

**Application Review  
for  
Low Impact Hydropower Institute Certification of the  
Jordanelle Dam Hydroelectric Project**

**Prepared by Fred Ayer  
Executive Director, LIHI**

**Note:** *This is an unusual LIHI certification application and as you read this report, you may want to keep several things in mind:*

*The project before you is not licensed with FERC, but is authorized through a lease of power privilege which is an alternative within the Department of the Interior(DOI) to development of a federal hydropower project;*

*The Large federal project which consists of the Jordanelle Dam and Jordanelle Reservoir was built as part of the Central Utah Project and its prime purpose is water delivery;*

*The development of a hydroelectric facility will not change the operation of Jordanelle Dam and Reservoir<sup>1</sup>;*

*The generation of electricity at the Jordanelle Dam Hydroelectric Project (the Applicant's Project) is incidental to water delivery for authorized purposes. Including municipal and industrial water supply, irrigation, flood control, and fish and wildlife; and,*

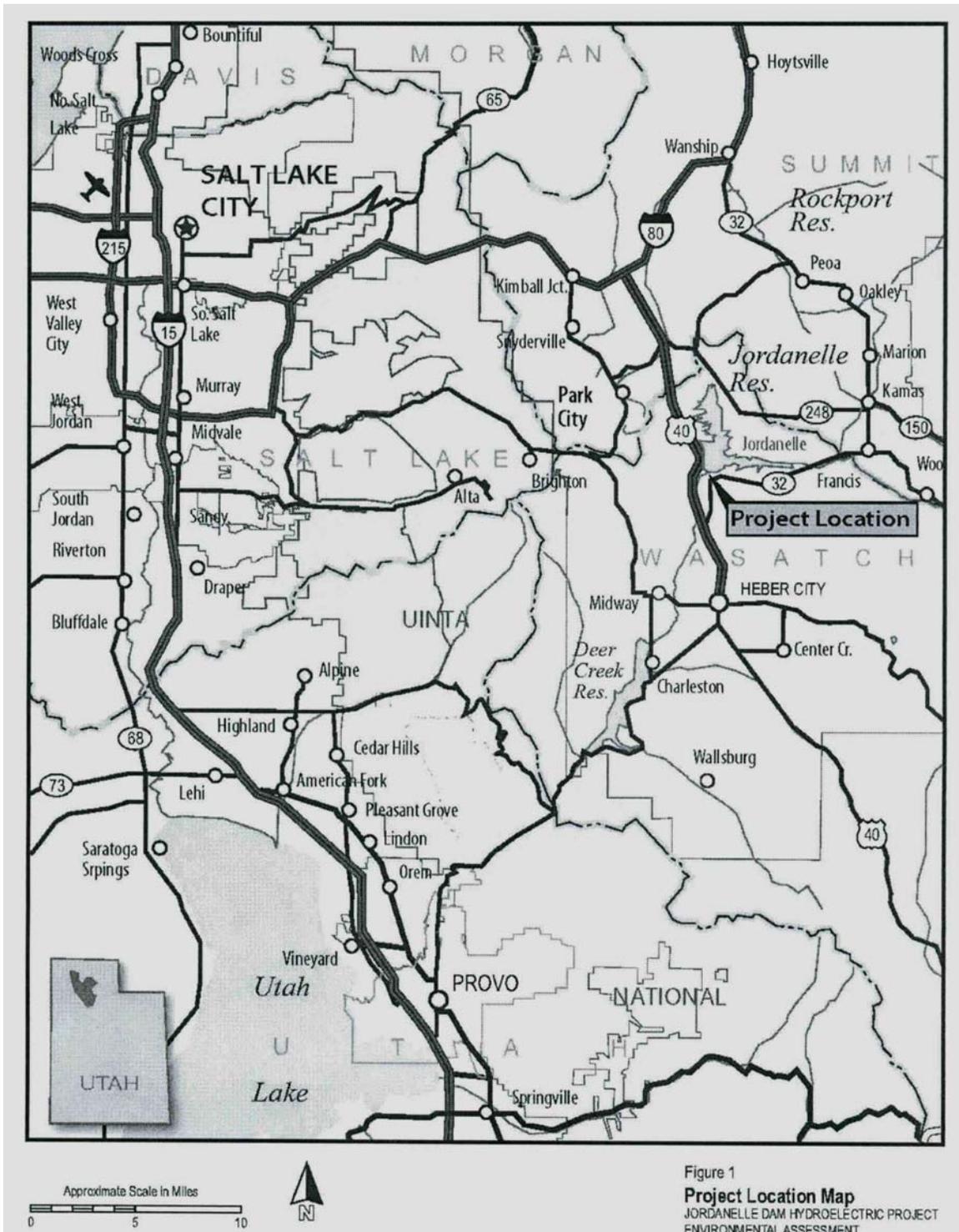
*An important issue in your deliberations on the Jordanelle Dam Hydroelectric Project is its relationship to and potential to impact the Provo River Restoration Project.*

## **Introduction and Overview**

This report reviews the application submitted by Central Utah Water Conservancy District (CUWCD) for LIHI Certification for the Jordanelle Dam Hydroelectric Project (JDHP). The JDHP is located on the downstream side of Jordanelle Dam below Jordanelle Reservoir. Jordanelle Dam and Jordanelle Reservoir are located on the Provo River in Wasatch County, Utah approximately 4 miles north of Heber City, Utah.

