WEBER HYDROELECTRIC PROJECT
(FERC NO. 1744)

DRAFT APPLICATION FOR NEW LICENSE
FOR MAJOR CONSTRUCTED PROJECT LESS THAN 5MW

EXHIBIT E

DRAFT APPLICANT PREPARED ENVIRONMENTAL ASSESSMENT

AND

APPENDIX A - MEMORANDUM OF AGREEMENT

APPENDIX B - DRAFT HISTORIC PROPERTIES MANAGEMENT PLAN

APPENDIX C - UPSTREAM FISH PASSAGE CONCEPTUAL DESIGN REPORT

APPENDIX D - LETTER: OPERATION OF 1938 POWER WATER AGREEMENT

APPENDIX E - COMMUNICATION PLAN

APPENDIX F - DRAFT LICENSE CONDITIONS RECOMMENDED BY STAFF

APPENDIX G - RESPONSE TO COMMENTS ON THE DRAFT EA

PACIFICORP

DECEMBER 2017

WEBER HYDROELECTRIC PROJECT

DRAFT APPLICANT PREPARED ENVIRONMENTAL ASSESSMENT

FOR HYDROPOWER RELICENSE

Weber Hydroelectric Project
FERC Project No. P-1744

Utah

Prepared by:

PacifiCorp Hydro Resources
1407 West North Temple, Suite 210
Salt Lake City, Utah 84116

For Submission to:

Federal Energy Regulatory Commission
Office of Energy Projects
Division of Hydropower Licensing, West Branch
888 First Street, NE
Washington, D.C. 20426

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ACRONYMS AND ABBREVIATIONS

ABA	Architectural Barriers Act
ACHP	Advisory Council on Historic Preservation
ABA	Architectural Barriers Act
ADA	Americans with Disabilities Act
ALP	Alternative Licensing Process
APEA	Applicant Prepared Environmental Assessment
AU	water quality assessment units
AW	American Whitewater
BCT	Bonneville cutthroat trout
BMPs	Best Management Practices
BOD	Biological Oxygen Demand
BOR	Bureau of Reclamation
CEQ	Council on Environmental Quality
Certification	Water Quality Certification under Section 401 of CWA
CFR	Code of Federal Regulations
cfs	Cubic feet per second
CRMP	Cultural Resources Management Plan
CWA	Clean Water Act
DO	Dissolved Oxygen
DWCCC	Davis and Weber Counties Canal Company
EA	Environmental Assessment
EDF	energy dissipation factor
ESA	Endangered Species Act
FERC	Federal Energy Regulatory Commission
FPA	Federal Power Act
fps	feet per second
FWG	Fisheries Working Group
FWS	U.S. Fish and Wildlife Service
GIS	Geographic Information System
HCC	Hydro Control Center
HPMP	Historic Properties Management Plan
I-84	Interstate 84 freeway
ILP	Integrated Licensing Process
kV	kilovolt
kW	kilowatt
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
MW	Megawatts
MWh	Megawatt hours

National Register	National Register of Historic Places
NAVD-88	North American Vertical Datum of 1988
NEPA	National Environmental Policy Act
NERC	North American Electric Reliability Corporation
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NOI	Notice of Intent
NRCS	Natural Resources Conservation Service
NTUs	Nephelometric Turbidity Units
PAD	Pre-Application Document
PIA	passive instream arrays
PIT	passive integrated transponder tags
PLC	programmable logic controller
PM&E	environmental protection, mitigation, and enhancement measures
RWG	Recreation Working Group
SD1	Scoping Document 1
SD2	Scoping Document 2
SHPO	State Historic Preservation Office
SSURGO	Soil Survey Geographic Database survey data
STATSGO	State Soil Geographic soil survey database
SUP	Special Use Permit
SWReGAP	Southwest Regional Gap Analysis Project
TDS	Total Dissolved Solids
TES	Threatened, Endangered, and Sensitive Species
TNW	Traditional Navigable Water
TSS	Total Suspended Solids
TU	Trout Unlimited
UDEQ	Utah Department of Environmental Quality
UDNR	Utah Department of Natural Resources
UDOT	Utah Department of Transportation
UDWQ	Utah Division of Water Quality
UDWR	Utah Division of Wildlife Resources
UDWS	Utah Division of Workforce Services
UGS	Utah Geological Survey
UPRC	Union Pacific Railroad Company
USDA	U.S. Department of Agriculture
USFS	United States Forest Service
USGS	U.S. Geological Survey
USU	Utah State University
UWCNF	Uinta-Wasatch-Cache National Forest
WECC	Western Electricity Coordinating Council
WRWG	Water Resources Working Group

EXECUTIVE SUMMARY

Application and Proposed Action

On May 29, 2015, PacifiCorp filed with the Federal Energy Regulatory Commission (FERC) a Pre-Application Document (PAD) and Notice of Intent (NOI) to seek a new license for the Weber Hydroelectric Project (Weber Project or Project) (FERC Project No. 1744). In its NOI, PacifiCorp also submitted a request to the Commission to use the Alternative Licensing Process (ALP). The Commission approved the use of the ALP on August 13, 2015. Under the ALP, PacifiCorp has prepared this Applicant-Prepared Environmental Assessment (APEA) in lieu of an Exhibit E to the Draft License Application. FERC will use this APEA in preparing their environmental assessment (EA). FERC's EA is separate and independent though FERC may adopt all or parts of this APEA as its own based on its separate and independent review of the data, information, and analysis herein. This APEA has been prepared pursuant to the requirements of FERC's regulations at 18 CFR §4.38 and 4.61 and FERC's guidance document, Preparing Environmental Documents: Guidelines for Applicants, Contractors, and Staff (FERC 2008).

The Project is located on the Weber River in Weber, Morgan and Davis counties, Utah, approximately nine miles southeast of the town of Ogden, Utah. The Project is located partially on federal lands managed by the U.S. Forest Service (USFS), Uinta-Wasatch-Cache National Forest (UWCNF), and partially on lands owned by the Union Pacific Railroad Company (UPRC) (Figure 1). The Project Area referred to throughout this APEA is inclusive of the existing FERC Project Boundary, the Weber Recreation Site, the penstock, and the Weber River to the far bank of the river opposite the penstock (regardless of which side of the river the penstock is on). The Project was initially constructed in 1910 by Utah Light and Railway Company and later acquired by Utah Power & Light in 1944; both are predecessor companies to PacifiCorp, the current licensee. The original license was made effective January 1, 1938 and expired June 30, 1970. Subsequently, a FERC operating license was issued each year for the period from June 30, 1970 to June 28, 1990. After PacifiCorp completed a follow-up relicensing process with the FERC, the current license was issued on June 28, 1990. This license expires on May 31, 2020.

The Project is operated in run-of-river mode with a total plant capability of 3.85 megawatts (MW). The average annual generation of the Project is 16,932 megawatt-hours (MWh). PacifiCorp proposes no new generation facilities or other capacity additions. A new upstream fish passage structure is proposed as an environmental measure, which would result in minor operational changes to ensure the fish passage structure functions as designed. These operational changes would not result in changes in plant capability. Additional environmental measures are described below.

Proposed Environmental Protection, Mitigation, and Enhancement Measures

Proposed PM&E measures to be implemented at the Project relate to water resources, fisheries and aquatic resources, botanical resources, terrestrial wildlife resources, cultural and tribal resources, and recreation resources. These PM&E measures are summarized below and included in a Memorandum of Agreement (MOA) signed by all interested stakeholders, with the exception of UDWQ, who instead sent a letter of support (Appendix A). Due to the substantial proposed investment in Project PM&E measures for this 3.85 MW facility, PacifiCorp proposes a 50-year license term for the Weber Project.

Resource	Proposed PM&E Measures
Geology and Soils	None
Water Resources - Hydrology	HYD-1: Continue existing seasonally-adjusted minimum stream flows (34-50 cfs). Implement annual change, if needed, in required minimum streamflow within 10 days of the final Weber River runoff forecast from Natural Resources Conservation Service (NRCS), using the current formula.
Water Resources - Water Rights	None No PM&E measure is proposed because existing 1938 and 1965 agreements and existing water rights [35-8061—365 cfs flow right, 35-8062—100 af storage, 35-8741—storage in Echo] will remain unchanged.
Water Resources - Water Quality	None No PM&E measure is proposed because adherence to existing operations and maintenance practices is protective of the resource (state water quality standards are being met).
Fisheries and Aquatic Resources	FISH-1: Continue to provide minimum stream flow for the bypassed reach of the river affected by the Weber Project (identical to HYD-1, above). FISH-2: Construct, operate, and maintain a fish ladder suitable for upstream passage of both Bonneville cutthroat trout (BCT) and bluehead sucker, including a fish trap operated by UDWR and Trout Unlimited (TU) and maintained by PacifiCorp. PacifiCorp will consult annually with UDWR, TU, and USFS related to fish ladder and trap operation and maintenance according to a Communication Plan developed between UDWR, TU, USFS, FWS and PacifiCorp. The Communication Plan will also specify group contacts, alternates, and contact methods over the life of the license. FISH-3: Keep the low-level gate operational when forebay is dewatered subject to operational constraints and requirements such as extreme winter icing conditions (undertake periodic maintenance as required to ensure operation). If the forebay is dewatered and the low-level gate is inoperable for more than 10 days due to extreme temperature or flow conditions, PacifiCorp will consult with UDWR, TU, FWS, UDWQ, and USFS (per the Communication Plan methods) and open the low-level gate as soon as possible. FISH-4: In the event of a prolonged project outage, keep forebay full if possible to ensure fish ladder operation. PacifiCorp will consult with UDWR, TU, FWS, DWQ, and USFS (per the Communication Plan methods) to discuss fishway operation during any interim periods exceeding 10 days when neither the low-level gate nor the fishway are operable.
Botanical Resources	BOT-1: Continue existing annual USFS consultation. BOT-2: Conduct weed control per historic practice, adding the area abutting improved project river access point in riparian habitat (see REC-8, below), subject to land owner weed control requirements and constraints.
Terrestrial Wildlife Resources	WL-1: Continue existing annual USFS consultation.
Cultural and Tribal Resources	CULT-1: Finalize and implement the Historic Properties Management Plan (HPMP) (Formerly approved as the Cultural Resources Management Plan [CRMP]).

Resource	Proposed PM&E Measures
Recreation Resources	REC-1: Continue to maintain the existing Weber Recreation Site, but with modifications outlined below. REC-2: Coordinate with USFS, UDWR, TU, UDWQ, FWS, and AW on improved interpretive signage; include potential for improved technology to include a code that is scannable and that links to flow information (REC-3). REC-3: Create a webpage hosted and maintained by PacifiCorp (linked on both the Corporate website and the Project website) indicating approximate bypass reach flows (program subtracts generation flow from USGS gage site flow and posts it to website)—when minimum streamflow only, the calculated number will be replaced by the phrase "minimum streamflow of approximately 50 cfs or inflow" to eliminate the risk of showing a calculated flow that could be less than the minimum for that period. REC-4: Install a year-round permanent vault Americans with Disabilities Act (ADA)/ Architectural Barriers Act (ABA)-compliant toilet facility (flush bathrooms are available at the rest stop upstream), maintained by PacifiCorp. Install signage instructing visitors on dog waste protocol and provide dog waste bags for disposal. REC-5: Consult with USFS to create a new ADA/ABA compliant accessible picnic site on flat lawn area closest to parking lot (consisting of a concrete pad, a grill, and an accessible picnic table), or to modify the existing site per USFS standards. REC-6: Maintain/repave access road to Weber Recreation Site and existing asphalt path in picnic area. REC-7: Reconfigure former sandbox area fencing to remove south, east, and west portions (retain north portion to partition recreation site from I-84). REC-8: Improve two existing user-created trails located in and outside the Weber FERC Project Boundary: • In the Project Boundary, improve (construct steps) the existing dirt river access trail at the west end of the recreation site; • Outside the Project Boundary, provide $30,000 through an off-license agreement with TU to fund cooperative effort to improve pedestrian river access (with concurrence from Utah Department of Transportation [UDOT] and the underlying land owner) at the under-freeway user-created trail extending west from the Weber Recreation Site—proposed improvements would involve breaking up the existing large-boulder surface or backfilling this surface to create a navigable path of smaller rock with minimal width (no paving). Funds provided through the off-license agreement may be used by TU to provide another habitat benefit in the watershed in the event that improving pedestrian river access in the indicated location is infeasible or requires less funding than provided through the agreement. REC-9: Support whitewater boating use of bypass reach: If AW can identify access which it believes to be safe and legal, the USFS and DWCCC agree to review the proposed access and the items and improvements needed for safe use, such as but not limited to signage, steps for the portage area, and hazard mitigation. If the USFS agrees, in its sole discretion, that the proposed access is appropriate for public use, PacifiCorp will annually provide boater flows to the bypass reach by curtailing generation (up to 320 cfs or inflow) for 4-hour segments on four Saturdays prior to July 15. Flow schedule and notice to be determined in conjunction with AW, and in coordination with DWCCC and FS, with the provision that boater flows in the future may be subject to minimum boater use (fewer than a minimum threshold of boaters may result in suspension of boater flows). Specific use triggers and related release changes to be determined.
Land Use	None
Aesthetic Resources	None
Socioeconomic Resources	None

Alternatives Considered

This APEA considers the following alternatives: (1) a no-action alternative, meaning that PacifiCorp would continue to operate the Project with no changes, and (2) PacifiCorp's proposal (the proposed action).

Public Involvement

FERC's regulations (18 CFR, §16.8) require applicants to consult with appropriate resource agencies, tribes, and other entities before filing an application for a license. This consultation is the first step in complying with the Fish and Wildlife Coordination Act, Endangered Species Act, National Historic Preservation Act, and other federal statutes. Prefiling consultation must be completed and documented according to the FERC's regulations.

Relicensing of the Weber Hydroelectric Project was formally initiated May 29, 2015, when PacifiCorp filed with the FERC a PAD and NOI to license the Project using the ALP. FERC approved the use of the ALP on August 13, 2015. Through this relicensing PacifiCorp has consulted with resource agencies and other interested parties (Section 1.2). Communications and consultation with stakeholders in the ALP occurs in accordance with an approved Communication Protocol dated April 28, 2015. All comments received from stakeholders and the public, as well as PacifiCorp responses on the various study plans, technical reports, and other license process issues, have been filed with FERC and are also available on PacifiCorp's Weber Hydroelectric Project Relicensing website (http://www.pacificorp.com/es/hydro/hl/weber.html#).

As part of EA preparation a public and agency scoping process was conducted to determine what issues and alternatives to address in the analysis. A scoping document (SD1) was distributed to interested parties (agencies and others) in September 2015. It was noticed in the Federal Register on September 25, 2015. Two scoping meetings were held on October 6, 2015 in Ogden, Utah to request comments on the Project. A court reporter recorded all comments and statements made at the scoping meetings. These are part of the FERC's public record for the Project. No written comments were provided during the scoping period. Because no new issues were introduced during the formal scoping period, no revised scoping document (SD2) was prepared.

Environmental Effects

Only the resources that would be affected, or about which comments were received, are addressed in detail in this APEA. Based on this, geological and soil resources, water resources, fisheries and aquatic resources, botanical resources, terrestrial wildlife resources, recreation resources, and socioeconomic resources may be affected by the proposed action and alternatives and are therefore addressed in further detail in this APEA.

Geological and Soil Resources

Fish ladder construction activities under the proposed action would require earthmoving activities below and east of the ordinary high water line at the existing Weber diversion dam. This would not result in a substantive change in the geological structure of the area as a result of the small acreage and volume of the deposits (0.16 acres and 1,130 cubic yards, respectively) relative to the Weber River system (125 linear miles of mainstem stream from its origin in the Uinta Mountains to its terminus in Great Salt Lake). The Project is situated within an area known to contain faults, landslide risks, and debris flow risks. The continued operation of the facility and the specific PM&E measures would not aggravate or contribute to risks associated with these hazards. However, faults, landslide risks, and debris flow risks do pose a risk to Project facilities and Project operations.

Fish ladder construction would result in earthmoving activities which have the potential to result in localized erosion and soil loss. A total of 0.16 acres of earthmoving and construction activities are planned for fish ladder construction. Erosion control measures and other BMPs (e.g., silt fences, etc.) as required by regulatory authorities would be implemented to reduce sediment delivery to the Weber River during construction. In addition, the total area of earthmoving activities for fish ladder construction would be approximately 0.8 percent of the river area (the Weber River and a 25- foot buffer on either side), from the diversion dam area where fish ladder construction would occur, to the downstream end of the Project powerhouse.

Implementation of PM&E measure REC-9 would result in the release of up to approximately 320 cfs of water into the Weber River on four different occasions per year, each with a duration of four hours. These boater flow releases would raise the water level in the bypassed reach of the Weber River for short periods which may result in potential stream bank scouring and subsequent erosion of soils in the bypassed reach at times when flows (although uncommon) could be as low as 34-50 cfs in this reach. The degree of scouring and erosion of stream would be limited as a result of the amount of rock armoring in the existing channel, the relatively small volume of water released for boater flows, and the relatively slow rate (1.5 feet/hour is proposed) at which water levels would rise in the bypassed reach during a flow release.

It is anticipated that trail improvement activities to satisfy PM&E measure REC-8, specifically step construction, on the trail within the Project Boundary leading south to the north bank of the Weber River may result in a small area of localized disturbance to surface soils along the trail. Step construction is unlikely to result in a substantive amount of soil loss and soil delivery to the river because of the limited construction activities. The presence of the steps along this trail would ultimately reduce the potential for soil erosion and soil delivery to the river in the future.

Water Resources

Water Quantity (Flows)

Under the proposed action the Project would operate for a period of 30-50 years and the PM&E measures described above would be implemented. Available flows would not change as no actions are proposed that would influence (change) available flows in the Weber River. However, implementation of PM&E measure HYD-1 would ensure that existing seasonally-adjusted minimum stream flows of 34-50 cfs (or inflow) continue in the bypassed reach of the river. During low flow times of the year, maintaining this minimum flow in the bypassed reach requires PacifiCorp to curtail generation in favor of the provision of flows that contribute to flow-related benefits such as fish habitat. In addition, implementation of PM&E measure REC-9 would result in an additional 16 hours per year of flows up to 320 cfs in the bypassed reach. However, these flows do not represent a change in available flow nor do they represent a change in minimum flows. The provision of 16 hours per year of flows up to 320 cfs for whitewater recreation would require PacifiCorp to curtail generation during these flow releases which are intended to provide whitewater boating opportunities in the bypassed reach outside the typical higher flow period that occurs in the early spring.

Water Rights

Changes in water rights or water rights-related agreements are not proposed by the proposed action. As a result there would be no change in water rights with implementation of the proposed action.

Water Quality

Under the proposed action the Project would operate with specific PM&E conditions for a period of 30-50 years. Over this timeframe, Project operations would be largely similar to the current operations except for minor changes to facilitate PM&E measures FISH-2, FISH-3, FISH-4, and REC-9 (see Section 2.2.3). No substantive changes in temperature, pH, specific conductivity, dissolved oxygen (DO), turbidity, total suspended solids (TSS), or chlorophyll *a* are anticipated as a result of implementation of the proposed action as the Project has little influence on these water quality parameters based on field studies conducted in 2016 and 2017. However, certain PM&E measures could influence some water quality constituents (specific conductivity, DO, turbidity, TSS). This information, on a parameter-by-parameter basis, is summarized below.

Parameter	Summary of Effects
Specific Conductivity	Fish ladder construction would result in earthmoving activities which have the potential to result in localized erosion and soil loss including potential soil constituents (e.g., salts and alkalis) that can contribute to salinity and therefore specific conductivity measurements in the Weber River. Erosion control measures and other BMPs (e.g., silt fences, etc.) as required by permitting authorities would be implemented to reduce sediment delivery to the Weber River during construction. In addition, the total area of earthmoving activities for fish ladder construction would be approximately 0.8 percent of the river area (the Weber River and a 25-foot buffer on either side) from the diversion dam area where fish ladder construction would occur to the downstream end of the Project powerhouse. During the release of boater flows to satisfy REC-9, specific conductivity in the bypassed reach of the Weber River is likely to decrease temporarily as a result of higher flows (up to approximately 320 cfs) in the bypassed reach diluting the salinity of the water. This effect would not exceed approximately 16 hours per year (four boater flows provided on four occasions), and is also limited spatially. That is, downstream of the powerhouse, the dilution effect would cease as the Project water is released back to the river at that point.
Dissolved Oxygen	Based on field studies conducted in 2016 and 2017, the Project currently contributes benefits to DO in the river. The Project appears to exert a stabilizing influence on DO fluctuations across the system from sampling point WR01 to WR04 as well as increasing DO concentrations at the downstream end of the Project powerhouse (WR04). Increased DO concentrations at the downstream end of the Project powerhouse are likely a result of water turbulence in the pipeline followed by water turbulence in the turbine. This effect is expected to continue into the future because the configuration of the Project would remain largely the same between the current condition and the proposed action. Further, implementation of PM&E measure REC-9 is likely to increase DO concentrations in the bypassed reach during the release of boater flows. This is largely a result of increased water turbulence during the boater flow events. This effect would not exceed approximately 16 hours per year (four boater flows provided on four occasions) and would likely occur between approximately late April and early July depending on the runoff in any given year and Project operational factors.
Turbidity	Field studies indicated that minimum turbidity values downstream of the Project powerhouse (sampling site WR04) never reached zero (3.5 NTUs was the minimum at WR04) whereas minimum turbidity values at all other sampling points were zero. This is likely a result of there being no opportunities for deposition in the diversion pipeline/penstock. In addition, the water turbulence caused by the turbine in the powerhouse suspends sediment. Implementation of PM&E measures FISH-2 and REC-9 may influence turbidity in the river. Fish ladder construction may result in localized erosion and sediment delivery to the river. This could occur during active earthmoving and construction activities. Required BMPs would ameliorate such impacts so that the Project stays within required limits for turbidity. Boater flow releases to satisfy REC-9 would increase the volume of water in the bypassed reach of the river by up to 320 cfs per release. The potential for scour and erosion of the streambank during releases is very low given the rocky and highly armored channel in the bypassed reach, as well as the relatively low volume of releases (the channel commonly handles up to 10 times the proposed boater flow, sometimes for weeks or months, rather than for hours). The boater flows could result in a temporary increase in suspended particles in the river though it would not likely increase turbidity. This is because of the larger volume of water also present in the river reducing the total concentration of suspended particles. In addition, this effect would not exceed approximately 16 hours per year (four boater flows provided on four occasions) and would likely occur between approximately late April and early July depending on the runoff in any given year and Project operational factors.
Total Suspended Solids	Effects of implementation of the proposed action on TSS would be the same as those described for turbidity because of the close relationship between turbidity (a measure of the cloudiness or haziness of water caused by large numbers of individual particles) and TSS (a measure of the total amount, by weight, of solid material suspended in water).

Fisheries and Aquatic Resources

Under the proposed action the Project would be relicensed for a period of 30-50 years with the adoption and implementation of the PM&E measures summarized above. The continued presence and operation of the Project would generally result in the persistence of conditions and trends described in the affected environment with the exception of modifications created by implementation of water resources (hydrology) and fisheries and aquatic resources related PM&E measures (PM&E measures HYD-1 and FISH-1 through FISH-4; note that implementation of FISH-1 and HYD-1 would continue the current minimum flow regime that has been in effect for many decades). In particular, the construction, operation, and maintenance of a fish ladder suitable for upstream passage of Bonneville cutthroat trout and bluehead sucker (PM&E measure FISH-2) would improve upstream fish passage opportunities for these, and perhaps other, species. Likewise, provisions to keep the low level gate open during times when the fish ladder is inoperative (PM&E measures FISH-3 and FISH-4) would allow for upstream fish passage as well. The low level gate also provides an additional opportunity for downstream fish passage when it is open. No changes in habitat other than the fish ladder are proposed. As a result, habitat conditions for aquatic species would remain the same, especially given the inclusion of HYD-1 and FISH-1 in the proposed PM&E measures (these PM&E measures are identical to each other), which propose continuing the existing 34-50 cfs minimum flows through the bypassed reach for the duration of any future license (30-50 years). This flow represents a substantial on-going investment in improved aquatic and fisheries habitat conditions within the Project Area.

Fish entrainment and turbine mortality would remain at or lower than current levels. Overall, entrainment and mortality potential of Bonneville cutthroat and bluehead sucker appears to be relatively low for the Weber Project. Entrainment and mortality risk at unscreened irrigation diversions, such as the DWCCC diversion just downstream from the power plant, may be greater for these populations. This is due to the high percentage of river flow removed and the presumably high mortality levels of entrained fish. The potential for fish entrainment and turbine mortality at the Project is described in detail in Section 3.3.3.1 based on studies conducted in 2016. With construction of the fish ladder, and modification of the existing ice sluice as attraction flow coupled with spill, which can occur more often during the higher flow periods, there are several avenues for fish to move downstream without having to go through the turbines. This would reduce the potential for fish entrainment and turbine mortality.

Botanical Resources

Impacts to botanical resources as a result of implementation of the proposed action revolve largely around PM&E measures FISH-2, BOT-2, REC-5, REC-8, and REC-9. Other than implementation of these measures, the primary impact of the proposed action would be the persistence of the botanical resource conditions described in the affected environment.

Earth-moving activities associated with construction of the fish ladder to satisfy PM&E measure FISH-2 would largely affect space that is already developed or is sparsely vegetated. Approximately 31 percent (0.05 acres) of the 0.16 acres modified by fish ladder construction is currently developed space while much of the remainder (69 percent, 0.11 acres) is un-vegetated (e.g., area adjacent to the ice chute, sidewalk areas, etc.) or Weber Recreation Site lawn. Fish ladder construction would present opportunities for weed introduction and spread as a result of the use of earthmoving and other construction equipment. This equipment could carry weed seeds into the Project Area from elsewhere or facilitate the spread of weeds in the vicinity of construction activities. However, BMPs to control the introduction and spread of weeds would be implemented during construction, thereby reducing the magnitude of this potential effect. Furthermore, PM&E measure BOT-2 would require PacifiCorp to conduct and enhance weed control per historic practices, subject to land owner weed control requirements and constraints.

Implementation of PM&E measure REC-5 would result in the creation of a new Americans with Disabilities Act (ADA)/Architectural Barriers Act (ABA) compliant accessible picnic site on the flat lawn area closest to the parking lot, or modification of the existing but not fully ADA/ABA compliant site. Implementation of this PM&E measure could convert approximately 14 feet by 10 feet of surface area from cultivated grass cover (lawn) to concrete. While this does not represent a botanical loss in terms of native vegetation or an important element of the botanical community, it would nonetheless result in the loss of 140 square feet of plant cover within the Project Area to benefit an underserved population.

Trail improvement actions associated with PM&E measure REC-8 would increase the likelihood of weed introduction and spread along the river corridor through the use of tools potentially carrying weed seed and through the presence of workers potentially carrying weed seed. This impact would be limited by the application of weed control BMPs in addition to the implementation of PM&E measure BOT-2 as described above.

Boater flow releases to satisfy REC-9 would increase the volume of water in the bypassed reach of the river by up to 320 cfs and therefore increase, although minimally (see Section 3.3.1 for further explanation), the potential for scour and erosion of the streambank during releases. Eroded stream banks could create barren stream bank surfaces that could provide opportunities for weed establishment and spread. However, given the existing rock armoring in the bypassed reach, this effect is unlikely. In addition, flows released for whitewater boaters would also serve to transport weed seed downstream to portions of the bypassed reach and below, similar to existing conditions when the Project is off-line. Boater flows would not exceed approximately 16 hours per year (4-hour boater flows provided on four occasions) and would likely occur between approximately late April and early July depending on the runoff in any given year and Project operational factors. While boater flow releases would be limited to 16 hours per year, the potential weed establishment and proliferation-related effects could extend

beyond this timeframe, although this effect would be indistinguishable from current conditions when the Project is off-line.

Terrestrial Wildlife Resources

Because plant communities and associations are an essential component of wildlife habitat, potential impacts to wildlife habitats as a result of implementation of the proposed action are reflected in the impact analysis contained under the botanical resources heading. Implementation of the proposed action would result in the persistence of species and habitat conditions described in the affected environment because activities proposed under the proposed action are largely a continuation of current activities that make up the affected environment. Earth-moving activities (totaling 0.16 acres) associated with construction of the fish ladder under PM&E measure FISH-2 would largely affect space that is already developed or is sparsely vegetated and does not provide valuable habitat for the species that may pass through or inhabit the area. The Project Area is largely developed space. Approximately 66 percent of the Project Area is within the developed, open space medium high intensity land cover type. Also, under PM&E measure WL-1, before planned maintenance or operational measures that would require ground-disturbing activities are conducted by PacifiCorp, consultation with USFS would be required. This consultation process, while not impact-reducing in and of itself, would likely result in the implementation of resource protection measures as needed, depending on the maintenance or operational activity being conducted. Finally, implementation of PM&E measure REC-7 would provide minor benefits to wildlife foraging and traversing the area by removing impediments to movement.

Recreation

Continued operation of the Project in general would not change the status of recreation resources or their use. However, recreation-related effects would be associated with implementation of PM&E measures HYD-1, FISH-1, FISH-2, FISH-3, FISH-4, and all recreation specific PM&E measures.

Measures HYD-1 and FISH-1 are identical. These measures would continue the existing seasonally-adjusted minimum stream flows (34-50 cfs) for the bypassed reach of the river affected by the Project. Maintaining minimum stream flows for the bypassed reach of the river ensures that appropriate fish habitat conditions are maintained, subject to adequate inflows (i.e., occasionally Project inflows are insufficient to meet even the minimum flows; at those times the Project passes all inflows and no generation occurs). As a result, in low flow conditions, providing minimum stream flows of 34-50 cfs or inflow maintains the quality of the fishing experience for recreationists fishing the bypassed reach of the river.

Fish ladder construction as part of implementing PM&E measure FISH-2 is expected to take approximately nine months. During the construction period recreationists and other non-Project related visitors to the area would be temporarily

prohibited from entering and using the recreation site and from accessing the bypassed reach of the river via the recreation site. Fish ladder construction would result in a likely nine-month loss of recreation opportunities for all recreation amenities and opportunities associated with the Project and the bypassed reach of the river. Fish ladder operation, on the other hand, is likely to improve the quality of the fishery by facilitating upstream passage of fish. This may also improve the quality of the fishing experience for recreationists fishing the bypassed reach of the river as well as the forebay and fishable portions of the river upstream of the forebay. Measures FISH-3 and FISH-4 would have similar effects in terms of maintaining the quality of the fishery by facilitating passage of fish.

All of the recreation-related PM&E measures (REC-1 to REC-9) would improve recreation amenities and uses associated with the Project. These effects are summarized below.

Recreation PM&E Measure	Summary of Recreation-related Effects
REC-1	Continued maintenance of the existing recreation site would facilitate the ongoing use of the recreation site as described in the affected environment section of this document.
REC-2	Implementation of measure REC-2 would improve the recreational experience for visitors by providing them with more information related to recreation and other resources present at the site.
REC-3	The creation of a webpage indicating approximate bypassed reach flows would improve access for recreationists to real-time information about flows in the river. Access to real-time information about flows would facilitate boater use of the river particularly during periods of high flow in the spring months. This information would also be useful to recreationists seeking to fish the bypassed reach of the river and wanting to ensure they do so during wadeable timeframes.
REC-4	This measure would improve visitors' enjoyment of the recreation site by facilitating dog waste clean-up by visitors with dogs and subsequently reducing the presence of dog waste left by other visitors. Also, the presence of a year-round permanent vault toilet facility would improve the recreational experience at the site during the off season months when a portable toilet is currently not provided at the site (currently in the off season visitors need to use the toilet facilities at the nearby rest stop upstream of the Project recreation facilities).
REC-5	The creation or modification of the ADA/ABA compliant accessible picnic site at the Weber Recreation Site would improve a recreation amenity for individuals with disabilities. Current information on the volume of visitors with disabilities that are using the site is unavailable.
REC-6	The maintenance/repaving of the access road to the recreation site and the maintenance/repaving of the existing asphalt path in the picnic area would improve the visitor experience for recreationists by creating a more even and continuous surface for driving to the site as well as walking in the picnic area either for purposes of picnicking or river access.
REC-7	The reconfiguration of fencing on the west end of the recreation site to remove the south, east, and west portions of the fence would improve the scenic quality of the picnic area for recreationists.

Recreation PM&E Measure	Summary of Recreation-related Effects
REC-8	This measure prescribes the improvement of the user-created trail on the west end of the recreation site that provides access to the bypassed reach of the river just downstream from the diversion dam. Implementation of this measure would improve the recreational experience of recreationists accessing the bypassed reach of the river by increasing the ease and safety of river access. This measure also prescribes the provision of funds through an off-license agreement with TU to fund a cooperative effort to improve pedestrian river access at the under-freeway user-created trail extending west from the recreation site and outside the Project Boundary. Implementation of this measure would improve the recreational experience of recreationists using this trail by increasing the ease and safety of trail use in this location. Funds provided through the off-license agreement may be used by TU to provide another habitat benefit in the watershed in the event that improving pedestrian river access in the indicated location is infeasible or requires less funding than provided through the agreement. What this habitat benefit would be is unknown.
REC-9	Implementation of this measure would benefit whitewater boaters by providing them with a total of 16 hours of additional boatable flows per year. On the other hand, recreationists desiring to fish the bypassed reach of the river at these times would potentially encounter non-wadeable conditions limiting their access to the river other than from the river bank.

Socioeconomics

Under the proposed action the Project would be relicensed, with the proposed PM&E measures outlined in Table 11, for an additional 30-50 years. The socioeconomic benefits of the Project would continue for the duration of the term of the new license. This translates to an additional 30-50 years of annual economic contribution of the Project to the economy of the state of Utah as well as an additional 30-50 years of benefits to the storage water needs of several water conservancy districts which rely on the Project's winter water rights to allow water storage in several reservoirs. Furthermore, the Project would continue to provide a reliable supply of renewable energy to the area.

No-Action Alternative

Under the no-action alternative, the Weber Hydroelectric Project would continue to operate in its current manner. As a result, there would be no changes to the physical, biological, or cultural resources of the area. The existing conditions and trends described in the affected environment would persist for the term of the new license.

Conclusions and Recommendations

Under the no-action alternative, the Project would continue to operate as it does now with no changes. The Project would have an installed capacity of 3.85 MW, and generate an average of 16,926 MWh of electricity annually valued at about $38.99/MWh. The average annual levelized Project cost would be about $47.23/MWh, including $6.04/MWh for the value of the existing (and proposed) minimum stream flow. Overall, the Project under the no-action alternative would produce power at an annual net cost of about $2.20/MWh. Under PacifiCorp's proposal, the Project would be licensed (as noted previously, PacifiCorp proposes a 50-year license term) with the changes described in

Section 2.2. The Project would have a total installed capacity of 3.85 MW, and an average annual generation of 16,878 MWh valued at about $38.99/MWh. The average annual Project cost would be about $62.63/MWh, including the same $6.04/MWh value for the proposed minimum stream flow. Overall, the Project under the proposed action (PacifiCorp's proposal) would produce power at an annual net cost of about $17.60/MWh. While the Project under the proposed action and no-action alternatives would produce power at a net cost rather than a net benefit, PacifiCorp's proposal is the preferred course of action. The proposed action would result in the environmental benefits that accompany implementation of the PM&E measures described in Table 11 and PacifiCorp would continue to operate the Project as a dependable source of renewable electrical energy for its customers. In addition, implementation of the proposed action would provide favorable customer benefits over Project decommissioning. Project decommissioning was considered but dismissed from detailed analysis in Section 2.3.3 for the following reasons: (1) there would be substantial costs involved with decommissioning the Project and/or removing any Project facilities, (2) removing Project facilities is likely to be unworkable and unreasonable from both a technical and economic perspective given the many constraints present in the Project vicinity (including the steep and narrow topography of Weber Canyon, the UPRC rail line, east- and west-bound sections of I-84, and transmission lines), and (3) water rights for other facilities (Echo Reservoir and Deer Creek Reservoir) are, by prior agreement, dependent upon water rights associated with the Project and if the Project were to be decommissioned these water rights would be adversely affected. Finally, annual power value is subject to somewhat unpredictable fluctuation over time. As a result, over the term of the license the annual power value may ultimately be greater than that calculated in this analysis and result in a lesser annual net cost or even an annual net benefit that is not currently foreseeable.

FPA §4(e) and 10(a)(1) require the Commission to give equal consideration to the power development purposes and to the purposes of energy conservation; the protection, mitigation of damage to, and enhancement of fish and wildlife resources; the protection of recreational opportunities; and the preservation of other aspects of environmental quality. Any license issued shall be such as in the Commission's judgment will be best adapted to a comprehensive plan for improving or developing a waterway or waterways for all beneficial public uses. The costs and benefits of the recommended alternative are weighed against other proposed measures.

Based on agency and public comments filed on this Project and the environmental effects of the Project under the proposed action and no-action alternatives, PacifiCorp recommends the proposed action including the proposed PM&E measures outlined above, for a license term of 50 years. The proposed action includes all elements of PacifiCorp's proposal, and PM&E measures developed in coordination with stakeholders through the ALP. PacifiCorp recommends this alternative for the following reasons: (1) issuance of a new hydropower license by the Commission would allow PacifiCorp to operate the Project as a dependable source of electrical energy for its customers; (2) the

3.85 MW of electrical energy generated from this renewable resource may offset the use of fossil-fueled, steam-electric generating plants, thereby conserving nonrenewable resources; (3) the public benefits of this alternative would exceed those of the no-action alternative; and (4) the PM&E measures would maintain minimum stream flows, protect and enhance fisheries resources, protect botanical and terrestrial wildlife resources, protect cultural and tribal resources, and provide improved recreation opportunities at the Project.

WEBER HYDROELECTRIC PROJECT
APPLICANT PREPARED ENVIRONMENTAL ASSESSMENT

For Submission to:

Federal Energy Regulatory Commission
Office of Energy Projects
Division of Hydropower Licensing, West Branch
Washington, D.C.

Weber Hydroelectric Project, P-1744
Utah

1.0 INTRODUCTION

1.1 APPLICATION

On May 29, 2015, PacifiCorp filed with the Federal Energy Regulatory Commission (FERC) a Pre-Application Document (PAD) and Notice of Intent (NOI) to seek a new license for the Weber Hydroelectric Project (Weber Project or Project) (FERC Project No. 1744). In its NOI PacifiCorp also submitted a request to the Commission to use the Alternative Licensing Process (ALP). The Commission approved the use of the ALP on August 13, 2015. Under the ALP, PacifiCorp has prepared this Applicant-Prepared Environmental Assessment (APEA), in lieu of an Exhibit E to the Draft License Application. FERC will use this APEA in preparing their environmental assessment (EA). FERC's EA is separate and independent though FERC may adopt all or parts of this APEA as its own based on its separate and independent review of the data, information, and analysis herein. This APEA has been prepared pursuant to the requirements of FERC's regulations at 18 CFR §4.38 and 4.61 and FERC's guidance document, *Preparing Environmental Documents: Guidelines for Applicants, Contractors, and Staff* (FERC 2008).

The Project is located on the Weber River in Weber, Morgan and Davis counties, Utah, approximately nine miles southeast of the town of Ogden, Utah. The Project is located partially on federal lands managed by the U.S. Forest Service (USFS) Uinta-Wasatch-Cache National Forest (UWCNF), and partially on lands owned by the Union Pacific Railroad Company (UPRC) (Figure 1). The Project Area referred to throughout this APEA is inclusive of the existing FERC Project Boundary, the Weber Recreation Site, the penstock, and the Weber River to the far bank of the river opposite the penstock (regardless of which side of the river the penstock is on). The Project Area is depicted in Figure 1. The Project was initially constructed in 1910 by Utah Light and Railway Company and later acquired by Utah Power & Light in 1944; both are predecessor

companies to PacifiCorp, the current licensee. The original license was made effective January 1, 1938 and expired June 30, 1970. Subsequently, a FERC operating license was issued each year for the period from June 30, 1970 to June 28, 1990. After PacifiCorp completed a follow-up relicensing process with the FERC, the current license was issued on June 28, 1990. This license expires on May 31, 2020.

