	446	360	264	375
1970	163	150	150	143	140	135	146	941	872	525	466	311	347
1971	164	150	150	150	150	159	140	900	1,582	489	433	287	397
1972	165	150	150	150	151	164	149	1,210	813	513	425	267	360
1973	161	150	150	150	150	153	127	802	1,189	475	412	334	355
1974	167	150	148	138	134	129	138	1,278	1,313	549	529	326	418
1975	158	146	144	137	137	129	139	397	1,643	898	556	358	404
1976	172	154	148	144	136	131	142	833	602	542	495	380	324
1977	158	141	136	138	137	135	174	234	318	335	288	326	210
1978	141	133	128	131	131	125	141	382	1,269	1,110	829	355	408
1979	162	133	136	136	134	145	143	385	438	561	466	304	263
1980	159	135	133	125	128	143	132	290	623	558	442	326	266
1981	158	162	158	136	133	131	167	491	965	476	404	271	305
1982	160	155	155	133	130	153	131	798	1,167	719	443	360	376
1983	152	163	145	139	257	1,204	133	479	1,617	744	460	430	495
1984	158	133	137	137	278	428	768	949	1,268	741	414	389	483
1985	142	138	133	134	131	125	562	1,288	651	571	526	371	400
1986	152	162	140	137	125	1,126	403	914	1,641	764	349	254	516
1987	141	143	140	150	140	226	511	999	348	541	631	488	373
1988	154	138	132	134	129	126	218	453	464	326	363	237	240
1989	166	142	138	139	136	141	252	546	793	649	452	266	319
1990	167	129	147	143	141	137	165	374	593	364	308	250	244
1991	154	147	140	142	137	131	166	329	617	611	423	286	274
1992	168	133	131	138	128	142	159	613	409	512	414	249	267
1993	167	126	126	126	126	126	129	351	736	673	434	245	281
1994	158	126	127	126	127	129	155	382	545	535	406	224	254
1995	148	133	130	126	128	127	156	353	476	1,427	570	238	337
1996	150	164	162	150	150	152	135	812	1,390	546	516	365	391
1997	159	150	150	150	150	125	582	1,092	1,069	657	416	320	419
1998	168	159	150	128	137	125	140	907	1,031	589	381	358	357
1999	133	159	137	136	125	143	409	978	1,086	638	457	374	399
Average	157	144	141	138	141	186	206	648	909	634	482	330	344
Maximum	172	164	162	150	278	1,204	768	1,333	1,643	1,427	915	508	516
Minimum	133	126	126	125	125	125	127	234	318	326	288	224	210

P-1a
Baseline Flow (cfs)
Provo River Release from Jordanelle
Total

Water Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Average
1950	144	150	131	125	126	125	171	947	1,188	487	443	306	363
1951	143	150	150	150	150	150	141	1,160	1,234	470	435	376	394
1952	149	150	150	150	150	190	362	1,333	1,301	381	379	321	418
1953	149	127	133	127	128	130	149	427	1,438	531	465	316	343
1954	154	141	139	133	130	149	232	516	310	449	460	311	262
1955	152	138	135	134	134	128	150	399	566	561	461	321	274
1956	148	136	129	131	132	132	177	406	987	1,028	750	378	379
1957	161	132	131	129	126	134	154	288	1,313	902	566	322	364
1958	161	150	150	138	138	127	146	783	715	582	482	313	325
1959	159	132	135	134	132	131	190	465	696	549	482	293	292
1960	165	152	138	135	134	130	145	417	652	606	523	368	298
1961	151	150	137	137	136	133	154	300	425	470	426	265	241
1962	154	150	143	141	126	132	148	350	709	1,107	900	509	383
1963	164	138	143	141	136	134	147	449	817	901	544	279	334
1964	164	138	140	141	136	136	135	282	693	1,158	933	518	383
1965	152	143	130	136	130	139	136	399	1,151	781	399	423	344
1966	154	144	150	144	136	150	229	751	461	561	474	306	307
1967	161	133	132	133	132	128	142	355	774	610	541	433	307
1968	166	150	150	140	132	150	139	348	1,418	530	409	337	338
1969	165	150	150	142	150	137	136	1,283	1,105	446	360	264	375
1970	163	150	150	143	140	135	146	941	872	525	466	311	347
1971	164	150	150	150	150	159	140	900	1,582	489	433	287	397
1972	165	150	150	150	151	164	149	1,210	813	513	425	267	360
1973	161	150	150	150	150	153	127	802	1,189	475	412	334	355
1974	167	150	148	138	134	129	138	1,278	1,313	549	529	326	418
1975	158	146	144	137	137	129	139	397	1,643	898	556	358	404
1976	167	153	146	141	132	127	139	832	597	532	481	369	319
1977	154	138	132	133	131	130	169	228	309	324	276	312	203
1978	141	133	128	131	131	125	141	382	1,269	1,110	829	355	408
1979	162	133	136	136	134	145	143	385	438	561	466	304	263
1980	159	135	133	125	128	143	132	290	623	558	442	326	266
1981	158	162	158	136	133	131	167	491	965	476	404	271	305
1982	160	159	155	133	130	157	131	798	1,167	729	458	372	380
1983	152	164	145	142	257	1,207	133	479	1,619	750	477	449	499
1984	158	133	137	137	278	428	768	949	1,268	754	424	405	486
1985	142	138	133	134	131	125	562	1,288	651	571	526	371	400
1986	152	162	140	137	125	1,126	403	914	1,641	764	349	254	516
1987	141	143	140	150	140	226	511	999	348	541	631	488	373
1988	154	138	132	134	129	126	218	453	464	325	363	236	240
1989	163	137	133	133	130	135	246	538	783	636	434	256	311
1990	161	125	141	137	136	132	161	369	588	355	296	239	237
1991	150	143	136	137	132	127	162	326	613	603	412	279	269
1992	164	130	128	134	125	138	155	608	405	503	405	244	263
1993	170	125	125	125	125	125	128	355	748	692	459	265	288
1994	157	125	127	125	126	128	154	392	563	566	438	237	263
1995	148	133	130	126	128	127	156	363	477	1,434	572	238	339
1996	150	164	162	150	150	152	135	812	1,390	546	516	365	391
1997	159	150	150	150	150	125	582	1,092	1,069	657	416	320	419
1998	168	159	150	128	137	125	140	907	1,031	589	381	358	357
1999	130	159	137	136	125	143	409	979	1,087	643	464	378	400
Average	156	144	140	137	140	186	205	648	910	636	483	331	344
Maximum	170	164	162	150	278	1,207	768	1,333	1,643	1,434	933	518	516
Minimum	130	125	125	125	125	125	127	228	309	324	276	236	203