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<sup>1</sup> Department of the Interior, February 2, 2004, Notice of Intent To Prepare a Draft Environmental Assessment for 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, Central Utah Project



The Project is not licensed by the Federal Energy Regulatory Commission (FERC) but is authorized through a lease of power privilege from the Department of the Interior (DOI), Bureau of Reclamation's (BurRec) Central Utah Project (CUP) which is an alternative to DOI for development of federal hydropower. 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 the hydropower at Jordanelle Dam under a lease of power privilege.

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 BurRec legal statutes includes among others, the Town Sites and Power Development Act of 1906 and the Reclamation Project Act of 1939. Development of a federal power project for the Jordanelle Dam, because by December 2002, when federal power was authorized for funding, Department of the Interior (DOI) had already selected a potential lessee and entered into negotiations.

In 2005, an Environmental Assessment (EA) was prepared pursuant to the National Environmental Policy Act (NEPA) of 1969. The DOI/CUPCA Office and CUWCD were Joint Lead Agencies for preparation of the EA. The BurRec and the Utah Reclamation, Mitigation, and Conservation Commission served as cooperating agencies for the NEPA analysis.

The EA addresses several purposes of the project, which include:

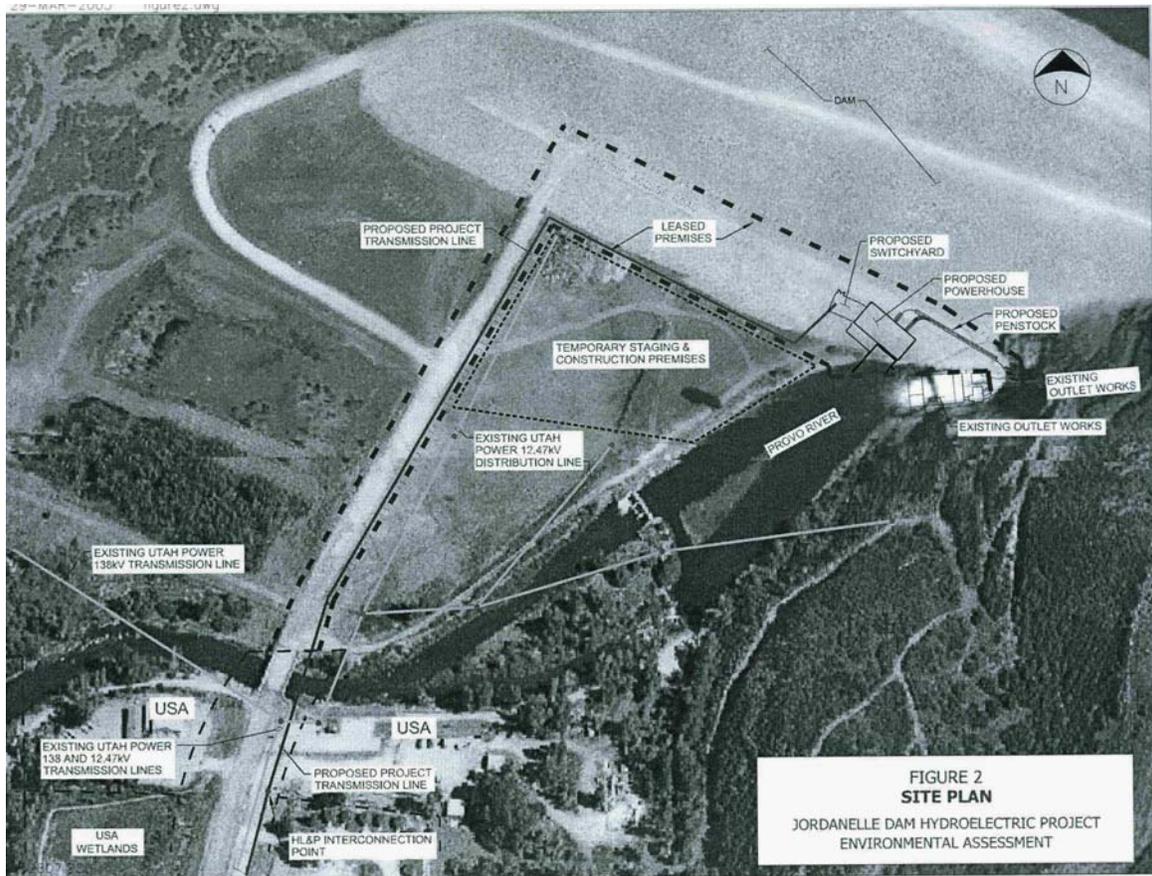
- Allow the execution of a Lease of Power Privilege for the Jordanelle Dam Hydroelectric Project
- Allow the construction, operation, and maintenance of facilities and transmission lines associated with the Jordanelle Dam Hydroelectric Project
- Meet the objectives of hydroelectric power potential at Jordanelle Dam, which is a CUP facility, as authorized through the Colorado River Storage Project (CRSP) Act of April 11, 1956
- 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 includes municipal and industrial water supply, irrigation supply, flood control, and fish and wildlife
- Protect water quality in Jordanelle Reservoir and the Provo River