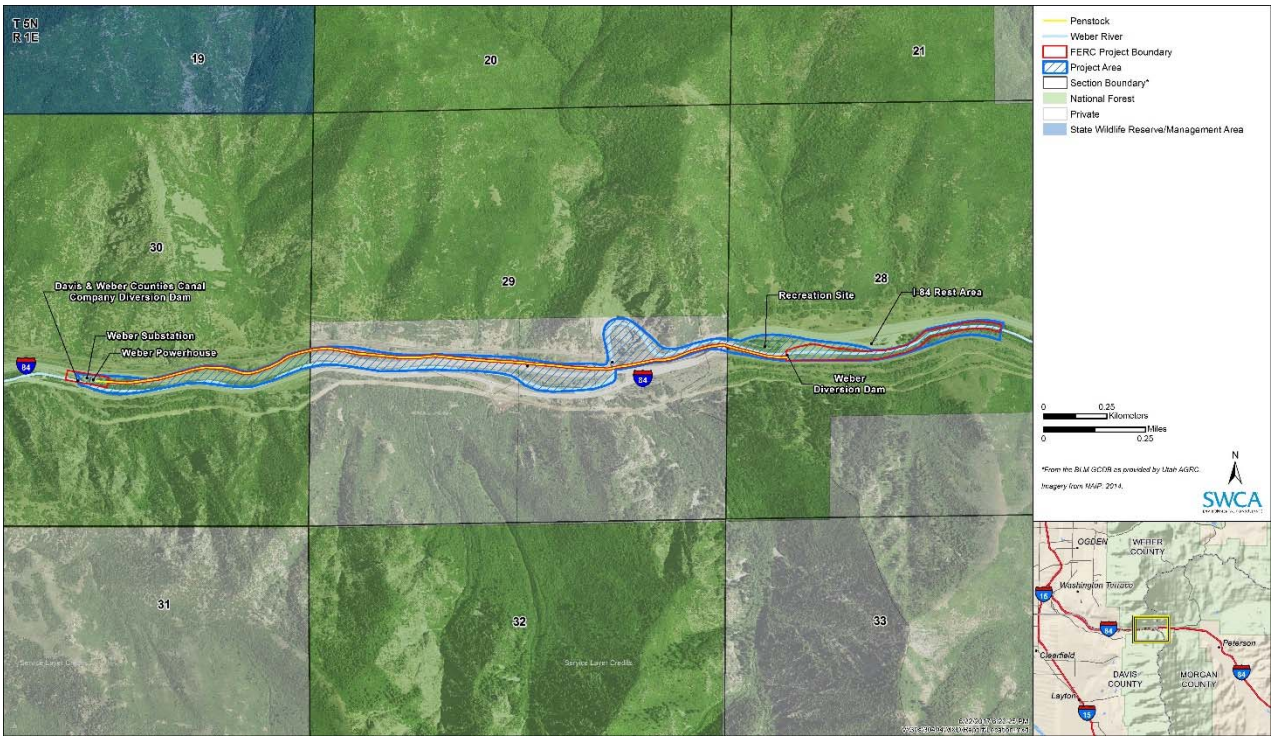

Figure 1. Project location and land ownership.

The Project is operated in run-of-river mode with a total plant capability of 3.85 megawatts (MW). The average annual generation of the Project is 16,932 megawatt-hours (MWh). PacifiCorp proposes no new generation facilities or other capacity additions. A new upstream fish passage structure is proposed as an environmental measure, which would result in minor operational changes to ensure the fish passage structure functions as designed. These operational changes would not result in changes in plant capability. Due to the substantial proposed investment in Project PM&E measures for this 3.85 MW facility, PacifiCorp proposes a 50-year license term for the Weber Project.

1.2 ALTERNATIVE LICENSING PROCESS

The regulations at 18 CFR §4.34 (i) and FERC Order No. 596 allow license applicants, subject to FERC approval, to use the FERC's ALP where circumstances are appropriate. The ALP process is designed to "improve communication among affected entities and to be flexible and tailored to the facts and circumstances of the particular proceeding" (FERC Order No. 596). The ALP process allows applicants to combine pre-

filing consultation and environmental review processes under the National Environmental Policy Act (NEPA) into a single process as well as allowing for the preparation of an APEA. As indicated above, the FERC approved PacifiCorp's use of the ALP for the Weber Project on August 13, 2015. FERC's ALP regulations require that hydropower license applicants "submit a Communications Protocol, supported by interested parties, governing how the applicant and other participants in the pre-filing consultation process, including the Commission staff, may communicate with each other regarding the merits of the applicant's proposal and proposals and recommendations of interested parties." PacifiCorp developed a Communications Protocol in spring 2015 that has been governing communications in the ALP for the Project since. Early in the process (prior to formal approval of the ALP by the Commission) this Communications Protocol was reviewed and approved by interested parties and continues to guide communications among the parties associated with the Project.

Early in the relicensing process PacifiCorp contacted individuals and entities who might have an interest in the relicensing process (Table 1).

Table 1. Weber Hydroelectric Project initial contact list (organized alphabetically by organization/entity then by first name).

Organization	Name	Address
American Whitewater	Charles Vincent	1800 E. 3990 South Salt Lake City, UT 84124
American Whitewater	Kevin Colburn	2725 Highland Drive Missoula, MT 59802
Bureau of Reclamation	Jonathan Jones	302 E. 1860 South Provo, UT 84606
Bureau of Reclamation	Justin Record	302 E. 1860 South Provo, UT 84606
Bureau of Reclamation Provo Area Office	Wayne Pullan	302 E. 1860 South Provo, UT 84606
Centerville City	No individual identified	250 N. Main Centerville, UT 84014
City of Harrisville	No individual identified	363 W. Independence Blvd. Harrisville, UT 84404
Clearfield City	No individual identified	55 S. State St. Clearfield, UT 84015
Clinton City	No individual identified	2267 N. 1500 W. Clinton, UT 84015
Confederated Tribe of Goshute	Madeline Greymountain	P.O. Box 6104 Ibapah, UT 84034
Davis County Planning Department	Barry Burton	P.O. Box 618 Farmington, UT 84025
Farmington City	No individual identified	160 S. Main PO Box 160 Farmington, UT 84025
Farr West City	No individual identified	Farr West City Office 1896 N. 1800 W. Farr West, UT 84404
Federal Energy Regulatory Commission Division of Hydropower Licensing	Claire McGrath	888 First Street, N.E., Washington, DC 20426

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Organization	Name	Address
Federal Energy Regulatory Commission Division of Hydropower Licensing	Jim Hastreiter	805 SW Broadway Fox Tower – Ste. 550 Portland, OR 97205
Fruit Heights City	No individual identified	City Hall 910 S. Mountain Rd. Fruit Heights, UT 84037
Hooper City	No individual identified	Hooper City Civic Center 5580 W. 4600 S. Hooper, UT 84315
Kaysville City	No individual identified	23 E. Center Kaysville, UT 84037
Layton City	No individual identified	437 N. Wasatch Dr. Layton, UT 84041
Morgan County Planning and Development	Bill Cobabe	Morgan County Courthouse 48 West Young Street Morgan, UT 84050
National Marine Fisheries Service	Keith Kirkendall	1201 NE Lloyd Blvd, Ste. 1100 Portland, OR 97232
National Park Service Intermountain Regional Office	David Hurd	12795 W. Alameda Pkwy. Denver, CO 80225-0287
National Park Service	Sue Masica	12795 Alameda Parkway Denver, CO 80225
North Ogden City	No individual identified	Municipal Bldg. 505 E. 2600 N. North Ogden, UT 84414
Northwestern Band of Shoshone Nation	Patty Timbimboo Madsen or Jason Walker	707 North Main Street Brigham City, UT 84302
Ogden City	No individual identified	Ogden Municipal Building 2549 Washington Blvd. Ogden, UT 84401
Paiute Tribes of Utah	Corrina Bow	440 North Paiute Dr. Cedar City, UT 84721
Plain City	No individual identified	4160 W. 2200 N. Plain City, UT 84404
Pleasant View City	No individual identified	520 W. Elberta Dr. Ogden, UT 84414
Provo River Water Users	Jeff Budge	285 W. 1100 North Pleasant Grove, UT 84062
Riverdale City	No individual identified	4600 S. Weber River Dr. Riverdale, UT 84405
Roy City	No individual identified	Roy Municipal Building 5051 S. 1900 W. Roy, UT 84067
Shoshone-Bannock Tribe	Dan Stone	P. O. Box 306 Fort Hall, ID 83203
Shoshone-Bannock Tribes Fish and Wildlife Department	Cleve Davis	P. O. Box 306 Fort Hall, ID 83203
Shoshone-Bannock Tribes Fort Hall Business Council	Nathan Small	P.O. Box 306 Fort Hall, ID 83203
SHPO Compliance & Preservation Utah Division of State History	Chris Hansen	300 S. Rio Grande Street Salt Lake City, UT 84101

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Organization	Name	Address
Skull Valley Band of Goshute	Lori Bear	P.O. Box 448 Grantsville, UT 84029
South Ogden City	No individual identified	3950 S. Adams Avenue, Ste. 1 South Ogden, UT 84403
South Weber City	No individual identified	1600 E. South Weber Dr. South Weber, UT 84405
Sunset City Corporation	No individual identified	200 W. 1300 N. Sunset, UT 84015
Syracuse City	No individual identified	Municipal Building 1979 W. 1900 South Syracuse, UT 84075
Trout Unlimited	Paul Burnett	5729 S. 150 East Ogden, UT 84405
U.S. Environmental Protection Agency Region 8	Shaun McGrath	1595 Wynkoop St. Mailcode 8RA Denver, CO 80202-1129
U.S. Fish and Wildlife Service	Amy DeFreese	2369 W. Orton Circle, Ste. 50 West Valley City, UT 84119
U.S. Fish and Wildlife Service	Paul Abate	2369 W. Orton Circle, Ste. 50 West Valley City, UT 84119
U.S. Forest Service Ogden Ranger District Wasatch-Cache National Forest	Anne Hansen	507 E. 25th Street Ogden, UT 84401
U.S. Forest Service Uinta-Wasatch-Cache National Forest Forest Supervisor's Office	Charlie Rosier	857 W. South Jordan Parkway South Jordan, UT 84095
U.S. Forest Service Inter-Regional Hydropower and Ditch Bill Team	Dawn Alvarez	324 25th Street Ogden, UT 84401
U.S. Forest Service Logan Ranger District Wasatch-Cache National Forest	Paul Chase	1500 E. Hwy 89 Logan, UT 84321
U.S. Forest Service Ogden Ranger District Wasatch-Cache National Forest	Robert Sanchez	507 25th St., Ste. 103 Ogden, UT 84401
U.S. Forest Service Ogden Ranger District Wasatch-Cache National Forest	Terry Swinscoe	507 25th St., Ste. 103 Ogden, UT 84401
Union Pacific Railroad Company	Justin Mahr	1400 Douglas St. Omaha, NE 68179
Utah Department of Transportation	Brent DeYoung	166 W. Southwell St. S. Willard, UT 84340
Utah Division of Indian Affairs	Shirlee Silversmith	250 North 1950 West, Ste. A Salt Lake City, UT 84116
Utah Division of State History	Lori Hunsaker	300 S. Rio Grande Street Salt Lake City, UT 84101
Utah Division of Water Quality	Kari Lundeen	P. O. Box 144870 195 N. 1950 West Salt Lake City, UT 84114-4870
Utah Division of Water Quality	William Damery	P.O. Box 144870 195 N. 1950 W. Salt Lake City, UT 84114-4870

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Organization	Name	Address
Utah Division of Water Resources	Eric Millis	1594 W. North Temple Salt Lake City, UT 84116
Utah Division of Wildlife Resources Northern Region	Ben Nadolski	515 E. 5300 South Ogden, UT 84405
Utah Division of Wildlife Resources	Bill James	P.O. Box 146301 Salt Lake City, UT 84114-6301
Utah Division of Wildlife Resources	Craig Walker	P.O. Box 146301 1594 W. North Temple Salt Lake City, UT 84114
Utah Division of Wildlife Resources	Krissy Wilson	P. O. Box 146301 1594 W. North Temple, Ste. 2110 Salt Lake City, UT 84114-6301
Utah Division of Wildlife Resources	Paul Badame	P. O. Box 146301 1594 W. North Temple, Ste. 2110 Salt Lake City, UT 84114-6301
Utah Division of Wildlife Resources Northern Region	Paul Thompson	515 E. 5300 South Ogden, UT 84405
Utah State Parks and Recreation	Fred Hayes	1594 W. North Temple, Ste. 116 Salt Lake City, UT 84116
Ute Indian Tribe	Shaun Chapoose	P.O. Box 190 Fort Duchesne, UT 84026-0190
Washington Terrace City	No individual identified	City Hall 5249 S. South Pointe Dr. Washington Terrace, UT 84405
Weber & Ogden Water Commissioner	Cole Panter	P.O. Box 741 Ogden, UT 84402
Weber Basin Water Conservancy District	Mark Anderson	2837 E. Hwy 193 Layton, UT 84040
Weber County Planning Division	Sean Wilkinson	2380 Washington Blvd. Ste. 240 Ogden, UT 84401
Weber River Water Users & Davis and Weber Counties Canal Company	Ivan Ray	138 W. 1300 North Sunset, UT 84105
West Haven City	No individual identified	4150 S. 3900 W. West Haven, UT 84401
West Point City	No individual identified	West Point City Hall 3200 W. 300 N. West Point, UT 84015

During the relicensing process, PacifiCorp engaged an active stakeholder group comprised of interested parties (Table 2). Subsequently, additional working groups were formed to focus discussions within a given resource area. Participants in the Fisheries Working Group (FWG), Recreation Working Group (RWG), and Water Resources Working Group (WRWG) are listed in Table 3, Table 4, and Table 5, respectively.

Table 2. Participants in the stakeholder group for the Weber Hydroelectric Project ALP (organized alphabetically by organization/entity then by first name).

Organization	Name
American Whitewater	Charlie Vincent
American Whitewater	Kevin Colburn
Bureau of Reclamation Provo Area Office	Justin Record
Bureau of Reclamation Provo Area Office	Rick Jones
Bureau of Reclamation Provo Area Office	Wayne Pullan
Federal Energy Regulatory Commission Division of Hydropower Licensing	Evan Williams
Federal Energy Regulatory Commission Division of Hydropower Licensing	John Mudre
Federal Energy Regulatory Commission Division of Hydropower Licensing	Kyle Olcott
PacifiCorp	Eve Davies
PacifiCorp	Frank Shrier
PacifiCorp	Jack Kolkman
PacifiCorp	Russ Howison
PacifiCorp	Todd Olson
Provo River Water Users	Jeff Budge
Stonefly Society	Fred Reimherr
Trout Unlimited	Paul Burnett
U.S. Fish and Wildlife Service	George Weekley
U.S. Fish and Wildlife Service	Paul Abate
U.S. Forest Service Uinta-Wasatch-Cache National Forest	Charlie Rosier
U.S. Forest Service Intermountain Region	Jamie Gough
U.S. Forest Service Intermountain Region	Jim Nutt
U.S. Forest Service Uinta-Wasatch-Cache National Forest	Paul Chase
U.S. Forest Service Uinta-Wasatch-Cache National Forest	Sean Harwood
Utah Department of Environmental Quality Division of Water Quality	Kari Lundeen
Utah Department of Environmental Quality Division of Water Quality	William Damery
Utah Department of Transportation	Brent DeYoung
Utah Division of State History State Historic Preservation Office	Chris Hansen
Utah Division of Wildlife Resources State Headquarters	Bill James
Utah Division of Wildlife Resources Northern Region Office	Paul Thompson

Table 2. Participants in the stakeholder group for the Weber Hydroelectric Project ALP (organized alphabetically by organization/entity then by first name).

Organization	Name
Utah Division of Wildlife Resources State Headquarters	Sarah Seegert
Weber and Ogden Water Commissioner	Cole Panter
Weber Basin Water Conservancy District	Mark Anderson
Weber River Water Users & Davis and Weber Counties Canal Company	Rick Smith

Table 3. Participants in the FWG (same participants as the WRWG) for Weber Hydroelectric Project ALP (organized alphabetically by organization/entity then by first name).

Organization	Name
Federal Energy Regulatory Commission Division of Hydropower Licensing	John Mudre
PacifiCorp	Eve Davies
PacifiCorp	Frank Shrier
Stonefly Society	Fred Reimherr
Trout Unlimited	Paul Burnett
U.S. Fish and Wildlife Service	George Weekley
U.S. Fish and Wildlife Service	Paul Abate
U.S. Forest Service Intermountain Region	Jim Nutt
U.S. Forest Service Uinta-Wasatch-Cache National Forest	Paul Chase
Utah Department of Environmental Quality Division of Water Quality	Kari Lundeen
Utah Department of Environmental Quality Division of Water Quality	William Damery
Utah Division of Wildlife Resources Northern Region Office	Paul Thompson
Utah Division of Wildlife Resources State Headquarters	Sarah Seegert

Table 4. Participants in the RWG for Weber Hydroelectric Project ALP (organized alphabetically by organization/entity then by first name).

Organization	Name
American Whitewater	Charlie Vincent
Bureau of Reclamation Provo Area Office	Rick Jones
Federal Energy Regulatory Commission Division of Hydropower Licensing	Kyle Olcott
PacifiCorp	Eve Davies
PacifiCorp	Russ Howison
U.S. Forest Service Uinta-Wasatch-Cache National Forest	David Ashby

Table 4. Participants in the RWG for Weber Hydroelectric Project ALP (organized alphabetically by organization/entity then by first name).

Organization	Name
U.S. Forest Service Intermountain Region	Jamie Gough
U.S. Forest Service Inter-Regional Hydropower and Ditch Bill Team	Jim Nutt
Utah Division of Wildlife Resources Northern Region Office	Paul Thompson

Table 5. Participants in the WRWG (same participants as the FWG) for Weber Hydroelectric Project ALP (organized alphabetically by organization/entity then by first name).

Organization	Name
Federal Energy Regulatory Commission Division of Hydropower Licensing	John Mudre
PacifiCorp	Eve Davies
PacifiCorp	Frank Shrier
Stonefly Society	Fred Reimherr
Trout Unlimited	Paul Burnett
U.S. Fish and Wildlife Service	George Weekley
U.S. Fish and Wildlife Service	Paul Abate
U.S. Forest Service Intermountain Region	Jim Nutt
U.S. Forest Service Uinta-Wasatch-Cache National Forest	Paul Chase
Utah Department of Environmental Quality Division of Water Quality	Kari Lundeen
Utah Department of Environmental Quality Division of Water Quality	William Damery
Utah Division of Wildlife Resources Northern Region Office	Paul Thompson
Utah Division of Wildlife Resources State Headquarters	Sarah Seegert

A summary of key events and milestones in the ALP for the Project is provided in Table 6. A listing of key dates associated with study reports (also referred to as technical reports) is provided in Table 7.

Table 6. Key events and milestones of the Project ALP.

Event	Summary	Date
Stakeholder Group		
Interested Party Meeting Ogden, UT	• Heard presentations from PacifiCorp regarding the Weber Hydroelectric Project and the relicensing process • Reviewed general schedule for relicensing • Reviewed and discussed relicensing options (ALP vs Integrated Licensing Process [ILP]) • Reviewed draft communication protocol	March 5, 2015
Draft Pre-Application Document (PAD)	• Draft PAD distributed to Interest Group for 30-day review	April 21, 2015
Interested Party Meeting Ogden, UT	• Took part in a collaboration workshop • Took part in a PAD workshop	April 28, 2015
Field Review - Terrestrial Threatened, Endangered, and Sensitive (TES) Species and Noxious Weeds Weber Hydroelectric Project Area	• Reviewed Project Area, TES protocols for target species, and plans to survey and manage noxious weeds	July 2, 2015
Preliminary Draft Study Plans	• Preliminary draft study plan for Terrestrial TES Species distributed to stakeholders for 30-day review	July 13, 2015
	• Preliminary draft study plan for Cultural Resources distributed to stakeholders for 30-day review	July 16, 2015
	• Preliminary draft study plans for Fisheries, Recreation and Water Quality distributed to stakeholders for 30-day review	September 4, 2015
Scoping Document 1	• Distributed to interest group and filed with FERC	September 3, 2015
Public Scoping Meeting Ogden, UT	• Site visit with PacifiCorp and FERC Staff • Initial study plan meeting • Fisheries and water resources work groups formed	October 6 & 7, 2015
Draft Study Plans	• Filed with FERC	November 18, 2015
Recreation Work Group	• Recreation work group formed to help guide general recreation and whitewater boating studies	February 17, 2016
Revised Draft Study Plans	• Revised draft study plans distributed for acceptance/approval	March 7, 2016
Final Study Plans	• Final study plans for water resources, fisheries, recreation, cultural resources, and terrestrial TES and noxious weeds filed with FERC	April 4, 2016
Draft Plan for Fish Entrainment Study	• Distributed to interest group for review	May 17, 2016
Preliminary Draft Technical Reports – Cultural Resources and Terrestrial TES and Noxious Weeds	• Distributed to interest group for 30-day review	August 2, 2016
Draft Technical Reports – Cultural Resources and Terrestrial TES and Noxious Weeds	• Filed with FERC for 30-day public comment	September 13, 2016

Table 6. Key events and milestones of the Project ALP.

Event	Summary	Date
Preliminary Draft Recreation Technical Report	• Distributed to recreation work group for 30-day review • Stakeholder group invited to review	November 15, 2016
Draft Recreation Technical Report	• Filed with FERC for 30-day public comment	December 20, 2016
Preliminary Draft Fisheries Technical Report	• Distributed to fisheries work group for 30-day review • Stakeholder group invited to review	December 22, 2016
Draft Fisheries Technical Report	• Filed with FERC for 30-day public comment	February 9, 2017
Preliminary Draft Water Resources Technical Report	• Distributed to water resources work group for 30-day review • Stakeholder group invited to review	March 15, 2017
Draft Water Resources Technical Report	• Filed with FERC for 30-day public comment	April 28, 2017
Stakeholder Meeting	• Heard updates on the relicensing process and studies • Reviewed and discussed PacifiCorp's proposed protection, mitigation and enhancement measures • Reviewed preliminary draft memorandum of agreement (MOA) • Heard update on the applicant-prepared environmental assessment (APEA)	April 20, 2017
FWG		
Public Scoping Meeting Ogden, UT	• Site visit with PacifiCorp and FERC Staff • Initial study plan meeting • Fisheries Work Group formed	October 6 & 7, 2015
Fish Passage Design Onsite Review Weber Hydroelectric Project	• Site review for fish passage design held with bidders and work group members	January 19, 2016
Fisheries Work Group Meeting Ogden, UT	• Reviewed technical proposals received in response to PacifiCorp's RFP for fish passage design • Provided input on contractor selection	February 8, 2016
Fisheries Work Group Meeting Salt Lake City, UT	• Kickoff meeting with fish passage design consultant (Kleinschmidt Associates) • Met with consultant team • Discussed the project and process • Established fish passage design criteria	March 7, 2016
Draft Fishway Design Memo	• Kleinschmidt's draft fishway design memo distributed for work group review	April 25, 2016
Fisheries Work Group Meeting Ogden, UT	• Review and approve fish passage design criteria • Develop fish passage alternatives	May 4, 2016
Draft Process Plan for Fish Entrainment Study (Fisheries Study 2)	• PacifiCorp's draft fish entrainment study plan distributed for work group review	May 11, 2016
Fisheries Work Group Conference Call	• Discussed required modifications to design of the fish passage preferred alternative with Kleinschmidt Associates	June 2, 2016

Table 6. Key events and milestones of the Project ALP.

Event	Summary	Date
Design Criteria and Conceptual Design for Upstream Fish Passage at the Weber Plant	• Distributed for fisheries work group review	June 15, 2016
Draft Alternatives Memo for Upstream Fish Passage at the Weber Plant	• Distributed to fisheries work group for 30-day review	June 23, 2016
Fisheries Work Group Meeting Ogden, UT	• Reviewed and discussed the preferred fish passage alternative, as modified • Discussed upcoming fish entrainment study	July 13, 2016
Final Fishway Design Criteria Memo	• Distributed to the fisheries work group (included revisions requested at July 13, 2016 meeting)	July 15, 2016
Fish Entrainment Study Weber Hydroelectric Project Area	• Fish entrainment study, phase 1 carried out by PacifiCorp, UDWR, and volunteers from fisheries work group	July 19, 2016
Fish Entrainment Study Data Summary	• Distributed to fisheries work group for review and discussion	July 26, 2016
Weber Dam Onsite Meeting and Conference Call	• Discussed results of phase 1 entrainment study and potential need for further study	July 29, 2016
Fish Entrainment Study Phase 2 Scope of Work	• Distributed to fisheries work group	August 2, 2016
Fish Entrainment Study Phase 2	• Fish entrainment study, phase 2 (photographic study) begins	August 9, 2016
Final Fish Passage Alternative Memo	• Distributed to fisheries work group	August 10, 2016
Draft Upstream Fish Passage Conceptual Design Report	• Distributed to fisheries work group for 30-day review	August 12, 2016
Fisheries Work Group Conference Call	• Heard an update on phase 2 entrainment studies and recommendation from PacifiCorp to discontinue phase 2 studies in favor of a literature review and desktop analysis	September 14, 2016
Fisheries Work Group Meeting Ogden, UT	• Wrapped up 2016 activities including final edits to fish passage conceptual design • Reviewed progress on fisheries technical report • Reviewed schedule for 2017	October 19, 2016
Preliminary Draft Fisheries Technical Report	• Distributed to fisheries work group for 30-day review	December 20, 2016
Fisheries Work Group Conference Call	• Heard updates on technical reports • Discussed PacifiCorp's low level gate operation • Discussed scheduling for 2017	February 8, 2017
Draft Fisheries Technical Report	• Filed with FERC for 30-day public review	February 9, 2017
RWG		
Public Scoping Meeting Ogden, UT	• Site visit with PacifiCorp and FERC Staff • Initial study plan meeting	October 6 & 7, 2015
Recreation Work Group	• Recreation work group formed to help guide general recreation and whitewater boating studies	February 17, 2016

Table 6. Key events and milestones of the Project ALP.

Event	Summary	Date
Recreation Work Group Meeting by Conference Call	• Initial work group meeting with ERM (whitewater boating study consultant) and Cirrus (general recreation study consultant) • Reviewed methods and timeframes for both studies	February 23, 2016
Recreation Study Kickoff Weber Hydroelectric Project Area	• Held site visit with consultants and interested work group members	March 1, 2016
Whitewater Boater Focus Group Ogden, UT	• Focus group with whitewater boaters who use the Weber River in the Project Area; interested work group members invited to attend • Gathered information on whitewater boating opportunities, use patterns, flow preferences, and access in the reach of the Weber River downstream of the project diversion.	May 3, 2016
Preliminary Draft Recreation Technical Report	• Distributed to recreation work group for 30-day review	November 15, 2016
Draft Recreation Technical Report	• Filed with FERC for 30-day public review	December 20, 2016
Recreation and Water Resources conference call	• Heard updates on technical reports and discussed 2017 scheduling	February 2, 2017
Boater Egress Subgroup Meeting	• Subgroup (PacifiCorp, Davis and Weber Counties Canal Company, U.S. Forest Service, and American Whitewater) met to discuss proposed PM&E measure Rec-9	May 19, 2017
Boater Egress Subgroup Meeting	• Subgroup met to continue discussion of proposed PM&E measure 9	June 9, 2017
WRWG		
Public Scoping Meeting Ogden, UT	• Site visit with PacifiCorp and FERC Staff • Initial Study Plan meeting • Water Resources work group formed	October 7, 2015
Fish Passage Design Onsite Review, Weber Hydroelectric Project Area	• Final water quality monitoring sites selected	January 19, 2016
Fisheries Work Group Meeting Ogden, UT	• Reached agreement on proposed changes to water quality monitoring/sampling	February 8, 2016
Recreation and Water Resources Conference Call	• Heard updates on technical reports and discussed 2017 scheduling	February 2, 2017
Preliminary Draft Water Resources Technical Report	• Distributed to water resources work group for 30-day review	March 15, 2017
Draft Water Resources Technical Report	• Filed with FERC for 30-day public comment	April 28, 2017
Stakeholder Group Conference Call	• Reviewed and discussed proposed revisions to the draft MOA	August 31 and September 6, 2017

Table 7. Key dates associated with technical reports and review periods.

Study Plan Technical Report	Preliminary Draft Report to Stakeholder Group	Draft Filed with FERC	Final Filed with FERC
Cultural Resources	August 2, 2016	September 13, 2016	June 30, 2017
Terrestrial TES	August 2, 2016	September 13, 2016	June 30, 2017
Recreation	November 15, 2016	December 20, 2017	June 30, 2017
Fisheries	December 22, 2016	February 9, 2017	June 30, 2017
Water Resources	March 15, 2017	April 28, 2017	June 30, 2017

1.3 PURPOSE OF ACTION AND NEED FOR POWER

1.3.1 Purpose of Action

The purpose of the Weber Hydroelectric Project is to continue to provide a source of hydroelectric power to meet the region's power needs. Under the provisions of the Federal Power Act (FPA), the Commission must decide whether to issue a license to PacifiCorp for the Project and what conditions should be placed on any license issued. In deciding whether to issue a license for a hydroelectric project, the FERC must determine that the project will be best adapted to a comprehensive plan for improving or developing a waterway. In addition to the power and developmental purposes for which licenses are issued (such as flood control, irrigation, or water supply), the FERC must give equal consideration to the purposes of: (1) energy conservation; (2) the protection of, mitigation of damage to, and enhancement of fish and wildlife resources; (3) the protection of recreational opportunities; and (4) the preservation of other aspects of environmental quality.

Issuing a new license for the Weber Hydroelectric Project would allow PacifiCorp to generate electricity for the term of a new license, making electrical power from a renewable resource available to its customers.

1.3.2 Need for Power

The Weber Hydroelectric Project is an important and renewable component of the local electrical grid supplying 3.85 MW of installed capacity to meet local demand. The Project generates an average of 16,932 MWh of energy each year.

The North American Electric Reliability Corporation (NERC) annually forecasts electrical supply and demand nationally and regionally for a 10-year period. The Weber Hydroelectric Project is located in the Western Electricity Coordinating Council (WECC) region, in the WECC-NWPP-US assessment area, of NERC which includes the states of Washington, Oregon, Idaho, Montana, Nevada, and Utah. According to NERC's most recent long-term reliability assessment (2016), peak energy demand in the WECC-NWPP-US assessment area is expected to increase over the next 10-year period (between 2017 and 2026) by more than 6.5 percent. Electricity from the Weber Hydroelectric

Project would help meet this need for power in both the short and long term, and would provide grid support.

Should a new license for the Project not be granted, the services that the Project provides would need to be provided by other existing generation projects or in some other fashion by PacifiCorp.

1.4 STATUTORY AND REGULATORY REQUIREMENTS

A license for the Weber Hydroelectric Project is subject to several requirements under the FPA and other applicable statutes. The major regulatory and statutory requirements are described below.

1.4.1 Federal Power Act

1.4.1.1 Section 18 Fishway Prescriptions

FPA §18 states that the FERC is to require construction, operation, and maintenance by a licensee of such fishways as may be prescribed by the Secretary of the Interior or the Secretary of Commerce. In this relicensing, the U.S. Fish and Wildlife Service (FWS), as the designee of the Secretary of Interior, has jurisdiction over relevant fish species in the Weber River (in this case, relevant means federally-listed Threatened or Endangered species; UDWR has jurisdiction over non-listed wildlife of the state). The construction, operation, and maintenance of an upstream fish ladder is proposed by PacifiCorp as an environmental measure to be included in a new license for the Weber Hydroelectric Project. Stakeholders engaged in the relicensing process agreed with PacifiCorp that an upstream fish ladder is needed to protect and promote local fisheries resources. Stakeholders played an integral role in the development of fish ladder design criteria as well as the fish ladder design ultimately proposed by PacifiCorp (Section 2.2.4.1 provides detailed information on the proposed fish ladder).

1.4.1.2 Section 4(e) Conditions

FPA §4(e) applies to projects that are located within federal reservations such as USFS lands or tribal lands. Section 4(e) requires that the Commission find that the license in question will not be inconsistent with the original purposes of the reserved lands. Section 4(e) further indicates that the federal agency managing the reserved lands may require conditions necessary for the protection and use of those lands. However, the federal agency managing the reserved lands may not veto the license. Section 4(e) conditions apply to the Weber Hydroelectric Project because a portion of the Project is located on USFS lands managed by the UWCNF. The USFS is participating in the ALP as a stakeholder. In addition, the USFS requires PacifiCorp to obtain a USFS Special Use Permit (SUP) to operate and maintain the Project. The SUP application process is being conducted concurrently with the relicensing process.

1.4.1.3 Section 10(j) Recommendations

Under §10(j) of the FPA, each hydroelectric license issued by the Commission must include conditions based on recommendations provided by federal and state fish and wildlife agencies for the protection, mitigation, or enhancement of fish and wildlife resources affected by the Project. The Commission is required to include these conditions unless it determines that they are inconsistent with the purposes and requirements of the FPA or other applicable laws. Before rejecting or modifying an agency recommendation, the Commission is required to attempt to resolve any such inconsistency with the agency, giving due weight to the recommendations, expertise, and statutory responsibilities of such agency. The FWS and Utah Division of Wildlife Resources (UDWR) have been engaged in the ALP for the Project since the relicensing process began in spring 2015. Throughout the ALP these stakeholders have provided recommendations for the protection, mitigation, and enhancement of fish and wildlife resources affected by the Project. These recommendations are reflected in the proposed environmental measures described in Section 2.2.4.

1.4.1.4 Section 30(c) Fish and Wildlife Terms and Conditions

Under §30(c) of the FPA the Commission is required to consult with the FWS, National Marine Fisheries Service (NMFS), and the state fish and wildlife agency consistent with the Fish and Wildlife Coordination Act. This consultation relates to terms and conditions that FWS, NMFS, and the state fish and wildlife agency determine are needed to prevent loss of, or damage to, fish and wildlife resources as a result of implementation of the Project. The FWS and UDWR have been engaged in the ALP for the Project since the relicensing process began in spring 2015. Throughout the ALP these stakeholders have provided recommendations related to the prevention of loss of, or damage to, fish and wildlife resources affected by the Project. These recommendations are reflected in the proposed environmental measures described in Section 2.2.4. NMFS has not been consulted because resources under their jurisdiction are not affected by the Project.

1.4.2 Clean Water Act

Under §401 of the Clean Water Act (CWA), a license applicant must obtain water quality certification (Certification) from the appropriate state pollution control agency verifying compliance with the CWA. The Utah Division of Water Quality (UDWQ) has been engaged in the ALP for the Project since the relicensing process began in spring 2015. Within 60 days of the Commission's notice requesting terms and conditions and recommendations PacifiCorp will apply to UDWQ for Certification for the Weber Hydroelectric Project. UDWQ must act on this request for Certification within one year of its receipt or the Certification is waived.

For jurisdictional purposes of the CWA, which relies on determination of Traditional Navigable Waters (TNW), the State of Utah has made a navigability determination for the Weber River and has rated the Weber River and its tributaries as

non-navigable, although they are all tributary to the Great Salt Lake, which is considered a TNW. Under a separate definition, in April 2015, a federal court of the State of Utah made a navigability determination under the Commerce Clause of the US Constitution, which relies on a rating of navigable-in-fact, for the upper 25 miles of the Weber River, from the headwaters to Rockport Reservoir. This latter designation is strictly related to questions of recreational access versus private property rights.

1.4.3 Endangered Species Act

Section 7 of the Endangered Species Act (ESA) requires federal agencies to ensure that their actions are not likely to jeopardize the continued existence of federally listed endangered or threatened species or result in the destruction or adverse modification of the critical habitat of such species. Based on field surveys conducted in 2015, 2016, and 2017 no federally listed endangered or threatened species are known to occur in the vicinity of the Project (Sections 3.3.4.1 and 3.3.5.1). FWS has been engaged in the ALP for the Project since the relicensing process began in spring 2015. PacifiCorp has sought concurrence from the FWS that formal consultation is not needed given no federally listed species occur in the Project Area. However, it is expected that FERC will formally consult with FWS under Section 7 if required.

1.4.4 National Historic Preservation Act

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

Pursuant to Section 106 of NHPA, a formal cultural resources inventory was conducted to identify the presence of cultural resources in the Weber Hydroelectric Project Area and to assess potential Project impacts on these resources. During the inventory three historic properties were identified (two are eligible for and one is listed on the National Register). No adverse impacts to these properties are expected with issuance of a new license from FERC. PacifiCorp requested concurrence from State Historic Preservation Office (SHPO) on a finding of no adverse effect for the proposed undertaking and received concurrence from SHPO on December 16, 2016 (Utah Division of State History 2016). As part of this relicensing process and in consultation with SHPO, the existing Cultural Resources Management Plan (CRMP) has been found to meet the goals and principles outlined in the *Guidelines for the Development of Historic Properties Management Plans for FERC Hydroelectric Projects* (FERC and ACHP 2002). Therefore, the CRMP will be updated and implemented as a Historic Properties Management Plan (HPMP; also see Appendix B for the draft HPMP) for the renewed license. Data gathering and analysis and execution and adherence to the existing CRMP,

as updated to a HPMP (see Appendix B), demonstrates compliance with Section 106 of NHPA.

1.5 PUBLIC REVIEW AND COMMENTS

FERC's regulations (18 CFR, §16.8) require that applicants consult with appropriate resource agencies, tribes, and other entities before filing an application for a license. This consultation is the first step in complying with the Fish and Wildlife Coordination Act, ESA, NHPA, and other federal statutes. Prefiling consultation must be completed and documented according to the FERC's regulations.

Relicensing of the Weber Hydroelectric Project was formally initiated May 29, 2015, when PacifiCorp filed with the FERC a PAD and NOI to license the Project using the ALP. FERC approved the use of the ALP on August 13, 2015. Through this relicensing PacifiCorp has consulted with resource agencies and other interested parties (Section 1.2). Communications and consultation with stakeholders in the ALP occurs in accordance with an approved Communication Protocol dated April 28, 2015. All comments received from stakeholders and the public, as well as PacifiCorp responses on the various study plans, technical reports, and other license process issues, have been filed with FERC and are also available on PacifiCorp's Weber Hydroelectric Project Relicensing website (http://www.pacificorp.com/es/hydro/hl/weber.html#).

1.5.1 Scoping

As part of this EA preparation, a public and agency scoping process was conducted to determine what issues and alternatives should be addressed in the analysis. A scoping document (SD1) was distributed to interested parties (agencies and others) in September 2015. It was noticed in the Federal Register on September 25, 2015. Two scoping meetings were held on October 6, 2015 in Ogden, Utah to request comments on the Project. A court reporter recorded all comments and statements made at the scoping meetings, and these are part of the FERC's public record for the Project. No written comments were provided during the scoping period. Because no new issues were introduced during the formal scoping period, no revised scoping document (SD2) was prepared.

1.5.2 Interventions

[The Commission's guidance document *Preparing Environmental Documents: Guidelines for Applicants, Contractors, and Staff* (FERC 2008) indicates that while this section need not be included in an APEA prepared under the ALP, the framework for the section may be included. This section is prepared by Commission staff after a final application is filed and a notice seeking interventions is issued.]

1.5.3 Comments on the License Application

[Pending notice requesting preliminary recommendations and terms and conditions.]

1.5.4 Comments on the Draft APEA

[Pending completion of Final APEA.]

2.0 PROPOSED ACTION AND ALTERNATIVES

2.1 NO-ACTION ALTERNATIVE

The no-action alternative is the baseline of comparison for the proposed action alternative. Under the no-action alternative, the Project would continue to operate under the terms and conditions of the current license. Thus, the no-action alternative would include the existing Project Boundary, existing facilities, current Project operation, and existing environmental measures.

2.1.1 Existing Project Boundary

The existing Project Boundary is depicted in Figure 2. This boundary encompasses most of the facilities and activities described below. However, it excludes the following Project features: Weber Recreation Site, portions of both the intake gatehouse ("Buck's house") on the south bank of the diversion dam and the ice chute on the north bank, and the cottages and out buildings near the powerhouse. Further, it includes the following non-Project features: a portion of I-84, a portion of Davis and Weber Counties Canal Company's (DWCCC) diversion dam, and a portion of the Weber River upstream of the upper extent of the forebay. Land ownership within the existing Project Boundary is described in Table 8. To reconcile actual Project uses, changes to the Project Boundary are proposed as part of this relicensing process (see Section 2.2.1).