Appendix G

Responses to Public Comments on the Draft Environmental Assessment Jordanelle Dam Hydroelectric Project

APPENDIX G

Responses to Public Comments on the Draft Environmental Assessment Jordanelle Dam Hydroelectric Project

Seven interested parties responded during the public comment period. They are listed in Table G-1. This appendix presents each comment letter, with comments delineated and a reference number assigned to each. On facing pages, the responses to the comments are presented and identified by reference number.

Where a comment response includes specific changes to the EA text, it is so indicated. In a few cases, an addition or revision of the EA text was in response to several different comments to clarify information already presented: Section 3.13, the surface water quality discussion under Section 3.8.4, and the discussion of project controls under Section 2.9.

TABLE G-1
Comment Letters

Reference Number	Agency	Date
1	Salt Lake County Fish and Game Association	April 24, 2005
2	Division of State History/Utah State Historical Society	May 13, 2005
3	Governor's Office of Planning and Budget	May 23, 2005
4	Utah Council, Trout Unlimited	May 24, 2005
5	U.S. Bureau of Reclamation	May 25, 2005
6	Provo River Water Users Association	June 1, 2005
7	U.S. Fish and Wildlife Service	June 1, 2005

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Comment Letter No. 1

Dan Potts
SLCF&GA
801-596-1536
April 24, 2005

Terry Hickman
CUWCD

RE: **Specific Comments on the Jordanelle Hydroelectric EA**

Mr. Hickman,

As you are well aware, I am mostly qualified to make comments on fish/fishery content, so I have limited them to that section only, as follows:

1-1 | **3.6.3 Jordanelle Reservoir, Para 2., Sent 3.**
Add: ", and is considered a world class smallmouth bass fishery."

1-2 | **Provo River Below Jordanelle Reservoir, Para 2., Last two sentences**
Reword; difficult to understand!

1-3 | **Para 4., Sent 2.**
Add: "Other" to "Native fishes ..." as there are native spp. in the previous.

1-4 | **Last sentence**
Reword this sentence to say: "Surveys of this study have demonstrated that the river restoration work of the PRRP has resulted in significant biomass and density increases of brown trout over the past 3 years (Hepworth, 2004a)."

1-5 | **Para 5., Sent 2.**
Remove: "... and is restricted to artificial flies and lures only".
This is untrue! A large proportion of the Provo R. below Jordanelle allow bait fishing, including the reach between the Midway Bridge and Deer Creek Reservoir, and the reach from the Olmstead Diversion to Utah Lake.

1-6 | **Last Paragraph**
If "there would be no impact" to this resource, then I see no need for this mostly trivial and inconsequential paragraph.

1-7 | **3.6.4 Alternative 2, Sent 3.**
Reword; difficult to understand (same sentence as in Provo River Below Jordanelle Reservoir, Para 2, above).

Thanks for the opportunity,
Dan Potts, Chairman, Fisheries Committee, SLCF&GA

1-1 The text has been revised as suggested.