This EA updates and uses information and data from the 2004 Final EIS for the Utah Lake Drainage Basin Water Delivery System (ULS) and the Municipal and Industrial System (M&I) Final Supplement relative to the construction of a hydroelectric power plant and associated facilities. The operation of the Jordanelle Dam and Reservoir with the new hydroelectric project in place will remain the same as described in the 2004 ULS EIS.

The EA found no significant issues associated with implementing the project, a Finding of No Significant Impact (FONSI) was prepared by the Lead Agencies. The project is currently under construction and is scheduled for completion and commercial operation in mid 2008.

## Facility Description

**Dam** – While the dam is a critical component of the Applicant’s project it was not built primarily to “host” a hydro project. We are being asked to certify the hydro component which of necessity uses the host dam to make the hydro work. While we are not certifying the dam, it is important that we know how it works, so I’ve included some general information on the dam.



Jordanelle Dam is a rolled earthfill structure with a fuse plug emergency spillway and outlet works. The reservoir has a storage capacity of 311,000 acre-feet at elevation 6,166.4 feet. The total reservoir storage capacity is 361,500 acre-feet at elevation 6,182.0.

The rolled earth embankment section of Jordanelle Dam has a structural height of 300 feet and a crest length of 3820 feet at elevation 6185.0 feet. The emergency fuse plug spillway is located near the left abutment and consists of an unlined inlet channel, a concrete lined trapezoidal channel, an earthen plug section, a concrete chute, and a 9.5-foot by 10-foot concrete double box conduit. The design flow of the spillway is 5,510 cfs at elevation 6182.0 feet.

The outlet works is located within the left abutment and consists of two primary outlet works intake structures one (LLOW) Low level outlet works and one (SLOW) selective level outlet works merging into a common outlet pipe and a bypass system. The capacities

for the outlet works are 3,269 cfs and 2,153 cfs respectively at elevation 6,086.7. The bypass system taps into both the SLOW and LLOW upstream of the emergency gates with a capacity of 300 cfs at elevation 6,166.0 feet.

The primary purpose of the reservoir is to provide municipal and irrigation water for use in Salt Lake City and northern Utah County. Additional project purposes include flood control, recreation, Heber Valley irrigation water, and fish and wildlife enhancement.

**Powerhouse** - The powerhouse is a reinforced concrete structure located partially within the rock berm at the toe of the dam, west of the existing outlet works. The penstock is constructed from the 72-inch-diameter connection in the outlet conduit and then routed to the powerhouse where it bifurcates into two 66-inch-diameter pipes feeding the turbines.

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

The major equipment located on the turbine floor includes 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 powerhouse arrangement includes 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 is isolated from the turbine floor and sound-proofed to provide a quiet space for the operator. It is located above the turbine floor to protect the equipment from potential flooding, and is located near the plant substation to minimize conduit and cable runs.

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

The 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 project is expected to generate 39,000 MWH annually.

**Transmission Facilities** - The generated electric power will be transmitted to the site of interconnection with the utility's facilities via a new, and upgraded existing, overhead 12.47-kV, 3-phase, wood pole assemblies. A pole-mounted isolation switch will be installed. Metering will be performed by the existing HL&P system, and at the Jordanelle Dam Hydroelectric Project powerhouse.

### **Provo River Restoration Project (PRRP)**

The origin of the PRRP is closely tied to federal reclamation projects in Utah, especially the Central Utah Project (CUP) and the Provo River Project. The CUP is a large water development project that transfers water normally flowing to the Colorado River to the Bonneville Basin through a series of pipes, aqueducts and reservoirs. As a consequence of CUP construction, fish and wildlife habitat have been negatively affected. For example, water was diverted out of streams on the south slope of Uintas for storage in Strawberry Reservoir which in some instances eliminated fish habitat. There exists an obligation on the part of the federal government to mitigate these impacts to fish and wildlife.