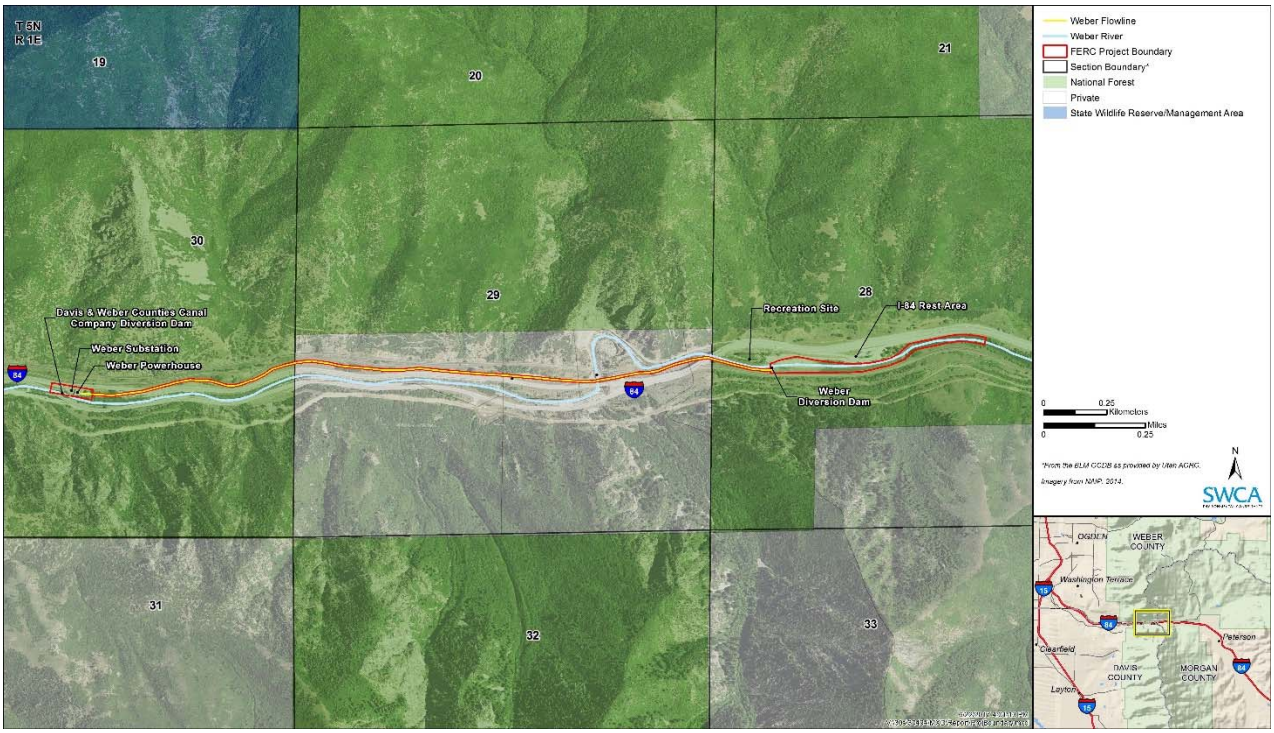

Figure 2. Existing Project Boundary.

Table 8. Land ownership/management within the existing Project Boundary.

Ownership/Management	Acres
U.S. Forest Service (USFS)	15.51
Union Pacific Railroad Company (UPRC)	2.97
Total	18.48

2.1.2 Existing Project Facilities

The Weber Hydroelectric Project is a run-of-river operation consisting of the following facilities: 1) a diversion dam with an overall length of 114 feet and crest elevation of 4,788.69 feet (NAVD-88) consisting of a 27-foot-high, 79-foot-long concrete section, two radial gates (one referred to as the north gate and the other referred to as the south gate) approximately 29 feet long, and a 35-foot-long intake structure on the Weber River; 2) a 3-foot by 18-foot non-operative fish passage structure that is used to pass minimum flows through a calibrated slide gate opening; 3) a forebay with a surface area of 8.4 acres at elevation 4,798 above mean sea level (amsl) and total water storage capacity of approximately 42 acre-feet; 4) a 9,107-foot-long, 5-foot to 6.3-foot diameter steel penstock partially encased in concrete beginning at the intake and terminating at the powerhouse on the Weber River; 5) a powerhouse with one 3,850 kilowatt (kW) generating unit (5,000 horsepower) operating under a head of 185 feet and producing a 50-year average annual energy output of 16,926 MWh (average monthly generation is 1,411 MWh, estimated dependable capacity is 1,420 kW utilizing the entire 96-year period of record, but 594 kW utilizing the most recent 30-year period of record; see Section 3.3.2.1 for discussion of the difference in flows between the two periods); 6) a discharging pipe returning turbine flows into the Weber River at the powerhouse; and 7) a 77-foot-long, 46-kilovolt (kV) transmission line which connects to the Weber substation (substation is not part of the Weber Hydroelectric Project). The locations of existing Project facilities are depicted in Figure 3.

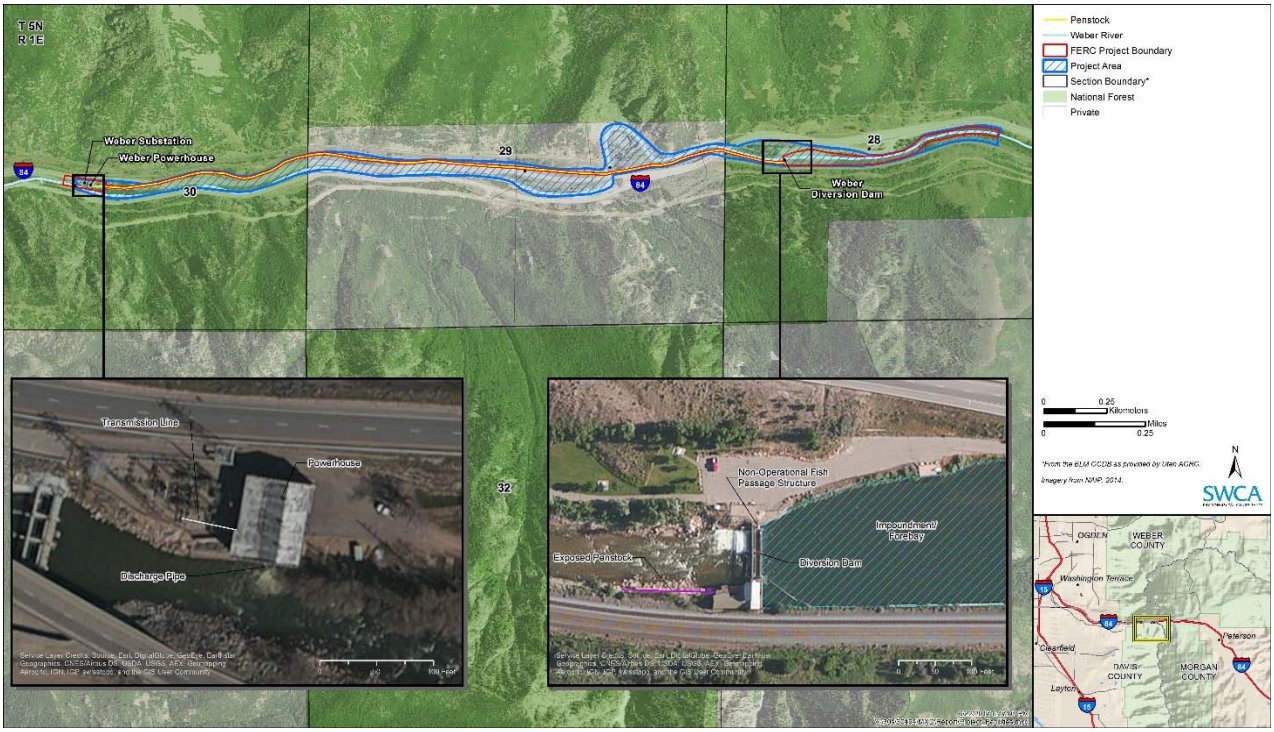

Figure 3. Locations of existing Project facilities.

During the current license term, PacifiCorp made the following capital improvements to the Project:

- 1992 – Weber Recreation Site construction (mandated by the current license Article 405)
- 1993 – North radial gate automated (south gate was previously automated)
- 1996 – Automatic leak detect system installed
- 2004 – Weber Dam spillway apron extended
- 2009 – Weber load controller replaced and bearing rebabbited
- 2010 – Weber Powerhouse battery bank replacement
- 2013 – Weber radial gate seal repaired
- 2014-2015 – Tunnel penstock recoating and support structure improvement
- 2017 – Turbine bearing, seal, and runner repair

2.1.3 Project Safety

The Project has been operating for more than 27 years under the existing FERC license and during this time, FERC staff has conducted operational inspections focusing on the continued safety of the structures, identification of unauthorized modifications, efficiency and safety of operations, compliance with the terms of the license, and proper maintenance. FERC Part 12 (D) requirements do not apply to the Project because the diversion dam is less than 32.8 feet in height above the streambed, it impounds less than 2,000 acre-feet of water, and it has low hazard potential.

As part of a relicensing process, FERC staff evaluate the continued adequacy of the proposed Project facilities under a new license. Special articles would be included in any license issued, as appropriate. FERC staff then continue to inspect the Project during the new license term to assure continued adherence to approved plans and specifications, special license articles relating to construction (if any), operation and maintenance, and accepted engineering practices and procedures.

2.1.4 Existing Project Operation

The current Project operating license was issued by the FERC in 1990 with a 30-year license term, expiring May 31, 2020. The Project is operated as a run-of-the river project. The current license does not specify any daily/seasonal ramping rates, flushing flows, reservoir operations, or flood control operations (reflective of the size of the facility and lack of potential water storage). Prior to 1993, the Project was manually operated. Following the installation of an automated control system in 1993, the Weber plant is now designed for unmanned semi-automatic operation and is controlled by a programmable logic controller (PLC). The normal mode of operation is for the plant to be unattended aside from daily operations. Two local operators are located nearby in Ogden, Utah, and visit the Project on a daily basis and as called out by PacifiCorp's Hydro Control Center (HCC) located in Ariel, Washington. The HCC monitors the Project operations remotely and notifies the local operator when an issue arises. In addition to standard local generator protection equipment and alarms, the penstock pressure, generator load, forebay level, and circuit breaker at the Weber plant are monitored by a hydro control operator at the HCC. The Weber flowline can divert up to approximately 365 cubic feet per second (cfs) at the Project dam; the bypassed reach between the diversion dam and the powerhouse is approximately 1.7 miles long.

Downstream of the Project diversion dam, the current license mandates a continuous minimum stream flow of 34 cfs or inflow, whichever is less, from October 1-March 31; and, a continuous minimum flow of 34-50 cfs (range dependent on the annual runoff forecast), or inflow, whichever is less, from April 1-September 30.

Annual maintenance is routinely conducted each year and involves vegetation management (including landscaping areas) on Project lands, recreation area maintenance and management (including seasonal portable restroom facilities), snow clearing and other limited road maintenance activities, as-needed maintenance on the water conveyance system and generating unit, and non-routine forebay dredging (any dredged materials are removed and disposed of at a permitted off-site location). The timing and scope of annual maintenance activities are coordinated with the UWCNF as provided in the current SUP issued for the Project by the USFS.

Generation from the Project provides energy to the Western Electricity Coordinating Council (WECC) electric reliability region. The average annual Project generation is 16,926 MWh. The average monthly generation (based on average monthly

generation rate, 1966-2016) is 1,411 MWh. The generating unit located in the powerhouse has a rated capacity of 3,850 kW operating under a head of 185 feet.

2.1.5 Existing Environmental Protection, Mitigation, and Enhancement Measures

Existing environmental protection, mitigation, and enhancement (PM&E) measures being implemented at the Project relate to fisheries, botanical resources, terrestrial wildlife resources, cultural resources, and recreation resources. These PM&E measures are summarized in Table 9. This table also includes a brief description of PacifiCorp's compliance history for each measure. Measures related to compliance with other laws, regulations, agreements, and standards (e.g., state water quality regulations) are not enumerated here because they are not license specific.

Table 9. Existing PM&E measures.

Resource	Environmental Measure	License Article or Other Reference (as applicable)	Compliance History
Fisheries and Aquatic Resources	Maintain required minimum stream flow for the bypassed reach of the river affected by the Project (see Section 2.1.4).	Article 401	Variances average less than once/year reported to FERC as they have occurred.
	Operational measures to reduce impacts to aquatic resources, such as minimizing sediment release during forebay elevation changes, and not flushing sediment from the Project forebay.	Voluntary	Full compliance
Botanical Resources	Annual consultation with the USFS regarding any planned maintenance or operational measures that would involve ground-disturbing activities.	Article 104	Full compliance
	Annual weed control around the Project recreation site, dam and flowline intake, and powerhouse/cottage area.	Voluntary	Full compliance
Terrestrial Wildlife Resources	Annual consultation with the USFS regarding any planned maintenance or operational measures that could impact wildlife habitat.	Article 104	Full compliance
Cultural Resources	Implementation of a CRMP.	Article 403	Full compliance
Recreation Resources	Construction (completed in 1992) and maintenance of the existing recreation site consisting of the following: a paved parking area, five picnic tables, a grassy area, fishing access to the Weber River downstream of the dam, fishing access to the forebay with a handicapped-accessible platform, and a portable toilet that is available on a seasonal basis.	Article 405	Full compliance

2.2 APPLICANT'S PROPOSAL

The proposed action (applicant's proposal) is to continue to operate and maintain the Project on the Weber River, and implement certain additional PM&E measures. PacifiCorp proposes no new hydroelectric developments or changes to Project operation with the exception of minor modifications related to the proposed PM&E fish passage measure. Proposed Project Boundary changes relate to excluding non-Project features from the Project Boundary.

2.2.1 Proposed Project Boundary

The proposed Project Boundary is depicted in Figure 4. This boundary encompasses all the facilities and activities described below. Land ownership within the proposed Project Boundary is described in Table 10.

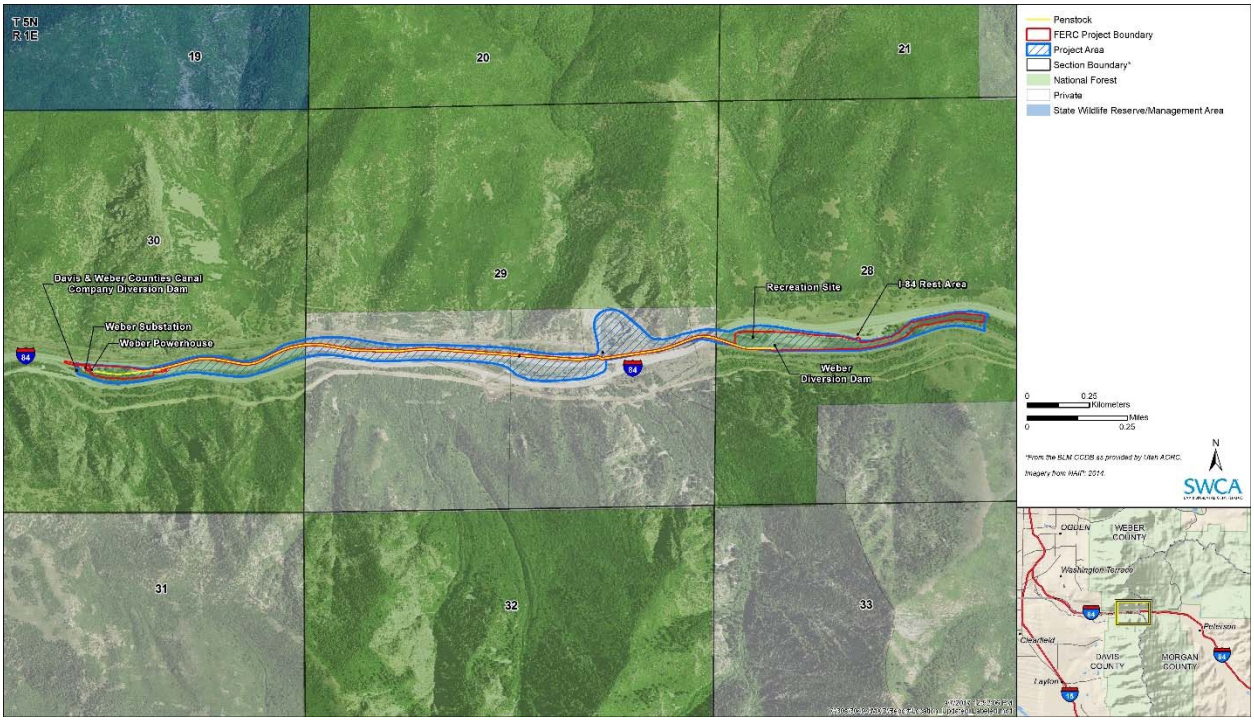

Figure 4. Proposed Project Boundary.

Table 10. Land ownership/management within the proposed Project Boundary.

Ownership/Management	Acres
U.S. Forest Service (USFS)	14.92
Union Pacific Railroad Company (UPRC)	3.14*
Total	18.06

* Note the minor change from Table 8 is an artifact of different measuring/surveying precision since 1990.

2.2.2 Proposed Project Facilities

No new or upgraded facilities or structural changes to the Project during the term of the new license are proposed, other than the potential for Project intake area modernization projects and other minor actions to allow for the construction and operation of the proposed PM&E fish passage measures (FISH-2, FISH-3, and FISH-4 [see Table 11]). Project facilities and generation capacities described above in Section 2.1.2 would remain the same under the proposed action. Periodic project facility maintenance (e.g., cottage and powerhouse roofing, flowline coating, recreation site facility upkeep, etc.), and project component repairs would continue to occur as needed.

2.2.3 Proposed Project Operation

No operational changes to the Project during the term of the new license are proposed except for those necessary to accommodate the following PM&E measures described in detail in Section 2.2.4: FISH-2, FISH-3, FISH-4, and REC-9.

Fish Passage

The proposed fish ladder, with a design flow of 20 cfs through the fish ladder, would accommodate upstream fish passage for Bonneville cutthroat trout and bluehead sucker, and most fish species seeking to pass upstream of the Project. The remaining flow (from 14-30 cfs more, depending on the annual runoff flow forecast) would be passed via the existing minimum flow gate and the existing "ice chute" (when the diversion dam was originally constructed, the "ice chute" was intended to provide fish passage but has never functioned as such and instead has been used by operators to pass ice downstream that accumulates in the forebay during the winter months.). The 20 cfs through the fish ladder would remain constant with the existing minimum flow gate being used to provide the flow adjustment required to accommodate the varying minimum flow requirement (a total of 34-50 cfs). To ensure that the remaining minimum flow (14-30 cfs) that flows through the ice chute provides the necessary attraction flow without being 'swamped' by any spill flow or reservoir elevation maintenance flows, when needed the south radial gate would be opened rather than the north radial gate (currently the north radial gate is opened; PacifiCorp to install a new motor for the south gate to provide for the required finer-level control of forebay reservoir level via the south gate). In addition, in the event of a prolonged Project outage PacifiCorp would keep the forebay full if possible to ensure fish ladder operation. When the forebay is dewatered PacifiCorp would keep the low-level gate operational subject to constraints such as extreme winter icing conditions. Keeping the low-level gate operational would facilitate fish passage when the proposed fish ladder is not functioning; any deviation from the proposed new operational regime of the fish ladder and low-level gate greater than 10 days in duration would result in consultation with the agencies.

Whitewater Boating Flows

In the event that a safe and legal egress site can be identified by the boating community and agreed to by the USFS and DWCCC, PacifiCorp would provide boater flows to the bypassed reach by curtailing generation (up to 320 cfs or inflow) for 4-hour segments on four Saturdays prior to July 15 annually. The exact schedule of this provision of boater flows would be determined in conjunction with American Whitewater (AW). Boater flows in the future may be subject to minimum boater use.

In all other respects the Project operations described in Section 2.1.4 would remain the same under the proposed action as under the no-action alternative (the current license).

2.2.4 Proposed Environmental Protection, Mitigation, and Enhancement Measures

Proposed PM&E measures to be implemented at the Project relate to water resources, fisheries and aquatic resources, botanical resources, terrestrial wildlife resources, cultural resources, and recreation resources. These PM&E measures are summarized in Table 11.

Table 11. Proposed PM&E Measures

Resource	Proposed PM&E Measures
Geology and Soils	None
Water Resources - Hydrology	HYD-1: Continue existing seasonally-adjusted minimum stream flows (34-50 cfs). Implement annual change, if needed, in required minimum streamflow within 10 days of the final Weber River runoff forecast from Natural Resources Conservation Service (NRCS), using the current formula.
Water Resources - Water Rights	None No PM&E measure is proposed because existing 1938 and 1965 agreements and existing water rights [35-8061—365 cfs flow right, 35-8062—100 af storage, 35-8741—storage in Echo] will remain unchanged.
Water Resources - Water Quality	None No PM&E measure is proposed because adherence to existing operations and maintenance practices is protective of the resource (state water quality standards are being met).
Fisheries and Aquatic Resources	FISH-1: Continue to provide minimum stream flow for the bypassed reach of the river affected by the Weber Project (identical to HYD-1, above). FISH-2: Construct, operate, and maintain a fish ladder suitable for upstream passage of both Bonneville cutthroat trout (BCT) and bluehead sucker, including a fish trap operated by UDWR and TU and maintained by PacifiCorp. PacifiCorp will consult annually with UDWR, TU, and USFS related to fish ladder and trap operation and maintenance according to a Communication Plan developed between UDWR, TU, USFS, FWS and PacifiCorp. The Communication Plan will also specify group contacts, alternates, and contact methods over the life of the license. FISH-3: Keep the low-level gate operational when forebay is dewatered subject to operational constraints and requirements such as extreme winter icing conditions (undertake periodic maintenance as required to ensure operation). If the forebay is dewatered and the low-level gate is inoperable for more than 10 days due to extreme temperature or flow conditions, PacifiCorp will consult with UDWR, TU, FWS, UDWQ, and USFS (per the Communication Plan methods) and open the low-level gate as soon as possible.

Table 11. Proposed PM&E Measures

Resource	Proposed PM&E Measures
	FISH-4: In the event of a prolonged project outage, keep forebay full if possible to ensure fish ladder operation. PacifiCorp will consult with UDWR, TU, FWS, DWQ, and USFS (per the Communication Plan methods) to discuss fishway operation during any interim periods exceeding 10 days when neither the low-level gate nor the fishway are operable.
Botanical Resources	BOT-1: Continue existing annual USFS consultation. BOT-2: Conduct weed control per historic practice, adding the area abutting improved project river access point in riparian habitat (see REC-8, below), subject to land owner weed control requirements and constraints.
Terrestrial Wildlife Resources	WL-1: Continue existing annual USFS consultation.
Cultural and Tribal Resources	CULT-1: Finalize and implement the Historic Properties Management Plan (HPMP) (Formerly approved as the Cultural Resources Management Plan [CRMP]).
Recreation Resources	REC-1: Continue to maintain the existing Weber Recreation Site, but with modifications outlined below. REC-2: Coordinate with USFS, UDWR, TU, UDWQ, FWS, and AW on improved interpretive signage; include potential for improved technology to include a code that is scannable and that links to flow information (REC-3). REC-3: Create a webpage hosted and maintained by PacifiCorp (linked on both the Corporate website and the Project website) indicating approximate bypass reach flows (program subtracts generation flow from USGS gage site flow and posts it to website)—when minimum streamflow only, the calculated number will be replaced by the phrase "minimum streamflow of approximately 50 cfs or inflow" to eliminate the risk of showing a calculated flow that could be less than the minimum for that period. REC-4: Install a year-round permanent vault Americans with Disabilities Act (ADA)/ Architectural Barriers Act (ABA)-compliant toilet facility (flush bathrooms are available at the rest stop upstream), maintained by PacifiCorp. Install signage instructing visitors on dog waste protocol and provide dog waste bags for disposal. REC-5: Consult with USFS to create a new ADA/ABA compliant accessible picnic site on flat lawn area closest to parking lot (consisting of a concrete pad, a grill, and an accessible picnic table), or to modify the existing site per USFS standards. REC-6: Maintain/repave access road to Weber Recreation Site and existing asphalt path in picnic area. REC-7: Reconfigure former sandbox area fencing to remove south, east, and west portions (retain north portion to partition recreation site from I-84). REC-8: Improve two existing user-created trails located in and outside the Weber FERC Project Boundary: • In the Project Boundary, improve (construct steps) the existing dirt river access trail at the west end of the recreation site; • Outside the Project Boundary, provide $30,000 through an off-license agreement with TU to fund cooperative effort to improve pedestrian river access (with concurrence from Utah Department of Transportation [UDOT] and the underlying land owner) at the under-freeway user-created trail extending west from the Weber Recreation Site—proposed improvements would involve breaking up the existing large-boulder surface or backfilling this surface to create a navigable path of smaller rock with minimal width (no paving). Funds provided through the off-license agreement may be used by TU to provide another habitat benefit in the watershed in the event that improving pedestrian river access in the indicated location is infeasible or requires less funding than provided through the agreement.

Table 11. Proposed PM&E Measures

Resource	Proposed PM&E Measures
	REC-9: Support whitewater boating use of bypass reach: If AW can identify access which it believes to be safe and legal, the USFS and DWCCC agree to review the proposed access and the items and improvements needed for safe use, such as but not limited to signage, steps for the portage area, and hazard mitigation. If the USFS agrees, in its sole discretion, that the proposed access is appropriate for public use, PacifiCorp will annually provide boater flows to the bypass reach by curtailing generation (up to 320 cfs or inflow) for 4-hour segments on four Saturdays prior to July 15. Flow schedule and notice to be determined in conjunction with AW, and in coordination with DWCCC and FS, with the provision that boater flows in the future may be subject to minimum boater use (fewer than a minimum threshold of boaters may result in suspension of boater flows). Specific use triggers and related release changes to be determined.
Land Use	None
Aesthetic Resources	None
Socioeconomic Resources	None

2.2.4.1 Fish Ladder Construction, Operation, and Maintenance

PM&E measure FISH-2 calls for the construction, operation, and maintenance of a fish ladder suitable for upstream passage of both Bonneville cutthroat trout and bluehead sucker, including a fish trap operated by UDWR and TU and maintained by PacifiCorp. Based on input provided by the stakeholder group, PacifiCorp proposes a traditional style vertical slot fish ladder with a design flow of 20 cfs. Supplemental attraction flow, which is also the 14-30 cfs remainder of the required 34-50 cfs minimum flow, unchanged from the current license requirement, would be provided using the existing minimum flow gate and existing ice chute. Conceptual design drawings of the proposed fish ladder are attached as Appendix C.

Fish Ladder Location and Operation

The proposed location of the new upstream fish passage facility is on the north side of the spillway immediately adjacent to the ice chute where the minimum flow is released (Figure 5). The proposed layout of the facility would not affect the existing ice chute and minimum flow gate. Locating the new fish ladder on the south side of the river is not feasible as it would interfere with the diversion intake, penstock, and railroad.

The proposed fish ladder would be in operation anytime the forebay is full. When the forebay is dewatered the fish ladder would not be operational. However, at these times the low level outlet gate would normally be opened to allow fish passage (see PM&E measures FISH-3 and FISH-4). When the forebay is full the fish ladder would remain in operation for river flows of 34 cfs to approximately 2,500 cfs. The fish ladder is designed to have a water surface elevation drop of nine inches per pool (across approximately 17 pools based on the conceptual design). The pools would have an energy dissipation factor (EDF) of less than 4.0.

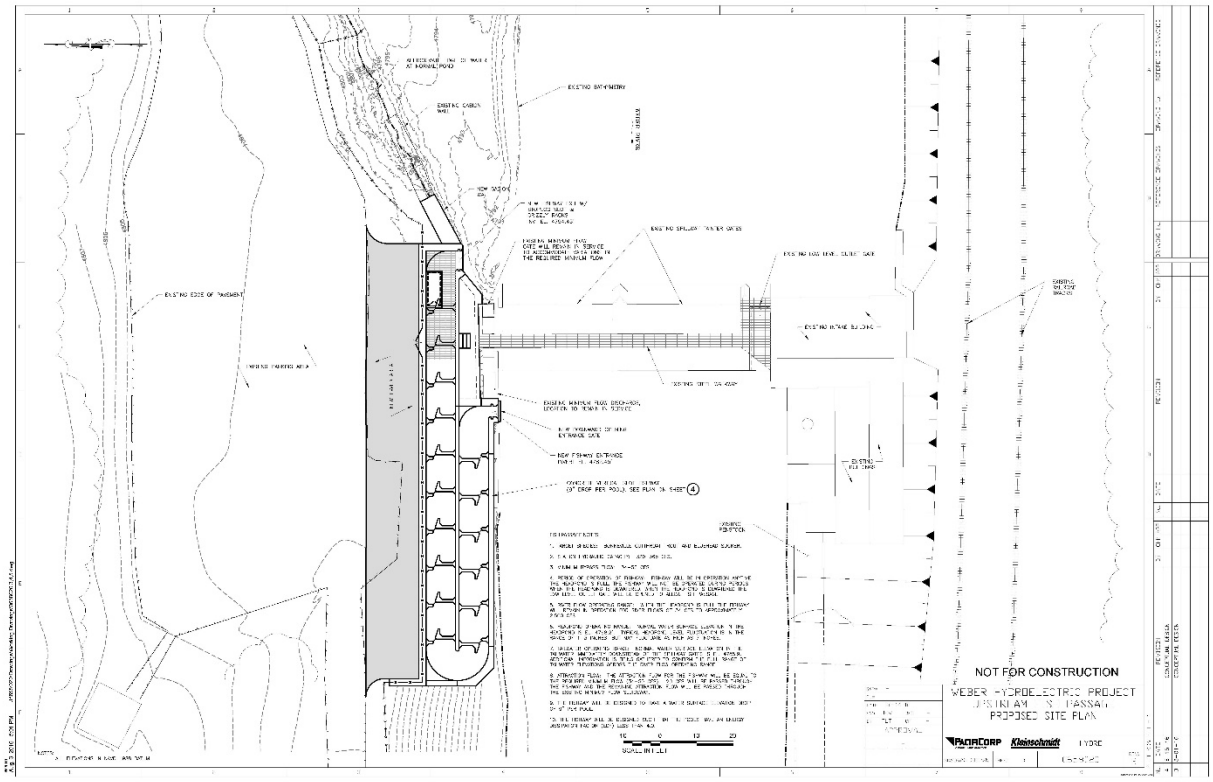

Figure 5. Proposed fish ladder conceptual design site plan.

Effective upstream fish passage requires an attraction flow, or a quantity of flow that fish can detect and follow into the fish ladder entrance. A portion of the required minimum flow (20 cfs) would be passed through the proposed fish ladder to act as attraction flow. The remainder of the minimum flow (14-30 cfs more) would be passed through the existing minimum flow gate and ice chute. The entrance to the proposed fish ladder would be located immediately adjacent to the existing minimum flow discharge location, therefore the entire quantity of minimum flow would act as attraction flow to guide fish toward the proposed fish ladder entrance.

Currently the north spillway gate is operated for forebay level control. As the river flow increases above the hydraulic capacity of the turbine, excess flow is discharged through the north spillway gate immediately upstream of and adjacent to the proposed fish ladder entrance. Without a new spillway gate operation scheme, as river flow increases, the north spillway gate would open further and further, quickly exceeding the fish ladder attraction flow that would be released immediately downstream. This operation would effectively "drown out" the attraction flow from the proposed fish ladder and make it more difficult for fish to find the fish ladder entrance during spill conditions. Because of this, PacifiCorp intends to switch the gate prioritization and use the south

spillway gate for forebay level control, rather than the north spillway gate. This change in gate prioritization requires some mechanical retrofits to the south spillway gate which would be completed as part of the new fish ladder construction. Although PacifiCorp believes switching main gate operation to the south spillway gate will correct attractant conditions at the fish ladder entrance generally, under certain high flows where both gates are needed, the fish ladder entrance will likely be under water until the high flow surge passes.

Fish ladders are designed for a range of flow conditions to accommodate upstream passage by target species. The defining parameters of water velocity and water depth within the structure are generally determined by the forebay elevation. As elevation of the forebay affects the water velocities and water depths in the fish ladder, the range of fluctuation in forebay elevations must be reviewed to confirm that effective fish passage would be provided throughout the operational range. Existing standard forebay fluctuations should be incorporated into final design criteria. The existing normal range of forebay fluctuation at the Weber Project is considered to be +/- 3 or 4 inches above and below the normal forebay elevation of 4,788.69 feet (but may fluctuate as high as 7 inches). This range of forebay fluctuation would not have a substantial impact on the water velocities or water depths within the proposed fish ladder, therefore no changes are proposed for the existing Project operations or range of forebay fluctuations.

Fish Ladder Construction

Fish ladder construction is expected to require approximately nine months and be completed within a single in-water work period, ideally during the lowest flow portion of the year, from October through December. All construction activities are expected to occur during daylight hours though concrete pours may extend into the next day depending on the pour. Equipment requirements may consist of one to two track hoes, one to two concrete trucks/pumpers, one to two skid-steer loaders, and possibly a crane. The total area of disturbance for construction includes the footprint of the fish ladder and approximately 10 feet around the fish ladder footprint to the north and west where construction activities would occur (a total of approximately 0.16 acres). Warm weather and low flows within the Weber River are ideal work conditions for fish ladder construction. While these conditions are targeted to support fish ladder construction, the necessary duration of construction activities would likely require work outside of the ideal timeframe (approximately October through December). Construction would be required below the ordinary high water line. To accommodate this, a stream alternation permit would be requested from the State of Utah, Division of Water Rights. In addition, a coffer-dam or similar means of moving water around the work area is likely to be needed. To promote public safety and given the limited construction area, visitors to the area would be prohibited from entering and using the Weber Recreation Site and from accessing the bypassed reach of the river via the recreation site for the expected 9-month duration of construction activities. PacifiCorp would support the USFS and UDWR in the public outreach process explaining the expected nine-month recreation site closure while

the fish ladder is being installed. Standard Best Management Practices (BMPs) would be installed to control erosion, prevent the spread of aquatic invasive species, manage stormwater, control weeds, and complete revegetation and related site reclamation following fish ladder construction activities. The provisions of the proposed HPMP (PM&E measure CULT-1) would be adhered to prior to and during the construction process.

Fish Ladder Maintenance

Maintenance related to debris cleaning and handling is anticipated to increase with the installation of the proposed fish ladder due to the flow obstructions that would likely result from the proposed fish ladder design. The proposed fish ladder would include a coarse-spaced bar rack (a "grizzly rack") at the upstream end and a number (approximately 17 per the current design) of pools and baffles with 12-inch-wide vertical slots. The coarse-spaced bar rack is intended to prevent large debris from entering the fish ladder and would need to be cleaned regularly to allow fish to freely pass upstream into the forebay. The coarse-spaced bar racks should filter out most debris that would be large enough to get caught in the 12-inch-wide vertical slots between the ladder pools. The fish ladder would be routinely inspected and cleaned of debris as required to maintain effective fish passage.

The proposed fish trap to be installed at the upstream end of the fish ladder would likely be constructed of bar rack material with clear spacings close enough to prevent passage of fish. Therefore it would accumulate debris and likely require frequent cleaning when the trap is in operation. When the fish trap is not in operation it would be raised up out of the water to prevent continued debris collection. Operation of the proposed fish trap and daily maintenance would be completed by UDWR and TU; construction and major maintenance of the proposed fish trap would be completed by PacifiCorp.

Cleaning or maintenance efforts may occasionally require temporarily shutting off flow through the fish ladder. During such times the Project minimum flow compliance would be attained via increased flow release at the existing minimum flow gate or a spillway gate.

Minimum Flow Compliance

Minimum flow compliance is currently achieved via the existing historic concrete fish passage flume, controlled with a slide gate at the upstream end. The slide gate is partially closed to limit flow releases and changes in forebay elevation have little effect on flows through the gate opening. The gate is calibrated annually and is operated such that the required minimum flow is passed even when the forebay is at the low end of its range of fluctuation. A flow quantity slightly higher than the required minimum flow is passed when the forebay is higher in its range of fluctuation. Once the proposed fish ladder is installed, a portion of the minimum flow would be passed through the fish ladder to act as attraction flow. The remainder of the flow would continue to be passed

through the existing minimum flow gate and ice chute. After installation of the fish ladder, a flow evaluation would be completed to determine the range of flow through the ladder corresponding to the range of normal forebay fluctuation. The existing minimum flow gate would then be calibrated to pass the remainder of the required minimum flow.

2.3 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED STUDY

Several alternatives to PacifiCorp's new license proposal were considered but eliminated from further analysis because they are not reasonable under the circumstances surrounding the Project and related to the purpose of action and need for power described in Section 1.3. They are: (1) federal government takeover of the Project, (2) issuing a non-power license, (3) decommissioning (retiring) the Project, and (4) relicensing the Project without upstream fish passage. Several upstream fish passage options were also considered but eliminated from detailed analysis.

2.3.1 Federal Government Takeover of the Project

In accordance with §16.14 of the FERC's regulations, during Project scoping, a federal department or agency may file a recommendation that the United States exercise its right to take over a hydroelectric power project with a license that is subject to §14 and §15 of the FPA. During the scoping period for the Project no federal department or agency filed any such recommendation. Federal government takeover of the Project is therefore not a reasonable alternative. Federal takeover of the Project would require congressional approval. While that fact alone would not preclude detailed consideration of this alternative, there is currently no evidence showing that federal takeover should be recommended to Congress. No party has suggested that federal takeover would be appropriate, and no federal department or agency, during the appropriate scoping window, expressed interest in operating the Project.

2.3.2 Issuing a Non-power License

A non-power license is a temporary license that FERC would terminate when it determines that another governmental agency is authorized and willing to assume regulatory authority and supervision over the lands and facilities covered by the non-power license. At this time, no governmental agency has suggested a willingness or ability to take over the Project. No party has sought a non-power license, and there is no basis for concluding that the Weber Project should no longer be used to produce power. As a result this alternative has been eliminated from detailed study.

2.3.3 Decommissioning (Retiring) the Project

Decommissioning of the Project could be accomplished with or without dam removal. Either option would result in the FERC denying the license application and PacifiCorp surrendering or terminating the existing license with appropriate conditions.

There would be substantial costs involved with decommissioning the Project and/or removing any Project facilities. Removing Project facilities is likely to be unworkable and unreasonable from both a technical and economic perspective given the many constraints present in the Project vicinity. These constraints include the steep and narrow topography of Weber Canyon, the UPRC rail line, east- and west-bound sections of I-84, and transmission lines. In addition, water rights for other facilities (Echo Reservoir and Deer Creek Reservoir) are, by prior agreement, dependent upon water rights associated with the Project. If the Project were to be decommissioned these water rights would be adversely affected. Finally, the Project provides a viable, safe, and clean renewable source of electric power to the region.

Only a single public individual has suggested Project decommissioning. That comment was provided in response to their review of the draft recreation study plan. No other party participating in the relicensing process has suggested Project decommissioning would be appropriate, and there is no clear basis for recommending it. Project decommissioning is not a reasonable alternative to relicensing the Project with appropriate cost-effective environmental measures.

2.3.4 Relicensing the Project Without Upstream Fish Passage

The Project could be relicensed without the provision of upstream fish passage as proposed or in any other configuration. This alternative was eliminated from detailed analysis because fish passage supports local Bonneville cutthroat trout and bluehead sucker populations. In addition, neither PacifiCorp nor the stakeholders involved in the ALP relicensing process have expressed an interest in relicensing the Project without upstream fish passage. Future upstream fish passage is considered by all parties to be an important part of relicensing the Project.

2.3.5 Upstream Fish Passage Options Considered But Eliminated From Detailed Study

Over the course of several months the Fisheries Working Group (see Section 1.2) was engaged to develop upstream fish passage design criteria and then fish passage alternatives, evaluate upstream fish passage designs, and ultimately develop the proposed fish ladder design described in Section 2.2.4.1. In addition to developing design criteria the group evaluated a total of six upstream fish passage options. Through this process a traditional vertical slot fish ladder with a design flow of 20 cfs and supplemental attraction flow (together comprising the minimum stream flow of 34-50 cfs) using the existing minimum flow gate and ice chute was selected as the preferred fish ladder. This alternative is evaluated in detail as the fish ladder design proposed in PM&E measure FISH-2. The other fish passage alternatives, along with reasons why they were dismissed from further detailed analysis, are summarized in Sections 2.3.5.1 through 2.3.5.5 below.