1-2 The last two sentences have been reworded for clarification.

1-3 The text has been revised as suggested.

1-4 The text has been revised as suggested.

1-5 The text has been revised as suggested.

1-6 Thank you for your comment.

1-7 The last two sentences have been reworded for clarification.

Comment Letter No. 2

State of Utah

JON M. HUNTSMAN, JR.
Governor

GARY R. HERBERT
Lieutenant Governor

Department of Community and Culture
YVETTE DONOSSO DIAZ
Executive Director

Division of State History / Utah State Historical Society
PHILIP F. NOTARIANNI
Division Director

April 28, 2005

Terry J. Hickman
Environmental Programs Manager
Central Utah Water Conservancy District
355 West University Parkway
Orem UT 84058-7303

RE: Jordanelle Dam Hydroelectric Draft EA

In Reply Please Refer to Case No. 05-0413

Dear M. Hickman:

2-1 The Utah State Historic Preservation Office received information on your project referenced above on April 25, 2005. We have previously concurred with the recommendations for the project, and have no additional comment at this time. We appreciate being informed as to the progress of the project, and will be adding this information to the case file.

This information is provided to assist with Section 106 responsibilities as specified in §36CFR800. If you have questions, please contact me at (801) 533-3561. My email address is: christopherhansen@utah.gov

Sincerely,

Chris Hansen
Preservation Planner

CH:05-0413 OFR/NP

300 South Rio Grande, Salt Lake City, UT 84101 • telephone (801) 533-3500 • facsimile (801) 533-3503 • www.history.utah.gov

Page 1 of 1

2-1 Thank you for your comment.

Comment Letter No. 3

Jon M. Huntsman, Jr.
Governor

Gary R. Herbert
Lieutenant Governor

State of Utah

GOVERNOR'S OFFICE OF PLANNING AND BUDGET
Resource Development Coordinating Committee

John A. Harja
Executive Director

May 19, 2005

Terry Hickman
Central Utah Water Conservancy District
355 West University Parkway
Orem, Utah 84058-7303

SUBJECT: Project No. 05-5202

Dear Mr.Hickman:

The Resource Development Coordinating Committee (RDCC) appreciates the opportunity to review the draft Environmental Assessment for the Jordanelle Dam Hydroelectric Project. The Department of the Interior and the Central Utah Water Conservancy District are proposing the construction of a hydroelectric power development at the Jordanelle Dam in Wasatch County. The RDCC has reviewed the document, and would like to offer the following comments:

3-1 The General Overview chapter provides a good description of the project, but only half of the acronyms are explained. We recommend that they be clarified.

3-2 One of the potential concerns that might be raised by the local residents is the visual impact of the overhead transmission lines. We suggest including an illustration of the difference between typical 12.47kV and 138kV power lines.

The Committee appreciates the opportunity to review this proposal. Please direct any other written questions regarding this correspondence to the Resource Development Coordinating Committee at the above address or call Carolyn Wright at (801) 537-9230 or Kim Frost at (801) 538-7326.

Sincerely,

John Harja
Executive Director
Resource Development Coordinating Committee

5100 State Office Building, Salt Lake City Utah 84114 telephone (801) 537-9230 facsimile (801) 537-9226

Page 1 of 1

3-1 Acronyms are defined where they are first used throughout the document.

3-2 During the course of the EA process, Utah Power has completed all features of its new 138-kV transmission line and Jordanelle Substation. As a result, further definition of the expected 12.47-kV line construction along the route of this new 138-kV line can be provided.

In addition to its construction being within existing line easements, the 12.47-kV line may share existing pole structures along the county road where it parallels the 138-kV line. This arrangement will further reduce both visual and construction impacts. Figure 4 has been added to the EA and shows the profile of each type of line structure. The text has been revised.

Comment Letter No. 4

RECEIVED: 5-24-05
FILE CODE/REFERENCE:

Utah Council, Trout Unlimited
2348 Lynwood Dr
Salt Lake City, UT 84109
(801) 467-3862
May 23, 2005

Terry J. Hickman
Environmental Program Manager
Central Utah Water Conservancy District
355 West University Parkway
Orem, UT 84058-7303

Re: Utah Council, Trout Unlimited (UTU) comments on the Environmental Assessment (EA) for the Proposed Jordanelle Dam Hydroelectric Project

Dear Mr. Hickman:

Thank you for the opportunity to comment on the proposed hydroelectric project. The Provo River between the Jordanelle and Deer Creek reservoirs is one of the premier Blue Ribbon fisheries in the State of Utah. Anglers from nearly every state and many countries enjoy the experience of fishing this section of the Provo River. The economic impact of this activity is significant. Any action that has the potential to negatively impact this valuable resource needs a thorough evaluation.