The PRRP is also being undertaken under the general authority of the Secretary of the Interior to manage and correct problems arising from federal reclamation projects. The Provo River Project was authorized in 1933 and constructed during the 1940s and 1950s. Specifically, the Provo River Channel Revision component of the project led to the diking and channelization of much of the Provo River in Heber Valley. Impacts to fish and wildlife habitats were not systematically evaluated or mitigated. Prior to 1992, mitigation measures included angler access and stream habitat improvement projects on numerous streams in the Bonneville Basin.

In 1992, Congress created the Utah Reclamation Mitigation and Conservation Commission (Mitigation Commission) to assure that mitigation for the CUP and other federal reclamation projects in Utah was accomplished. With the creation of the Mitigation Commission, new standards were imposed on mitigation projects that can be summarized as an "ecosystem restoration" standard. With this mandate the Mitigation Commission was directed to support mitigation projects that integrated multiple aspects of the environment. For example, rather than just putting water back into streams for fish, a

project should also include the water necessary to support streamside vegetation that is a critical component of healthy fish habitat.

In 1999, the Utah Reclamation Mitigation and Conservation Commission began the Provo River Restoration Project (PRRP) between Jordanelle Dam and Deer Creek Reservoir to restore the middle Provo River's pattern and ecological function to a more natural condition. The project is expected to be complete in 2007.

PRRP consists of restoring the straightened river channel to a meandering channel mimicking historic conditions, reconnecting the river to existing remnants of historic secondary channels, and constructing small side channels to recreate aquatic features. The project will provide a protected 800 to 2,200-foot-wide corridor along the entire reach of the restored middle Provo River for angler access and wildlife habitat. Existing levees are being set back to create a near natural flood plain and to allow the river to change course naturally. Planting and fostering streamside vegetation will provide necessary environment for healthy fisheries. Side channels and ponds will improve fish habitat and create habitat for wetland dependent wildlife. Baseline monitoring of riparian habitat, physical features, sensitive species, neotropical migratory birds and related studies are underway.

Utah Division of Wildlife Resources and U.S. Bureau of Reclamation construction crews helped initiate the project by carving new meanders, side channels and wetland ponds in a pilot project along approximately 1.5 miles of river corridor near the new Highway 40 river crossing. In 2000, about 1.3 miles of river reconstruction was completed starting beneath the bridge over Highway 40 and ending at River Road in Midway. Similar to the pilot project, main channel, secondary channel and wetlands features were created. In 2001, work began on a 2-mile reach of the Provo River that was completed the spring of 2002. In December 2002, crews completed reconstructing about 0.9 miles of river immediately upstream from the pilot project, above Cottonwood Canyon bridge to below Jordanelle Dam. Much farther downstream, below Midway Lane in Midway, reconstruction of two additional miles began in 2003, with work continuing in the area through 2004. In 2005, restoration began an approximately one and a half miles of river downstream from the bridge over River Road in Midway. Work continued in 2006. Six angler access sites have also been completed along the restored river areas with parking lots, trash receptacles, educational displays and new restrooms.

Public comment – The Institute did not receive any comments during or after the 60-day Public Comment period (June 10, 2007 to August 10, 2007).

General conclusions. The project's design, location, topography, and geology have resulted in a project that appears to be consistent with LIHI criteria even though it is not FERC licensed. This project is similar to several other projects the Board has certified and that are located at federal facilities and use the existing dam

Recommendation. Based on my review of information submitted by the applicant, my review of additional documentation, and my consultations with resource agency staff, I believe the Jordanelle Dam Hydroelectric Project meets the LIHI certification criteria. While this project is unusual for us, in that it is not under FERC jurisdiction, it is very similar to several other projects that we have certified. Without the hydro facility in place the Jordanelle Dam discharges the water downstream through penstock and valves in accordance with flows described in this report. The Jordanelle Dam Hydro Project merely replaces the penstock and valves with a power house, penstock, and hydro turbines and continues with the required flows.

## LIHI Certification Criteria

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### A. Flows:

#### Criteria

- 1) **Is the facility in Compliance with Resource Agency Recommendations issued after December 31, 1986 regarding flow conditions for fish and wildlife protection, mitigation and enhancement (including in-stream flows, ramping and peaking conditions, and seasonal and episodic instream flow variations) for both the reach below the tailrace and all bypassed reaches?**

**YES** *go to B*

In accordance with the Department of Interior's 2004, Notice of Intent for the Draft Environmental Assessment for a Lease of Power Privilege of a Non-Federal Hydroelectric Generation Facility on Jordanelle Dam, the development of a hydroelectric facility will not change the operation of Jordanelle Dam and Reservoir.

The following table shows expected average, maximum, and minimum flows immediately downstream of Jordanelle Dam. The Applicant will operate the hydro facility in accordance with these flow ranges.