2.3.5.1 Denil Fishway

This option consisted of a concrete Denil fishway along the northern shore of the Weber River, adjacent to the existing spillway. Denil fishways are artificially roughened channels that use regularly spaced baffles to create a zone of low velocity flow that fish can negotiate. Typical Denil fishway baffles are angled upstream at a 45 degree angle and are spaced at 2.5 feet on center. Baffles can be constructed from an array of materials including wood, aluminum, and fiberglass. Denil fishways are typically in the range of 2-4 feet wide, with 4 feet in width being the most commonly used. Denil fishways are typically constructed with a floor slope in the range of 10-20 percent (1:10 to 1:5). The conceptual Denil fishway layout for the Weber Project would be 4 feet wide with a slope of 10 percent (1:10). Conveyance flow through a Denil fishway is typically in the range of 15-35 cfs. To accommodate the proposed fishway attraction flow of 34-50 cfs a supplementary attraction flow system would be required. Supplementary attraction flow for Denil fishways is typically provided via a screened inlet in the floor of the exit channel at the upstream end of the fishway, leading into a pipe which would deliver flow to a diffusion chamber beneath the entrance channel of the fishway, where the supplementary attraction flow would come up through a floor screen and rejoin the conveyance flow coming down the fishway before being discharged at the fishway entrance. The supplementary attraction flow pipe would then be equipped with a valve to control the amount of flow and accommodate the varying attraction flow requirement. The entrance to the fishway would be located adjacent to the existing minimum flow discharge and would require cutting an opening in the existing concrete retaining wall. The fishway entrance would be equipped with a downward opening gate used to dewater the fishway and to control the velocity of the flow at the entrance based on varying tailwater levels during fishway operation. The upstream fishway exit would be equipped with an upward opening dewatering gate.

The Denil fishway option was identified as having the smallest footprint and therefore the lowest construction cost. However, this alternative was also noted to potentially be the least biologically effective of the alternatives. Therefore, the Denil fishway alternative was not carried forward for detailed consideration.

2.3.5.2 Pool and Weir Fishway Sized to Accommodate the Full Range of Fishway Flow

This option consists of a concrete pool and weir style fishway along the northern shore of the Weber River, adjacent to the existing spillway. Pool and weir fishways consist of a sequential series of stepped pools that are created by flow control weirs. The conceptual pool and weir fishway layout for the Weber Project would include pools approximately 12 feet wide by 12 feet long by 5.5 feet deep. The proposed head drop per pool would be 9 inches. The pool size was estimated assuming an EDF of 4.0. An EDF of 4.0 is adequate for the weaker swimming fish that may be present at this site (such as bluehead sucker). A 1-foot-wide by 1-foot-tall submerged orifice would also be included at the bottom of each weir to provide passage for bottom-oriented species. The entrance

to the fishway would be located adjacent to the existing minimum flow discharge and would require cutting an opening in the existing concrete retaining wall. The downstream fishway entrance would be equipped with a downward opening gate used to dewater the fishway and to control the velocity of the flow at the entrance based on varying tailwater levels during fishway operation. The upstream fishway exit would also be equipped with a downward opening gate used to dewater the fishway and to control the flow through the fishway.

This option was dismissed from detailed analysis because the overall footprint of the pool and weir design sized to accommodate the full range of fishway flow is excessive (relative to the site constraints) compared to the other options. In addition, in terms of biological effectiveness this option would not offer any greater benefit compared to the fish ladder option considered in detail (traditional vertical slot fishway with supplemental attraction flow). In fact, the stakeholder group indicated that while there are no known pool and weir fish ladders in Utah there is a traditional vertical slot fishway known to effectively pass bluehead sucker (one of the species of primary concern for the Project).

2.3.5.3 Pool and Weir Fishway with Reduced Pool Size and Additional Supplementary Attraction Flow System

This option is the same as the pool and weir fishway designed to accommodate the full range of fishway flow except that the pool size would be reduced and, as a result, supplementary attraction flow would be required. The overall footprint of this option would be reduced (by about half) compared to the other pool and weir fishway option considered above. However, this option was eliminated from detailed analysis for essentially the same reasons as the pool and weir fishway designed to accommodate the full range of fishway flow.

2.3.5.4 Vertical Slot Fishway Serpentine Style

This option consists of a vertical slot serpentine style fishway along the northern shore of the Weber River, adjacent to the existing spillway. Vertical slot fishways are similar to pool and weir fishways, but instead of a concrete overflow weir to control flow they use a full height vertical slot. The conceptual vertical slot fishway layout for the Weber Project would have pools approximately 12 feet wide by 15 feet long with a depth of 4-6 feet. The proposed head drop per pool would be 9 inches, with flow passing through an 18-inch-wide vertical slot which is beneficial for weaker swimming fish species. The downstream entrance to the fishway would be located adjacent to the existing minimum flow discharge and would require cutting an opening in the existing concrete retaining wall. The fishway entrance would be equipped with a downward opening gate used to dewater the fishway and to control the velocity of the flow at the entrance based on varying tailwater levels during fishway operation. The upstream fishway exit would also be equipped with a downward opening gate used to dewater the fishway and to control the flow through the fishway.

This option was dismissed from detailed analysis primarily because of the geometry and layout of the serpentine style vertical slot fishway. The overall footprint of this option is excessive (relative to the site constraints) compared to the other options particularly because it does not offer any greater benefit in terms of biological effectiveness. The other vertical slot fish ladders in the region are the traditional style layout (which is the layout of the proposed fish ladder) and at least one of them is known to pass bluehead sucker.

2.3.5.5 Natural Channel Fishway

This option consists of a natural channel fishway along the northern shore of the Weber River, adjacent to the existing spillway. Natural channel fishways typically consist of gravel, boulders, and other common stream bed material placed in a manner that mimics a natural stream. The conceptual natural channel fishway layout for the Weber Project would be approximately 15 feet wide with a slope of 5 percent. Rock weirs would be positioned along the length of the channel to provide a 9-inch drop per weir. The downstream channel entrance would be located adjacent to the existing minimum flow discharge and would require demolition of some or all of the existing concrete retaining wall. To fit the site area, the channel would first extend approximately 70 feet downstream before making a 180 degree bend and continuing approximately 140 feet upstream to the forebay. A new concrete flow control structure would be constructed at the upstream exit of the natural channel. Due to the limited space available at the site, sheet pile cut off walls may be required to stabilize the channel.

The natural channel fishway alternative was identified as likely having similar biological effectiveness as the pool and weir and vertical slot fishway alternatives. It was also agreed by the stakeholder group that it would be the most aesthetically pleasing alternative, although at the Weber site (adjacent to the freeway and between the parking lot and the Project diversion dam), site aesthetics were determined to be less important than might be the case at other dam sites. However, there was substantial concern regarding the stability and durability of the downstream end of the natural channel (downstream of the spill gates) which would be inundated during high flow events, and this could cause scouring and erosion of the natural channel streambed. Disturbance of the natural channel streambed during high flow events would be a substantial maintenance concern due to the cost of rehabilitation/reconstruction and the time that the fishway would be out of service if repairs were required. Therefore, the natural channel fishway alternative was not carried forward for detailed consideration.

3.0 ENVIRONMENTAL ANALYSIS

This section contains the following: (1) a general description of the Project vicinity (the Weber River Basin); (2) an explanation of the scope of the cumulative effects analysis; and (3) analysis of the potential effects of the proposed action including proposed PM&E measures. Sections are organized by resource area. Under each resource area, historic and current conditions are first described. The existing condition is the baseline against which the environmental effects of the proposed action and alternatives are compared, including an assessment of the effects of proposed PM&E measures, and any potential cumulative effects of the proposed action and alternatives. Conclusions and recommended measures are discussed in Section 5.2, Comprehensive Development and Recommended Alternative. As described in Section 1.1, the Project Area referred to throughout Section 3.0 is inclusive of the FERC Project Boundary, the Weber Recreation Site, the penstock, and the Weber River to the far bank of the river opposite the penstock (regardless of which side of the river the penstock is on). The Project Area is depicted in Figure 1.

3.1 GENERAL DESCRIPTION OF THE RIVER BASIN

The Weber River Basin drains an area of 2,476 square miles in Summit, Morgan, Weber, and Davis Counties, Utah, and part of Uinta County, Wyoming (Figure 6). The primary drainage of the basin, the Weber River, forms near Reids Peak (11,708 feet) in the Uinta Mountains, flows west to Oakley, Utah, and then flows in a northwesterly direction to its terminus at Great Salt Lake. The Weber River is approximately 125 miles long, and within its drainage there are approximately 968 miles of perennial streams and 1,254 miles of intermittent streams (Great Salt Lake Information System 2017). Flows in the Weber River Basin are regulated by seven major reservoirs. Echo and Rockport Reservoirs are located on the mainstem of the Weber River, whereas Pineview, Causey, East Canyon, Lost Creek, and Smith and Morehouse Reservoirs are located on tributaries.

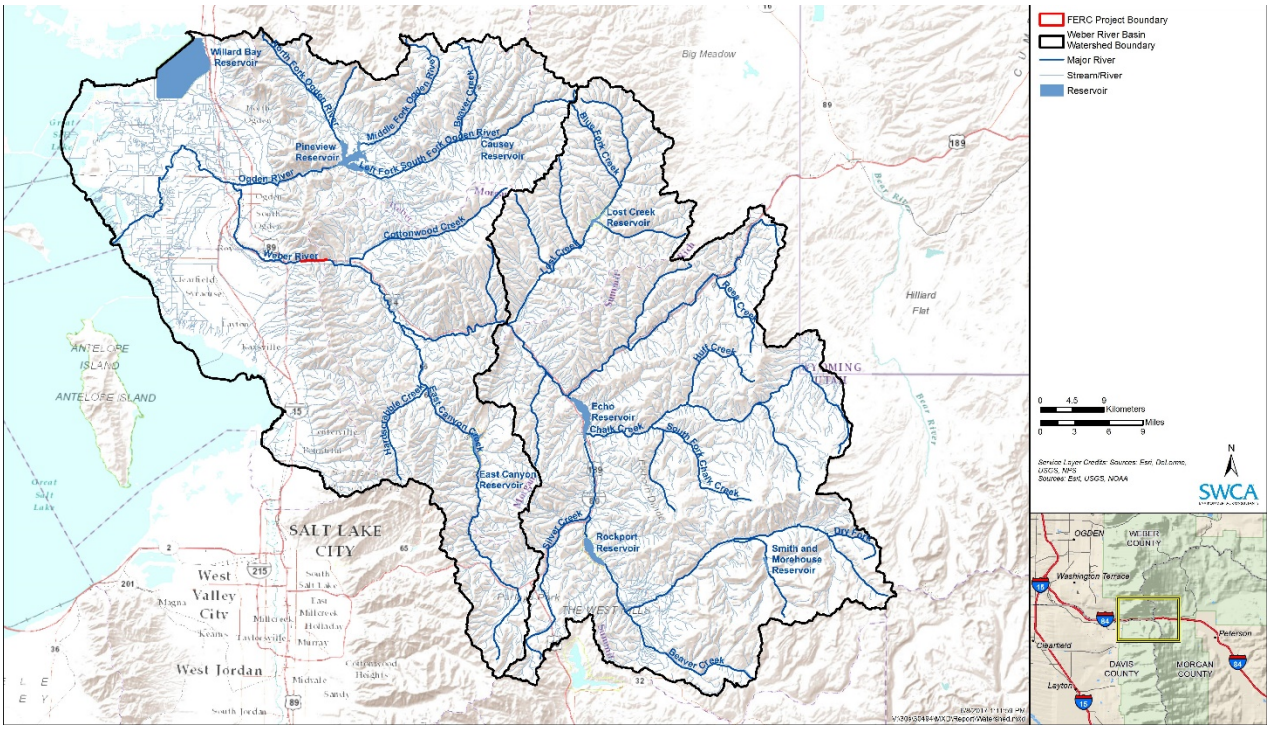

Figure 6. Weber River Basin.

Mean annual precipitation for the basin is 26 inches (3.4 million acre-feet). It is estimated that approximately 70 percent of the total precipitation in the watershed on average is consumed by vegetation and humans, leaving approximately 9 inches (1.2 million acre-feet) that is yielded to the basin's rivers, streams, and aquifers. Of the annual water yield, approximately 3 percent is exported out of the basin through canals (Great Salt Lake Information System 2017).

In the vicinity of the Project, Weber Canyon is a narrow, steep-walled canyon with highly altered (filled and channelized) riverine and canyon floor environments. The high degree of alteration is due primarily to the construction of the interstate freeway I-84 and its associated bridges and infrastructure, as well as various pipelines, cable and fiber utility lines, railroad tracks, the former highway, the Weber Hydroelectric Project diversion dam and flowline, and other river diversion structures. Some areas of fill, up to 30 feet deep and placed primarily to facilitate freeway construction, have altered the hydrogeomorphology of the canyon since the 1960s.

3.2 SCOPE OF THE CUMULATIVE EFFECTS ANALYSIS

According to the Council on Environmental Quality's (CEQ) regulations for implementing NEPA (40 CFR 1508.7), a cumulative effect is the effect on the environment that results from the incremental effect of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative effects can

result from individually minor but collectively significant actions taking place over a period of time, including hydropower and other land and water development activities.

Based on the proposed action in this license application (and informed by Project scoping, subsequent Project technical reports, and agency and public comments), the following resources have the potential to be cumulatively affected by the proposed action in combination with past, present, and reasonably foreseeable future actions: water resources (specifically water quality), fisheries and aquatic resources, botanical resources, terrestrial wildlife resources, and recreation. Due to the site-specific and limited nature of the direct and indirect impacts of the proposed action on geology and soil resources and socioeconomic resources (see Sections 3.3.1 and 3.3.7, respectively) these resources do not have the potential to be cumulatively affected by the proposed action in combination with past, present, and reasonably foreseeable future actions. Therefore no cumulative effects analysis related to geology and soil resources and socioeconomics is provided below.

3.2.1 Geographic Scope

The geographic scope of analysis for cumulatively affected resources is defined by the physical limits or boundaries of: (1) the proposed action's direct and indirect effects on the resources, and (2) contributing effects from other hydropower and non-hydropower activities within the geographic scope of analyses. Because the proposed action would affect resources differently, the geographic scope of analysis for each resource may vary.

The Weber River Basin from the upstream portion of the Project Boundary downstream to the confluence with the Ogden River is the geographic scope of analysis for water resources (Figure 7). This area was chosen because the Project would not contribute incrementally to water quality effects upstream of this area (i.e., the Project would not result in direct or indirect effects to water quality upstream of this area).

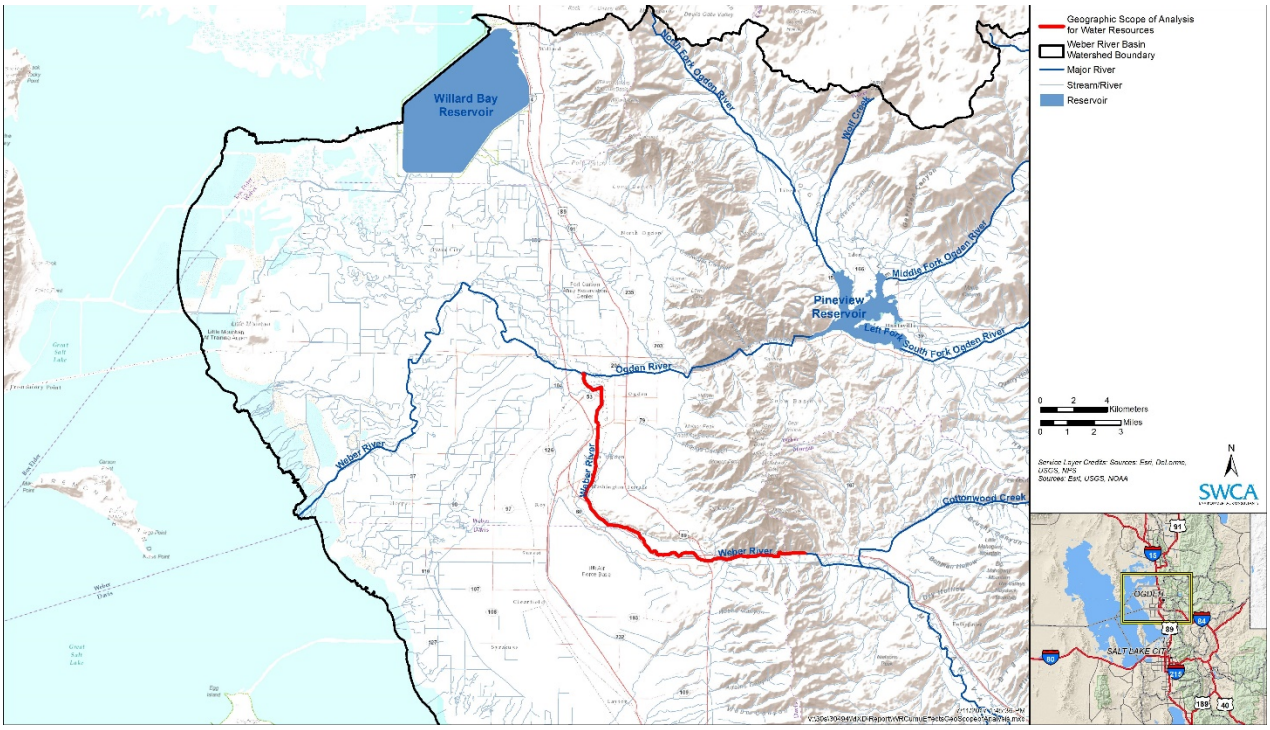

Figure 7. Geographic scope of cumulative effects analysis for water resources.

For fisheries and aquatic resources the Weber River Basin downstream of Echo Reservoir has been identified as the geographic scope of analysis (Figure 6). This area was chosen because habitat for fish species is available across this river system and fish species movements occur throughout the system.

The geographic scope of analysis for botanical and terrestrial wildlife resources encompasses the Weber River Basin (Figure 6). This geographic scope of analysis was chosen because regulation of flows by upstream dams and diversions has caused daily and seasonal changes in surface water fluctuations that may have led to shoreline erosion, spread of invasive species, and alteration of shoreline habitats.

The geographic scope of analysis for recreation resources encompasses the Weber River Basin (Figure 6). This spatial scope of analysis was chosen because river-based recreation resources are available across the basin and recreation amenities and uses provided by the Project fall within this spatial scale.

3.2.2 Temporal Scope

The temporal scope of the cumulative effects analysis includes a discussion of past, present, and reasonably foreseeable future actions and their effects on each resource that could be cumulatively affected. Based on the term of the proposed license, the temporal scope of the cumulative effects analysis looks 30 to 50 years into the future, concentrating on resource effects as a result of reasonably foreseeable future actions. The historical discussion is limited, by necessity, to the amount of available information for

each resource and on the effects of past actions which are still visible on the landscape today. Present resource conditions are identified based primarily on field investigations and studies, agency comments, and comprehensive plans.

3.3 PROPOSED ACTION AND ALTERNATIVES

In this section, the effects of the Project alternatives on environmental resources are discussed. For each resource, the affected environment is described first. The affected environment is the existing condition and baseline against which effects are measured. The site-specific and cumulative environmental issues are then discussed and analyzed under the environmental effects heading.

Only the resources that would be affected, or about which comments have been received, are addressed in detail in this EA. Based on this, geological and soil resources, water resources, fisheries and aquatic resources, botanical resources, terrestrial wildlife resources, recreation resources, and socioeconomic resources may be affected by the proposed action and alternatives and are addressed in detail in this EA (though no cumulative effects analysis is provided for geology and soil resources and socioeconomic resources as noted in Section 3.2). Table 12 provides a listing of resources for which no substantive issues were identified and therefore no further detailed analysis is provided in this EA. This table also includes rationale concerning why, for issues associated with these resources, no additional analysis is provided. Recommendations are provided in Section 5.2, Comprehensive Development and Recommended Alternative.

Table 12. Resources for which no substantive issues were identified and no detailed analysis is provided in this EA.

Resource	Rationale for elimination from detailed analysis in this EA
Cultural and tribal resources	Three cultural resource sites have been documented in the Project Area: the Union Pacific Railroad, Historic U.S. 30S Road, and the Devil's Gate Weber Hydroelectric Power Plant Historic District. Of these three sites, only the Historic District is listed on the National Register. In addition, because of the existing development along the canyon floor, it is also unlikely that any subsurface deposits would remain intact and be able to convey important information about the prehistory or history of the region. PacifiCorp requested concurrence from SHPO on a finding of no adverse effect for the proposed undertaking and received concurrence from SHPO on December 16, 2016 (Utah Division of State History 2016). There are no known tribal lands or tribal claims within or immediately adjacent to the Project Area. Also, no tribal comments were received during the scoping process and following requests for comments from tribes in Utah and Idaho. Further, PacifiCorp prepared and implemented a CRMP as part of the previous FERC license to address potential impacts to cultural resources in the FERC Project Boundary. As part of this relicensing process and in consultation with SHPO, the existing CRMP has been found to meet the goals and principles outlined in the *Guidelines for the Development of Historic Properties Management Plans for FERC Hydroelectric Projects* (FERC and ACHP 2002). Therefore, the CRMP would be updated and implemented as a Historic Properties Management Plan (HPMP) for the renewed license (see PM&E measure CULT-1). PacifiCorp will follow the standards and procedures outlined in the existing CRMP/updated HPMP in coordination with SHPO for proposed fish passage construction, continued operation and maintenance, and any new proposed construction over the life of the license. As a result of the aforementioned, no issues regarding cultural and tribal resources are expected to arise from the continued operation of the Project and therefore no issues associated with cultural and tribal resources are analyzed in detail in this EA.
Land use	SD1 indicates that land use issues could arise from potential conflicts with applicable land use and resource management plans that have been drafted or revised since the Project was originally approved and licensed, as well as changing conditions in the Project Area resulting from human factors such as additional surrounding area development or such environmental factors as climate change. Based on review of current applicable land use and resource management plans (see Section 5.5 for a list of relevant plans) there are no conflicts with the continued operation of the Project and Project Area and surrounding land uses. Further, no changes in land use are envisioned to be an outcome of continued operation of the Project. As a result, no issues regarding land use are expected and land use issues are dismissed from detailed analysis in this EA.
Aesthetic resources	Because the Project is adjacent to a divided four-lane interstate freeway, pipelines, and railroads, as well as other developments, noise and other aesthetic effects of continued operation of the Project do not present a contrast from the existing surrounding environment. Therefore, no issues regarding aesthetic resources are expected to arise from the continued operation of the Project and aesthetic resources are dismissed from detailed analysis in this EA.

3.3.1 Geological and Soil Resources

Geology and soils provide information into the environmental history and setting of the Project Area. Brief overviews of both are presented below. Geology data were primarily obtained from the Utah Geological Survey's Geologic Map of Utah (2000), and soils data were primarily obtained from the Natural Resources Conservation Service (NRCS) State Soil Geographic (STATSGO) soil survey database.

3.3.1.1 Affected Environment

Geology

The main geologic unit identified in the Project Area is the Farmington Canyon Complex (Lowe et al. 2003). The Farmington Canyon Complex, which formed the Wasatch Range, consists of early Proterozoic high-grade metamorphic and igneous rocks (Bryant 1984, as cited in Lowe et al. 2003). Most of the Project Area is underlain by Precambrian metamorphic rocks such as migmatite and gneiss (Figure 8). The eastern end of the Project Area is underlain by surficial alluvium and colluvium deposits, which primarily consist of silts, sands, and pebbles and gravel. There are two major northwest-southeast-trending fault lines through the central portion of the Project Area, and an additional two fault lines just east of the Project Area. In addition, the Utah Geological Survey (UGS) indicates that the portion of Weber Canyon containing the Project Area is susceptible to shallow and/or deep-seated landslides largely due to slopes greater than 30 percent (Christenson and Shaw 2008a). For the same reason (slopes greater than 30 percent) UGS also identifies the portion of Weber Canyon containing the Project Area as a debris flow source area (Christenson and Shaw 2008b).

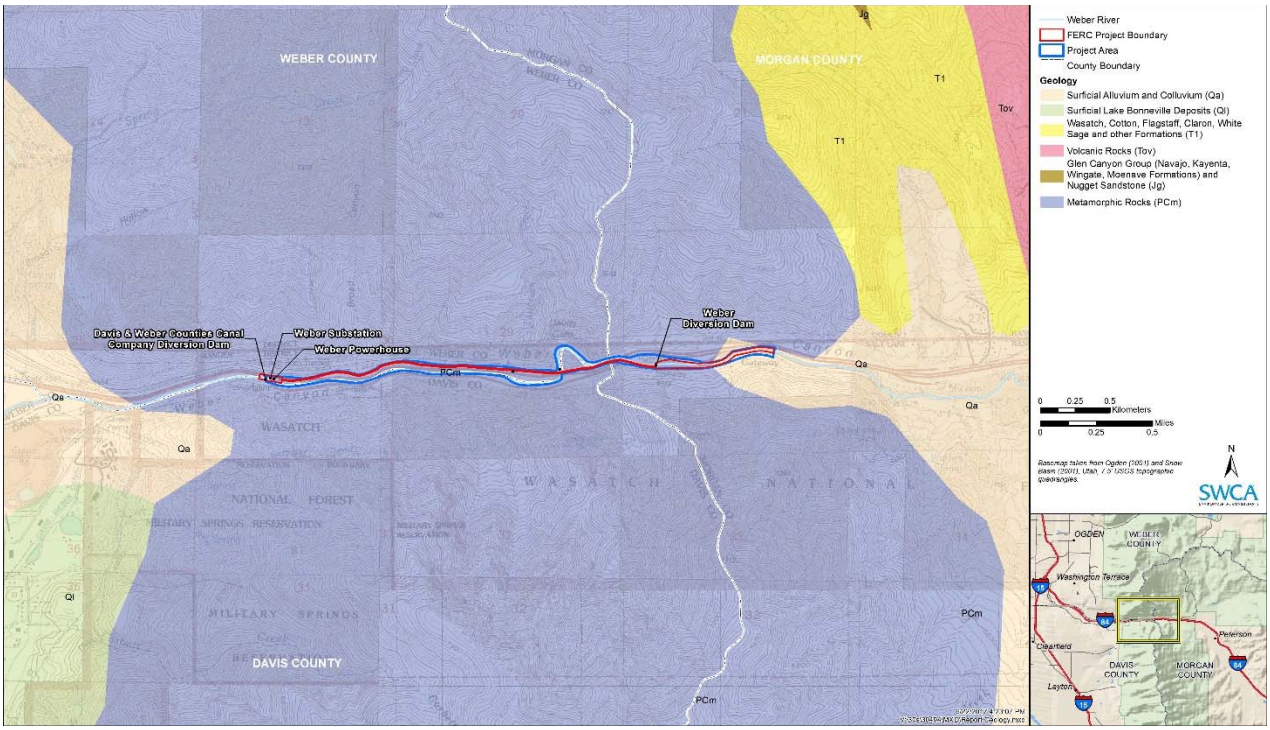

Figure 8. Geology of the Project Area.

Soils

There are two reported soil types for the Project Area, both of which are primarily rocky outcrop-type soils (Rock outcrop-Patio-Nagisty-Broad Canyon and Rock outcrop-Ridd-Barton; Figure 9). The primary difference between these two soil types is that the

soil complex (Rock outcrop-Ridd-Barton) encompassing the western part of the Project Area has a slightly higher percentage of clay, sand, and organic content by mass, and has a greater soil k-factor (i.e., is slightly more erodible) than the soil complex (Rock outcrop-Patio-Nagisty-Broad Canyon) encompassing the eastern part of the Project Area. Most of the soils in the Project Area and surrounding landscape are recent surficial deposits that were formed by lakebed deposits, river deposits, mountainside erosion, and glacial processes (Lowe et al. 2003). Due to the low resolution of STATSGO soil survey data (versus Soil Survey Geographic Database [SSURGO] survey data), other soil properties are too variable or vague to be generalized for the Project Area.

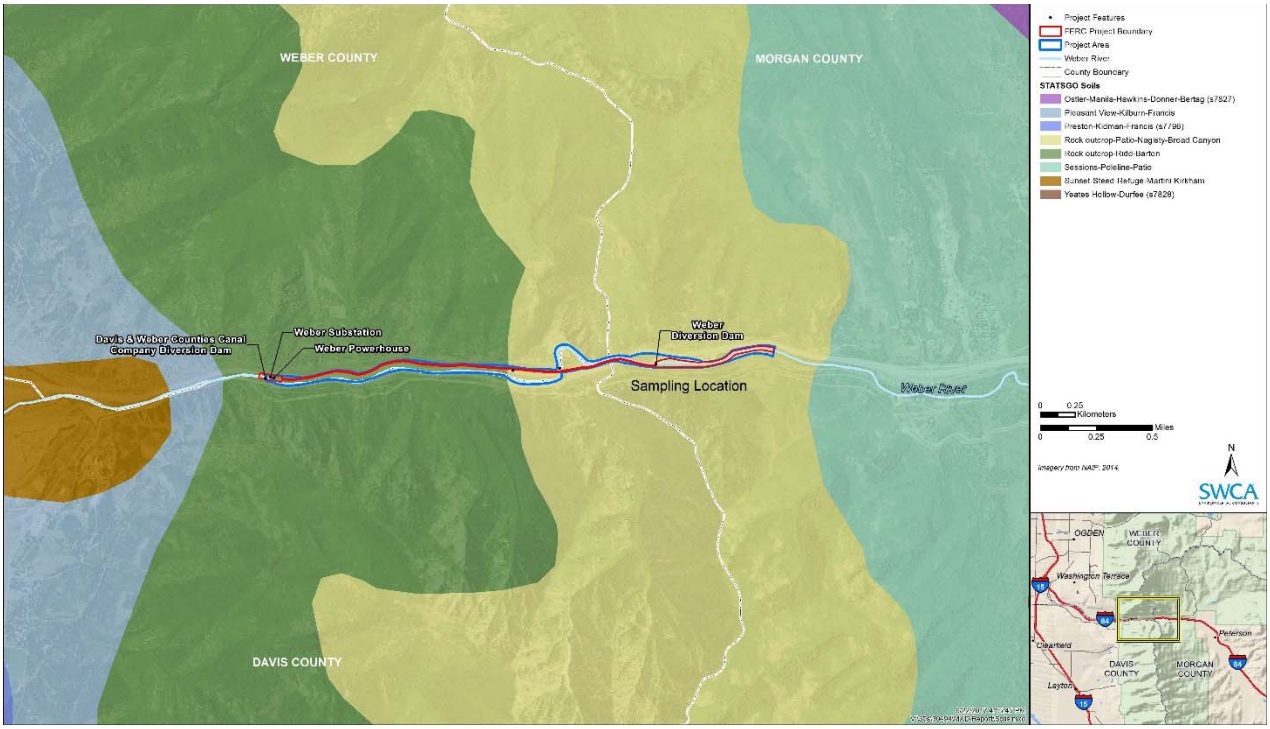

Figure 9. Soils of the Project Area.

3.3.1.2 Environmental Effects

Geology

Fish ladder construction activities under the proposed action would require earthmoving activities below and both north and east of the ordinary high water line in the near vicinity of the existing Weber diversion dams' north bank. This would result in the perturbation of approximately 0.16 acres of the surficial alluvium and colluvium deposits, (primarily silts, sands, pebbles, and gravel) underlying the Project Area in this location. Approximately 1,130 cubic yards of these deposits would be removed from the area and the fish ladder structure would be constructed in their place. The perturbation and removal of alluvium and colluvium deposits from this area would not result in a substantive change in the geological structure of the area as a result of the small acreage and volume of the deposits (0.16 acres and 1,130 cubic yards, respectively) relative to the

Weber River system (125 linear miles of mainstem stream from its origin in the Uinta Mountains to its terminus in Great Salt Lake).

Based on mapping provided by UGS, the Project is situated within an area known to contain three main geologic hazards: faults, landslide risks, and debris flow risks. Under the proposed action the Project would remain in its current configuration, with the addition of the proposed PM&E measures, for a period of 30-50 years. The continued operation of the facility and the specific PM&E measures, including construction activities associated with the proposed fish ladder, would not aggravate or contribute to risks associated with geologic hazards. However, faults, landslide risks, and debris flow risks do pose a risk to Project facilities and Project operations. An earthquake, landslide, or debris-generating flood event (or some combination thereof) could result in damage to and/or loss of Project facilities and discontinued Project operation for a period of time. The degree of damage or loss and the length of time the Project would be inoperable after an event would depend on the severity of the earthquake, landslide, and/or debris generating event.

Soils

Fish ladder construction would result in earthmoving activities which have the potential to result in localized erosion and soil loss. A total of 0.16 acres of earthmoving and construction activities are planned for fish ladder construction. Erosion control measures and other BMPs (e.g., silt fences, etc.) as required by regulatory authorities would be implemented to reduce sediment delivery to the Weber River during construction. Further, active work below the ordinary high water mark would be isolated behind a coffer-dam which would prevent sediment transport and associated water quality impacts during fish ladder construction. If dewatering of the work area behind the coffer-dam is necessary, water would be pumped to unsaturated upland vegetated areas for infiltration. These activities would only occur in the eastern portion of the Project Area adjacent to the diversion dam on the north shore of the Weber River where the fish ladder would be placed. STATSGO data indicate that the soil complex (Rock outcrop-Patio-Nagisty-Broad Canyon) encompassing the eastern part of the Project Area is not highly erodible. A large portion of the area (approximately 31 percent) where fish ladder construction would occur is currently developed surface (asphalt/concrete). Most of the remaining site area is currently unvegetated and previously disturbed ground adjacent to the ice chute. In addition, the total area of earthmoving activities for fish ladder construction would be approximately 0.8 percent of the river area (the Weber River and a 25- foot buffer on either side), from the diversion dam area where fish ladder construction would occur, to the downstream end of the Project powerhouse.

PM&E measure REC-9 calls for curtailing generation and the release of boater flows up to 16 hours prior to July 15 annually in the event that safe legal egress can be found for boaters. Such flows would result in the release of up to approximately 320 cfs of water into the Weber River on four different occasions per year for a duration of four hours. These boater flow releases would raise the water level in the bypassed reach of the

Weber River for short periods. This may result in potential stream bank scouring and subsequent erosion of soils in the bypassed reach at times when flows (although uncommon) could be as low as 34-50 cfs in the bypassed reach. The degree of scouring and erosion of stream banks during a boater flow release would be limited as a result of the amount of rock armoring in the existing channel, the relatively small volume of water released for boater flows, and the relatively slow rate (1.5 feet/hour is proposed) at which water levels would rise in the bypassed reach during a flow release. Scouring and erosion of stream banks during boater flow releases is also expected to be limited because natural high flows (1,000 cfs and greater) at earlier times of the year (i.e., during spring runoff) are expected to have already eroded any erodible bank sections in the bypassed reach.

PM&E measure REC-8 calls for improvements to up to two user-created trails providing access to the Weber River. One of these trails falls within the proposed Project Boundary and leads south from the Weber Recreation Site to the north bank of the Weber River. The other trail leads west from the recreation site outside of the proposed Project Boundary and under I-84. It is anticipated that trail improvement activities, specifically step construction, on the trail within the Project Boundary leading south to the north bank of the Weber River may result in a small area of localized disturbance to surface soils along the trail. Step construction is unlikely to result in a substantive amount of soil loss and soil delivery to the river because of the limited construction activities (no more than approximately 18 feet of step construction along approximately 30 linear feet of trail approximately 2-3 feet wide) and application of BMPs. The presence of the steps along this trail would ultimately reduce the potential for soil erosion and soil delivery to the river as a result of trail use in the future because the steps themselves would control erosion. No soil related impacts are expected as a result of trail improvements on the trail leading west from the recreation site and under I-84. This is because these trail improvement activities are anticipated to be limited to breaking up or filling in the existing large-boulder surface to create a navigable path of smaller rock with minimal width (i.e., no soil disturbance is anticipated).

3.3.1.3 Cumulative Effects

Due to the very site-specific nature of geology and soil resource related impacts as a result of implementation of the proposed action these resources do not have the potential to be cumulatively affected by the proposed action in combination with past, present, and reasonably foreseeable future actions. Consequently, no cumulative effects analysis related to geology and soil resources is provided here.

3.3.2 Water Resources

3.3.2.1 Affected Environment

Water Quantity (Flows)

Weber River flows were estimated using data from the USGS stream flow gaging station upstream of the Project diversion dam (gage no. 10136500). Flows were estimated for the total period of record from August 1, 1920 to December 31, 2016 as well as for

the most recent 30-year period (from January 1, 1987 to December 31, 2016). Flows from the most recent 30-year period are estimated independent of the total period of record because this more recent timeframe includes the effects of additional water development and changes in upstream facility operations in the most recent 10 years. In addition, the total period of record includes multiple decades of flow data (early in the period of record) that do not reflect current and anticipated future conditions (e.g., water development, operations, climatic conditions, etc.). As a result, reporting only estimated flows from the total period of record may not be representative of the current affected environment.

Water Quantity (Flows) for the Total 96-Year Period of Record

Data for the period from August 1, 1920 to December 31, 2016 from USGS gage no. 10136500 were used to estimate Weber River flows for the total period of record. Over the approximately 96-year total period of record average monthly minimum flows ranged from 137 cfs in December to 854 cfs in May while average monthly maximum flows ranged from 264 in November to 2,108 cfs in May. Average mean monthly flows ranged from 187 cfs to 1,428 cfs (November and May, respectively). Table 13 lists all average monthly minimum, mean, and maximum flow data for USGS gage no. 10136500 over the total 96-year period of record.

Table 13. Average monthly flow data for USGS gaging station (No. 10136500) for the 96-year period of record (8/1/1920 to 12/31/2016).

Month	Minimum Flow across all years (average) (cfs)	Mean Flow across all years (average) (cfs)	Maximum Flow across all years (average) (cfs)
January	144	215	385
February	180	267	467
March	259	477	887
April	530	944	1,528
May	854	1,428	2,108
June	596	1,079	1,708
July	411	523	731
August	360	437	530
September	252	351	475
October	153	230	352
November	146	187	264
December	137	200	344

Figure 10 provides a flow duration curve (blue line) for the total contribution of the Weber River over the total period of record as described above. River flows at USGS gage no. 10136500 met or exceeded 84 cfs 90 percent of the time, 335 cfs 50 percent of the time, and 1,240 cfs 10 percent of the time over the approximately 96-year total period of record.

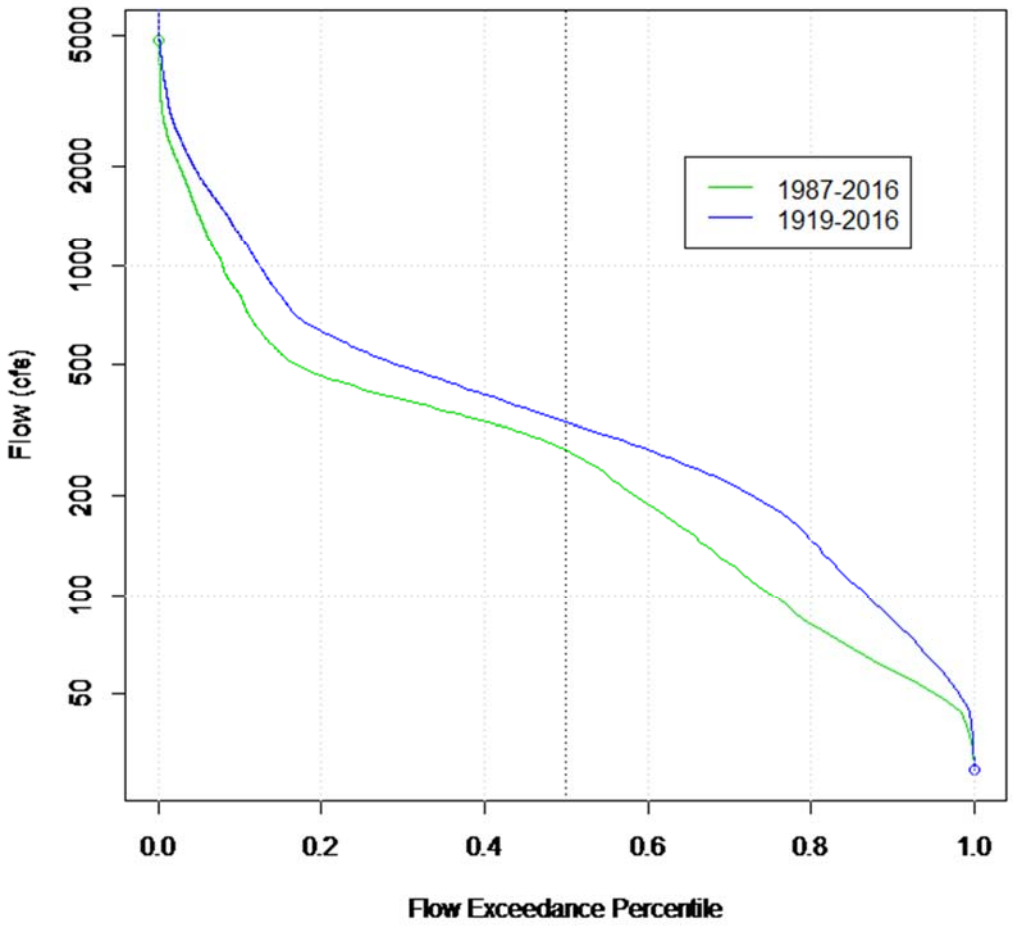

Figure 10. Flow duration curve of daily mean flows for Weber River at Gateway, UT (USGS gage no. 10136500) for the total 96-year period of record (8/1/1920 to 12/31/2016) and the most recent 30-year period (1/1/1987 to 12/31/2016).