Specifically, UTU has the following comments:

4-1 **Facility Operations**, Section 2.9 –
Page 2-8 and 2.9
This section includes the statement, "The dissolved oxygen content of releases made through the turbines is expected to be lower than releases made through the outlet works valves because the aeration produced by the valves would not occur". Also "It is anticipated that the project would be operated to minimize the head loss in the outlet works system to the greatest extent possible within the water quality constraints (the reservoir plan)". With the high potential for a reduction in dissolved oxygen immediately below the hydroelectric facilities' outlet works, it is essential that the plant control system is integrated (on a real time basis) with the water quality parameters being monitored (closed loop). In addition there is a need for an automated system backup to handle the contingency of a loss of the primary (computer) control system.

4-2 **Prevention of Water Pollution**, Section 2.10.5 –
Page 2-11, 2nd paragraph
It is not clear what the contractors' responsibilities are with respect to monitoring water quality during construction of the facility. Is the monitoring to be on an hourly, daily, weekly, basis? UTU recommends continuous monitoring.

4-1 A Project Control System (PCS) will integrate generating unit controls with those provided for project-level operations. The generation control system will provide protective functions as well as manual and automatic startup / shutdown of the units. The PCS will be an extension of CUWCD's existing supervisory control and data acquisition (SCADA) system, which currently monitors water releases, including quantities and quality. It will provide the capability of remote control and monitoring of the operation of Jordanelle Dam facilities. The generating units and the existing Outlet Works control valves will be automatically controlled together to release required flows from the dam. Unless water quality requirements dictate otherwise, releasing required flows through the generating units will be the priority. Should utility conditions or other protective functions shut down either or both generating units, the PCS will automatically open a control valve to maintain releases at their assigned value. A backup system will operate to maintain release of required flows under conditions of main control system failure.

Changes in flow release are made in steps that occur over the course of days (not minutes or seconds). Likewise, changes in water quality occur over similar time periods. The PCS will be provided with automatic control algorithms suited to the characteristics of some of the processes / parameters; however, operator alarms and control will continue to be used for other processes and parameters. The PCS design and adjustment, together with operator monitoring, control, and alarms, will be used to verify that required limits are not violated.

The existing measurement locations for flow releases and water quality parameters are at the dam outlet works and approximately 1,500 feet downstream of the Jordanelle Dam outlet works and proposed power plant tailrace. The existing measurement points in the dam facilities allow operator monitoring and control of operations and allow a comparison to the downstream compliance point. The downstream location is an established gauging location, coincides with project boundary, and is ideally-suited for project compliance purposes, as it provides a well-mixed sample of Provo River flow. Upstream locations will not reliably reflect the combined output of the Outlet Works Control Structure and the proposed hydroelectric power plant but provide the operators with more detailed data to compare to the compliance monitoring.

Text has been added to Section 2.9 to reflect this information.

4-2 The frequency of monitoring water quality by the contractor during construction activities will be dictated through the permit process.

Affected Environment/Water Temperature and Phosphorous, Section3.8.3 – Page 3-20

The language in this section that refers to impacts on water temperature ("it may be necessary" and "use of Monitoring and adaptive management") is very open ended. It implies that a considerable amount of time may pass in the process of determining specific actions that must be initiated to bring water temperature and Phosphorous levels back to established, water quality, limits. The UTU comments regarding Facility Operations (Section 2.9) are applicable to this section. Specifically, the facility should have a 'closed loop' control system. Closed loop is defined as the condition wherein plant control is based, in part, upon real-time telemetered water quality data.

4-3

We understand the concept of a run of the river hydro-electric facility. The premise is that generation is solely based on dam water releases necessary to meet established (non- power generation) water contracts. Other run of the river hydroelectric facilities have had the problem of a computer control system failure that results in severe/cyclical water releases from the dam. UTU recommends that operational controls be in place to prevent such a contingency.

We encourage your serious consideration of our recommendations. It would be unfortunate to negatively impact the Blue Ribbon fishery that now exists below Jordanelle.

If you have any questions regarding our comments, please do not hesitate to call me.

Sincerely,

Paul F. Dremann

Paul F. Dremann
Vice President, Conservation
Utah Council, Trout Unlimited

Cc: UTU Exec. Comm.
Don Wiley, UDWR
Mark Holden, URMCC
BRFAC

4.3 The language in Section 3.8.3, page 3-20 concerning moderation of temperature and phosphorus concentrations is in reference to steps that will be taken through the Water Quality Management Plan which was prepared to protect and improve the water quality of Deer Creek Reservoir and Jordanelle Reservoir (see Section 3.8.3). Temperature and phosphorus levels will continue to be monitored by the District. Reservoir releases for temperature and phosphorus will not be changed from the existing operation by the addition of hydroelectric facilities. Also, see the response to Comment 4-1.