#### 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.

**NOT APPLICABLE** *go to A2*

- 2) **If there is no flow condition recommended by any Resource Agency for the Facility, or if the recommendation was issued prior to January 1, 1987, is the Facility in Compliance with a flow release schedule, both below the tailrace and**
- 3) **in all bypassed reaches, that at a minimum meets Aquatic Base Flow standards or “good” habitat flow standards calculated using the Montana-Tennant method?**

**YES** *go to B*

**NO** *If no, go to A3.*

- 4) **If the Facility is unable to meet the flow standards in A.2., has the Applicant demonstrated, and obtained a letter from the relevant Resource Agency confirming that demonstration, that the flow conditions at the Facility are appropriately protective of fish, wildlife, and water quality?**

**NO** *fail*

**YES** *go to B*

**PASS**

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## **B. Water Quality:**

- 1) **Is the Facility either:**
  - a) **In compliance with all conditions issued pursuant to a Clean Water Act Section 401 water quality certification issued for the facility after December 31, 1986? Or**
  - b) **In Compliance with the quantitative water quality standards established by the state that support designated uses pursuant to the federal Clean Water Act in the Facility area and in the downstream reach?**

**YES** *go to B2*

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.

The applicant commits to maintaining 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.

Temperature, dissolved oxygen, pH, and conductivity profiles have been taken approximately monthly on Jordanelle Reservoir since 1994 and will continue. 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.

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.

**2) Is the Facility area or the downstream reach currently identified by the state as not meeting water quality standards (including narrative and numeric criteria and designated uses) pursuant to Section 303(d) of the Clean Water Act?**

*NO pass*

**3) If the answer to question B.2. is yes, has there been a determination that the Facility is not a cause of that violation?**

*YES pass*

*NO fail*

**PASS**

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**C. Fish Passage and Protection:**

**Background Notes:** The hydropower project will essentially straddle a recognized Blue Ribbon (brown trout) Fishery in the reservoir and a Blue Ribbon fishery in the reconfigured Provo River. 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 below the dam. To put this in context it is helpful to know something about the reservoir (not part of this certification) and the Provo River below the reservoir (not part of this certification).

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.

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.

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 (see Flows).

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.

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 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.

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.

**1) Is the facility in compliance with Mandatory Fish Passage Prescriptions for upstream and downstream passage of anadromous and catadromous fish issued by Resource Agencies after December 31, 1986?**

**NOT APPLICABLE** go to C2

The dam was built in 1993 with the understanding that fish passage would not be provided because of the high velocity water released from the valves and the lack of migratory species. The hydropower plant will not change the status of the operation of the dam. Also, there are no anadromous and/or catadromous fish in the area. Any fish that may have historically moved from Utah Lake up the river to spawn, are blocked by multiple diversion structures that serve as fish passage barriers and Deer Creek Reservoir. All of which lay downstream of Jordanelle Dam and the hydropower plant.

**2) Are there historic records of anadromous and/or catadromous fish movement through the facility area, but anadromous and/or catadromous fish do not presently move through the Facility area (e.g., because passage is blocked at a downstream dam or the fish run is extinct)?**

**NO** Go to C3

- a) **If the fish are extinct or extirpated from the Facility area or downstream reach, has the Applicant demonstrated that the extinction or extirpation was not due in whole or part to the Facility?**
- b) **If a Resource Agency Recommended adoption of upstream and/or downstream fish passage measures at a specific future date, or when a triggering event occurs (such as completion of passage through a downstream obstruction or the completion of a specified process), has the Facility**

**c) owner/operator made a legally enforceable commitment to provide such passage?**

**YES** *Go to C2b*

**N/A** *Go to C2b*

**NO** *fail*

**3) If, since December 31, 1986:**

**a) Resource Agencies have had the opportunity to issue, and considered issuing, a Mandatory Fish Passage Prescription for upstream and/or downstream passage of anadromous or catadromous fish (including delayed installation as described in C2a above), and**

**b) The Resource Agencies declined to issue a Mandatory Fish Passage Prescription,**

**c) Was a reason for the Resource Agencies' declining to issue a Mandatory Fish Passage Prescription one of the following: (1) the technological infeasibility of passage, (2) the absence of habitat upstream of the Facility due at least in part to inundation by the Facility impoundment, or (3) the anadromous or catadromous fish are no longer present in the Facility area and/or downstream reach due in whole or part to the presence of the Facility?**

**NO** *Go to C5*

**5) Is the Facility in Compliance with Mandatory Fish Passage Prescriptions for upstream or downstream passage of riverine fish?**

**If NOT APPLICABLE** *go to C6*

**6) Is the facility in Compliance with Resource Agency Recommendations for Riverine, anadromous and catadromous fish entrainment protection, such as tailrace barriers?**

**YES** *Pass, go to D*

The Jordanelle Dam Hydropower Plant is located at the base of Jordanelle dam. The dam was built with the understanding that fish passage would not be provided because of the high velocity water released from the valves. However, water temperature can be adjusted

from the selective level inlet structure to provide for water quality and fish and wildlife benefits. Water is released from the dam through a selective level and or low level inlet structure through piping and tunnels to the outlet works. The outlet works consists of two

72 inch fixed cone valves and a bypass jet flow valve. Under the current condition fish are unable to swim past the fixed cone valves. After power plant construction, fish still will be unable to swim past the turbine and dam.