A dependable capacity of 1,377 kW (based on the total 96-year period of record) for the Project is estimated using the critical month method. The critical month method uses the lowest monthly average flow for the total 96-year period of record (187 cfs) from USGS gage no. 10136500 and considers this to be the approximate minimum inflow expected at the Project diversion dam based on flow data from the total period of record. The minimum in-stream flow for the bypassed reach (34 cfs) is subtracted from the lowest monthly average flow because this minimum in-stream flow is not available for generation. A simple h/k factor conversion (9 kW/cfs) for the power plant is then used to convert 153 cfs (187 cfs – 34 cfs = 153 cfs) to 1,377 kW (the dependable capacity for the Project based on the total 96-year period of record).

Water Quantity (Flows) for the Most Recent 30-Year Period

Data for the period from January 1, 1987 to December 31, 2016 from USGS gage no. 10136500 were also used to estimate Weber River flows for the most recent 30-year period. Over this period average monthly minimum flows ranged from 71 cfs in November to 542 cfs in May while average monthly maximum flows ranged from 155 in November to 1,327 cfs in May. Average mean monthly flows ranged from 100 cfs to 903 cfs (November and May, respectively). Table 14 lists all average monthly minimum, mean, and maximum flow data for USGS gage no. 10136500 over the most recent 30-year period. Figure 10 above provides a flow duration curve (green line) for the total contribution of the Weber River over the most recent 30-year period. River flows at USGS gage no.10136500 met or exceeded 59 cfs 90 percent of the time, 275 cfs 50 percent of the time and 809 cfs 10 percent of the time. Finally, using the critical month method for the most recent 30-year period, the dependable capacity for the Project is 594 kW ([100 cfs – 34 cfs] x 9 kW/cfs) = 594 kW).

Table 14. Average monthly flow data for USGS gaging station (No. 10136500) for the most recent 30-year period (1/1/1987 to 12/31/2016).

Month	Minimum Flow across all years (average) (cfs)	Mean Flow across all years (average) (cfs)	Maximum Flow across all years (average) (cfs)
January	91	136	269
February	125	194	333
March	197	403	748
April	395	671	1,149
May	542	903	1,327
June	481	829	1,285
July	333	444	657
August	298	368	472
September	237	319	432
October	87	174	314
November	71	100	155
December	72	112	224

Water Quantity (Flows) Summary

The range of average minimum, mean, and maximum monthly flows across all years for each of the two periods of record examined in detail are provided in Table 15. Based on data collected at USGS gage no. 10136500, average minimum, mean, and maximum monthly flows in the most recent 30-year period depart substantially from average minimum, mean, and maximum monthly flows for the total period of record (approximately 96 years). Given this sharp departure, flows from the more recent time period are likely to be more representative of the current affected environment and the anticipated future condition. Table 15 also summarizes flow duration curve data and dependable capacity data for each of the two periods of record examined in detail. These data also indicate that flows in the most recent 30-year period depart substantially from flows for the total 96-year period of record.

Table 15. The range of average minimum, maximum, and mean monthly flows across all years, flow duration curve data, and dependable capacity for each of the periods of record examined (USGS gage no. 10136500).

	Total Period of Record (8/1/1920 to 12/31/2016)	Most Recent 30-year Period (1/1/1987 to 12/31/2016)
Average Monthly Minimum Flow Range (cfs)	137 – 854	71 – 542
Average Monthly Mean Flow Range (cfs)	187 – 1,428	100 – 903
Average Monthly Maximum Flow Range (cfs)	264 – 2,108	155 – 1,327
Flows met or exceeded 90% of time (cfs)	84	59
Flows met or exceeded 50% of time (cfs)	335	275
Flows met or exceeded 10% of time (cfs)	1,240	809
Dependable Capacity (kW)	1,377	594

Water Rights

PacifiCorp holds three water rights certificated by the State of Utah, Division of Water Rights, for the purposes of power generation at the Project. Up to 365 cfs may be diverted from the Weber River under water right no. 35-8061. The storage of 100 acre-feet in the forebay is permitted under water right no. 35-8062. "Project waters" consist of waters within the Project Area that have been diverted from the Weber River pursuant to this right. Following the original development of the Project, two agreements (covered in more detail below) allow for additional water storage and diversion away from the Weber Project to benefit other water storage facilities. A subsequent water right related to the 1965 agreement, water right no. 35-8741, allows for the storage of 28,040 acre-feet in Echo Reservoir.

Other than for the DWCCC immediately downstream of the powerhouse (and as memorialized in the 1938 Bureau of Reclamation [BOR] contract), there are no known existing or proposed uses of Project waters for irrigation, domestic water supply, industrial or other purposes that would impose additional upstream or downstream constraints to Project operations.

Other than the Project itself, there are no known in-stream flow uses, existing water rights or pending water rights in the Project vicinity upstream of the Project that would be affected by continued operation of the Project. It should be noted that no changes to existing water rights are proposed or envisioned as a result of this license process.

The Division of Water Rights, Weber River Commissioner, administers the water on the Weber River in priority. In 1938, a predecessor company to PacifiCorp, Utah Power & Light Company, entered into an agreement—the 1938 Power Water Agreement—that allowed for the storage of water out of priority upstream of Echo Dam including diversion into the Provo River basin for storage in Deer Creek (and now also Jordanelle Reservoir). This may occur from October 15 through April 15 each year, and interferes with generation at the Project when it is in force. A 1965 agreement allowed further interference with winter flows through the Project, similarly to store water in

Echo Reservoir. The two contracts mandate the compensation due to PacifiCorp through the exercise of these contracts.

In a letter dated January 21, 2014, the Division of Water Rights State Engineer issued instructions to the Weber River Commissioner as to the storage period, trade period, and spill period of the 1938 Power Water Agreement. A copy of these instructions is attached as Appendix D.

Water Quality

The UDWQ delineates stream and river water quality assessment units (AUs) based on detailed guidelines summarized in UDWQ's 2016 Final Integrated Report (UDWQ 2016). The Project falls within a portion of the Weber River watershed delineated as the Weber River-3 AU. This AU extends from the confluence of the Weber River with the Ogden River upstream to the confluence of Cottonwood Creek with the Weber River. It is approximately 20 miles in length and encompasses the entirety of the Project Area (Figure 11). Designated beneficial uses for this portion of the river are identified as 2B (infrequent primary contact recreation [e.g., fishing and wading]), 3A (coldwater fishery/aquatic life), and 4 (agricultural uses [crop irrigation and stock watering]). Key numeric water quality criteria applicable to these designated beneficial uses are provided in Table 16.

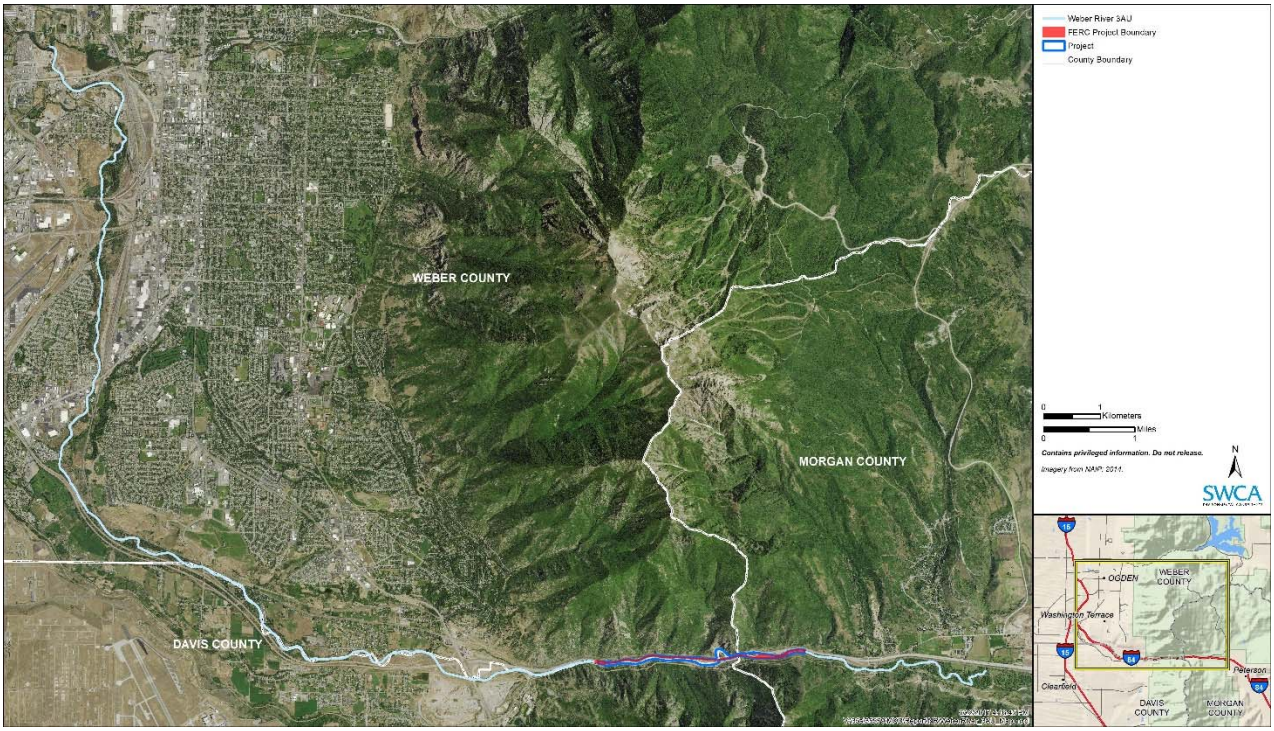

Figure 11. Weber River-3 AU.

Table 16. Key numeric water quality criteria applicable to Weber River-3 AU.

Parameter	2B (infrequent primary contact recreation)	3A (coldwater fishery/aquatic life)	4 (agricultural uses)
pH range	6.5 – 9	6.5 – 9	6.5 – 9
Maximum Total Dissolved Solids (TDS) (mg/L)	--	--	1,200
Turbidity Increase (NTUs)	10	10	--
Biological Oxygen Demand (BOD) (mg/L)[+]	5	5	5
Nitrate as N (mg/L)[+]	4	4	--
Total Phosphorus as P (mg/L)[+]	0.05	0.05	--
Minimum Dissolved Oxygen (DO) (mg/L)			
- 30-day Average	--	6.5	--
- 7-day Average	--	9.5/5[*]	--
- Minimum	--	8/4[*]	--
Temperature (°C)			
- Maximum	--	20	--
- Maximum Change	--	2	--

[+]BOD, Nitrate as N, and Total Phosphorus as P are pollution indicators only. There are no water quality standards for these parameters (see R317-2-14 and footnote 5).
[*]First number in column is for when early life stages are present, second number is for when all other life stages are present.

Throughout 2016 and in early 2017 (January) PacifiCorp completed a water quality study (SWCA 2017) to characterize water quality immediately upstream of the Project diversion dam, within the bypassed reach, and in the catch basin of the Project power house (four total water quality sampling locations). Water quality sampling occurred continuously at 15-min intervals for a year for most parameters measured, and monthly for total suspended solids (TSS) and chlorophyll *a* (grab samples) over the same period. Water quality sampling locations are identified in Figure 12 and described in Table 17. The water quality monitoring parameters defined and evaluated below are temperature, pH, specific conductivity, dissolved oxygen (DO), turbidity, and TSS. Some of these water quality parameters have numeric water quality criteria (see Table 16.) for the beneficial uses designated by the State of Utah for the Weber River-3 AU. Although TSS and specific conductivity do not have listed numeric water quality criteria, they lend additional insight into the water quality of the Weber River-3 AU. In the case of TSS, parameter values contribute to the understanding of turbidity. With respect to specific conductivity, this parameter provides information about dissolved salts and inorganic materials in the water. In addition to these water quality parameters, PacifiCorp elected to monitor chlorophyll *a* to assess algal biomass throughout the Project Area to assist the overall understanding of water quality in the Weber River. Algae, as represented by chlorophyll *a*, is the primary food source for the bluehead sucker (*Catostomus discobolus*), a Utah state species of special concern, and it is important to understand how algae varies both spatially and temporally in the river.

Figure 12. Water quality sampling locations.

Table 17. Sampling sites, methods used, and water quality parameters recorded.

Sampling Site	Data Collection Method	Water Quality Parameters
WR01 – At USGS station 10136500, Weber River, Gateway, Utah	Sonde	Temperature, pH, specific conductivity, DO, and turbidity
	Grab Sample	TSS and Chlorophyll *a*
WR02 – Upstream of the Project diversion dam	Grab Sample	Chlorophyll *a*
WR03 – Downstream of the Project diversion dam, in the bypassed reach of the river, approximately 100 meters upstream of the Project powerhouse	Sonde	Temperature, pH, specific conductivity, DO, and turbidity
	Grab Sample	TSS and Chlorophyll *a*
WR04 – Within the Project powerhouse catch basin, upstream of the DWCCC dam *	Sonde	Temperature, pH, specific conductivity, DO, and turbidity
	Grab Sample	TSS and Chlorophyll *a*

*Data were not collected at WR04 in February, November, and December 2016, and January 2017.

Water quality sampling sondes placed at sampling sites WR01, WR03, and WR04 recorded temperature, pH, specific conductivity, DO, and turbidity data on 15-minute intervals. Sonde data were retrieved once a month from February 2016 to January 2017. Per stakeholder agreement, data for WR04 (within the catch basin of the Project power house) were collected only when the Project was operational. The Project was not operational in February 2016, December 2016, and January 2017.

Grab samples were collected for laboratory analysis of TSS and chlorophyll *a* once a month from February 2016 to January 2017. Samples for both parameters were collected at the four locations with the following exceptions: TSS was not sampled at WR02 (WR02 was sampled for chlorophyll *a* only) and grab samples for TSS and chlorophyll *a* were not taken at WR04 in February 2016 and January 2017 because the powerhouse was offline and water in the powerhouse catch basin was frozen. In total, 34 grab samples were analyzed for TSS and 46 grab samples were analyzed for chlorophyll *a*. Grab samples were collected using the Utah Department of Environmental Quality (UDEQ) UDWQ standard operating procedures (UDEQ 2013a, 2013b, 2014). Grab samples were submitted to American West Analyticals Laboratories (in Salt Lake City) for TSS analysis, and to the Utah Department of Health Division of Laboratory Services for analysis of chlorophyll *a*.

Temperature

Statistical summaries for the water temperature sonde data are provided in Tables 18 and 19. Temperature recorded at the three sampling sites follows a typical seasonal pattern (Figure 13). Temperatures recorded at WR03 (downstream of the Project diversion dam, in the bypassed reach of the river, approximately 100 meters upstream of the Project powerhouse) slightly exceed the State of Utah water quality standards for temperature (20 degrees Celsius [°C]) on 15 days between July 21, 2016, and August 8, 2016.

The Weber River is designated as a cold water fishery (3A), for which maximum temperature change should not exceed 2.0 °C. From WR01 (upstream of the Project) to WR03 (downstream of the Project diversion dam, in the bypassed reach of the river, approximately 100 meters upstream of the Project powerhouse), there is no change in average temperature. From WR01 and WR03 to WR04 (catch basin in powerhouse), the average temperature change is 0.1°C when compared to the eight months of data that all sites have in common, and 1.9°C when the eight months of data available for WR04 are compared to the 12 months of data (including the three coldest months of the year) that were collected at WR01 and WR03 (see Table 18). Although this larger average change in temperature may suggest a potential impact to temperature from the water diversion, it is an artifact of the data collection set. That is, the average for WR04 is based on eight months of data (by agreement with the stakeholders, data were not collected and therefore were not available for three months when the powerhouse was offline or the one month when there was a sonde malfunction), whereas the averages for WR01 and WR03 are based on 12 months of data. The averages for the same eight months of data at WR01 and WR03 are more comparable to the WR04 average (these averages are shown in parentheses in Table 18). Monthly averages show that temperature decreases from WR01 to WR03 and WR04 in some months and increases in others. The change is never greater than 1.0 °C.

Table 18. Statistical summaries for the temperature sonde data (°C).

Sampling Site	Minimum	Maximum	Average	Standard Deviation
WR01	-0.2	19.8	9.7 (11.5)	5.7
WR03	-0.3	20.9	9.7 (11.8)	5.8
WR04	0.0	20.0	11.6	4.4

To provide a more comparable number, the temperatures in parentheses represents the average for the 8 months when WR04 data were available.

Table 19. Monthly averages for the temperature sonde data (°C).

Month / Year	Sampling Site		
	WR01	WR03	WR04
February / 2016	3.51	3.70	ND
March / 2016	6.49	6.37	6.35
April / 2016	9.21	9.18	9.06
May / 2016	11.48	11.46	11.10
June / 2016	14.24	15.02	16.87
July / 2016	16.67	16.87	17.51
August / 2016	17.45	17.09	17.59
September / 2016	14.97	14.72	15.17
October / 2016	11.01	10.12	10.99
November / 2016	6.71	5.66	7.33
December / 2016	2.18	1.78	ND
January / 2017	1.37	0.98	ND

ND = no data

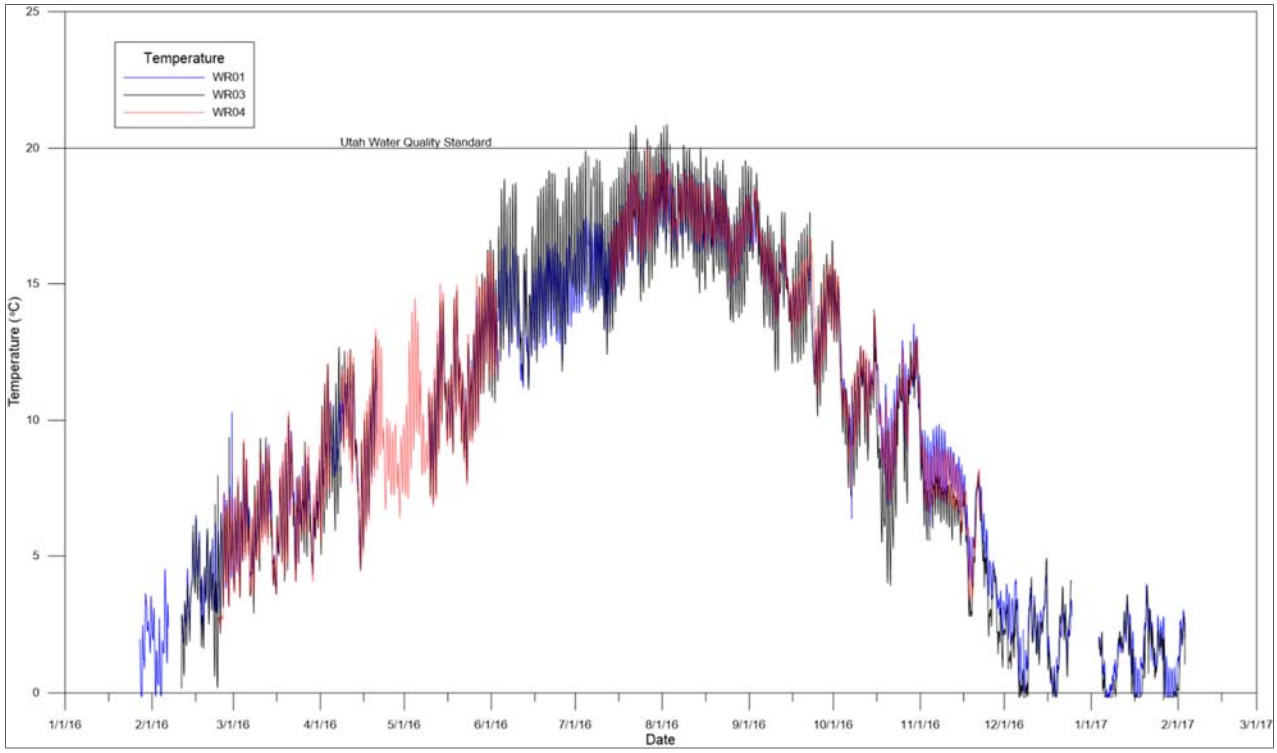

Figure 13. Water temperature sonde data.

pH

Statistical summaries for the pH sonde data are provided in Table 20. pH data recorded at all sampling sites follow the same general trend (Figure 14) and are within the State of Utah water quality standard (6.5–9.0).

Table 20. Statistical summaries for the pH sonde data.

Sampling Site	Minimum	Maximum	Average	Standard Deviation
WR01	7.5	8.8	8.1	0.2
WR03	7.8	8.9	8.3	0.2
WR04	7.8	8.9	8.2	0.2

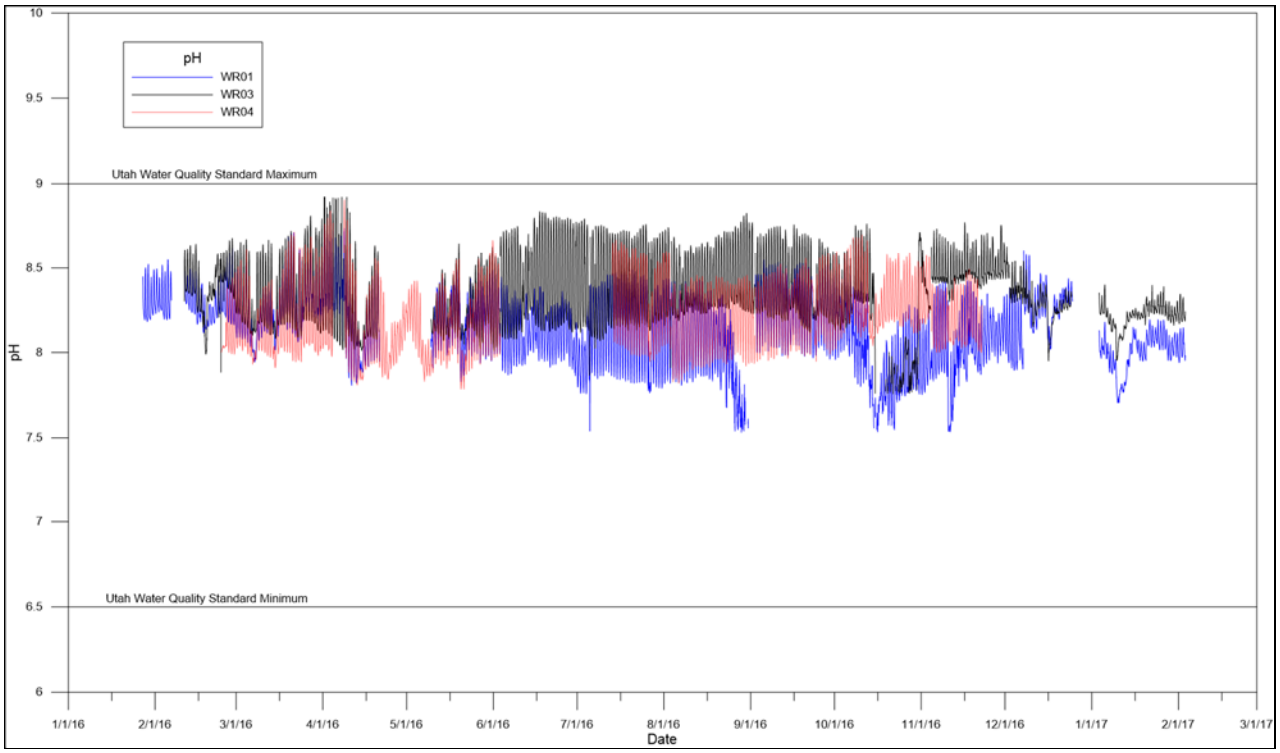

Figure 14. pH sonde data.

Specific Conductivity

Statistical summaries for the specific conductivity sonde data are provided in Tables 21 and 22. In general, specific conductivity at all sampling sites appears to be influenced by seasonal Weber River flows (Figure 15). As expected, high flows tend to dilute the salinity of the water, therefore lowering the specific conductivity.

Table 21. Statistical summaries for the specific conductivity sonde data (microSiemens).

Sampling Site	Minimum	Maximum	Average	Standard Deviation
WR01	234	977	615	129
WR03	221	864	567	127
WR04	198	766	542	147

Table 22. Monthly averages for the specific conductivity sonde data (microSiemens).

Month / Year	Sampling Site		
	WR01	WR03	WR04
February / 2016	703.07	578.11	ND
March / 2016	601.70	502.34	499.27
April / 2016	444.09	374.49	328.96
May / 2016	433.40	320.16	321.34
June / 2016	576.96	495.46	ND
July / 2016	535.62	591.24	616.67
August / 2016	529.18	612.11	601.43
September / 2016	608.93	627.36	623.67
October / 2016	701.34	628.69	681.82
November / 2016	722.89	701.93	711.37
December / 2016	696.96	660.29	ND
January / 2017	751.33	646.04	ND

ND = no data

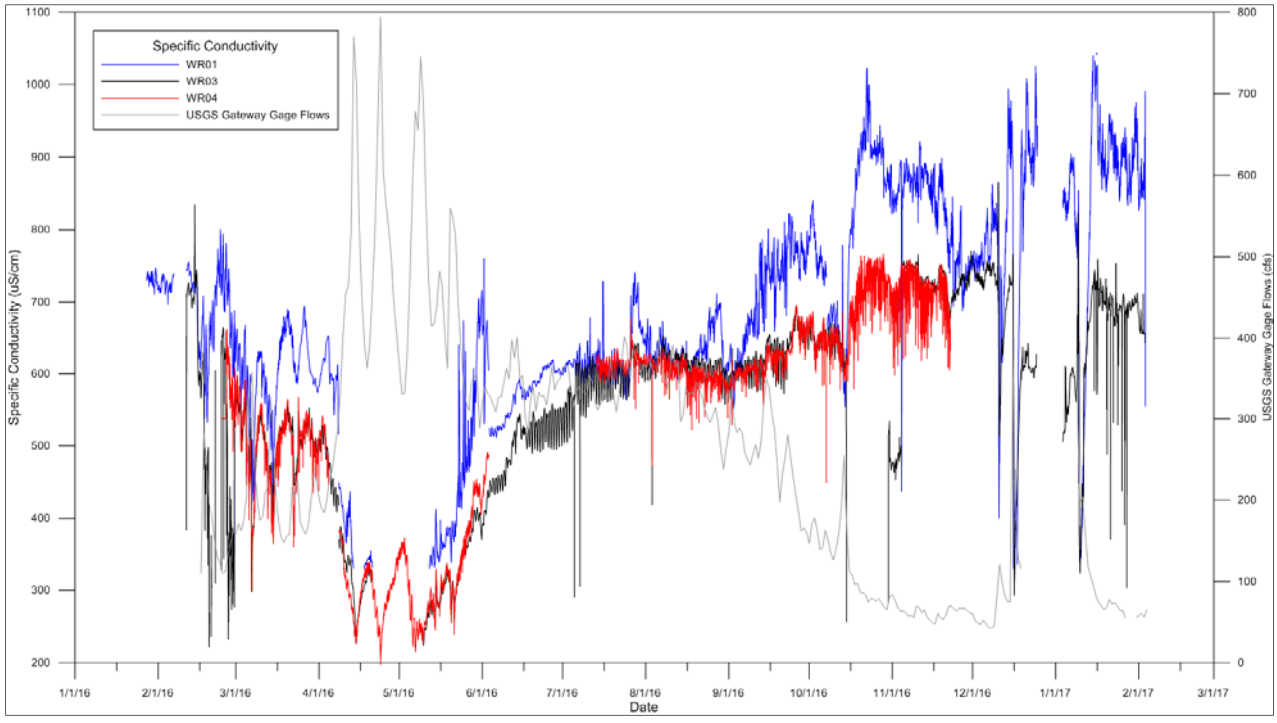

Figure 15. Specific conductivity sonde data.

Dissolved Oxygen

Statistical summaries for the DO sonde data are provided in Table 23. DO concentrations recorded at WR03 and WR04 followed the same general trend (Figure 16). DO concentrations recorded at WR04 were equal to or greater than the State of Utah water quality criteria (minimum 30-day average of 6.5 mg/L), and often above those recorded at WR01. Similarly, DO concentrations recorded at WR03 were equal to or greater than the water quality criteria, except for a few instances in late September and early October when DO concentrations in the water flowing past WR01 station (upstream of the Project Area) were extremely low; in those instances the DO concentrations at WR03 were greater than those measured at WR01.

DO concentrations measured at WR01 (upstream of the Project Area) had a wide range of fluctuations. Initially it was thought that the probe calibration may have drifted; however the probe was calibrated periodically throughout the monitoring period, and DO concentrations continued to fluctuate (see Figure 16). Next it was thought that temperature variations could be responsible, but that was also tested, and no correlation was observed. It is postulated that there is a pollutant source upstream of WR01 that is periodically depressing DO at the sample site.

Table 23. Statistical summaries for the DO sonde data (mg/L).

Sampling Site	Minimum	Maximum	Average	Standard Deviation
WR01	0.6	14.6	8.7	3.3
WR03	5.4	13.9	9.7	1.4
WR04	6.5	12.4	9.4	1.1

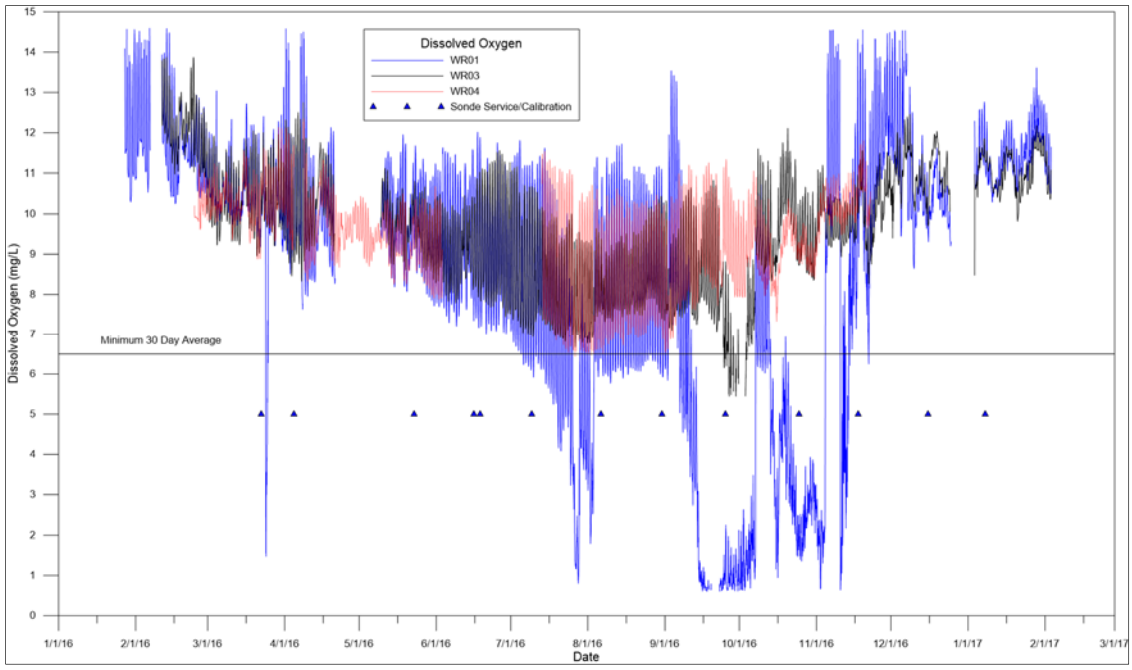

Figure 16. DO sonde data.

Turbidity

Statistical summaries for the turbidity sonde data are provided in Table 24. The three sampling sites (WR01, WR03, and WR04) follow the same general trend for turbidity (Figure 17). The minimum value of 3.5 nephelometric turbidity units (NTUs) at the powerhouse (WR04) is most likely the result of there being few opportunities for deposition in the diversion pipe. Furthermore, the water turbulence caused by the turbine in the powerhouse suspends sediment. The maximum observed value was at site WR01 (74.8 NTU) which is outside the Project Area (Figure 12). The turbidity standard for a 3A cold water fishery states that the turbidity increase as a result of Project implementation must be less than or equal to 10 NTUs above the turbidity value of inflows. The data here show that this standard is met in this stretch of the Weber River. The average turbidity upstream of the Project at sampling point WR01 is 15.4 NTUs whereas the average turbidity below the Project powerhouse (WR04) is 17.6 NTUs (an average 2.2 NTU increase above the turbidity value upstream of the Project, although it is noteworthy that the maximum turbidity values are measured at WR01, upstream of the Project).

Table 24. Statistical summaries for the turbidity sonde data (NTUs).

Sampling Site	Minimum	Maximum	Average	Standard Deviation
WR01	0.0	74.8	15.4	14.0
WR03	0.0	69.3	18.1	14.4
WR04	3.5	62.3	17.6	12.0

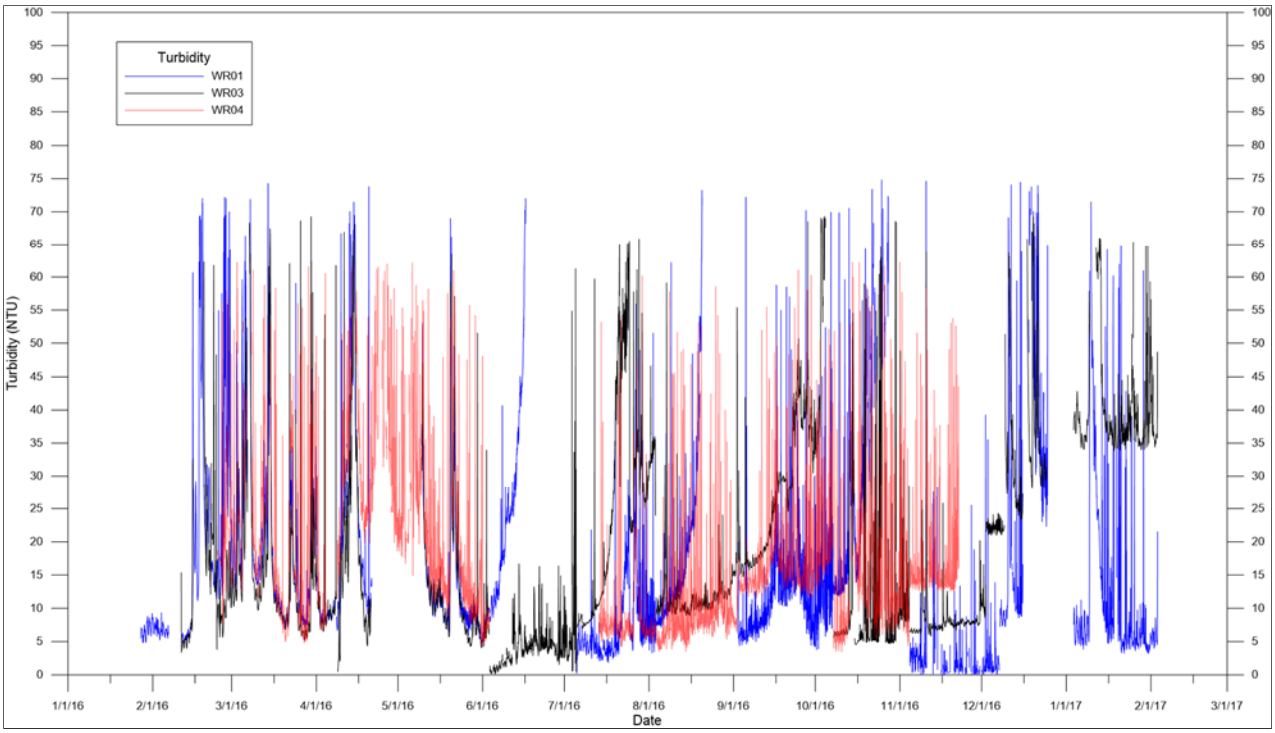

Figure 17. Turbidity sonde data.

Total Suspended Solids

TSS refers to the amount of solid material suspended in the water. It differs from turbidity in that it provides the actual weight of suspended matter. High TSS in a waterbody can often mean higher concentrations of bacteria, nutrients, pesticides, and metals in the water. These pollutants may attach to sediment particles on the land and be carried into waterbodies with storm water. In the water, the pollutants may be released from the sediment or travel farther downstream. High TSS can also result in a decrease of light penetration into the water column, an increase in water temperatures, and a decrease in DO (Murphy 2007).

Grab sample results for TSS are provided in Table 25. TSS concentrations at all sampling sites follow the same general trend (Figure 18). TSS appears to be directly related to flows and peaks during spring runoff. TSS is higher in the Project Area (WR03 and WR04) during spring runoff, but is less than upstream (WR01) for the duration of the year, except for an increase of 5 mg/L at WR04 between August 1, 2016 and October 7, 2016. For the same reasons described above for turbidity (i.e., reduced opportunities for deposition in the diversion pipe and water turbulence caused by the turbine in the powerhouse), TSS is expected to be higher at WR04, although this was only periodically observed.

Table 25. Grab sample data for TSS (mg/L).

Date	WR01	WR03	WR04
02/02/2016	4.4	7.6	Powerhouse offline
20/29/2016	7.2	17.2	19.6
04/08/2016	4.4	*1.5*	3.2
05/06/2016	18.0	25.6	22.8
06/03/2016	11.6	*1.5*	8.0
07/05/2016	10.8	5.2	9.6
08/03/2016	7.6	5.6	6.4
09/02/2016	8.8	3.6	14.4
10/03/2016	3.2	*1.5*	5.6
11/04/2016	8.4	*1.5*	*1.5*
12/02/2016	*1.5*	*1.5*	*1.5*
01/03/2017	20.4	13.2	Powerhouse offline
Minimum	*1.5*	*1.5*	*1.5*
Maximum	20.4	25.6	22.8
Average	8.9	7.1	9.3
Standard Deviation	5.7	7.7	7.4

The values in italics are less than the laboratory detection limit. The value entered is half the detection limit.

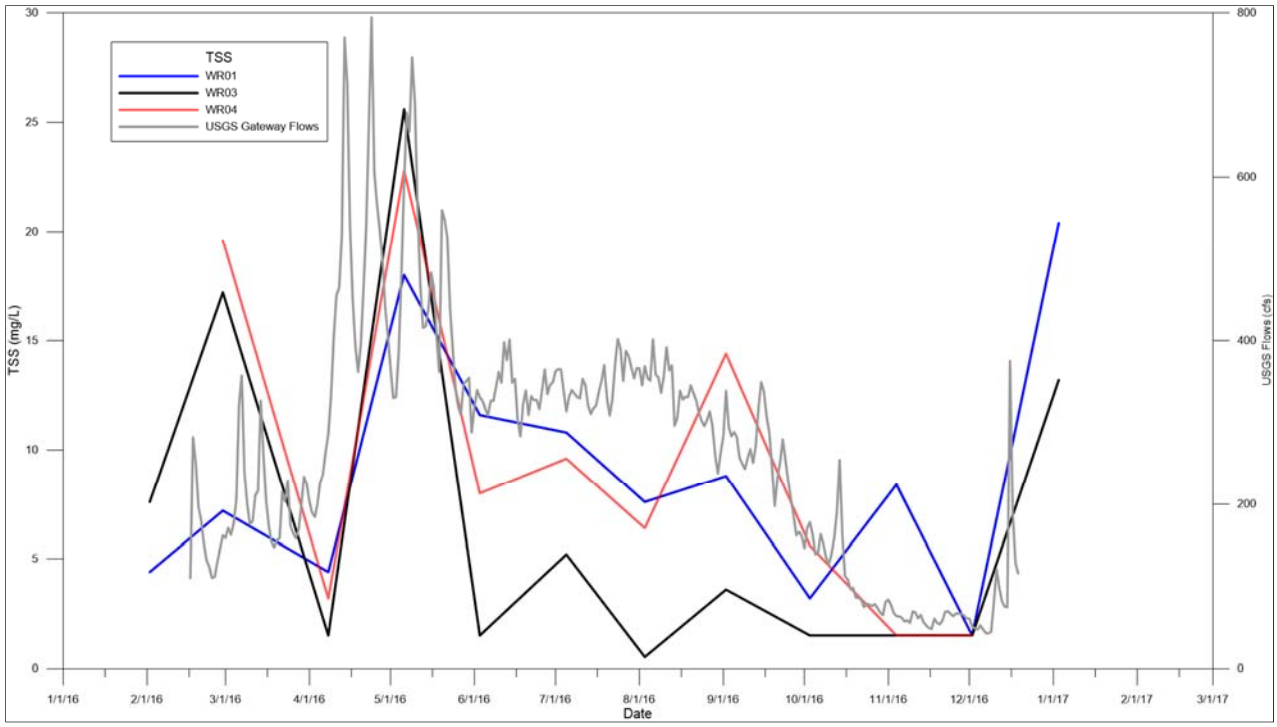

Figure 18. TSS grab sample data.