Comment Letter No. 5

United States Department of the Interior

BUREAU OF RECLAMATION
Upper Colorado Region
Provo Area Office
302 East 1860 South
Provo, Utah 84606-7317

TAKE PRIDE IN AMERICA

IN REPLY REFER TO:

PRO-770
ENV-6.00

MAY 25 2005

Mr. Terry J. Hickman
Environmental Programs Manager
Central Utah Water Conservancy District
355 West University Parkway
Orem, UT 84058-7303

Subject: Bureau of Reclamation, Provo Area Office Comments on Draft Environmental Assessment (EA) of the Jordanelle Dam Hydroelectric Project

Dear Mr. Hickman:

We have reviewed the subject draft EA and note that most of our comments, provided as a cooperating agency on the preliminary draft EA, have been incorporated. We have only a few comments to submit at this time, most of which are minor:

5-1 1. Table 1-1, p. 1-4: The reference 6th from bottom in the left hand column to Section 106 compliance implies that there is a permit involved in this process. It would be more accurate to state that this is a consultation rather than issuance of a permit.

5-2 2. Same table, last entry: As noted in our comments on the preliminary draft EA, agreements for easements, rights of way, and access and entry permits are primarily the responsibility of Reclamation where such agreements or permits are needed in order to cross or access Reclamation land.

5-3 3. Page 2-5, Section 2.8, 3rd line from bottom of paragraph: The word 'as' should be inserted between 'so' and 'not.'

5-4 4. Page 2-14, Section 2.11.2, next to last line: Reference is made here to 'Table 4,' it appears that this reference should be to Table 2-3.

We appreciate the opportunity to review the draft EA. If you have any questions about our comments, please contact Ms. Beverley Heffernan at 801-379-1161.

Sincerely,

Bruce C. Barrett
Area Manager

Page 1 of 1

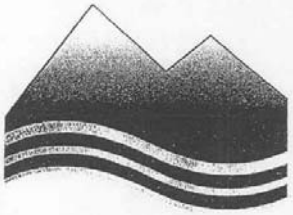
5-1 The table has been revised as suggested.

5-2 All necessary approval for easements, rights of way, access, and entry, within the leased premises shown on Figure 1 will be granted under the Jordanelle Dam Lease of Power Privilege Contract to be executed by both Interior and Reclamation following completion of NEPA compliance. If any additional authorization / approval by Reclamation is required beyond the rights granted in the Lease of Power Privilege contract, the approvals will be applied for by the Joint Lead Agencies.

5-3 The text has been revised as suggested.

5-4 The test has been revised as suggested.

Comment Letter No. 6



PROVO RIVER
WATER USERS
ASSOCIATION

June 1, 2005

Central Utah Water Conservancy District
Attn: Terry J. Hickman
Environmental Programs Manager
355 West University Parkway
Orem, UT 84058-7303

Re: Environmental Assessment of the Jordanelle Dam Hydroelectric Project

Dear Terry:

In response to your letter dated April 20, 2005 relative to the above, Provo River Water Users Association (the Association) respectfully submits the following comments to the April 2005 Environmental Assessment of the Jordanelle Dam Hydroelectric Project.

6-1 In general, the Association is supportive to the proposed Jordanelle Dam Hydroelectric Facility (Proposed Project) based on the assumption that its operation will not interfere with or adversely impact the Provo River Project (PRP). Specifically, the Association is concerned that the Environmental Assessment (EA) does not address:

6-2 (1) Whether the operation of the Proposed Project will result in a reduction of electrical energy and power at the Deer Creek Powerplant and if so, whether such reduction will be replaced or otherwise compensated, and

6-3 (2) Whether PRP water will be used by the Proposed Project to generate additional electrical energy and power and, if so, whether the PRP will be compensated therefor.

6-4 cont. Section 1.6.2 "Other Projects" (page 1-9) of the EA makes general references to the Provo River Project and the Deer Creek-Jordanelle Operating Agreement. It is suggested that this section be amended to clarify that the operation of the Proposed Project will comply with all provisions of the Deer Creek-Jordanelle Operating Agreement and particularly with provisions similar to paragraphs 30 and 31 covering

(a) replacement to PacifiCorp for all electrical energy and power reductions at the Deer Creek Powerplant which might result from the operation of the Proposed Project while PRP is operating under the 1938 Power Contract; and

285 WEST 1100 NORTH · PLEASANT GROVE, UT 84062 · 801.796.8770 · 801.254.2988 (SLC LINE) · 801.796.8771 (FAX) · www.prwua.org

Page 1 of 3

6-1 As stated in Sections 1.2.1, 1.3, 2.1, 3.8.3, and Appendix F of the EA, the proposed operation of the Jordanelle Dam Hydroelectric Facility would be secondary and incidental to other Central Utah Project purposes and, therefore, would not change or modify the existing operations of Jordanelle Dam and Reservoir. Consequently, there would be no interference or impacts to the Provo River Project that are not already addressed in the Deer Creek–Jordanelle Operating Agreement and previous NEPA compliance documents.