The facility will have no impact on Riverine fish. Movement of fish through the outlet works of Jordanelle Dam is infrequent. The discharge of all or part of the release from

Jordanelle Dam through hydroelectric turbines will not affect the potential or frequency of fish entrainment, nor is it expected to increase fish passage mortality.

Operating procedures established by the Bureau of Reclamation in 1993 for the selective level outlets works of the reservoir only allow velocities in excess of 10 feet per second in an emergency. Normal operations on any given gate are always less than 10 feet per second. The addition of a power plant will not change this criteria.

The environmental assessment for the Jordanelle Dam Hydroelectric Project was reviewed by federal, state and local wildlife agencies. No comments were received from any of these agencies concerning fish passage.

## PASS

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### D. Watershed Protection:

**1 ) Is there a buffer zone dedicated for conservation purposes (to protect fish and wildlife habitat, water quality, aesthetics and/or low-impact recreation) extending 200 feet from the high water mark in an average water year around 50 - 100% of the impoundment, and for all of the undeveloped shoreline**

**YES** *Pass, go to E and receive 3 extra years of certification*

#### Jordanelle Reservoir Management Boundary

As part of the planning process prior to construction of the Jordanelle Reservoir, a Water Quality Management Plan was established. The plan represents several years of intensive study by a multiagency (state, local, and federal) committee under the direction of the Utah State Division of Environmental Health. The State certified the plan in December, 1984. The Environmental Protection Agency has approved both the plan and the implementation program for the plan.

The plan included components or commitments for each agency involved. One of the components that the Bureau of Reclamation was responsible for was to establish an

appropriate management boundary around the reservoir which includes provisions for water quality protection by establishing a buffer zone around the shoreline. The buffer zone was established with consideration given to: water quality protection, protecting the reservoir from potential development, recreation development, wildlife mitigation, and geology/slope stability.

**2 ) Has the facility owner/operator established an approved watershed enhancement fund that: 1) could achieve within the project's watershed the ecological and recreational equivalent of land protection in D.1.,and 2) has the agreement of appropriate stakeholders and state and federal resource agencies?**

**YES** *Pass, go to E and receive 3 extra years of certification*

**NO** *go to D3*

**3 ) Has the facility owner/operator established through a settlement agreement with appropriate stakeholders and that has state and federal resource agencies agreement an appropriate shoreland buffer or equivalent watershed land protection plan for conservation purposes (to protect fish and wildlife habitat, water quality, aesthetics and/or low impact recreation)**

**YES** *Pass, go to E*

**NO** *Go to D4*

**4 ) Is the facility in compliance with both state and federal resource agencies recommendations in a license approved shoreland management plan regarding protection, mitigation or enhancement of shorelands surrounding the project.**

**YES** *Pass, go to E*

**NO** *fail*

**PASS**

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**E. Threatened and Endangered Species Protection:**

**1) Are threatened or endangered species listed under state or federal Endangered Species Acts present in the Facility area and/or downstream reach?**

**YES** *Go to E2*

The federal threatened and endangered (T&E) species that were addressed in the Jordanelle Dam EA include the threatened bald eagle (*Haliaeetus leucocephalus*), the endangered black-footed ferret (*Mestelo nigripes*), and the threatened Canada lynx (*Lynx canadensis*).

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 Columbia spotted frog. The Bonneville cutthroat trout and spotted frog are known to

occur in or along the Provo River downstream of the project area. The Colorado River cutthroat trout is not known to exist between the Jordanelle Dam and Deer Creek Reservoir.

The US Fish and Wildlife Service finds that the Columbia spotted frog is not warranted' for listing under the Endangered Species Act because of successful mitigation efforts, in part by the Utah Reclamation Mitigation and Conservation Commission on the Middle Provo River just below Jordanelle Dam. If new information indicating that the level of threats

have become more severe or the status of the spotted frog or its habitat degenerates in the future, the status of the spotted frog will be reevaluated.

### **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.

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 and there would be "No Effect" to bald eagle from the construction and operation of the hydropower project.

### **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. 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. Ferret range is coincident with that of prairie dogs. No documentation exists of black-footed ferrets breeding outside of prairie dog colonies.

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. 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. No ferrets have been introduced in the vicinity of this project, and ferrets are not known to occur in the project area.

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 the construction and operation of the hydropower project.

### **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. In Canada and Alaska, lynx habitat is the classic boreal forest ecosystem known as the taiga. Within these general forest types, lynx are most likely to persist in areas that receive deep snow, for which the lynx is highly adapted.

According to the Forest Service, 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. 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.