Chlorophyll a

Chlorophyll *a* is a measure of the amount of algae growing in a waterbody. It can be used to classify the trophic condition of a waterbody. Algae is a natural part of freshwater ecosystems; however, too much algae can cause problems such as decreased levels of DO when algae are dead and decaying and biological oxygen demand is high. Some algae also produce toxins that can be a public health concern when found in high concentrations. One of the symptoms of degraded water quality condition is the increase of algae biomass as measured by the concentration of chlorophyll *a*. Waters with high levels of nutrients from fertilizers, septic systems, sewage treatment plants, and urban runoff may have high concentrations of chlorophyll *a* and excess amounts of algae (U.S. Environmental Protection Agency 2016).

Grab sample results for chlorophyll *a* are provided in Table 26. Chlorophyll *a* concentrations at all sampling sites follow the same general trend (Figure 19), except at WR03. However, similar to TSS, there is a spike in chlorophyll *a* concentrations during spring runoff for sites WR01, WR02, and WR04. At this same time, chlorophyll *a* concentrations should be suppressed. After spring runoff, chlorophyll *a* concentrations at all sampling sites follow the same general trend.

Table 26. Grab sample data for chlorophyll *a* (ug/L).

Date	WR01	WR02	WR03	WR04
02/02/2016	3.80	3.60	7.10	Powerhouse offline
02/29/2016	1.70	1.50	3.40	3.10
04/08/2016	19.30	23.70	5.50	23.50
05/06/2016	3.90	5.20	0.80	4.20
06/03/2016	3.50	0.20	1.90	2.70
07/05/2016	0.60	*0.05*	1.70	*0.05*
08/03/2016	1.66	Excluded	*0.05*	0.71
09/02/2016	*0.05*	*0.05*	2.31	0.51
10/03/2016	0.74	0.51	0.51	1.19
11/04/2016	2.32	1.16	*0.05*	*0.05*
12/02/2016	0.79	1.13	*0.05*	0.48
01/03/2017	1.24	0.11	1.81	Powerhouse offline
Minimum	*0.05*	*0.05*	*0.05*	*0.05*
Maximum	19.30	23.70	7.10	23.50
Average	3.30	3.38	2.10	3.65
Standard Deviation	5.20	6.94	2.24	7.12

The values in italics are less than the laboratory detection limit. The value entered is half the detection limit.
The sample collected on 8/3/16 at WR02 was excluded because the duplicate sample was outside the acceptable range of precision.

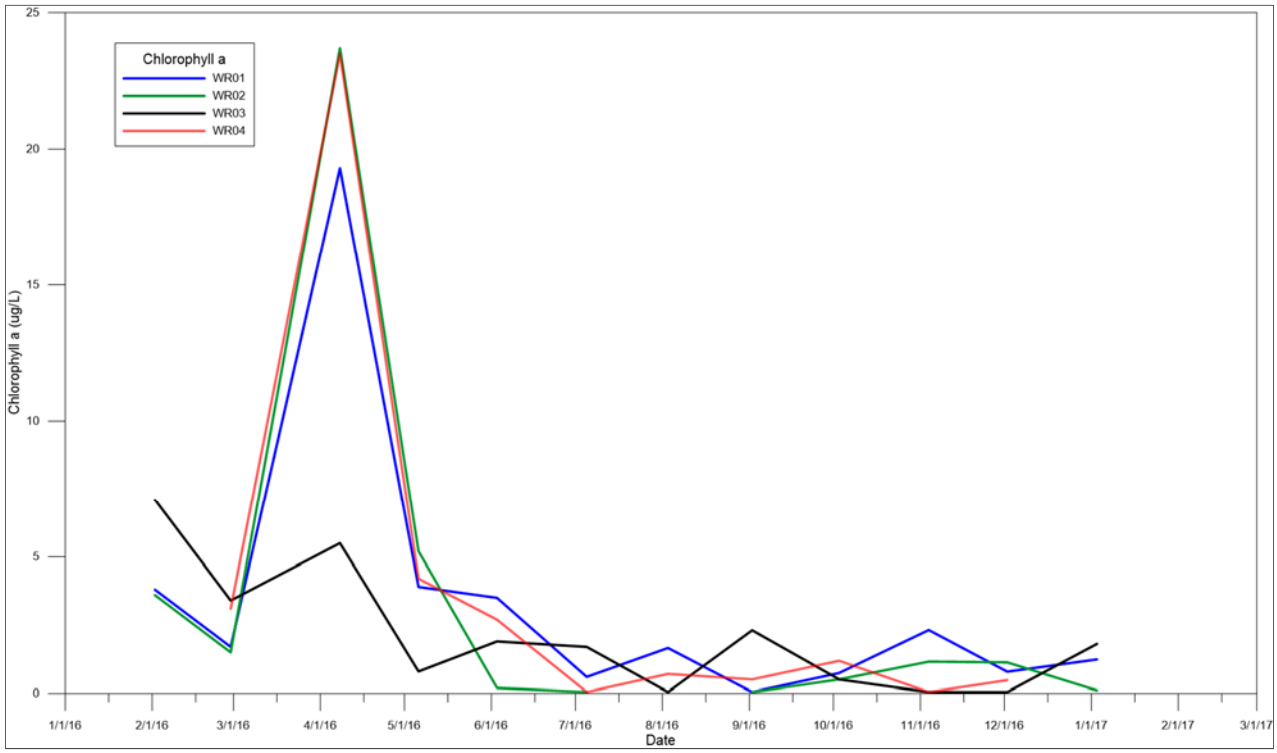

Figure 19. Chlorophyll *a* grab sample data.

3.3.2.2 Environmental Effects

Water Quantity (Flows)

Under the proposed action the Project would operate for a period of 30-50 years and the PM&E measures described in Table 11 would be implemented. Available flows would not change as no actions are proposed that would influence (change) available flows in the Weber River. However, implementation of PM&E measure HYD-1 would ensure that existing seasonally-adjusted minimum stream flows of 34-50 cfs (or inflow) continue in the bypassed reach of the river. During low flow times of the year maintaining this minimum flow in the bypassed reach requires PacifiCorp to curtail generation in favor of the provision of flows that contribute to flow-related benefits such as fish habitat. In addition, implementation of PM&E measure REC-9 could result in an additional 16 hours per year of flows up to 320 cfs in the bypassed reach. However, these flows do not represent a change in available flow nor do they represent a change in minimum flows. The provision of 16 hours per year of flows up to 320 cfs for whitewater recreation would require PacifiCorp to curtail generation during these flow releases which are intended to provide whitewater boating opportunities in the bypassed reach outside the typical higher flow period that occurs in the early spring.

Water Rights

Changes in water rights or water rights-related agreements are not proposed by the proposed action. As a result there would be no change in water rights with implementation of the proposed action.

Water Quality

Under the proposed action the Project would operate with specific PM&E conditions for a period of 30-50 years. Over this timeframe Project operations would be largely similar to the current operations except for minor changes to facilitate PM&E measures FISH-2, FISH-3, FISH-4, and REC-9 (see Section 2.2.3). No substantive changes in temperature, pH, specific conductivity, DO, turbidity, TSS, or chlorophyll *a* are anticipated as a result of implementation of the proposed action as the Project has little influence on these water quality parameters based on field studies conducted in 2016 and 2017. However, certain PM&E measures could influence some water quality constituents. Additional information on a parameter-by-parameter basis is provided below.

Temperature

No change in temperature is anticipated as a result of the proposed action because the Project has little influence on temperature based on field studies conducted in 2016 and 2017. Monthly average temperatures show that temperature decreases from sampling point WR01 to sampling points WR03 and WR04 in some months and increases in others. The change is never greater than 1.0 °C. There is no known mechanism by which

implementation of PM&E measures could influence temperature in the river and therefore PM&E measures are not anticipated to result in temperature changes.

pH

No change in pH is anticipated as a result of the proposed action because the Project has no influence on pH based on field studies conducted in 2016 and 2017. There is no known mechanism by which implementation of PM&E measures could influence pH in the river, particularly to the degree that would cause exceedance of State of Utah water quality standards (6.5-9.0) for pH.

Specific Conductivity

No change in specific conductivity is anticipated as a result of the proposed action because the Project has little influence on specific conductivity based on field studies conducted in 2016 and 2017. Specific conductivity at all sampling sites is influenced by seasonal flows in the Weber River but not by Project-related activities. There is no known mechanism by which implementation of PM&E measures could influence specific conductivity in the river except for PM&E measures FISH-2 and REC-9.

Measure FISH-2 involves the construction, operation, and maintenance of a traditional vertical slot fish ladder designed for upstream passage of Bonneville cutthroat trout and bluehead sucker. Fish ladder construction would result in earthmoving activities which have the potential to result in localized erosion and soil loss including potential soil constituents (e.g., salts and alkalis) that can contribute to salinity and therefore specific conductivity measurements in the Weber River. Erosion control measures and other BMPs (e.g., silt fences, etc.) as required by permitting authorities would be implemented to reduce sediment delivery to the Weber River during construction. Also, active work below the ordinary high water mark would be isolated behind a coffer-dam or utilize other de-watering measures, which would prevent sediment transport and associated water quality impacts during fish ladder construction. In addition, the total area of earthmoving activities for fish ladder construction would be approximately 0.8 percent of the river area (the Weber River and a 25-foot buffer on either side) from the diversion dam area where fish ladder construction would occur to the downstream end of the Project powerhouse.

Measure REC-9 calls for the curtailment of power generation and the provision of boater flows for 4-hour segments on four Saturdays prior to July 15 annually in the event that safe legal egress can be found for boaters. During the release of boater flows to satisfy REC-9 specific conductivity in the bypassed reach of the Weber River is likely to decrease temporarily as a result of higher flows (up to approximately 320 cfs) in the bypassed reach diluting the salinity of the water. This effect would not exceed approximately 16 hours per year (four boater flows provided on four occasions) which is less than one percent of the total year. This effect is also limited spatially. That is, downstream of the powerhouse, the dilution effect would cease as the Project water is

released back to the river at that point. Boater flow releases would likely occur between approximately late April and early July depending on the runoff in any given year and Project operational factors.

Dissolved Oxygen

Based on field studies conducted in 2016 and 2017 the Project currently contributes benefits to DO in the river. The Project appears to exert a stabilizing influence on DO fluctuations across the system from sampling point WR01 to WR04 as well as increasing DO concentrations at the downstream end of the Project powerhouse (WR04) (see Table 23). Increased DO concentrations at the downstream end of the Project powerhouse are likely a result of water turbulence in the pipeline followed by water turbulence in the turbine. This effect is expected to continue into the future because the configuration of the Project would remain largely the same between the current condition and the proposed action. Further, implementation of PM&E measure REC-9 is likely to increase DO concentrations in the bypassed reach during the release of boater flows. This is largely a result of increased water turbulence during the boater flow events. This effect would not exceed approximately 16 hours per year (four boater flows provided on four occasions) which is less than one percent of the total year. Boater flow releases would likely occur between approximately late April and early July depending on the runoff in any given year and Project operational factors.

Turbidity

No change in turbidity is anticipated as a result of the continued operation of the Project because the Project has little influence on turbidity based on field studies conducted in 2016 and 2017. However, field studies indicated that minimum turbidity values downstream of the Project powerhouse (sampling site WR04) never reached zero (3.5 NTUs was the minimum at WR04) whereas minimum turbidity values at all other sampling points were zero. This is likely a result of there being no opportunities for deposition in the diversion pipeline/penstock. In addition, the water turbulence caused by the turbine in the powerhouse suspends sediment.

Implementation of PM&E measures FISH-2 and REC-9 may influence turbidity in the river. Measure FISH-2 calls for the construction and operation of a fish ladder suitable for passage of Bonneville cutthroat trout and bluehead sucker. Fish ladder construction may result in localized erosion and sediment delivery to the river. This could occur during active earthmoving and construction activities. Required BMPs would ameliorate such impacts so that the Project stays within required limits for turbidity. Additional details regarding the potential for erosion and sediment delivery to the river are provided in Section 3.3.1 (the geological and soil resources related effects analysis). Measure REC-9 calls for the curtailment of power generation and the provision of boater flows for 4-hour segments on four Saturdays prior to July 15 annually in the event that safe legal egress can be obtained for boaters. Boater flow releases to satisfy REC-9 would increase the volume of water in the bypassed reach of the river by up to 320 cfs per

release. The potential for scour and erosion of the streambank during releases is very low given the rocky and highly armored channel in the bypassed reach, as well as the relatively low volume of releases (the channel commonly handles up to 10 times the proposed boater flow, sometimes for weeks or months, rather than for hours). The boater flows could result in a temporary increase in suspended particles in the river though it would not likely increase turbidity. This is because of the larger volume of water also present in the river reducing the total concentration of suspended particles. In addition, this effect would not exceed approximately 16 hours per year (four boater flows provided on four occasions) which is less than one percent of the total year. Boater flow releases would likely occur between approximately late April and early July depending on the runoff in any given year and Project operational factors.

Total Suspended Solids

Effects of implementation of the proposed action on TSS would be the same as those described for turbidity because of the close relationship between turbidity (a measure of the cloudiness or haziness of water caused by large numbers of individual particles) and TSS (a measure of the total amount, by weight, of solid material suspended in water).

Chlorophyll a

No change in chlorophyll *a* is anticipated as a result of the proposed action because the Project has little influence on chlorophyll *a* based on field studies conducted in 2016 and 2017. Likewise, there is no known mechanism by which implementation of PM&E measures could influence chlorophyll *a* in the river.

3.3.2.3 Cumulative Effects

The geographic scope of the cumulative effects analysis associated with water resources is the Weber River Basin from the upstream portion of the Project Boundary downstream to the confluence with the Ogden River (Figure 7). This area was chosen because the Project would not contribute incrementally to water quality effects upstream of this area (i.e., the Project would not result in direct or indirect effects to water quality, water quantity, or water rights upstream of this area).

Based on a review of aerial imagery the primary potential influences on water resources within this geographic scope consist of the following: DWCCC diversion structure downstream of the western portion of the proposed Project Boundary, roads (especially I-84 freeway, which runs parallel to the Weber River within the portion of Weber Canyon that contains the Project, and dirt roads running parallel to the Weber River on the south river bank), urban/suburban development, and agriculture. At some times of the year (typically the summer months) stream diversions up- and downstream of the Project result in partial to nearly complete dewatering of stream segments. Road development and urban/suburban development tends to create impervious surfaces that increase runoff and potentially increase the delivery of salts, sediments, nutrients, and

other constituents to receiving waters. Likewise, runoff from agricultural land uses is often associated with elevated levels of salts, sediments, nutrients, and other constituents in receiving waters.

Based on field studies conducted in 2016 and 2017, as well as the analysis above, continued operation of the Project under the proposed action, with implementation of the PM&E measures described in Table 11, is unlikely to contribute substantively to cumulative water quality effects within the geographic scope of analysis. Temperature, pH, specific conductivity, turbidity, TSS, and chlorophyll *a* all appear to be essentially unaffected by the Project. The Project appears to be a net contributor to DO concentrations in the stream; however, the extent to which this contribution persists downstream of the Project Boundary is unknown.

3.3.3 Fisheries and Aquatic Resources

3.3.3.1 Affected Environment

Habitat

The aquatic habitat in the Project Area has been severely altered from historical conditions. The physical characteristics of the river have been altered with construction of I-84 freeway in 1968. Much of the river was channelized and a large portion of the lower velocity/backwater environment was eliminated (Webber, et al. 2012). Further and potentially more substantial effects may result from water diversions and subsequent diminishment of flows throughout the Weber River Basin. Many such diversions do not have (or have very low) established minimum stream flows. Within the Project Area the river substrate is typical of high gradient mountain streams in the Wasatch-Cache National Forest, consisting primarily of small boulders, small to medium cobble, gravel and sand.

Fish Community

There are no anadromous fish that occur in the Weber River system. However, there are populations of resident fish species, and at least one fluvial species. Fish identified previously in the Project bypassed reach or the Project Area are rainbow trout (*Oncorhynchus mykiss*), Bonneville cutthroat trout (*O. clarki*), brown trout (*Salmo trutta*), mountain whitefish (*Prosopium williamsoni*), mottled sculpin (*Cottus bairdii*), bluehead sucker (*Catostomus discobolus*), mountain sucker (*C. platyrhynchus*), Utah sucker (*C. ardens*), speckled dace (*Rhinichthys osculus*), longnose dace (*R. cataractae*), redside shiner (*Richardsonius balteatus*), and common carp (*Cyprinus carpio*). Cutthroat trout, mountain whitefish, and brown trout make up more than 95 percent of the total biomass of game species in the bypassed reach. The UDWR rates the Project reach of the Weber River as Class IIIB, a quality fishery with species of special concern (Bonneville cutthroat trout and bluehead sucker). Bonneville cutthroat trout is also listed as a sensitive species by the USFS.

UWDR does not stock fish in the vicinity of the Weber Project Area and relies, primarily, on natural production (Paul Thompson, UDWR, personal communication, March 10, 2015). UDWR previously stocked 3-inch brown trout but that was discontinued several years prior to 2015. UDWR now manages the area for native Bonneville cutthroat trout. There are some catchable sterile rainbow trout stocked in Echo, East Canyon, and Lost Creek reservoirs and it is possible some of these fish can make it downstream to the Project Area. Historical stocking of fertile rainbow trout may have resulted in a few fertile rainbow trout or cutthroat-rainbow trout hybrids occurring within the Project Area, although these fish are removed when discovered during annual fisheries surveys and other work.

The following is a description of the aquatic species present in the Project Area beginning with native species and followed by introduced species. The largest body of information presented below relates to Bonneville cutthroat trout and bluehead sucker given these are the species of primary concern.

Bonneville Cutthroat Trout

The Bonneville cutthroat trout is the only subspecies of cutthroat native to the historic Lake Bonneville basin of Utah, Wyoming, Idaho, and Nevada. Pure strains of these fish are rare throughout their historic range but several Utah populations exist in Bear Lake and Strawberry Reservoir. Bonneville cutthroat trout have been petitioned twice for federal listing under the Endangered Species Act (ESA) in 1992 and 1998. In both cases the FWS found the species did not warrant federal protection. Most recently, on September 9, 2008, the FWS again concluded there was insufficient cause to list the fish as either threatened or endangered under the ESA (Federal Register 2008). Continuing threats to Bonneville cutthroat trout include: 1) water development projects resulting in changes in the timing, magnitude, and duration of stream flows; 2) degraded aquatic habitat and water quality; 3) riparian habitat loss; 4) interruption of migratory corridors by man-made barriers; and 5) competition with, predation by, and hybridization with nonnative fishes (Lentsch et al. 2000). Because of these threats and to further cooperation toward protection of the species, both the State of Utah (Utah Bonneville Cutthroat Trout Team 2008) and Range-wide (Lentsch et al. 2000) Bonneville cutthroat trout Conservation Agreements and Strategies have been developed. Recent genetic studies conducted by UDWR indicate that Bonneville cutthroat trout in the Project Area have a very low level of hybridization. Because of these numerous threats, this cutthroat subspecies is included on the Utah Sensitive Species List (UDWR 2015). Bonneville cutthroat trout is also the Utah state fish.

Bonneville cutthroat trout primarily eat insects, but large individuals have been known to also eat other fish. Like most cutthroat trout, this subspecies spawns in streams in gravel substrate in the spring. Fish can be found in a variety of habitat types ranging from high elevation mountain streams and lakes to low elevation grassland streams and can also be found in natural lakes, such as Bear Lake, or in reservoirs. Within each

different habitat type, these fish require a functional stream riparian zone which provides structure, cover, shade, and bank stability plus crucial spawning habitat.

UDWR, FWS, Utah State University (USU), TU and various other partners have collaborated on research and improvement projects in recent years to better understand and expand Bonneville cutthroat trout populations in the Weber River. A collaborative investigation initiated by UDWR, USU and TU in 2011 began documenting population structure, genetics, survival probability and adult migratory movements because of its relevance to population viability and persistence.

Using multiple-pass electrofishing, a population estimate of 405 (95 percent CI, 310-584) Bonneville cutthroat trout occurring from the Project powerhouse diversion downstream to the Lower Weber Diversion was made in 2011 (Budy et al. 2014). Generally, there appears to be a trend toward increasing densities of the fish moving upstream from the canyon mouth into the tributaries upstream of the powerhouse diversion (Table 27). Length-frequency histograms for fish in the Weber River indicated the smallest individual collected from 2011-2013 was about 100 mm total length and the largest 550 mm (Figure 20). The average total length was about 300 mm.

Table 27. Bonneville cutthroat trout population estimates with 95% confidence intervals in three mainstem sections of the Weber River, Utah, in 2011 and 2012.

Year and Weber River Section	Sampled Distance	Electrofishing Passes	Sampling Dates	Population Estimate (N hat)	95% Confidence Intervals
2011 Section 03 Lower Weber Diversion upstream to Powerhouse Diversion	Combined 1.8 of 4.4 km	2 and 3 (combined)	15 Nov, 17 Nov, 29 Nov, 14 Dec	405	310-584
2011 Section 04 Powerhouse Diversion upstream to Peterson Creek confluence in Weber River, plus portions of multiple upstream tributaries	11.7 km	4	20 July, 21 July, 26 Jul, 12 Aug	877	684–1,124
2012 Section 02 Canyon mouth upstream to Lower Weber Diversion	Lower 19 km of 20 km reach	2	19 June, 21 June	139	66–672
2012 Section 04 Powerhouse Diversion upstream to Peterson Creek confluence in Weber River, plus portions of multiple upstream tributaries	9.5 km	2	8 Aug, 16 Oct	1,296	911–2,069

Modified from Budy et al. 2014.

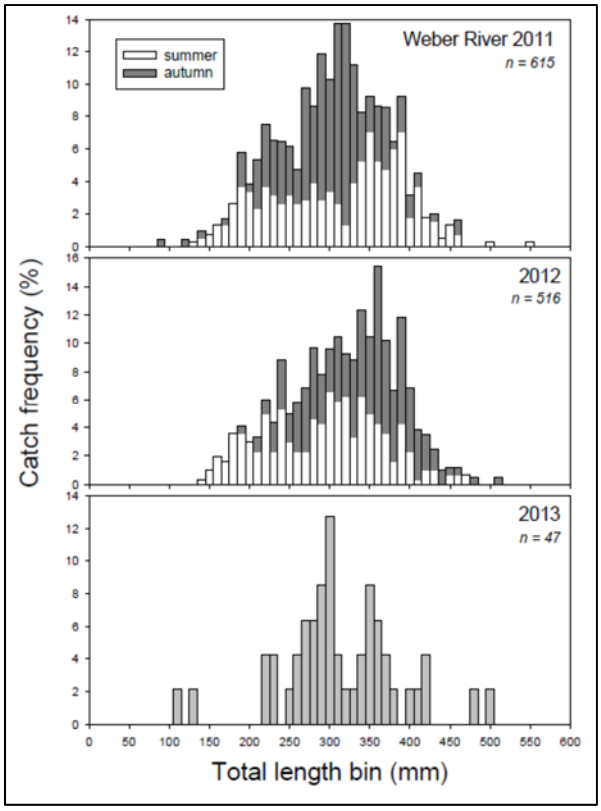

Figure 20. Bonneville cutthroat trout length-frequency histograms in the Weber River within the Project vicinity (from Budy et al. 2014).

During this study, from 2011 to 2013, researchers also implanted a total of 1,671 Bonneville cutthroat trout with passive integrated transponder (PIT) tags and documented movements in the Weber River from the canyon mouth and among tributaries located just upstream of the Project using passive instream arrays (PIAs) installed in a number of the tributaries. There was frequent use of tributaries by the mainstem population for spawning and movement between the tributaries, suggesting a sizable fluvial life history component still exists in the Weber River and may play an important role in the population's long-term viability. Human-made barriers exist in all of the major tributaries, although some appear passable under certain conditions. Those on Strawberry and Gordon creeks have been impassable (Budy et al. 2014). However the fish ladders that were installed on Strawberry Creek and Gordon Creek in 2016 do pass fluvial Bonneville cutthroat trout and smaller age classes of Bonneville cutthroat trout plus some resident cutthroat (Paul Thompson, UDWR, personal communication, October 12, 2017). Genetic mixing between mainstem and tributary populations was evident based on mitochondrial and otolith analysis, however, both populations appear to largely pure (Budy et al. 2014).

Recent UDWR tagging studies demonstrated that 28 Bonneville cutthroat trout moved upstream past the Project powerhouse diversion during spawning migrations in

2013 and 2014 (PacifiCorp 2015). Only three pathways are available to accomplish this: 1) the ice chute (historically designed for fish passage but never actually functioned as such) on the north side of the river; 2) the spillway; and 3) the low-flow gate on the south side of the Weber Dam diversion. At lower flows, the first two pathways do not appear to be feasible due to a large terminal drop at the ice chute with very high velocities throughout and insufficient depths across the spillway. Trout are commonly observed by PacifiCorp personnel attempting unsuccessfully to ascend the ice chute outflow. It is also likely that at higher river flow/stage conditions both would remain impassable. The low-level gate is the most likely possibility when open, and the timing of movements from past studies suggest it could have been utilized, though there has been no field verification of the exact pathway (PacifiCorp 2015).

Bluehead Suckers

Bluehead suckers are native to parts of Utah, Idaho, Arizona, New Mexico and Wyoming. The species occurs in the upper Colorado River system, the Snake River system, and the Lake Bonneville basin, although recent work suggests the Snake and Lake Bonneville populations (including the Weber River fish) are a genetically distinct group from those occurring in the Colorado River system (Hopken, et. al., 2013). In Utah, bluehead suckers have been reduced in numbers and distribution due to flow alteration, habitat loss or alteration, dams and diversions, and the introduction of nonnative fishes. Consequently the bluehead sucker is included on the *Utah Sensitive Species List* (UDWR 2015). Both Range-wide (UDNR 2006b) and State of Utah (UDNR 2006a) Conservation Agreements and Strategies have been developed for bluehead suckers to foster cooperation toward the protection of the species. The following are among the recommended conservation actions in these agreements: 1) conduct population surveys; 2) examine life history and habitat needs; 3) genetically characterize populations; 4) maintain and enhance important habitats; 5) control nonnative fishes where feasible; 6) expand populations; and 7) continue monitoring populations in the longer term (UDWR 2006a).

The bluehead sucker is a benthic species with a mouth modified to scrape algae from the surface of rocks. Algae is the primary food of the species. Bluehead suckers spawn in streams during the spring and early summer. Spawning usually takes place when stream temperature reaches about 16 °C (UDWR 2006a) and has been estimated as occurring in the Upper Colorado River Basin between about 18° and 24 °C (Ptacek et al 2005). An early study suggested bluehead suckers in the Weber River have a rather protracted spawning period based on gonadal index, extending from early May to late July (Andreasen and Barnes 1975). During that time period, average daily temperatures in the Weber River between 1995 and 2006 ranged from about 12° to 20 °C (PacifiCorp 2015). During the water quality studies conducted between February 2016 and January 2017 temperatures in the Weber River ranged from just below 0° to nearly 21°C. Average monthly temperatures ranged from just under 1 °C to over 17.5 °C with the lowest

temperatures recorded in December and January and the highest temperatures recorded in July and August.

Habitat use differs according to life stage, with larvae and young-of-year fish occupying low velocity habitats along stream margins after drifting some distance from spawning areas. Seasonal timing of larval emergence and drift is contingent on when spawning occurs and temperature-dependent egg development. As bluehead suckers grow, they often relocate to higher velocity habitats with greater cover (UDWR 2006a), though some research indicates use of pools with rocky substrate year-round (Sweet and Hubert 2010). Bluehead suckers do not thrive in impounded waters, tending to utilize habitats more swift than many other suckers (UDWR 2006a). Generally, adult bluehead sucker occurrence is correlated with habitats where cobble substrate is dominant; most likely due to their feeding habits. Juvenile occurrence can be negatively affected by partially desiccated sections of river (Bower et al. 2008). Overall, the literature regarding adult bluehead sucker movements is limited, but generally indicates they may be quite sedentary or undergo substantial migrations depending on the system (Ptacek et al. 2005). They have also been documented utilizing their suction-like mouth to maintain position in response to increasing current (Aedo et al. 2009).

Genetic studies have confirmed that bluehead sucker populations in the Upper Snake, Bear and Weber Rivers are distinct from those in the Colorado River Basin, and as such, are deserving of protection (Douglas et al. 2009). Concomitantly, various efforts have been undertaken recently by UDWR, USU and others to better understand demographics, life history and habitat requirements of Weber River bluehead suckers.

The bluehead sucker exists in the area of the Weber River occupied by the Project but also extending upstream and downstream of the Project (Webber, et al. 2012). Bluehead sucker populations are managed by UDWR between Echo Reservoir and the confluence with the Ogden River. The populations in the lower river (Project Area and downstream) appear to be the most robust (Webber et al. 2012). Generally the research conducted to date indicates that the population below the Project Area, from the canyon mouth to the Ogden River confluence, is somewhere in the hundreds and is experiencing some limited recruitment. As indicated above, bluehead suckers are known to occur upstream from the hydroelectric diversion with an estimated population between Echo Reservoir and the town of Morgan between 150 and 300 individuals. To what extent spawning and recruitment occur upstream from the Project to Echo Dam is not understood at this time. However, multiple (approximately eight) congregations of individuals displaying spawning characteristics have been documented in the same area.

Current efforts by USU researchers have been directed at identifying spawning areas in the lower section of the Weber River (i.e., below the canyon mouth) during late spring and quantifying habitat in these spawning reaches to assess what factors may limit recruitment. Researchers have also determined numbers of young-of-year bluehead suckers in low velocity habitats in that portion of the river. Abundance was positively associated with maximum backwater depth (Budy et al. 2017). Low velocity habitats

along the river margins are relatively rare in the river upstream from the Project due to much channelization, higher gradient and altered hydrology. However, the impoundment created upstream of the Project diversion may provide suitable rearing habitat for bluehead suckers spawned above this reach of the river.

Movements of PIT-tagged bluehead suckers (all >150mm) were evaluated using a passive antenna in the section of the river between Rockport Reservoir and Echo Reservoir (both upstream of the Project Area) from September to March 2007 to 2008. The greatest movement recorded was 2.6 km upstream. Nearly all movements were <1 km (62 percent) and during September. Most detections (88 percent) occurred at night (Webber et al. 2012). These movements are likely shortened due to thermal restrictions in the habitat as the upper half of the 12 miles within this reach are likely too cold to provide adequate bluehead sucker habitat due to the location of the tailwater release at the bottom of the dam at Rockport Reservoir. There are not any known formal studies directed towards movements of adult bluehead sucker during the spawning season (i.e., late spring and early summer) in the Weber River. However, movements are documented opportunistically through annual monitoring surveys conducted by UDWR. The section of the Weber River between the town of Morgan and Echo Dam is the least fragmented reach of the Weber River and as such has produced the most complete movement data for Weber River bluehead sucker. Within this reach bluehead sucker have been documented moving more than eight miles (more than13.1 km) between monitoring survey years. Reaching spawning areas in the spring is the most likely explanation for this extent of bluehead sucker movement across monitoring survey years. Bluehead sucker are routinely found seven miles from their last capture site from year to year within this reach. Movements of approximately seven miles have also been documented within the timeframe of one month (both upstream and downstream).

Mountain Suckers

Mountain suckers occur in most of the western United States and parts of western Canada. A native species in Utah, the mountain sucker is found in the Lake Bonneville basin and the Colorado River system. This species prefers clear, cold water of streams with gravel substrate. Mountain suckers are benthic oriented and feed on algae, higher plants, and sometimes invertebrates. The species spawns during the spring and early summer in gravel riffles. Because mountain suckers are small (about six to eight inches) and are often found in trout waters, this species is an important food item for trout.

Mountain Whitefish

This species is native to the western United States and western Canada. Mountain whitefish prefer cold mountain lakes and are common in many areas of Utah. Food habits include insect larvae, insects, fish eggs, and small fish. They feed most actively at night and during the winter. Mountain whitefish spawn in the late fall to early winter, usually in stream riffle habitat with gravel substrate.

Mottled Sculpin

The mottled sculpin is native to both eastern and western North America. The species is common in Utah and can be found in many of Utah's coldwater streams. Mottled sculpin are benthic organisms and are important forage for stream dwelling trout. These sculpin feed on aquatic insects, small fishes, crayfishes, fish eggs and plant matter. Mottled sculpin spawn in the late winter through early spring.

Utah Sucker

Utah suckers are still found within their native range in southeastern Idaho and western Wyoming in the Bear River drainage and along the western front range of the Wasatch Mountains in Utah along with parts of Nevada and the Snake River upstream of Shoshone Falls; all of which is part of the ancient Lake Bonneville (Sigler and Sigler 1987 and 1996). The Utah sucker spawns in the spring over shallow gravel or sand in small streams or lakeshores.

Speckled Dace

Speckled dace are a widely distributed native species in western North America and found in a variety of habitats. They are primarily invertivores feeding on insects, plankton, freshwater shrimp and plant material. These fish typically spawn in mid-summer in stream riffles.

Longnose Dace

The longnose dace, another native species, has a much more extensive range than the speckled dace ranging from northern Mexico to the Northwest Territories in Canada and southward in the Appalachians to Georgia. They are adapted to benthic life in fast-flowing streams and feed on drift organisms or immature aquatic insects. Longnose dace typically spawn in late spring or early summer over gravelly riffle areas.

Redside Shiner

Redside shiners, another small native species, are found in North America generally west of the Rocky Mountains. These fish are a schooling species found in lakes, ponds, and slower moving rivers and streams. Redside shiners feed primarily on invertebrates, zooplankton and algae but may also consume mollusks, fish eggs and smaller fishes. Redside shiners spawn in the late spring or early summer in shallow gravelly areas.

Brown Trout

Brown trout, a nonnative species introduced as a game fish, have become established in many of the cool and cold water streams in Utah. Their diet consists of primarily fishes, but they are opportunistic and are known to consume amphibians, rodents, and invertebrates including insects, snails and crayfish. Because of their piscivorous nature, brown trout often have a detrimental effect on populations of native

and nonnative sport fishes. The brown trout spawn in the fall in the gravel substrate of streams. While brown trout do not appear to be the majority species in the Weber Project reach, they are sought after by anglers because of their size.

Rainbow Trout

The rainbow trout is native to western North America but it is not native to Utah. It has been introduced to cool waters throughout the state. Because it is a popular sport fish and because most of the stocks used by UDWR are now considered sterile, millions of fish are stocked in Utah state waters.

Rainbow trout prefer to eat invertebrates including insects, worms, zooplankton, and insect larvae. Larger rainbows can become piscivorous. The species spawns in streams over gravel substrate during the spring. In areas where rainbow trout and cutthroat trout co-exist rainbow-cutthroat hybrids can occur. Loss of genetic purity of cutthroat trout is considered one of the major threats to Utah's native cutthroat trout, especially the Bonneville strain.

Common Carp

The common carp is not native to North America but is found in every mainland state in the U.S. Common carp were introduced to North America primarily as a food source for workers building the trans-continental railroad in the 1800s. Carp feed primarily on zooplankton but their diet may also include detritus and benthic organisms. They typically spawn in large groups over silt or vegetation in the shallow, warmer areas of lakes or rivers. Spawning and feeding activities can create a lot of turbidity which can inhibit feeding behavior of other species in the vicinity.

Rare, Threatened and Endangered Aquatic Species

There are no known federally listed threatened, endangered, or candidate species in the Weber River. The UDWR rates the Project reach of the Weber River as Class IIIB, a quality fishery with species of special concern (Bonneville cutthroat trout and bluehead sucker). Bonneville cutthroat trout is also listed as a sensitive species by the USFS.

Turbine Mortality and Fish Entrainment

Three studies (phases one, two, and three of Study Two: Fish Migration Downstream of the Project described in Section 6.0 of the Fisheries Technical Report [PacifiCorp 2017]) were conducted to assist in understanding current turbine mortality and fish entrainment associated with the Project. First, to understand turbine mortality different size groups of hatchery rainbow trout and tiger trout (brown trout – brook trout hybrids, *Salmo trutta x Salvelinus fontinalis*) were released through the penstock and turbines and recaptured below the Project powerhouse to estimate associated mortality. Second, potential fish entrainment was studied using an underwater camera to identify and count fish as they passed through the penstock. The physical characteristics of the Project infrastructure where the camera was placed limited the effectiveness of the

monitoring system. Although multiple adjustments were made in the study design and camera placement over several weeks, the results were incomplete, inconclusive, and did not meet the study objectives. As a result, a third study was conducted involving a qualitative desktop analysis to evaluate entrainment and mortality potential at the Project. The results and conclusions of these turbine mortality and fish entrainment studies are summarized below.

Turbine Mortality

Table 28 lists the results of the fish recapture, which ranged from 15 to 54 percent. The fewest recaptures were observed in the 3-inch size class with only 15 fish of 100 recovered. Of those, five were moribund resulting in 33 percent mortality. Forty-seven 6-inch trout were recaptured and 22 of those were mortalities resulting in 46 percent mortality in this size class. Finally, 54 12-inch fish were recaptured with 46 of those recorded as mortalities resulting in 85 percent mortality in this size class. All live fish were kept in a live pen until the test period was over to determine if there was any delayed mortality.

Table 28. Recapture results from the Weber Project tailrace.

	3-Inch Size Group	6-Inch Size Group	12-Inch Size Group
Recaptured	15	47	54
Mortalities	5	22	46
% Mortality	33%	46%	85%

Participants in the fish mortality study noted that it appeared that the study was biased towards recovery of injured or dead fish, especially in the larger size classes. That is, numerous individuals of the smallest size class were not recovered. However, they were observed, alive and swimming, by divers in both the river and the powerhouse tailrace sections. In addition, the efficiency of recapture resulting from electrofishing the smallest fish was very low.

Two basic types of mortality transpire from turbine passage: direct and indirect mortality. Direct mortality is the immediate killing of fish typically due to contact with one of the turbine components, shear forces, turbulence, grinding, cavitation, or pressure effects (Coutant and Whitney 2000). Indirect mortality is delayed death occurring as a result of injury suffered during passage, usually measured over about a 48-hour period (Cada 2001; Bickford and Skalski 2000).

Fish survival through Francis turbines (the type of turbine used by the Project) has been evaluated (Amaral 2001; Normandeau Associates 2012) and summarized (Eicher et al. 1987; EPRI 1992; FERC 1995; Franke et al. 1997) in a number of studies. Subsequently, various factors have been analyzed for their potential effect on fish survival. Among these are the following:

- turbine type,
- turbine discharge,
- number of blades or buckets,
- runner blade angle,
- peripheral runner speed and head,
- operating efficiency,
- intake depth,
- fish species,
- fish size, and
- fish trajectory.

Of these the most commonly implicated and relevant parameters consist of peripheral runner speed and head, intake depth, operating efficiency, fish species, and fish size.

Runner speed is generally accepted to be a major contributing factor in fish mortality for Francis turbines (EPRI 1992; Franke et al. 1997), which are intended to be operated at relatively high speeds. Head by itself does not impact fish survival (Eicher et al. 1987; Franke et al. 1997), although head does appear to be positively correlated with mortality. However, the principal effect of head is on runner speed, with higher net heads resulting in increased peripheral speed of the runner; and runner speed is correlated with survival in Francis turbines (increased runner speed is correlated with higher mortality). This is a critical although somewhat confusing distinction. Greater mortality with increasing head may also be an artifact of pressure-related effects though this is an issue only with deep water intakes (Coutant and Whitney 2000).

Intakes located at greater depths may cause higher mortality if fish are subjected to rapid decompression during passage through the powerhouse. That effect is related not just to the intake depth and net head, but also to negative pressures that may exist posterior to the turbine buckets. Longer penstocks such as the one at the Project with greater travel times may facilitate pressure acclimation so harmful effects are avoided (Franke et al. 1997).