6-2 Because the proposed operation of the Jordanelle Hydroelectric Facility would not change operations of Jordanelle Dam and Reservoir, no change would occur in the flow regime at the Deer Creek Powerplant. Also, see Section 3.13, Mineral and Energy Resources.

6-3 See the response to Comment 6-1. Also, as stated in Section 2.9 and as shown in Appendix F of the Final EA, there would be no change in existing Central Utah Project operations and all water available at the Jordanelle Hydroelectric facility could be used for power generation. Because there would be no changes in operation, the proposed Jordanelle Dam Hydroelectric Facility would have no impact on any Provo River Project contractual rights previously addressed in the Deer Creek-Jordanelle Operating Agreement. Because there are no additional impacts on Provo River Project power facilities and/or water supply, no compensation to the Provo River Project is anticipated.

6-4 See the response to Comments 6-1 and 6-3. No changes to Section 1.6.2 are necessary.

Comment Letter No. 6

6-4 cont.

(b) replacement to PRP for all reductions in surplus electrical energy and power which might result from the operation of the Proposed Project.

6-5

It is suggested that the third paragraph of Section 1.6.2 be changed to read "The Weber River Project diverts approximately 5400 acre-feet of Echo Reservoir storage water by exchange through the Weber-Provo Canal to the Provo River. Provo Reservoir Water Users Company also diverts Weber River natural flow water to the Provo River through the Weber-Provo Canal. These waters are used for irrigation in the Heber Valley as well as for irrigation and municipal and industrial purposes in Utah and Salt Lake Counties."

6-6

It is also suggested that Sec. 1.6.2 be further amended to clarify whether PRP water will be used by the Proposed Project to generate additional electrical energy and power and, if so, whether PRP will be credited or otherwise compensated therefor.

6-7

There will be occasions when PRP imported water from the Weber River will flow through the Proposed Project in route to storage in Utah Lake under PRP Water Right No. 35-8756 (A12141). In addition, PRP water released from Jordanelle Reservoir pursuant to paragraph 10(b) of the Deer Creek-Jordanelle Operating Agreement will flow through the Proposed Project. The PRP should be credited or otherwise compensated for additional electric energy and power generated by the Proposed Project with PRP water under provisions similar to paragraph 32 of the Deer Creek - Jordanelle Operating Agreement covering credits to Central Utah Water Conservancy District (CUWCD) for additional electric energy and power generated at the Deer Creek Powerplant with Bonneville Unit (BU) water. The foregoing is further acknowledged and implemented by Contract No. 94-SLC-0259 for Replacement Power dated June 1, 1995 under paragraph 8 entitled Central / Western Deviation Account.

I trust that the foregoing will receive your favorable consideration and will be incorporated into the final Environmental Assessment of the Jordanelle Dam Hydroelectric Project. I would welcome the opportunity to discuss these issues with you.

Sincerely,
PROVO RIVER WATER USERS ASSOCIATION

G. Keith Denos, P.E.
General Manager

cc: Warren Peterson General Counsel

6-5 The text has been revised as suggested.

6-6 See the response to Comment 6-1 and 6-3. No changes to Section 1.6.2 are necessary.

6-7 See the response to Comment 6-1 and 6-3.

Comment Letter No. 6

bc: Joseph Novak Snow, Christensen & Martineau

Comment Letter No. 7

United States Department of the Interior
FISH AND WILDLIFE SERVICE

UTAH FIELD OFFICE
2369 WEST ORTON CIRCLE, SUITE 50
WEST VALLEY CITY, UTAH 84119

In Reply Refer To
FWS/R6
ES/UT
05-0736

June 1, 2005

Terry J. Hickman, Environmental Programs Manager
Central Utah Water Conservancy District
355 West University Parkway
Orem, Utah 84058-7303

RE: Jordanelle Dam Hydroelectric Draft Environmental Assessment

Dear Mr. Hickman:

The U.S. Fish and Wildlife Service (Service) has received your letter of April 20, 2005 requesting review and comment on the Draft Environmental Assessment (EA) for the Jordanelle Dam Hydroelectric Project (Project). We are providing the following comments for consideration in your EA.

7-1 The draft EA states that the Department of the Interior (DOI) has proposed to enter into a Lease of Power Privilege contract, to provide for construction, operation, and maintenance of a non-federal hydroelectric generation facility on Jordanelle Dam. Central Utah Water Conservancy District and Heber Light and Power were selected by DOI as the potential joint lessees for development of the Project. The Preferred Alternative includes construction of a powerhouse facility at the toe of the dam west of the existing outlet works. Hydropower generation will be incidental to the delivery of water for authorized Central Utah Project purposes including municipal and industrial water supply, irrigation supply, flood control, and fish and wildlife.