Canada lynx have not been reported in the project area. However, a 2004 sighting of a single individual on Heber Mountain has been reported. There have been historical sightings of lynx with the nearest occurrence located approximately 20 miles east of the project location. Canada lynx habitat does not occur in the project area. There may be occasional individuals moving between habitats, but this is not likely to occur during the "outside" construction season. There would be "No Effect" to Canada lynx from the construction and operation of the hydropower project.

- 2) If a recovery plan has been adopted for the threatened or endangered species pursuant to Section 4(f) of the Endangered Species Act or similar state provision, is the Facility in Compliance with all recommendations in the plan relevant to the Facility?**

**NOT APPLICABLE** *Go to E3*

- 3) If the Facility has received authority to Incidentally Take a listed species through: (i) Having a relevant agency complete consultation pursuant to ESA Section 7 resulting in a biological opinion, a habitat recovery plan, and/or (if needed) an incidental take statement; (ii) Obtaining an incidental take permit pursuant to ESA Section 10; or (iii) For species listed by a state and not by the federal government, obtaining authority pursuant to similar state procedures; is the Facility in Compliance with conditions pursuant to that authority?**

**NOT APPLICABLE** *Go to E5*

- 4) If a biological opinion applicable to the Facility for the threatened or endangered species has been issued, can the Applicant demonstrate that:**
- a) The biological opinion was accompanied by a FERC license or exemption or a habitat conservation plan? Or**
  - b) The biological opinion was issued pursuant to or consistent with a recovery plan for the endangered or threatened species? Or**
  - c) There is no recovery plan for the threatened or endangered species under active development by the relevant Resource Agency? Or**

**d) The recovery plan under active development will have no material effect on the Facility's operations?**

**YES** *Pass, go to F*

**5) If E2 and E3 are not applicable, has the Applicant demonstrated that the Facility and Facility operations do not negatively affect listed species?**

**YES** *Pass, go to F*

**PASS**

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**F. Cultural Resource Protection:**

**Criteria:**

**1) If FERC-regulated, is the Facility in compliance with all requirements regarding Cultural Resource protection, mitigation or enhancement included in the FERC license or exemption?**

**NOT APPLICABLE** *Go to F2*

**2) If not FERC-regulated, does the Facility owner/operator have in place (and is in Compliance with) a plan for the protection, mitigation or enhancement of impacts to Cultural Resources approved by the relevant state or federal agency or *Native American Tribe*, or a letter from a senior officer of the relevant agency or Tribe that no plan is needed because Cultural Resources are not negatively affected by the Facility?**

**YES** *Pass, go to G*

The applicant submitted a report prepared by Sagebrush Archaeological Consultants entitled Jordanelle Dam Hydroelectric Project. The Utah State Historic Preservation Office received the report which states that no cultural resources were located in the project area. The SHPO concurs with the report's conclusion that no historic properties are affected by the project.

**PASS**

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**G. Recreation:**

**Criteria:**

- 1) If FERC-regulated, is the Facility in Compliance with the recreational access, accommodation (including recreational flow releases) and facilities conditions in its FERC license or exemption?**

**NOT APPLICABLE** *Go to G2*

- 2) If not FERC-regulated, does the Facility provide recreational access, accommodation (including recreational flow releases) and facilities, as Recommended by Resource Agencies or other agencies responsible for recreation?**

**YES** *Go to G3*

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).

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 dolomieu*; 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 (*Catostornus arc/ens*), black crappie (*Pomoxis nigromaculatus*) (Hepworth, 2004), and brook trout (*Salvelinus fontinalis*; UDEQ, 2004).

- 3) Does the Facility allow access to the reservoir and downstream reaches without fees or charges?**

**YES** *Pass, go to H*

**PASS**

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**H. Facilities Recommended for Removal:**

- 1) Is there a Resource Agency recommendation for removal of the dam associated with the Facility?**

**NO** *Pass, Facility is Certified*

**PASS**  
**FACILITY IS CERTIFIED**

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## RECORD OF CONTACTS WITH RESOURCE AGENCY STAFF

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Date of Conversation: October 23 and 26, 2007  
Application Reviewer: Fred Ayer, Executive Director  
Person Contacted: Mark Holden, Biologist  
Utah Reclamation, Mitigation, and Conservation  
Commission (URMCC)  
Telephone/email: 801-524-3146  
Areas of Expertise: NEPA Compliance Mitigation Implementation

Mark explained to me that the Commission's primary responsibility is make sure that the mitigation that is described in the EA is carried by the Applicant. His organization was created by federal legislation that was passed in 1992 which established the URMCC's role as NEPA compliance for the project. Mark was a wildlife biologist before joining the Commission. He thinks highly of CUWCD and describes them as being good operators. His concern is that over time that the Applicant sticks with the plan, but he also realizes that is what the Commission is set up for. Mark is comfortable that the EA and the EIS that were prepared for the Dam and the hydro project.