Operating efficiency is widely identified as a key factor in fish survival (Eicher et al. 1987; Coutant and Whitney 2000; Cada and Rinehart 2000). Some parameters related to efficiency include operating at the optimal turbine setting, wicket gate opening, runner speed, and gaps between the blades and other turbine components (Eicher et al. 1987). When operated under more optimal settings usually closer to the design settings, potentially harmful turbulence, cavitation and shear forces are minimized. The magnitude of these forces appears to be correlated with efficiency, which in turn can impact survival. However, these interrelated forces generally come into play only at the extreme ends of operating conditions, which are typically realized on only rare occasions at most sites. Plant operators generally avoid such circumstances because cavitation can damage turbine components (Cada and Rinehart 2000).

Generally, salmonids (trout, salmon) are among the hardier groups with respect to turbine survival and clupeids (shad, herring) are among the most sensitive. Very limited information is available regarding catostomids (suckers). White suckers are among the most studied of catostomids and typically experience somewhat intermediate survival compared to these other two families, although among all groups there is tremendous influence of other variables such as operating conditions and fish size (Eicher et al. 1987).

Generally, larger fish experience higher mortality from turbine passage than smaller fish. Equations used to estimate fish mortality use fish size as a direct multiplier, illustrating that it is highly influential. Such equations commonly incorporate the size-based potential for strike as fish pass through the runner as a criterion for determining mortality (Eicher et al. 1987). However, cavitation, shear forces and pressure changes are other parameters that can harm fish. Within the range of sizes common to most river systems (i.e., 2-40 cm), the relationship between mortality and fish length is close to linear. That is consistent with research on river-based turbine studies (Eicher et al. 1987; Franke et al. 1997). Cavitation affects all sizes fairly uniformly across most sizes of fish that would occur in most river systems. Shear forces appear to be most problematic for juveniles of larger sized species. Mortality of larval fish from turbine passage is very difficult to measure, but has been estimated at <5 percent in bulb-type turbines based on equations relating sized-based probability of contact (Cada 2011). Still, the innate fragility of larval fish may raise the potential for injury from other effects.

The recommended operating flows for the Weber Project turbines minimize hydraulic impacts from shear, turbulence and cavitation. Correspondingly, potential fish mortality due to such effects should be minimized for the size of fishes with the highest entrainment potential (fish ≤8 inches). According to PacifiCorp, there are areas of turbulence within the penstock at junctures where sections are joined together. Such areas could conceivably cause minor injuries as fish travel toward the powerhouse at an estimated 11.7 fps.

Net head associated with the Project is relatively high at 185 feet; however, intake depth is shallow and the pipeline is almost two miles long (9,107 feet), thus reducing the effect of head. These conditions are not conducive to pressure change effects and no pressure-associated injuries were observed during the turbine mortality study. As a result potential cavitation, turbulence, shear and pressure effects should be relatively low, or in some cases nonexistent. Under these conditions, turbine mortality should be due primarily to blade strike. Although head pressure should have no direct relationship to mortality, it does have a positive effect on runner speed.

Runner speed is positively correlated with fish mortality. The Weber Project has a runner speed of about 73 fps (22 m/s) and is roughly in the midrange of velocities tested for fish survival (10–120 fps, or 3–36.5 m/s) at 33 other sites with Francis turbines. Based on runner speed alone, survival at the Weber Project is estimated at about 70 percent. Survival is likely influenced by species and sizes of fish as well as the unique physical

characteristics of each site. Fish size may be the single most important of these. Entrained fish at the Weber Project are expected to be smaller fish that would likely experience better survival.

Project-specific turbine mortality studies suggested that survival for larger-sized trout (average length 285 mm) was relatively low at 15 percent compared to an average rate of 70 percent for comparably sized fish (range 290-420 mm) from studies at other sites using Francis turbines (Franke et al. 1997). One factor that may influence survival is the relatively high number of buckets (34) at the Weber Project compared to those from other studies (13-17). The Weber Project turbine is a double-runner design, with 17 buckets per side. Double-runner Francis turbines may be used to generate additional speed at sites where head is too low for one runner (Gordon 2003). No test results for double-runner Francis turbines were identified in the literature. Based on field tests, Franke et al. (1997) considered the number of buckets to affect survival of intermediate sized fish (150 mm), with an increase in buckets from 13 to 25 potentially reducing survival from about 95 percent to 90 percent. Survival of intermediate-sized fish (average length 166 mm) at the Weber River during the turbine mortality study was estimated at 54 percent. Survival of small fish (<100mm) could not be assessed during the turbine mortality study due to the inability to recover surviving fish swimming in the tailrace, although it is noteworthy that both dive teams observed numerous, small (3-inch test class tiger trout) fish swimming in the tailrace and the river below, apparently unharmed; these fish are also known to be less susceptible to electrofishing recovery tactics. Minimal survival rate was estimated at 67 percent, but was based on recapture of only 15 of 100 fish released. It is possible that small fish survival at the Weber Project is similar to rates observed at other Francis turbine sites.

Another factor that may influence mortality of larger fish at the Weber Project is runner diameter (3.7 feet or 1.1 m). Runner diameter in the reviewed literature was between 1.4–4.7 m (Franke et al. 1997). A smaller runner diameter may leave limited space between the buckets for fish to pass through. Finally, Francis turbines are somewhat more susceptible to cavitation (and potentially increased fish mortality) than other turbine designs. Running below a 50 percent load for long periods may increase cavitation risk (RIVERS 2014).

Fish Entrainment

While any resident fish species may become entrained by the Project, Bonneville cutthroat trout and bluehead sucker are a concern at this time due to their affinity to the Weber River upstream and downstream of the Weber Project dam, their reduced population numbers throughout their range, and their Utah State sensitive status.

Like most riverine fishes, Bonneville cutthroat trout and bluehead sucker exhibit life history characteristics that render certain life stages vulnerable to entrainment at hydropower or irrigation diversions on the Weber River. Bonneville cutthroat trout in the Weber River exhibit both resident and fluvial strategies, moving from the river to various

tributaries and even between tributaries during spawning. UDWR has documented adult fish moving upstream past the Project diversion. It is possible that adult fish will attempt to move downstream past the diversion, through the intake (rather than through the ice chute, the spill gates, or the low-level gate when open, all of which potentially allow safe downstream passage), where there is a potential risk of entrainment into the Project turbines. However, the spacing of the Project trash rack bars (<1.5 inches) would prevent many adult fish from attempting to move downstream through the Project, and minimize passage through that route of all but fairly small fish. Larvae, young-of-year and other juvenile Bonneville cutthroat trout may also travel downstream during certain times of the year and likely do so, although this has not been studied in the Weber River. Adult suckers may undergo spawning and other migrations of varying distances and have been documented in the Weber River below the Project. Downstream movement of larvae or juvenile fish appears likely based on studies in other basins which renders these fish potentially susceptible to entrainment at the Weber Project, if one of the three safer routes is not utilized.

Studies that have attempted to evaluate entrainment encompass sites with a wide range of physical factors (i.e., intake locations, intake screen design, operating conditions, reservoir features, etc.) and fish communities. These factors have hindered past efforts to isolate individual variable effects. Indeed, agencies often require operators to evaluate entrainment over several years to incorporate a range of operating and hydrologic conditions due to the high variability inherent at each site.

The intake screen spacing at diversion projects can vary between one and 10 inches, but appears to have little effect on smaller-sized fish (<8 inches) which are entrained in the greatest numbers at most sites. Trash rack bar spacing (located upstream of the intake gates) at the Weber Project varies between 1.25 and 1.5 inches. Fish <8 inches can easily pass through the intake rack. This was confirmed during studies when dead rainbow trout ranging between 4.5 and 7 inches were released upstream of the rack to evaluate the effectiveness of the camera system to detect fish (note following details regarding 'voluntary' movement of fish past and through the rack versus involuntary entrainment movements). At some larger size, girth should prevent fish from passing through the rack. Although it is unknown precisely what that size would be for the two species of interest, it is apparent that many if not most adult Bonneville cutthroat trout (ranging from about 300 mm to more than 600 mm [12 to more than 23.5 inches] in the Weber River project vicinity) and bluehead sucker (ranging from about 350 to 600 mm [13.75 to 23.5 inches]) would be excluded from passing through the Weber intake rack. The Project's rack is close to the 1-inch spacing often recommended as mitigation to prevent entrainment of larger fish (FERC 1995). Additionally, as noted, multiple potential 'safe' paths exist for fish of all sizes migrating downstream at the Weber Project. Adding the fish ladder to the diversion dam will provide a fourth additional safe downstream passage route.

Approach velocity to the intake screen is often not measured or reported at sites where entrainment has been studied. While no substantial relationship has been found with entrainment rates, approach velocities measured just upstream of the Weber Project trash rack in mid-summer ranged from 1–1.5 fps. This is within the range typically prescribed to reduce head loss, vibration, and debris accumulation and provide better safety margins for errant recreationists (Wahl 1992). Ideally, velocities should be kept within the cruising speeds of the species of concern to reduce impingement potential (OTA 1995), and it follows logically that this should also apply to entrainment. Prolonged swimming speeds in the range of 1–1.5 fps have been documented for Bonneville cutthroat trout that varied in standard length between 40–70 mm (1.5-2.75 inches) (Aedo et al. 2009). Most young-of-year Bonneville cutthroat trout should be able to swim against currents in front of the Weber Project intake rack and potentially escape via burst swimming. Indeed, fish of a wide range in sizes have been observed swimming in front of the Weber Project intake rack. It is highly likely that, with the exception of larval fish, actual involuntary entrainment is rare at the Weber Project. Juvenile bluehead suckers have been found to have relatively good swimming ability as well. Ward et al. (2003) tested fishes native to the southwestern U.S. to determine the velocity at which failure occurred. Bluehead suckers ranged from 61–82 mm (2.4-3.2 inches) total length. Mean failure velocity was about 90 cm (3 feet) per second and was among the highest for all species tested. This suggests that even young-of-year bluehead suckers should be capable of resisting entrainment based solely upon swimming ability. Yet, both young-of-year Bonneville cutthroat trout and suckers may still be vulnerable to entrainment from behavioral downstream movement.

The Weber Project's basic configuration with an intake just downstream of a shallow, narrow reservoir with a high flush rate and shallow intake located along the shoreline may predispose certain fish to relatively higher entrainment rates compared to an intake in a large, deep reservoir at greater depth. Many juvenile fish move along the shoreline, which may render them more vulnerable to entrainment at the Weber Project if they tend to migrate down the south shore. However, the impoundment upstream of the diversion also contains abundant macrophytes which could serve as rearing habitat and foraging areas for these fish, potentially discouraging further downstream movement.

Research has shown that for many riverine fish species, spring and summer are generally the time periods when peak movements of adult and juvenile fishes occur. The two species of concern in the Weber River appear to be no exception based on ongoing studies. Adults move primarily during spring in association with spawning. Juveniles, particularly young-of-year, may be displaced by higher flows during the spring or disperse downstream from potentially more crowded areas in the spring and summer. During those times, entrainment potential is probably greatest.

On average, Weber plant flows are at their highest levels from April through September when peak movements are taking place (Table 29). Although no consistent relationships between hydropower plant flow and entrainment have been found (FERC

1995), there has been some attention devoted to the potential association between diversion flow as a percent of river flow and entrainment for irrigation uses. Entrainment rate increases with flow at certain irrigation diversions (Kennedy 2009; Vogel 2012). The presumption that there is a relationship between these two variables has been used recently to rank the potential of diversions to entrain bluehead suckers and other native fishes in the San Juan and Animas River Basins (Lyons et al. 2016). Logically this may also apply to hydroelectric uses.

Table 29. Monthly average Weber River discharge relative to plant flow from 1966 through 2014.

Month	River Discharge (cfs)*	Turbine Discharge (cfs)	Turbine/River (%)
January	231	130	56.3%
February	291	150	51.5%
March	562	219	39.0%
April	949	273	28.8%
May	1,310	296	22.6%
June	1,110	303	27.3%
July	515	296	57.5%
August	423	292	69.0%
September	371	271	73.0%
October	232	167	72.0%
November	150	98	65.3%
December	185	108	58.4%

*Weber River discharge from USGS gage 10136500 at Gateway, UT, located about 1.1 miles upstream from Project diversion.

From that perspective, mean Weber Project flow as a percent of river flow has ranged from 22.6 percent in May to 73.0 percent in September during the 1966–2014 period of record (Table 29). During April–June when adult movements associated with spawning are expected to be at their highest levels, Project flows range from about 23–29 percent of river flows including the three lowest percentages for the entire year. After June, these percentages increase rapidly and substantially as river discharge decreases and plant flows remain fairly constant. This corresponds roughly to the period when fry emergence and downstream movement of larvae and young-of-year may be most likely and raises entrainment risk for these stages of both species of concern.

Table 30 contains entrainment-related conclusions based on analysis of the biology of the species of primary concern, Project features, and the existing entrainment literature.

Table 30. Entrainment-related conclusions from analysis of the biology of the species of primary concern, Project features, and the existing entrainment literature.

Juveniles (both species)	Juveniles of Bonneville cutthroat trout and bluehead sucker (about 203 mm [8 inches] or less) are more likely to be entrained. However, fish of this size should suffer relatively lower levels of mortality than larger fish, as observed during the turbine mortality study.
Young-of-year (both species)	Young-of-year of both species may have highest entrainment risk during the late spring and early summer when Weber Project flows, as a percentage of river flow, increase rapidly. This coincides with the period when newly emerged fish are most likely to move downstream either behaviorally or as a result of relatively high river flows. Other pathways exist for downstream movement, such as the diversion spillway, the ice chute and the low-level gate, that may be used under certain conditions. Adding the fish ladder to the diversion dam will provide a fourth additional safe downstream passage route.
Young-of-year and juvenile bluehead sucker	Young-of-year and juvenile bluehead sucker appear to be rare in collections well upstream of the Project. Abundance in the Project Area is not well understood at this time. Low numbers of juveniles should reduce the potential numbers of these species that may be entrained
Juvenile Bonneville cutthroat trout	Bonneville cutthroat trout are known to pass upstream of the Project diversion and spawn in tributaries upstream of the diversion. Potential downstream migration of juvenile Bonneville cutthroat trout produced in these areas is not well understood. These numbers may not be substantial if sufficient resources and suitable habitat exist upstream of the Project, including the impoundment.
Fall and Winter	Entrainment risk should be reduced during the fall and winter when movements of all life stages are lower. This coincides with the period when Project turbine flow (as a percentage of river flow) is at its highest annual levels.
Approach velocities and documented prolonged swimming speeds	Approach velocities to the intake rack (1-1.5 fps) are within the documented prolonged swimming speeds of young-of-year of both species, which may reduce entrainment risk; further, fish of all sizes have been observed swimming freely immediately in front of and along the intake rack.
Larger-sized Fish	Larger sized fish (mostly adults) of both species (>300 mm [12 inches]) should suffer substantially higher mortality than smaller individuals (about 203 mm [8 inches] or less). However, these are much less likely to be entrained according to previous studies, and by observation at the Project, due to intake bar spacing and downstream-swimming fish orientation. The largest fish (>350 mm [13.75 inches]) are likely precluded from entrainment due to the size of the intake opening (1.5 inches). Individuals of this size are common among adult populations of both species.
Overall Conclusion	Overall, entrainment and mortality potential of Bonneville cutthroat and bluehead sucker appears to be relatively low for the Weber Project. Entrainment and mortality risk at unscreened irrigation diversions, such as the DWCCC diversion just downstream from the power plant, may be greater for these populations. This is due to the high percentage of river flow removed and the presumably high mortality levels of entrained fish.

3.3.3.2 Environmental Effects

Under the proposed action the Project would be relicensed for a period of 30-50 years with the adoption and implementation of the PM&E measures summarized in Table 11. The continued presence and operation of the Project would generally result in the persistence of conditions and trends described in the affected environment with the exception of modifications created by implementation of water resources (hydrology) and fisheries and aquatic resources related PM&E measures (PM&E measures HYD-1 and FISH-1 through FISH-4; note that implementation of FISH-1 and HYD-1 would propose continuing the current minimum flow regime that has been in effect for many decades).

In particular, the construction, operation, and maintenance of a fish ladder suitable for upstream passage of Bonneville cutthroat trout and bluehead sucker (PM&E measure FISH-2) would improve upstream fish passage opportunities for these, and perhaps other, species. Likewise, provisions to keep the low level gate open during times when the fish ladder is inoperative (PM&E measures FISH-3 and FISH-4) would allow for upstream fish passage as well. The low level gate also provides an additional opportunity for downstream fish passage when it is open. No changes in habitat other than the fish ladder are proposed. As a result, habitat conditions for aquatic species would remain the same, especially given the inclusion of HYD-1 and FISH-1 in the proposed PM&E measures (these PM&E measures are identical to each other), which propose continuing the existing 34-50 cfs minimum flows through the bypassed reach for the duration of any future license (30-50 years). This flow represents a substantial on-going investment in improved aquatic and fisheries habitat conditions within the Project Area.

Fish entrainment and turbine mortality would remain at or lower than current levels as the proposed fish ladder would allow an additional safe potential avenue for downstream movement of fish in the Project reach of the Weber River. The potential for fish entrainment and turbine mortality at the Project is described above in Section 3.3.3.1 based on studies conducted in 2016. However, with construction of the fish ladder and modification of the existing ice chute as attraction flow coupled with spill, which can occur more often during the higher flow periods, there are several avenues for fish to move downstream without having to go through the turbines. This would reduce the potential for fish entrainment and turbine mortality.

3.3.3.3 Cumulative Effects

For fisheries and aquatic resources the Weber River Basin downstream of Echo Reservoir has been identified as the geographic scope of the cumulative effects analysis (see Figure 6). This area was chosen because habitat for fish species is available across this river system and fish species movements occur throughout the system.

The Project is one of two hydroelectric projects where water is impounded on the Weber River; the other project is the BOR's Echo Reservoir. Two additional hydroelectric and water storage projects are located on other creeks in the upper basin (East Canyon and Lost Creek). Numerous small irrigation diversion dams and other related infrastructure (including the Weber-Provo River Diversion) have altered the hydrologic flow regime of the Weber River and its tributaries. See Section 3.3.2 for differences in available flow from the total (96-year) period of record, compared to the most recent 30-year period of record. In addition, many of the impoundments and diversions have no or very low minimum flows (PacifiCorp 2016 [Figure 3 – Final Water Resources Study Plan]). Further, these projects have resulted in the conversion of a substantial amount of lotic (river-type) habitats in the basin to lentic (lake-type) habitats, which may have led to higher summer water temperatures and changes in the structure of fish communities. The dams have also impeded sediment and large woody debris transport, as well as fish migration routes which are important elements of fish habitat.

The establishment of some of the reservoirs has provided environmental conditions conducive to non-native macrophyte growth, which in turn may be responsible for occasionally elevated levels of nutrients and decreased levels of dissolved oxygen, particularly in the reservoir impoundments and the lower Weber River. The dams associated with numerous projects in the Weber River Basin noted above have substantively increased the number of barriers to fish movements in the basin especially during high flow periods. Potential load following operations (i.e., peaking) at the larger storage projects on the Weber River (note that the Weber Hydroelectric Project is run of river) may be causing disruption of fish spawning in shallower reservoir areas and river habitats, erosion along reservoir and river banks, and decreased abundance and diversity of macroinvertebrates. Other contributors to adverse effects on aquatic resources in the basin include construction of I-84 and other roads, introductions of non-native fish species, hybridization with related non-native trout species, some urbanization, pipeline and railroad construction, and historic timber harvest and mining operations.

Relicensing and continued operation of the Project with the implementation of PM&E measures described in Table 11 would in part have a countervailing impact on fish species in the Weber River system (offsetting impacts described above created by cumulative actions). This countervailing effect is a result of improvements to fish passage that would be created by the construction, operation, and maintenance of the fish ladder prescribed in PM&E measure FISH-2 as well as improvements in fish passage created by keeping the low-level gate operational when the forebay is dewatered (PM&E measure FISH-3) and continuation of the historic minimum flow (34-50 cfs) practice (FISH-1). On the other hand, the continued presence of Project facilities and continued operation of the Project would also continue to result in the overall low potential for fish entrainment and turbine mortality as described in Section 3.3.3.1 based on studies conducted in 2016.

3.3.4 Botanical Resources

The Project Area sits at approximately 4,600 feet elevation and is dominated by developed or un-vegetated areas (e.g., I-84, Weber Recreation Site, powerhouse, asphalt parking area, river, etc.) with minimal native vegetation. Botanical resources were evaluated in the Project Area and in a larger area which consists of a 1-mile buffer around the Project Area. This area comprises mostly USFS-administered lands from approximately 4,600 to 6,600 feet elevation and contains a wide range of vegetation communities and land cover types.

3.3.4.1 Affected Environment

Botanical Habitat

Geographic Information System (GIS)-based analyses of Southwest Regional Gap Analysis Project (SWReGAP) land cover data (Lowry et al. 2007) were performed which identified 18 SWReGAP vegetation communities and land cover types in the Project Area and 1-mile buffer area (Figure 21). The area is dominated by Rocky Mountain Gambel Oak-Mixed Montane Shrubland (57.0 percent), with substantial cover of Rocky

Mountain Bigtooth Maple Ravine Woodland (15.4 percent) and Rocky Mountain Montane Mesic Mixed Conifer Forest and Woodland (8.6 percent). The remaining 19 percent of the area consists of small patches of native vegetation communities, agriculture, and developed land cover types. Land cover in the Project Area is predominantly Developed, Medium-High Intensity land cover (66.8 percent), with smaller areas of Rocky Mountain Gambel Oak-Mixed Montane Shrubland (16.3 percent), Rocky Mountain Bigtooth Maple Ravine Woodland (0.8 percent), Rocky Mountain Cliff and Canyon (9.4 percent), Invasive Perennial Grassland (3.1 percent), and Inter-Mountain Basins Big Sagebrush Shrubland (3.6 percent). Just 0.06 percent of the area is Rocky Mountain Lower Montane Riparian Woodland and Shrubland. Figure 21 demonstrates that sheltered, north-facing slopes in the area comprise Rocky Mountain Montane Mesic and Dry-Mesic Mixed Conifer Forest and Woodlands interspersed with Bigtooth Maple Ravine Woodland and Gambel Oak-Mixed Montane Shrubland, with more xeric vegetation types dominating south-facing slopes north of the Weber River. SWReGAP land cover types in the Project Area and 1-mile buffer area are described in Table 31.

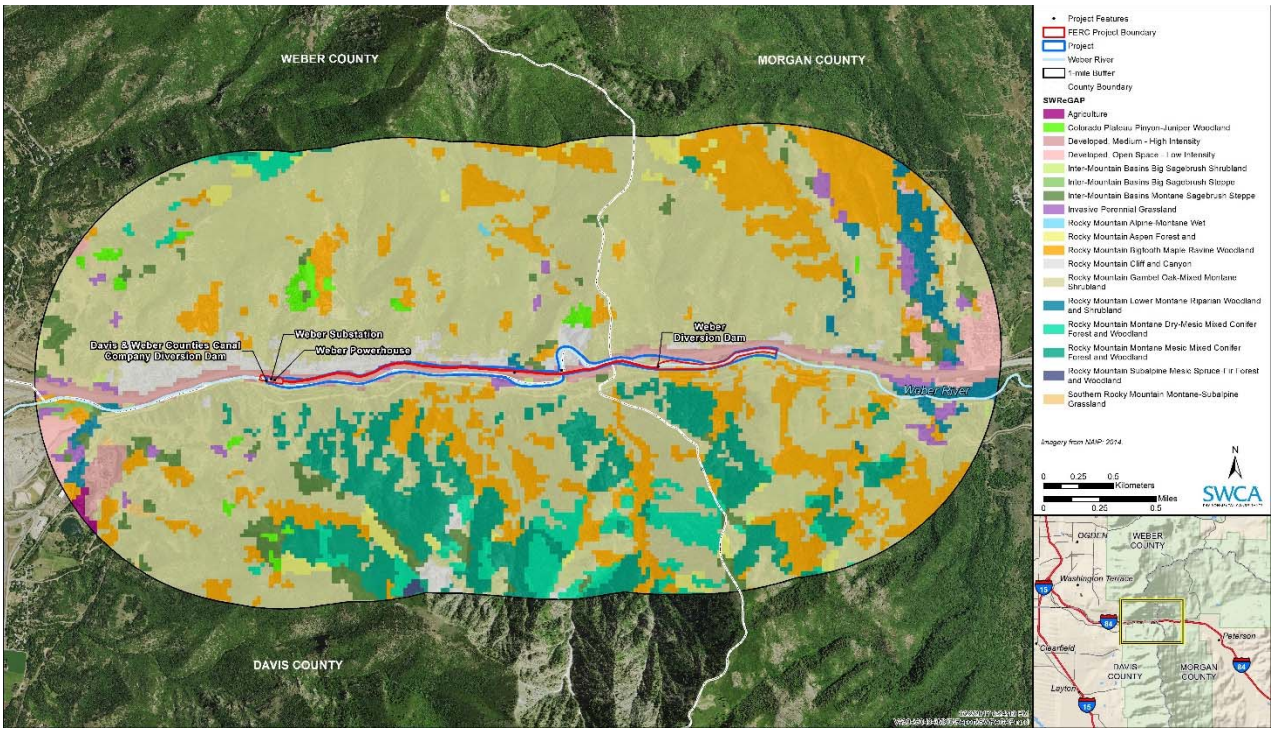

Figure 21. SWReGAP vegetation communities and land cover types in the Project Area and 1-mile buffer area.

Table 31. SWReGAP land cover types in the Project Area and 1-mile buffer.

Land Cover Type	Description	Acres / % Cover of Project Area Acres / % Cover of Project Area and 1-mile Buffer Area
Colorado Plateau Pinyon-Juniper Woodland	Colorado Plateau Pinyon-Juniper Woodland occurs from 4,900 to 7,874 feet and is dominated by Utah juniper (*Juniperus osteosperma*) with scattered pinyon (*Pinus edulis*) trees. At higher elevations and on north-facing slopes, Rocky Mountain juniper (*Juniperus scopulorum*) replaces Utah juniper as the dominant tree species.	N/A 37.8 / 0.8%
Developed, Open Space – Low Intensity	The Developed, Open Space-Low Intensity cover type is typically dominated by a mixture of infrastructure, construction materials and vegetation in the form of lawn grasses.	N/A 64.5 / 1.3%
Developed, Open Space – Medium High Intensity	The Developed, Open Space-Medium High Intensity cover type is typically dominated by infrastructure (e.g., freeway, bridges, diversion dams), disturbed ground (e.g., road edges), construction materials and limited vegetation with the majority of surface covered by impervious materials. This is the dominant land cover type in the Project Area.	43.5 / 66.8% 185.1 / 3.7%
Inter-Mountain Basins Big Sagebrush Shrubland	The Inter-Mountain Basins Big Sagebrush Shrubland cover type occurs from 4,900 to 7,545 feet and is dominated by basin big sagebrush (*Artemisia tridentata ssp. tridentata*) and/or Wyoming big sagebrush (*Artemisia tridentata ssp. wyomingensis*), with Utah juniper and pinyon pine as subdominants. Co-dominant species include saltbush (*Atriplex spp.*), greasewood (*Sarcobatus vermiculatus*), rubber rabbitbrush (*Ericameria nauseosa*), and snowberry (*Symphoricarpos oreophilus*).	2.4 / 3.6% 8.6 / 0.2%
Inter-Mountain Basins Big Sagebrush Steppe	The Inter-Mountain Basins Big Sagebrush Steppe cover type occurs at lower elevations and is typically dominated by basin big sagebrush and/or Wyoming big sagebrush along with antelope bitterbrush (*Purshia tridentata*). This cover type differs from Inter-Mountain Basins Big Sagebrush Shrubland in that grass is a dominant community component. Associated native grass species include Indian ricegrass (*Achnatherum hymenoides*), slender wheatgrass (*Elymus lanceolatus*), Idaho fescue (*Festuca idahoensis*), Sandberg bluegrass (*Poa secunda*), and bluebunch wheatgrass (*Pseudoroegneria spicata*).	N/A 6.0 / 0.1%
Inter-Mountain Basins Montane Sagebrush Steppe	The Inter-Mountain Basins Montane Sagebrush Steppe cover type occurs between 5,000 and 9,800 feet and is dominated by mountain big sagebrush (*Artemisia tridentata ssp. vaseyana*) and antelope bitterbrush. Common shrubs include snowberry, Utah serviceberry (*Amelanchier utahensis*), rubber rabbitbrush, and sticky rabbitbrush (*Chrysothamnus viscidiflorus*). Dominant grass species are similar to the Inter-Mountain Basins Big Sagebrush Steppe land cover type.	N/A 132.3 / 2.6%
Invasive Perennial Grassland	Invasive Perennial Grasslands are generally highly disturbed lands and have been either planted with or invaded by non-native/invasive perennial and annual grass species including crested wheatgrass (*Agropyron cristatum*), brome (*Bromus spp.*), and Kentucky bluegrass (*Poa pratensis*).	2.0 / 3.1% 58.9 / 1.2%
Rocky Mountain Alpine-Montane Wet Meadow	The Rocky Mountain Alpine-Montane Wet Meadow cover type occurs from 3,280 to 11,800 feet around ponds, lakes, and streams, and is dominated by grass, sedge, and dwarf shrub species.	N/A 1.1 / 0.02%

Table 31. SWReGAP land cover types in the Project Area and 1-mile buffer.

Land Cover Type	Description	Acres / % Cover of Project Area	Acres / % Cover of Project Area and 1-mile Buffer Area
Rocky Mountain Aspen Forest and Woodland	Rocky Mountain Aspen Forest and Woodland occurs from 5,000 to 10,000 feet and is typically dominated by quaking aspen (*Populus tremuloides*). Dominant understory species include graminoid and/or shrub species, including Utah serviceberry, snowberry, bearberry (*Arctostaphylos uva-ursi*), and thimbleberry (*Rubus parviflorus*).	N/A	68.2 / 1.4%
Rocky Mountain Bigtooth Maple Ravine Woodland	Rocky Mountain Bigtooth Maple Ravine Woodland is typically found on slopes and in ravines, and is dominated by bigtooth maple (*Acer grandidentatum*) and/or Gambel oak (*Quercus gambelii*). Other tree species include boxelder (*Acer negundo*) and quaking aspen. This cover type is typically found adjacent to Rocky Mountain Gambel Oak-Mixed Montane Shrubland.	0.5 / 0.8%	776.1 / 15.4%
Rocky Mountain Cliff and Canyon	Rocky Mountain Cliff and Canyon consists of sparsely vegetated cliff faces and rock canyon walls and occurs at most elevations. Dominant plant species are influenced by adjacent plant communities and can include white fir (*Abies concolor*), subalpine fir (*Abies lasiocarpa*), juniper (*Juniperus spp*.), lodgepole pine (*Pinus contorta*), limber pine (*Pinus flexilis*), Douglas-fir (*Pseudotsuga menziesii*), and/or quaking aspen.	6.1 / 9.4%	128.2 / 2.6%
Rocky Mountain Gambel Oak-Mixed Montane Shrubland	Rocky Mountain Gambel Oak-Mixed Montane Shrubland occurs from 6,500 to 9,500 feet and is dominated by Gambel oak. Co-dominants include Utah serviceberry, mountain-mahogany (*Cercocarpus montanus*), chokecherry (*Prunus virginiana*), bitterbrush (*Purshia spp*.), and snowberry.	10.6 / 16.3%	2,868.5 / 57.0%
Rocky Mountain Lower Montane Riparian Woodland and Shrubland	Rocky Mountain Lower Montane Riparian Woodland and Shrubland occurs from 2,900 to 9,200 feet along rivers and streams. Dependent on periodic flooding, the dominant plant species include boxelder, Rocky Mountain maple (*Acer glabrum*), mountain alder (*Alnus incana*), water birch (*Betula occidentalis*), redoiser dogwood (*Cornus sericea*), narrowleaf cottonwood (*P. angustifolia*), Fremont cottonwood (*P. fremontii*), Douglas-fir, spruce (*Picea spp.*), and willow (*Salix spp*.). State of Utah noxious weed species Russian-olive (*Elaeagnus angustifolia*) and saltcedar (*Tamarix chinensis*) may also dominate this land cover type in some landscapes.	0.04 / 0.06%	94.7 / 1.9%
Rocky Mountain Montane Dry-Mesic Mixed Conifer Forest and Woodland	Rocky Mountain Montane Dry-Mesic Mixed Conifer Forest and Woodland occurs from 4,100 to 11,000 feet elevation and is dominated by Engelmann spruce (*Picea engelmannii*) and subalpine fir. Co-dominant tree species may include blue spruce (*Picea pungens*), lodgepole pine, quaking aspen, and Douglas-fir.	N/A	156.6 / 3.1%
Rocky Mountain Montane Mesic Mixed Conifer Forest and Woodland	Rocky Mountain Montane Mesic Mixed Conifer Forest and Woodland occurs from 3,900 to 10,800 feet and is dominated by white fir and Douglas-fir. Co-dominant tree species include Engelmann spruce, blue spruce, quaking aspen, Rocky Mountain maple, bigtooth maple, mountain alder, and water birch. This land cover type differs from Rocky Mountain Montane Dry-Mesic Mixed Conifer Forest and Woodland in typically cooler, wetter site conditions.	N/A	433.3 / 8.6%

Table 31. SWReGAP land cover types in the Project Area and 1-mile buffer.

Land Cover Type	Description	Acres / % Cover of Project Area	Acres / % Cover of Project Area and 1-mile Buffer Area
Rocky Mountain Subalpine Mesic Spruce-Fir Forest and Woodland	The Rocky Mountain Subalpine Mesic Spruce-Fir Forest and Woodland cover type is typically found at high elevations and north-facing slopes. Dominant species include Engelmann spruce and subalpine fir.	N/A	2.9 / 0.06%
Southern Rocky Mountain Montane Subalpine Grassland	Southern Rocky Mountain Montane Subalpine Grassland occurs from 7,200 to 10,800 feet and is dominated by graminoid plant species including Idaho fescue and bluebunch wheatgrass. This open vegetation community is typically intermixed with spruce-fir stands.	N/A	4.3 / 0.09%

Rare, Threatened, and Endangered Plant Species

One federally threatened plant species (Ute ladies'-tresses orchid [*Spiranthes diluvialis*]) and two USFS R4 sensitive plant species (Utah angelica [*Angelica wheeleri*] and Wasatch fitweed [*Corydalis caseana*]) may have the potential to occur in the vegetation communities and elevational ranges found in the area. In 1990, when the original FERC licensing document (Utah Power & Light Company 1990) was prepared, no special-status plant species were documented. On-site surveys conducted in 2015, 2016, and 2017 indicate that no special-status plant species are present in the Project Area today as well.

3.3.4.2 Environmental Effects

Impacts to botanical resources as a result of implementation of the proposed action revolve largely around PM&E measures FISH-2, BOT-2, REC-5, REC-8, and REC-9 (see Table 11). Other than implementation of these measures, the primary impact of the proposed action would be the persistence of the botanical resource conditions described in the affected environment above.

Earth-moving activities associated with construction of the fish ladder to satisfy PM&E measure FISH-2 would largely affect space that is already developed or is sparsely vegetated. Approximately 31 percent (0.05 acres) of the 0.16 acres modified by fish ladder construction is currently developed space while much of the remainder (69 percent, 0.11 acres) is un-vegetated (e.g., area adjacent to the ice chute, sidewalk areas, etc.) or Weber Recreation Site lawn. Fish ladder construction would present opportunities for weed introduction and spread as a result of the use of earthmoving and other construction equipment. This equipment could carry weed seeds into the Project Area from elsewhere or facilitate the spread of weeds in the vicinity of construction activities. However, BMPs to control the introduction and spread of weeds would be implemented during construction, thereby reducing the magnitude of this potential effect. Furthermore,

PM&E measure BOT-2 would require PacifiCorp to conduct and enhance weed control per historic practices subject to land owner weed control requirements and constraints. Implementation of BOT-2 would also limit the introduction and spread of weed species in the area.

Implementation of PM&E measure REC-5 would result in the creation of a new Americans with Disabilities Act (ADA)/Architectural Barriers Act (ABA) compliant accessible picnic site on the flat lawn area closest to the parking lot or modification of the existing but not fully ADA/ABA compliant site. A new site would consist of a concrete pad, a grill, and an ADA/ABA accessible picnic table. Modification of the existing site to make it fully compliant with current ADA/ABA standards would not affect existing vegetation resources because this site is not composed of vegetation and no vegetation disturbance or removal is expected to make the site ADA/ABA compliant. Implementation of this PM&E measure would convert approximately 14 feet by 10 feet of surface area from cultivated grass cover (lawn) to concrete. While this does not represent a botanical loss in terms of native vegetation or an important element of the botanical community it would nonetheless result in the loss of 140 square feet of plant cover within the Project Area to benefit an underserved population.

PM&E measure REC-8 would prescribe the improvement of two existing user-created trails associated with the Project. Within the Project Boundary PacifiCorp would improve (construct steps) the existing dirt river access trail at the west end of the recreation site that leads to the north bank of the Weber River. In addition, PacifiCorp would provide funding through an off-license agreement with TU to improve pedestrian river access at the under-freeway user-created trail extending west from the Project recreation site. Both of these trail improvement actions would increase the likelihood of weed introduction and spread along the river corridor through the use of tools potentially carrying weed seed and through the presence of workers potentially carrying weed seed. This impact would be limited by the application of weed control BMPs in addition to the implementation of PM&E measure BOT-2 as described above.

PM&E measure REC-9 calls for the curtailment of power generation and the provision of boater flows for 4-hour segments on four Saturdays prior to July 15 annually in the event that safe, legal egress for boaters can be agreed to. Boater flow releases to satisfy REC-9 would increase the volume of water in the bypassed reach of the river by up to 320 cfs and therefore increase, although minimally (see Section 3.3.1 for further explanation), the potential for scour and erosion of the streambank during releases. Eroded stream banks could create barren stream bank surfaces that could provide opportunities for weed establishment and spread. However, given the existing rock armoring in the bypassed reach, this effect is unlikely. In addition, flows released for whitewater boaters could also serve to transport weed seed downstream to portions of the bypassed reach and below, similar to existing conditions when the Project is off-line. Boater flows would not exceed approximately 16 hours per year (4-hour boater flows provided on four occasions) which is less than one percent of the total year. Boater flow

releases would likely occur between approximately late April and early July depending on the runoff in any given year and Project operational factors. While boater flow releases would be limited to 16 hours per year the potential weed establishment and proliferation-related effects could extend beyond this timeframe, although this effect would be indistinguishable from current conditions when the Project is off-line.

3.3.4.3 Cumulative Effects

The geographic scope of the cumulative effects analysis for botanical resources encompasses the Weber River Basin. This geographic scope of analysis was chosen because regulation of flows by upstream dams and diversions has caused daily and seasonal changes in surface water fluctuations that may have led to shoreline erosion, spread of invasive species, and alteration of shoreline habitats.

Other river dams and diversions, pipelines, roads, mines, timber harvest, transmission line right-of-way maintenance, and farming and grazing activities, as well as rural, suburban, urban, commercial, and industrial development have collectively contributed to the loss and alteration of botanical habitat within the Weber River Basin. Although many of these non-Project developments have not occurred within the Project Boundary, they are close enough to have an effect on resources within the Project Area (particularly freeway and pipeline development). Upstream and upslope development and land clearing/alteration activities in combination with water diversions and canals may contribute to the establishment and spread of invasive species throughout the Weber River Basin. Road construction, vehicular traffic, and foot traffic associated with recreational pursuits may also contribute to the degradation and loss of botanical habitats.

While implementation of the proposed action would result in the persistence of current conditions with respect to botanical resources, the proposed action is unlikely to create a substantive additional incremental impact on botanical resources in combination with past, present, and reasonably foreseeable future actions. This is because of the very limited scope of activities associated with the following PM&E measures which have the potential to influence botanical resource conditions:

- FISH-2 – 0.16 acres of disturbance, 31 percent of which would be in currently developed (concrete/asphalt) space with the remainder (69 percent) un-vegetated or Weber Recreation Site lawn , with BMPs applied,
- REC-5 – 140 square feet of plant cover (lawn) loss,
- REC-8 – trail improvements with BMPs applied, and
- REC-9 – flow increases in the bypassed reach of the Weber River up to 320 cfs less than 1 percent of the year (16 hours) annually.

These factors, in combination with weed control activities prescribed under PM&E measure BOT-2, limit the degree to which the Project may contribute to cumulative effects.

3.3.5 Terrestrial Wildlife Resources

The Project Area sits at approximately 4,600 feet elevation and is dominated by development with minimal native vegetation. Terrestrial wildlife resources were evaluated in the Project Area and in a 1-mile buffer area around the Project Area. This area comprises mostly USFS-administered lands from approximately 4,600 to 6,600 feet elevation and contains a wide range of habitats.