The power plant would house two horizontal Francis turbines, each rated at approximately 300 cubic-feet-per-second with output ratings of about 6 megawatts (MW). Generated electrical power would be transmitted to the site of interconnection with the utility's facilities via an overhead 3-phase power line. Design for all new power lines both temporary and permanent, will conform to designs shown in the Avian Power Line Interaction Committee's 1994 and 1996 publications.

7-1 The District emphasizes that operations will comply with the intent of the last sentence of Paragraph 2 of comments by USFWS, “Hydropower generation will be incidental to the delivery of water for authorized CUP purposes, including Municipal and Industrial Water supply, irrigation, flood control, and fish & wildlife.”

General Comments:

7-2 As stated in the EA, the Provo River Restoration Project is currently being implemented to restore a more natural channel dimension, pattern, and profile as well as ecological function to the reach of the Provo River between Jordanelle Reservoir and Deer Creek Reservoir. As you know, this restoration work represents a substantial investment in terms of land acquisition, construction activities, and coordination of local, state, and federal agencies. As such, modification to reservoir operations should in no way impact ecological processes in the middle Provo River.

7-3 The EA states that the proposed power plant would be operated during periods when the following two conditions are met: when reservoir elevation is high enough to permit effective turbine operation, and when such reservoir releases can meet the requirements of the Water Quality Management Plan (Plan). The effects of the Project's operations on dissolved oxygen will be of primary importance and continual regulation of water temperature and phosphorus levels will be important as well. Although the Plan is referred to several times in the document it is unclear what the specific Plan criteria are for dissolved oxygen and phosphorus. A more thorough description of the Plan should be provided in the EA that specifies specific water quality criteria, how these criteria have been met during past operation of the reservoir, and by what methods these criteria will be met with future reservoir and hydropower operations.

7-4 Additionally, the document states that a monitoring station is located downstream of the dam outlet and Timpanogos Canal diversion; however, more information should be provided specifying monitoring parameters, frequency, and adaptive management methods for adjusting water intake and water release if standards are not met.

7-5 Because of the important fishery resources in Jordanelle Reservoir, we recommend that the EA include an analysis of the potential for fish entrainment into the hydropower generation system. If appropriate, the Project's design should include fish screens at the intake structure for the turbines or other features to reduce or eliminate entrainment.

7-6 Below hydroelectric facilities, nitrogen supersaturation has the potential to negatively affect fish by causing gas-bubble disease. From the information contained in the EA it is unclear if the Project would have any negative effect on nitrogen levels in waters of the Provo River fishery. We recommend that the EA include an analysis of the potential for Project induced nitrogen supersaturation and gas-bubble disease.

7-7 Outdoor lighting should be designed to minimize indirect impacts to migratory birds, bats, and other nocturnal wildlife by reducing scatter and light trespass. We recommend directional, downward-facing lighting (e.g. no floodlighting or lighting on tall poles (recommend not exceed 25 feet tall)).

7-2 The Joint Lead Agencies concur. The Jordanelle Dam Hydroelectric Project is in conformance with approved NEPA documents that may be associated with the proposed project area.

7-3 The Joint Lead Agencies commit to maintain dissolved oxygen concentrations above the State and EPA standards. The District presently has a water quality monitoring station located at an established gauging location approximately 1,500 feet downstream of the outlet of the dam. The District will operate the facilities to maintain the standard and post water quality information on the District website for a reasonable period of time. This station (Provo River below Jordanelle) has real time (hourly) data for temperature, dissolved oxygen, pH, and conductivity and is transmitted into the District's SCADA system. Data from this site have been used to ensure temperature releases downstream and will continue to be used after hydroelectric facilities are in place. In addition, dissolved oxygen monitoring will be initiated in the tailrace of the hydropower plant and incorporated into the SCADA system.

Also, as stated in section 2.9, first paragraph, "Operations that mix and blend Jordanelle Reservoir water to meet requirements of the Water Quality Management plan (the Plan) for Deer Creek and Jordanelle Reservoirs would be unchanged under the proposed project (Psomas, 1999)." The Plan criteria for dissolved oxygen and phosphorus will be met regardless of the presence of the hydropower plant; therefore, the Plan criteria for dissolved oxygen and phosphorus are not relevant to this planning process.

7-4 See response to Comment 7-3. Data from both stations will be used to make adjustments to water intake and releases as described in the EA, Section 3.8.4, to ensure meeting state water quality standards.

7-5 Movement of fish through the outlet works of Jordanelle Dam is infrequent. The discharge of all or part of the release from Jordanelle Reservoir through hydroelectric turbines will not affect the potential or frequency of fish entrainment, nor is it expected to increase fish passage mortality. Under existing conditions of operation, or the No Action Alternative, any entrained fish enter the outlet works conduit at the reservoir intake structures. They would be discharged through the outlet works control valves, passing through the valve mechanism into the stilling basin at velocities often exceeding 100 feet per second. Mortality in entrained fish would be extremely high.