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Date of Conversation: April 25, 2007  
Application Reviewer: Fred Ayer, Executive Director  
Person Contacted: Paul F. Dremann  
Vice President, Conservation  
Utah Council, Trout Unlimited  
Telephone/email: 801-467-3862  
Areas of Expertise: Fishery and angling

I spoke with Paul early in the process as part of a preliminary review and a suggestion by Steve Malloch that Paul would be a good source of information on the hydro project. Paul was a great source of information and explained the relationship between the Jordanelle Dam, hydropower project and the Provo River Restoration Project (PRRP). He also explained the quality of the fishery downstream of the project and how any possible negative impact from the hydro needed to be thoroughly evaluated. He is also concerned about the plant control system and that it be integrated (on a real time basis) with the water quality parameters being monitored. I told him it was my understanding that that is the way it will work. He also pointed out that he felt it was important to have a backup for the automated system.

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Date of Conversation: December 3, 2007  
Application Reviewer: Fred Ayer, Executive Director  
Person Contacted: Reed Murray, CUPCA program Director  
Department of the Interior  
Telephone/email: 801-379-1237  
Areas of Expertise: Fishery and angling

Reed is with the department within DOI mandated to carry out the Central Utah Project Completion Act and in essence they are responsible for the whole project, including NEPA compliance. They are also involved in other components of the CUP that have nothing to do with this application. If there were concerns and differences they would be the final recourse. However he said that there had not been problems that lasted long and stayed unresolved. When they held the first public meetings there were concerns raised about T&E species and the fishery, but after the project was explained, particularly the mitigation commitments made in the NEPA analysis what opposition there was dissolved. Reed confirmed that the Provo River downstream of the dam was a "Blue Ribbon" trout fishery, but he was not aware that the reservoir had that status. Reed had nothing but positive comments about the applicant saying they were very good people to work with.

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Date of Conversation: December 5, 2007  
Application Reviewer: Fred Ayer, Executive Director  
Person Contacted: Jeff Budge  
Provo River Water Users Association  
Telephone/email: 801-796-8770  
Areas of Expertise: Project operations

I asked Jeff if he would take a couple of minutes and tell me about the association and what role it had in the Jordanelle Dam Hydro Project. His organization operates the Deer Creek Dam and is made up of share holders who hold rights to various amounts of water, use the federal dam (Deer Creek) to move and store water. They also pay the feds for use of the facility. The largest shareholder is Salt Lake City Metro who use the water for M&I. The association coordinates operations with the hydro operators, but they do not have the authority or right to alter required flows from Jordanelle.

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Date of Conversation: December 3, 2007  
Application Reviewer: Fred Ayer, Executive Director  
Person Contacted: Amy Defrees  
Utah Rivers Council  
Telephone/email: 801-486-4776  
Areas of Expertise: Rivers in Utah

Amy returned my call. She said she had not followed the Jordanelle Dam Hydro project but was familiar with the Jordanelle Dam and the Provo River Mitigation Project. She generally agreed with others saying that it was very important that the Provo River project was protected and insured the flows and temperature regimes that had been guaranteed by the Jordanelle Dam EA. Amy also confirmed that the Provo mitigation project had successfully created additional habitat for the Columbia spotted frog.

I had actually spoken with Amy very early in the review process and had alerted her of our process and that we would be looking at the project for certification. She told me then that she would take a look at the project and listen for comments and concerns. Based on what she said today, that she had not heard anything about the project, I can safely say this is a low profile project with minimal concerns. She had no negative comments about the applicant.

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Date of Conversation: December 4, 2007  
Application Reviewer: Fred Ayer, Executive Director  
Person Contacted: Paul F. Dremann  
Vice President, Conservation  
Utah Council, Trout Unlimited  
Telephone/email: 801-467-3862  
Areas of Expertise: Fishery and angling

It was valuable to follow-up with Paul, he reminded me that he was probably the only NGO involved in the public review process for this project. He also said that while he was not a big fan of hydro in general and wouldn't be unhappy if the hydro component was not part of the project, but he really wasn't opposed to this hydro going forward, assuming that is operated correctly. I relayed a summary of the information that I had gleaned during my review and asked him whether my sense of this information seemed accurate. I told him I had reached the following conclusions: The Applicant has a good reputation and is easy to work with; and, the proposed project will have little or no effect on the Jordanelle Dam or the Provo River Mitigation as long as it is operated consistent with the commitments made in the NEPA document. Paul agreed and pointed out that he was cautiously optimistic that this project would operated as agreed to, with a minor caveat that while people were very familiar with the CUWCD they did not know the applicant's partner Heber Light and Power. There were rumors that Heber Light and Power might try to optimize the power generation, which means to Paul and others that the environmental mitigation would pay the price for optimization. I asked Paul if the reservoir upstream of the dam was a Blue Ribbon fishery also, and he told me that it was but for smallmouth bass. Paul had high praise for Mark Holden and felt that he was an important part of making sure the project was operated as promised.

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