7-6 The presence of nitrogen supersaturation and the associated gas bubble disease (GBD) can negatively affect fish. Nitrogen supersaturation below hydraulic structures is typically associated with spillways where highly aerated flows are plunged deep into stilling basins, followed by deep, slow-moving downstream flow conditions. Part of the entrained air is driven into solution before it has risen to the surface and escaped into the atmosphere. The slow-moving, deep downstream flow conditions allow the condition to persist.

Generally, hydroelectric turbines have not been associated with this problem. However, in some cases, where low water levels and vortex-prone intake conditions are present, some elevation of gas saturation can occur.

The potential for the proposed facilities to create nitrogen supersaturation problems is very small. The design of the existing reservoir intakes are not prone to vortex formation and gates are operated to reduce intake velocities. Therefore, the potential for air entrainment is very limited. The proposed powerhouse tailbay configuration results in turbine draft tube exits that are only 14 to 16 feet below the tailwater surface elevation. The geometry of the tailbays and tailrace will produce consistent levels of turbulence and mixing. At the tailrace outlet, the depth of flow is reduced to only 3 to 4 feet. Shallow depth of flow and turbulence in the stilling basin pool and downstream channel are likewise conducive to the elimination of supersaturation.

Text has been added to Section 2.9 to reflect this information.

7-7 Powerhouse and area lighting will be provided for security, safety, and maintenance purposes. Offsite lighting will be minimized through use of cut-off luminaires. Directional lighting will be taken into account wherever possible.

Specific Comments

7-8 Page 3-19, second full paragraph. The first sentence is unclear. If the reader is to assume that the text should read "...historical monitoring has not found the LLOW level dissolved oxygen levels to be extremely low.", what is the criteria for making this assessment? Please explain.

7-9 Page 3-20, first paragraph. The EA states that use of the LLOW "may be" necessary to keep temperatures below 56 degrees F mid-July through September and that these operations may result in higher concentrations of phosphorus being released. It is unclear what criteria have been used to evaluate phosphorus concentrations in Jordanelle Reservoir and the Provo River. Also, no information has been provided to explain how releases have been managed for these water conditions. Please expand this discussion to include this information.

7-10 Page 3-21, fifth paragraph. This paragraph states that dissolved oxygen would be monitored "...at a nearby downstream location...". Please provide the location for this monitoring as well as method and frequency for monitoring protocol.

7-11 Page 3-21 last full paragraph. We do not believe enough information or analysis has been provided to determine whether Project operations will have an effect on Provo River natural resources. The Affected Environment water quality section of the document stated that current dissolved oxygen levels are approximately 8-9 mg/L as calculated for a monthly mean. The Impact Analysis water quality section does not provide a standard for dissolved oxygen. If the reader is to assume that the State of Utah or Environmental Protection Agency (EPA) standard will be used, this should be stated in the document and analysis should be provided that explains the effects of reduced dissolved oxygen levels on Provo River natural resources.

Page 3-22, 3.8.5 Cumulative Impacts. Please see comments in previous paragraph.

We appreciate the opportunity to provide these comments. If you need further assistance, please contact Paul Abate, Ecologist, at the letterhead address or (801) 975-3330 ext. 130.

Sincerely,

for Henry R. Maddux
Utah Field Supervisor

cc: URMCC (Attn: Mark Holden)
UDWR - Springville (Attn: Ashley Green)
UDWR - SLC (Attn: Rick Larson)
DOI - CUP Completion Act Office (Attn: Reed Murray)

7-8 The text has been revised as suggested. The Jordanelle outlet works have not been operated with the reservoir as low as elevation 6070 feet since the reservoir has been filled and historical monitoring has not found the LLOW level dissolved oxygen levels to be extremely low.

Temperature, dissolved oxygen, pH, and conductivity profiles have been taken approximately monthly on Jordanelle Reservoir since 1994 and will continue as stated in Section 3.8.4. Those data show that dissolved oxygen has never been less than 1.3 mg/L at the bottom, and only one time in over 70 data points at that concentration. Other reservoirs typically have dissolved oxygen concentrations at or near zero mg/L for several weeks when the reservoir is stratified.

7-9 Operations for managing temperature and/or phosphorus levels are not changed by the presence of the power plant. Therefore, it is not warranted to try to address the detailed operations of the LLOW nor the SLOW. Also, see response to Comment 7-3 and Comment 4-3.

7-10 See the response to Comment 7-3 and 7-4.

7-11 The Joint Leads can only commit to maintain dissolved oxygen above the State and EPA standards. It is the Joint Leads understanding that fish do not appear to be negatively impacted by these standards. In addition, see the response to Comment 7-3 and 7-4.

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