Terrestrial wildlife distributions within the Project Area and 1-mile buffer area are limited by existing development and transportation corridors in Weber Canyon. Big game winter ranges typically occur below 7,000 feet along the entire western boundary of the Wasatch portion of the UWCNF, but are reduced due to human activities at the wildland-urban interface (USFS 2003).

3.3.5.1 Affected Environment

Terrestrial Wildlife Habitats

Terrestrial wildlife habitats in the area include sagebrush steppe shrublands, grasslands, oak-maple woodlands, pinyon-juniper woodlands, riparian woodlands, mixed coniferous forests, wet meadows, subalpine forests, and developed areas, particularly in the riverine canyon floor habitats. Detailed descriptions of the land cover types in the area are provided in Section 3.3.4, Botanical Resources.

Vegetation communities in the area are used by a variety of game and non-game terrestrial wildlife species. The area is dominated by oak shrublands interspersed with maple and mixed conifer woodlands. The remaining land cover in the area consists of small patches of other habitat types, agricultural lands, and developed areas. The land cover in and adjacent to the Project Area is mostly developed, with some native vegetation and invasive grasslands that are of limited or no value to wildlife. Sheltered, north-facing slopes along the canyon provide thermal cover for game species, while south-facing slopes are known to provide winter range for mule deer. Usable terrestrial wildlife habitats within the Project Area are extremely limited due to the presence of I-84 and other development infrastructure, as well as the inherent safety risks to terrestrial wildlife in areas with extremely high speed hazards (freeway—in continuous use for approximately the last 50 years, and railroad—in episodic but continuous use for approximately the last 150 years) and physical obstructions to wildlife movement.

Terrestrial Wildlife Community

Terrestrial wildlife with the potential to occur in the area comprises a diverse assemblage of large and small mammals and numerous migratory and year-round avian species. An approximate list of terrestrial mammals with potential to use habitats within the area for all or part of the year is provided in Table 32.

Table 32. Terrestrial mammals with potential to occur in the area.

Common Name	Species or Family Name
Moose	*Alces alces*
Coyote	*Canis latrans*
Beaver	*Castor Canadensis*
Elk	*Cervus Canadensis*
Porcupine	*Erithizon dorsatum*
Small rodents (voles and mice)	Family *Cricetidae* and Family *Muridae*
Weasel	Family *Mustelidae*
Bat species	Family *Vespertilionidae*
Cougar	*Felis concolor*
Bobcat	*Lynx rufus*
Yellow-bellied marmot	*Marmota flaviventris*
Skunk	*Mephitis mephitis*
Mink	*Mustela vison*
Chipmunk	*Neotamias spp.*
Mule deer	*Odocoileus hemionus*
Rock squirrel	*Otospermophilus variegatus*
Raccoon	*Procyon lotor*
Golden-mantled ground squirrel	*Spermophilus lateralis*
Mountain cottontail	*Sylvilagus nuttallii*
Red squirrel	*Tamiasciurus hudsonicus*
Badger	*Taxidea taxus*

Common bird species that likely use habitats in the area include song sparrow, robin, dark-eyed junco, orange-crowned warbler, and black-billed magpie. Numerous raptor species, such as sharp-shinned hawk, Cooper's hawk, American kestrel, and bald and golden eagles, are known to use the river corridor (Utah Power & Light Company 1990). A partial list of avian species with potential to occur in the area is shown below (Table 33).

Table 33. Partial list of avian species with potential to occur in the area.

Common Name	Species or Family Name	Season of Potential Use
Cooper's hawk	*Accipiter cooperii*	Breeding
Sharp-shinned hawk	*Accipiter striatus*	Breeding
American wigeon	*Anas Americana*	Breeding
Cinnamon teal	*Anas cyanoptera*	Breeding
Mallard	*Anas platyrhynchos*	Breeding
Golden eagle	*Aquila chrysaetos*	Year-round
Black-chinned hummingbird	*Archilochus alexandri*	Breeding
Short-eared owl	*Asio flammeus*	Year-round
Burrowing owl	*Athene cunicularia*	Breeding
Juniper titmouse	*Baeolophus ridgwayi*	Year-round
Common goldeneye	*Bucephala clangula*	Wintering
Ferruginous hawk	*Buteo regalis*	Year-round
Swainson's hawk	*Buteo swainsoni*	Breeding
Cassin's finch	*Carpodacus cassinii*	Year-round
American dipper	*Cinclus mexicanus*	Breeding
Olive-sided flycatcher	*Contopus cooperi*	Breeding
Yellow-rumped warbler	*Dendroica coronate*	Breeding
Yellow warbler	*Dendroica petechiapetechial*	Breeding
Willow flycatcher	*Empidonax traillii*	Breeding

Table 33. Partial list of avian species with potential to occur in the area.

Common Name	Species or Family Name	Season of Potential Use
Prairie falcon	*Falco mexicanus*	Year-round
American kestrel	*Falco sparverius*	Breeding
Pinyon jay	*Gymnorhinus cyanocephalus*	Year-round
Bald eagle	*Haliaeetus leucocephalus*	Wintering
Barn swallow	*Hirundo rustica*	Breeding
Dark-eyed junco	*Junco hyemalis*	Year-round
Loggerhead shrike	*Lanius ludovicianus*	Year-round
Lewis's woodpecker	*Melanerpes lewis*	Breeding
Song sparrow	*Melospiza melodia*	Breeding
Long-billed curlew	*Numenius americanus*	Breeding, wintering
Sage thrasher	*Oreoscoptes montanus*	Breeding
Fox sparrow	*Passerella liaca*	Breeding
Black-billed magpie	*Pica hudsonia*	Year-round
Eared grebe	*Podiceps nigricollis*	Breeding
Broad-tailed hummingbird	*Selasphorus platycercus*	Breeding
Williamson's sapsucker	*Sphyrapicus thyroideus*	Breeding
Brewer's sparrow	*Spizella breweri*	Breeding
Northern rough-winged swallow	*Stelgidopteryx serripennis*	Breeding
Calliope hummingbird	*Stellula calliope*	Breeding
Western meadowlark	*Sturnella neglecta*	Breeding
Tree swallow	*Tachycineta bicolor*	Breeding
American robin	*Turdus migratorius*	Year-round
Orange-crowned warbler	*Vermivora celata*	Breeding
Greater sage-grouse	*Centrocercus urophasianus*	Breeding
Yellow-billed cuckoo	*Coccyzus americanus*	Breeding

There are numerous amphibian and reptile species with potential to occur in the area (Table 34), but none of these have federally protected status and only one (smooth greensnake [*Opheodrys vernalis*]) is a state sensitive species (although most are protected from being killed as nuisance species by state law). These species include rattlesnake (*Crotalus oreganus lutosus*), gopher snake (*Pituophis catenifer*), garter snake (*Thamnophis sirtalis*), rubber boa (*Charina bottae*), yellow-bellied racer, tiger salamander (*Ambystoma tigrinum*), and leopard frog (*Rana pipiens*).

Table 34. Amphibian and reptile species with potential to occur in the area.

Common Name	Species or Family Name
Tiger salamander	*Ambystoma tigrinum*
Rubber boa	*Charina bottae*
Yellow-bellied racer	*Coluber constrictor Mormon*
Rattlesnake	*Crotalus oreganus lutosus*
Smooth greensnake*	*Opheodrys vernalis*
Gopher snake	*Pituophis catenifer*

Table 34. Amphibian and reptile species with potential to occur in the area.

Common Name	Species or Family Name
Leopard frog	*Rana pipiens*
Garter snake	*Thamnophis sirtalis*

*Smooth greensnake is a state sensitive species.

Rare, Threatened, and Endangered Terrestrial Wildlife Species

No federally listed or candidate threatened or endangered terrestrial wildlife species are known to occur in the Project Area or 1-mile buffer area around the Project Area. Likewise, no habitat for these species exists in the Project Area. Field surveys were conducted to detect smooth greensnakes (a Utah State sensitive species). During these surveys no smooth greensnakes were observed. In addition, the Project Area does not contain ideal habitat for smooth greensnakes, and none have been reported in the Project Area.

3.3.5.2 Environmental Effects

Because plant communities and associations are an essential component of wildlife habitat, potential impacts to wildlife habitats as a result of implementation of the proposed action are reflected in the impact analysis contained under the botanical resources heading above (Section 3.3.4). Implementation of the proposed action would result in the persistence of species and habitat conditions described in the affected environment because activities proposed under the proposed action are largely a continuation of current activities that make up the affected environment. Earth-moving activities (totaling 0.16 acres) associated with construction of the fish ladder under PM&E measure FISH-2 would largely affect space that is already developed or is sparsely vegetated and does not provide valuable habitat for the species that may pass through or inhabit the area. As described in the affected environment above and in Section 3.3.4 (Botanical Resources) the Project Area is largely developed space. Approximately 66 percent of the Project Area is within the developed, open space medium high intensity land cover type. Also, under PM&E measure WL-1, before planned maintenance or operational measures that would require ground-disturbing activities are conducted by PacifiCorp, consultation with USFS would be required. This consultation process, while not impact-reducing in and of itself, would likely result in the implementation of resource protection measures as needed, depending on the maintenance or operational activity being conducted. REC-7 prescribes the reconfiguration of fencing on the west end of the recreation site to remove the south, east, and west portions of the fence. Implementation of this measure would provide minor benefits to wildlife foraging and traversing the area by removing impediments to movement.

3.3.5.3 Cumulative Effects

The geographic scope of analysis (the Weber River Basin) for terrestrial wildlife resources is the same as that described above (Section 3.3.4) for botanical resources.

Likewise, the cumulative impact discussions and conclusions related to botanical resources are also relevant to terrestrial wildlife resources because botanical communities and associations are an essential component of terrestrial wildlife habitat. Other river dams and diversions, pipelines, roads, mines, timber harvest, transmission line right-of-way maintenance, and farming and grazing activities, as well as rural, suburban, urban, commercial, and industrial development have collectively contributed to the loss and alteration of terrestrial wildlife habitat within the Weber River Basin. Although many of these non-Project developments have not occurred within the Project Boundary, they are close enough to have an effect on resources within the Project Area (particularly freeway, railroad, and pipeline development). Upstream and upslope development and land clearing/alteration activities in combination with water diversions and canals may contribute to the establishment and spread of invasive species throughout the Weber River Basin. Road construction, vehicular traffic, and foot traffic associated with recreational pursuits may also contribute to the degradation and loss of sensitive habitats and displacement of wildlife. Ultimately, continued operation of the Project under the proposed action, including implementation of the PM&E measures described in Table 11, would result in the persistence of current conditions with respect to terrestrial wildlife resources, but is unlikely to create a substantive additional incremental impact on these resources in combination with past, present, and reasonably foreseeable future actions.

3.3.6 Recreation

3.3.6.1 Regional Setting

The Project is located within Weber Canyon and is surrounded by USFS and UPRC lands. The UWCNF is adjacent to the highly populated and urbanized Wasatch Front, which stretches from Brigham City, Utah, south to Nephi and includes the state capital of Salt Lake City. The mouth of Weber Canyon is approximately 8 miles from the Ogden City center and 30 miles north of Salt Lake City. The western, or down canyon, edge of the Project Area is approximately 9 miles from the Ogden City center. Recreation is the dominant land use on surrounding USFS land outside the Weber Canyon (due to I-84 and railroad lines, there is almost no recreational access in Weber Canyon except for the Utah Department of Transportation (UDOT) rest area and the Weber Recreation Site) and includes activities such as fishing, camping, hiking, picnicking, biking, snowmobiling, and cross-country and downhill skiing. The Utah 2014 State Comprehensive Outdoor Recreation Plan report (UDNR 2014) shows current uses, visitor perceptions, and future needs for the Wasatch Front area. This information shows that about half of the Wasatch Front population regards outdoor recreation as extremely important. Just over half of these people travel over 25 miles for recreation opportunities.

Due to the access limitations as described above, other than the Weber Recreation Site, the primary recreation facility in the vicinity of the Project is the State-managed rest stop located approximately 0.25 mile up Weber Canyon from the Project's diversion dam. While this site is managed by UDOT, a privately contracted company maintains it. The area primarily provides a place for motorists to stop and rest, but people also use the

area to picnic and fish. The site has restrooms, water, picnic tables, ADA/ABA compliant river access for handicapped persons, viewpoints, and irrigated landscaping. UDOT maintains another rest stop approximately 2 miles east of the Project Area. The USFS has no developed recreation sites in the vicinity.

3.3.6.2 Affected Environment

Existing Recreation Amenities

The existing Weber recreation site is located on USFS land and operated by PacifiCorp in the Project Area, immediately downstream from the Project diversion dam. It includes a parking area, picnic tables, a lawn, fishing access to the river downstream of the dam, fishing access to the forebay with a platform that meets ADA/ABA requirements, a portable toilet that is available on a seasonal basis, a dumpster, and an interpretive display. The existing recreation amenities at the site and their current condition are provided in Table 35.

Table 35. Existing recreation amenities at the site and their current condition.

Recreation Amenity Type	Recreation Amenity Description	Recreation Amenity Current Condition
Parking Area	Parking for approximately 12 vehicles	Parking area needs resurfacing
Seasonal Portable Toilet	1 seasonal portable toilet	Seasonal toilet receives sufficient maintenance to accommodate use levels
Dumpster	Dumpster suitable for use by recreationists at the site	Dumpster receives sufficient service to remain at or below capacity; small pieces of scattered trash in varying concentrations throughout the recreation site and along the river, both upstream and downstream of the dam, along the river corridor, and beneath the overpass
Picnic Area	4 picnic tables, 4 grills, paved path leading to one table and grill	Picnic tables and grills are in good condition; picnic table nearest the parking lot is not fully ADA/ABA compliant because the path leading to it is above the acceptable grade and it is cracked and buckled by tree roots
Interpretive Display	Information on Project management, rules, and fishing	Display panel includes required FERC Part 8 regulations and fisheries information but is generally lacking in interpretive information about the site, contains some information about Bonneville cutthroat trout and bluehead sucker; is in need of fresh paint
Fishing Platform	Fishing platform at forebay, with ADA/ABA access and 1 accessible table	Fishing platform is in good condition; railing is in need of fresh paint; in compliance with ADA
Fishing Access to Bypassed Reach	Narrow unpaved trail from paved pathway to north bank of the Weber River	Trail not developed or maintained as part of the formal recreation site. Informal trail created by repeated use.
Paved Path	Paved path down the side of the grass area	Paved trail is cracked and buckled due to tree roots and is overhung by branches in places (as a result it is not fully ADA/ABA compliant); chain link fence on the south side of the paved trail has numerous patches from visitors cutting holes in the fence, presumably for fishing access downstream of the dam; portions of the barbed wire along the top of this fence are damaged or missing

Table 35. Existing recreation amenities at the site and their current condition.

Recreation Amenity Type	Recreation Amenity Description	Recreation Amenity Current Condition
Informal Use Area	Open grass area	Grass is well cared for and in good condition; protective shields around the trees, to prevent damage by beavers, are often damaged or missing
Active Recreation Area	Sandbox play area	Sandbox area has become overgrown with vegetation and the fence surrounding the area is damaged

Current maintenance conducted by Project personnel at the recreation site entails grass mowing and edging, lawn watering, sprinkler maintenance and repair, tree branch removal, trash cleanup, and repair of vandalism. These tasks are conducted on an as-needed basis, as determined by Project personnel. The dumpster and seasonal portable toilet are maintained through contracts with outside companies. The recreation site is an out-of-the-way spot with ready freeway access. As a result, various illicit activities have been reported anecdotally, generally occurring at night.

Public Access and Trails

The primary point of public access is through the Weber Recreation Site picnic area along the paved trail. Beyond this paved trail, a primitive user-created and unsanctioned trail leads visitors further downstream (in a westerly direction) under I-84 and outside the current and proposed Project Boundary where additional access is limited due to the positioning of I-84 east- and west-bound lanes. Additionally, at the end of the paved trail a short segment of unpaved trail within the Project Boundary provides access to the north river bank (south of the paved trail and picnic area) within the bypassed reach. Finally, several pull-off locations exist along I-84 that serve as unsanctioned and illegal access points to the bypassed reach of the river as well.

Whitewater Boating

The Weber River offers one of the closest whitewater boating opportunities for Wasatch Front boaters. However, whitewater boating opportunities along the stretch of the Weber River that includes the Project are limited because the existing Class III-IV boatable section is relatively short (approximately 3 miles from the Horseshoe Bend to where the Weber River meets U.S. Highway 89 [American Whitewater 2017]) and has limited safe and legal access options due to the constraints of I-84 and a non-Project irrigation diversion dam located immediately downstream of the Project powerhouse. Boat launching is straightforward from the recreation site put-in but taking out is problematic. The other limitation on whitewater boating in this section of the Weber River is sufficient flows. Especially during drier years (e.g., 2012 - 2016), which are forecasted to become more the norm in the Project Area, when the Project is operating, there is rarely enough flow in the bypassed reach to boat without suspending generation. Whitewater boating use and demand is discussed in detail below.

There are no commercial whitewater outfitters operating on this reach. None are expected to operate in the future because the narrow river channel is not suitable for rafts, the pattern of flows suitable for whitewater boating is unpredictable, and there are challenges with access as described above.

Recreation Use and Demand

Current recreation use and demand associated with the Weber recreation site and adjacent primitive trails as well as the Weber River itself was estimated through a combination of visitor use surveys and trail camera user counts. Details concerning the survey questions and methods as well as the trail camera user count methods are available in the Final Recreation Technical Report (Cirrus 2016).

Based primarily on data obtained from the visitor use survey there are a total of approximately 3,754 recreation visits per year to the Weber recreation site. Visitor-days per year are estimated at 605-1,248. A visitor-day is defined as 12 hours of use by any combination of users to a recreation area. In terms of site occupancy, neither the parking area nor the tables are approaching capacity with approximately 50 percent maximum parking occupancy and 20 percent maximum table occupancy observed during the visitor use surveys. Table 36 provides a summary of visitor use estimates based on the visitor use survey.

Table 36. Recreation use metric estimates for the Weber recreation site.

Estimated Recreation Visits/Year	3,754
Estimated Recreation Visitor-Days/Year	605 – 1,248
Site Occupancy (maximum observed) Parking (approximately 12 stalls available) Tables (5 total – 4 grass area, 1 fishing platform)	 50% 20%

Fishing is the main recreational use of the Project Area based primarily on trail camera user counts, 2016 visitor survey data, and UDWR creel census data (Cirrus 2016). Of the 1,012 total users counted with the trail camera from March to September 2016, 617 (61 percent) were fishing. Fishing use of the area tends to dominate particularly within the June to September timeframe (as high as 79 percent of all users) with less fishing use as a percentage of all recreational use in the period from March through May (as low as 44 percent of all users). Walking and target shooting are also commonly engaged in recreational activities in the area with 25 percent (249 total users) and 12 percent (118 total users) of total users engaging in walking and target shooting, respectively. Other, less common uses of the area recorded by the trail camera, include photography (11 users or 1 percent of total users), kayaking (5 users or less than 1 percent of total users), and prospecting (1 user). Further information on whitewater boating use of the area is provided below. Recreational users by user type and month are recorded in Table 37.

Table 37. Primitive trail users by use type based on data from remote camera.

	Use Type	Percentage	n
March Individuals and Use Types (March 11-31)	Fishing	44	31
	Walking	42	29
	Shooting	11	8
	Photography	1	1
	Kayaking	0	0
	Prospecting	1	1
April Individuals and Use Types	Fishing	54	86
	Walking	34	54
	Shooting	11	17
	Photography	1	2
	Kayaking	0	0
	Prospecting	0	0
May Individuals and Use Types	Fishing	54	100
	Walking	31	57
	Shooting	9	16
	Photography	3	6
	Kayaking	3	5
	Prospecting	0	0
June Individuals and Use Types	Fishing	79	26
	Walking	12	4
	Shooting	9	3
	Photography	0	0
	Kayaking	0	0
	Prospecting	0	0
July Individuals and Use Types	Fishing	73	200
	Walking	12	53
	Shooting	14	51
	Photography	1	2
	Kayaking	0	0
	Prospecting	0	0
August Individuals and Use Types	Fishing	68	124
	Walking	20	37
	Shooting	12	22
	Photography	0	0
	Kayaking	0	0
	Prospecting	0	0
September Individuals and Use Types	Fishing	76	50
	Walking	22	15
	Shooting	2	1
	Photography	0	0
	Kayaking	0	0
	Prospecting	0	0
Total Individuals and Use Types	Fishing	61	617
	Walking	25	249
	Shooting	12	118
	Photography	1	11
	Kayaking	<1%	5
	Prospecting	<1%	1

While the trail camera user counts recorded that less than 1 percent of users are engaging in whitewater boating (kayaking), these numbers are likely under reporting

whitewater boating use as other whitewater boater trips were logged during the boater survey that were not captured by the trail camera, and there is a high degree of interest by the local boating community in the bypassed reach of the Weber River. This interest is primarily a result of the Class III-IV section of the river which contains rapids known as Horseshoe Bend (also known as Scrambled Eggs; Horseshoe Bend is used hereafter in this analysis) and Triple Drop. A 1.2-mile section of the river known as Hell or Highwater occurs downstream of these rapids and is rated Class II-III. However, for whitewater boaters, the Horseshoe Bend and Triple Drop rapids are the primary draw to the bypassed reach.

A whitewater boating-specific study was conducted to better ascertain whitewater boating use and demand related to the bypassed reach of the Weber River. This study indicates that the current minimum acceptable flow for whitewater boating use of the bypassed reach is 450 cfs. Some use occurs at lower flows, mostly confined to the Horseshoe Bend rapid. Historically (when access was allowed from I-84) the minimum acceptable flow was as low as 140 cfs. At that time boaters would only paddle the Horseshoe Bend rapid and avoid paddling further downstream because 140 cfs was too low for Ledges 1, 2, and 3 at Triple Drop. Horseshoe Bend at 140 cfs offered a technical slalom boating opportunity. The current access restrictions require a higher minimum acceptable flow because more water is needed to navigate Triple Drop (450 cfs minimum acceptable flow) and the 1.2-mile Hell or Highwater section downstream (300 cfs minimum acceptable flow) to egress this reach of the river now. While the current minimum acceptable flow for the bypassed reach is generally 450 cfs it is higher for boaters travelling longer distances (e.g., from outside the local Ogden area) to this reach of the Weber River. The optimal flow range, according to the whitewater boating study results, is 600 to 1,000 cfs (900 cfs is the most acceptable within this range).

Whitewater boating use in the bypassed reach typically occurs during the spring months, corresponding with the melting of lower-elevation snowpack and therefore higher flows in the river. Internet survey results indicate that in 2015 boaters made 22 visits to the bypassed reach. Most of these visits occurred in May and June though some occurred as late as September. Survey results indicated that in 2016 11 trips were made mostly in April (1 late June trip was reported).

Safe and legal access to the bypassed reach is difficult and limits use of the bypassed reach by whitewater boaters. The majority of boaters put in a short distance downstream from the Project diversion dam where the paved walking path terminates at the riverbank. River access is not permitted immediately downstream of the dam for safety and liability reasons. Boaters are able to launch on a gravel bar approximately 200 meters downstream from the dam. After boating the Horseshoe Bend section of the bypassed reach using the recreation site put-in, boaters must either carry their boats back upstream along the old highway bed and back to the put-in, or continue downstream through the Triple Drop and Hell or Highwater sections of the bypassed reach followed by a portage of the non-Project diversion located immediately downstream of the

powerhouse. This diversion is owned by DWCCC, and it commonly takes most or all of the flow in the Weber River at that point, limiting options for boaters to continue downstream. The boatable reach of the river is further constrained by being located between the two lanes of I-84 (particularly the Hell or Highwater section), and the only downstream access route is the road to the DWCCC irrigation diversion dam, which is gated and locked downstream of the potential portage area. The only other access to the boatable reach is via the old highway bed, and this access point has been gated and locked by UDOT to prevent recreationists from using a freeway pullout that is considered unsafe due to the lack of acceleration and deceleration lanes. Due to geomorphology constraints, there is no room for acceleration or deceleration lanes along this section of I-84. The majority of boaters take out on South Weber Drive (also known as the Mouth of the Canyon). This is currently the default take out location, however it is not preferred because it requires paddling the 1.2-mile Hell or Highwater section downstream from Triple Drop, portaging around the DWCCC dam, and paddling another 0.75 mile Class II section that may be severely dewatered by irrigation flow diversions.

3.3.6.3 Environmental Effects

Under the proposed action the Project would be relicensed for a term of 30-50 years. Project facilities and operations would remain the same as the current condition except for changes discussed in Section 2.2.3 that are necessary to accommodate PM&E measures FISH-2, FISH-3, FISH-4, and REC-9 (further PM&E measure details are provided in Table 11). Continued operation of the Project in general would not change the status of recreation resources or their use. However, recreation-related effects would be associated with implementation of PM&E measures HYD-1, FISH-1, FISH-2, FISH-3, FISH-4, and all recreation specific PM&E measures.

Measures HYD-1 and FISH-1 are identical. These measures would continue the existing seasonally-adjusted minimum stream flows (34-50 cfs) for the bypassed reach of the river affected by the Project. Maintaining minimum stream flows for the bypassed reach of the river ensures that appropriate fish habitat conditions are maintained subject to adequate inflows (i.e., if the volume of flows is less than or equal to the minimum stream flow in the river upstream of the Project, all of the flows are provided to the bypassed reach and no generation occurs). As a result, in low-flow conditions, providing minimum stream flows of 34-50 cfs or inflow maintains the quality of the fishing experience for recreationists fishing the bypassed reach of the river.

Measure FISH-2 involves the construction, operation, and maintenance of a traditional vertical slot fish ladder designed for upstream passage of Bonneville cutthroat trout and bluehead sucker. Fish ladder construction is expected to take approximately nine months. During the construction period recreationists and other non-Project related visitors to the area would be temporarily prohibited from entering and using the recreation site and from accessing the bypassed reach of the river via the recreation site. Fish ladder construction would result in a likely nine-month loss of recreation opportunities for all recreation amenities and opportunities associated with the Project

and the bypassed reach of the river. Warm weather and low flows within the Weber River are ideal work conditions for fish ladder construction. While these conditions are targeted for the timing of fish ladder construction, the duration of construction activities would require work outside of the ideal timeframe (approximately October to December) as well. Fish ladder operation, on the other hand, is likely to improve the quality of the fishery by facilitating upstream passage of fish (see Section 3.3.3 for further information). This may also improve the quality of the fishing experience for recreationists fishing the bypassed reach of the river as well as the forebay and fishable portions of the river upstream of the forebay. Measures FISH-3 and FISH-4, which relate to ensuring that fish passage is possible at times when the forebay is dewatered and the fish ladder is inoperable, would have similar effects in terms of maintaining the quality of the fishery by facilitating passage of fish.

All of the recreation-related PM&E measures (REC-1 to REC-9, see Table 11) would improve recreation amenities and uses associated with the Project. Continued maintenance of the existing recreation site prescribed by REC-1 would facilitate the ongoing use of the recreation site as described in the affected environment. REC-2, which prescribes the improvement of interpretive signage at the existing recreation site, would improve the recreational experience for visitors by providing them with more information related to recreation and other resources present at the site. The creation of a webpage indicating approximate bypassed reach flows (prescribed by REC-3) would improve access for recreationists to real-time information about flows in the river. Access to real-time information about flows would facilitate boater use of the river particularly during periods of high flow in the spring months. This information would also be useful to recreationists seeking to fish the bypassed reach of the river and wanting to ensure they do so during wadeable timeframes. REC-4 prescribes the installation of a year-round permanent vault toilet facility and the installation of signage instructing visitors on the site's dog waste protocol and supplying dog waste bags. This measure would improve visitors' enjoyment of the recreation site by facilitating dog waste clean-up by visitors with dogs and subsequently reducing the presence of dog waste left by other visitors. Also, the presence of a year-round permanent vault toilet facility would improve the recreational experience at the site during the off season months when a portable toilet is currently not provided at the site (currently in the off season visitors need to use the toilet facilities at the nearby rest stop upstream of the Project recreation facilities). The creation or modification of the ADA/ABA compliant accessible picnic site at the Weber Recreation Site is prescribed by REC-5. Because this measure would improve a recreation amenity for individuals with disabilities it would improve the recreation experience for these visitors. Current information on the volume of visitors with disabilities that are using the site is unavailable. The maintenance/repaving of the access road to the recreation site and the maintenance/repaving of the existing asphalt path in the picnic area (REC-6) would improve the visitor experience for recreationists. Implementation of this measure would result in a more even and continuous surface for driving to the site as well as walking in the picnic area either for purposes of picnicking

or river access. REC-7 prescribes the reconfiguration of fencing on the west end of the recreation site to remove the south, east, and west portions of the fence. This measure would improve the scenic quality of the picnic area for recreationists. REC-8 prescribes the improvement of the user-created trail on the west end of the recreation site that provides access to the bypassed reach of the river just downstream from the diversion dam. Implementation of this measure would improve the recreational experience of recreationists accessing the bypassed reach of the river by increasing the ease and safety of river access. REC-8 also prescribes the provision of funds through an off-license agreement with TU to fund a cooperative effort to improve pedestrian river access at the under-freeway user-created trail extending west from the recreation site and outside the Project Boundary. Implementation of this measure would improve the recreational experience of recreationists using this trail by increasing the ease and safety of trail use in this location. Funds provided through the off-license agreement may be used by TU to provide another habitat benefit in the watershed in the event that improving pedestrian river access in the indicated location is infeasible or requires less funding than provided through the agreement. What this habitat benefit would be is unknown. Finally, REC-9 indicates that in the event that a safe, legal egress site can be agreed to, PacifiCorp would provide boater flows to the bypassed reach by curtailing generation (up to 320 cfs or inflow) for 4-hour segments on four Saturdays prior to July 15 annually. Implementation of this measure would benefit whitewater boaters by providing them with a total of 16 hours of additional boatable flows per year. On the other hand, recreationists desiring to fish the bypassed reach of the river at these times would potentially encounter non-wadeable conditions limiting their access to the river other than from the river bank.

3.3.6.4 Cumulative Effects

The geographic scope of the cumulative effects analysis for recreation resources encompasses the Weber River Basin. This spatial scope of analysis was chosen because river-based recreation resources are available across the basin and recreation amenities and uses provided by the Project fall within this spatial scale.

The primary past and present actions within the Weber River Basin that influence river-based recreation uses and opportunities include water diversion, and water storage (irrigation) operations; hydroelectric, highways; and railroad development. Natural seasonal and year-over-year flow fluctuations also may affect river-based recreational opportunities within the basin. Operations that divert stream flow within the basin (such as the irrigation diversion downstream of the Project) typically result in a net loss or degradation of river based recreational opportunities as a result of the removal of flow from the stream. In some cases and at some times of the year (such as the summer months) stream diversions partially or completely dewater stream segments making them unavailable for recreational activities such as fishing and boating. Operations that divert stream flow also may result in the curtailment of access to the stream and stream banks for river-based recreation. Operations that impound stream flow and create reservoirs (such as Echo Reservoir upstream of the Project) also impair river-based recreation activities because they convert a portion of the stream system from river-type to lake-

type. However, impoundments also create lake-type recreational opportunities that include fishing and boating, offsetting the loss of the river-based recreational opportunity. The construction and presence of highways and other roads and the railroad within the Weber River Basin have, over time, resulted in access-related constraints on river-based recreation. For example, as a result of the presence of the I-84 freeway within Weber Canyon, points of access for recreationists to the Weber River are largely limited to the Weber Recreation Site and the UDOT rest stop upstream from the Project recreation site. Other access points have been restricted due to safety reasons associated with the I-84 freeway as well as the railroad and the presence of Project facilities such as the powerhouse on the downstream end of the proposed Project Boundary.

Implementation of the proposed action, including specifically the PM&E measures FISH-2 and REC-1 through REC-9 would add to and/or improve, incrementally, the recreation opportunities available within the basin as described above. These measures would primarily enhance existing recreation opportunities such as fishing, boating, and stream-side picnicking. However, the implementation of FISH-2 would temporarily (for approximately 9 months) contribute to losses of river-based recreation opportunities within the basin during the fish ladder construction timeframe because access to the Project recreation site and associated Weber River access point would be prohibited during fish ladder construction. Also, the Project powerhouse would continue to be a restricted access zone because there are no demonstrably safe ingress and egress points for the public to use to access the river in this location.

3.3.7 Socioeconomics

3.3.7.1 Affected Environment

The Project Area is located along the Weber River near the border of Davis, Weber, and Morgan counties. Table 38 contains demographic and employment related information for each county.

Table 38. Demographic and employment related information for Davis, Weber, and Morgan counties.

	Davis County	Weber County	Morgan County
2013 population (% of total Utah population)	322,094 (11%)	238,519 (8.2%)	10,173 (0.3%)
Population increase since 2005 (Utah statewide = 15.8%)	17%	10.9%	22.8%
Residents below age 18 (Utah statewide = 30.9%)	33.6	29.3	34.8
2012 average number of persons per household (Utah statewide = 3)	3	3	3

Table 38. Demographic and employment related information for Davis, Weber, and Morgan counties.

	Davis County	Weber County	Morgan County
Median household income (Utah statewide = $57,067)	$69,019	$54,169	$75,348
% of State of Utah's nonfarm jobs	8.6%	7.3%	0.1%
2013 labor force	151,430	115,472	4,465
Largest 3 employers	Hill Air Force Base, Davis County School District, Smith's Food and Drug/Marketplace	Internal Revenue Service, Weber County School District, McKay-Dee Hospital Center	Morgan County School District, Holcim Inc. (cement manufacturing), Browning

Source: UDWS 2013

Funds generated from the fishing community are a substantial source of revenue for the area. Krannich et al. (2012) estimated that anglers, on average, made $84 in direct expenditures (e.g., gas, food, and lodging) per trip. Recreation study data indicate that approximately 61 percent of trips (2,289 trips) to the bypassed reach are made by anglers, which translates to an estimated $192,276 in annual direct expenditures made by anglers frequenting local businesses during their fishing trips. Additionally, for every dollar in direct expenditures made, $0.76 in indirect economic output (e.g., industry, labor income, and tax revenue) is created (Kim and Jakus 2012). The overall annual economic contribution of the Weber River bypassed reach angling to the Utah economy is, therefore, estimated at $338,406.

Through water right interference agreements, the winter water that would otherwise flow through the Weber Hydroelectric Project is stored in Echo Reservoir and is diverted across the Weber-Provo Canal to be stored in Deer Creek Reservoir. To date approximately $290 million (Reclamation project costs were taken from the "Statement of Project Construction Costs and Repayment" and recent safety-of-dams work. Costs include original construction costs, safety-of-dams work, hydropower, canals and water distribution systems) has been spent of Echo and Deer Creek reservoirs and their related facilities. Over the last three years, 30,000-40,000 acre-feet/year of Weber Project water (Utah Division of Water Rights webpage, "Accounting for Deliveries to the Weber-Provo Canal") has been stored in Echo and Deer Creek reservoirs and used primarily for irrigation and municipal use. The storage of 30,000-40,000 acre-feet of water is sufficient to meet the indoor water needs of 80,000 homes or 10,000 acres of irrigation. As a result, the continued existence of the Weber Hydroelectric Project provides substantial benefits to the storage water needs of several water conservancy districts which rely on the Project's winter water rights to allow water storage in several large reservoirs.

PacifiCorp, owner and operator of the Weber hydroelectric facilities in the Project Area, employs approximately 6,000 people throughout the West. The Weber Project facilities are operated by two full-time employees that switch duties between this plant

and another plant. Another five full-time maintenance staff employees also switch duties between this plant and other PacifiCorp Utah hydro plants.

3.3.7.2 Environmental Effects

Under the proposed action the Project would be relicensed, with the proposed PM&E measures outlined in Table 11, for an additional 30-50 years. The socioeconomic benefits of the Project as described above would continue for the duration of the term of the new license. This translates to an additional 30-50 years of annual economic contribution of the Project to the economy of the state of Utah as well as an additional 30-50 years of benefits to the storage water needs of several water conservancy districts which rely on the Project's winter water rights to allow water storage in several reservoirs. Furthermore, the Project would continue to provide a reliable supply of renewable energy to the local area.

3.3.7.3 Cumulative Effects

Socioeconomic resources do not have the potential to be cumulatively affected by the proposed action in combination with past, present, and reasonably foreseeable future actions (see Section 3.2). As a result no cumulative effects analysis related to socioeconomics is provided here.

3.4 NO-ACTION ALTERNATIVE

Under the no-action alternative, the Weber Hydroelectric Project would continue to operate in its current manner. As a result, there would be no changes to the physical, biological, or cultural resources of the area. The existing conditions and trends described in the affected environment would persist for the term of the new license.

4.0 DEVELOPMENTAL ANALYSIS

In this section, the Weber Hydroelectric Project's use of the Weber River for hydropower purposes is examined to see what effect various environmental measures would have on the Project's costs and power benefits. Consistent with the Commission's approach to economic analysis, the power benefit of the Project is determined by estimating the cost of obtaining the same amount of energy and capacity using the likely alternative generating resources available in the region. In keeping with Commission policy as described in *Mead Corporation, Publishing Paper Division,* 72 FERC ¶ 61,027 (July 13, 1995), the economic analysis here is based on current electric power cost conditions and does not consider future escalation of fuel prices in valuing the Project's power benefits. In most cases, electricity from hydropower would displace some form of fossil-fueled generation, in which fuel cost is the largest component of the cost of electricity production.

This analysis includes: (1) an estimate of the net power benefit of the Project for each of the licensing alternatives (no-action and applicant's proposal); and (2) an estimate of the cost of individual PM&E measures considered in the EA. To determine the net power benefit for each of the licensing alternatives, project costs are compared to the value of the power output as represented by the cost of a likely alternative source of power in the region. For any alternative, a positive net annual power benefit indicates that the Project power costs less than the current cost of alternative generation resources and a negative net annual benefit indicates that Project power costs more than the current cost of alternative generation resources. This estimate helps to support an informed decision concerning what is in the public interest with respect to a proposed license. However, Project economics is only one of many public interest factors the Commission considers in determining whether, and under what conditions, to issue a license.

4.1 POWER AND ECONOMIC BENEFITS OF THE PROJECT

Table 39 summarizes the assumptions and economic information used in the analysis. The Project is only operated in run-of-river mode, and therefore, estimated values of on- and off-peak Project power are not included.

Table 39. Parameters for economic analysis of the Weber Hydroelectric Project.

Parameter	Value
Period of analysis (years)	44
Taxes and insurance (%) (PacifiCorp is self-insured)	NA
Federal income tax rate	37.951%
Levy rate (the Project is located at the intersection of three Utah counties)	1.40% (Weber County), 1.33% (Davis County), and 1.06% (Morgan County); overall rate of 1.10% weighted by county area
Assessment rate	100%
Insurance (PacifiCorp is self-insured)	NA
Net investment, $ [a]	$1,352,314

Table 39. Parameters for economic analysis of the Weber Hydroelectric Project.

Parameter	Value
Original cost, $	$4,554,002
Future major operations capital cost, $ [b]	$5,156,000
Relicensing implementation capital cost, $ [c]	$3,213,000
Relicensing cost, $ [d]	$1,099,000
Routine Operation and Maintenance (O&M), $/year [e]	$273,619
New and non-routine O&M, $/year [f]	$11,454
Annual fees, $/year [g]	$10,670

[a] Net investment, or net book value, is the depreciated Project investment allocated to power purposes.
[b] Future major capital costs include major plant rehabilitation to maintain present-day capability scheduled between 2021 and 2034 and are expressed in non-inflated dollars.
[c] Implementation capital costs include the cost of construction of new capital PM&E measures such as the proposed fish ladder and recreation site upgrades.
[d] Relicensing costs include the administrative, legal/study, and other expenses to date or budgeted to complete the license process.
[e] Existing plant O&M does not include O&M related to PM&E measures associated with the current license.
[f] New and non-routine O&M includes PM&E measure operation, dam safety, periodic dredging, and the 1965 contract benefit.
[g] Annual fees paid under Part I of the FPA are based on the nameplate capacity of the Project and include annual FERC land use fees ($246).

As currently operated, the 3.85 MW Weber Hydroelectric Project generates an average of 16,926 MWh annually (based on a 30-year average annual energy output) and has a dependable capacity of 1,420 kW utilizing the entire 96-year period of record, but 594 kW utilizing the most recent 30-year period of record.

4.2 COMPARISON OF ALTERNATIVES

Table 40 summarizes the annual cost, power benefits, and annual net benefits for the two alternatives considered in detail in this APEA: the no-action and the applicant's proposal.

Table 40. Summary of the annual cost, power benefits, and annual net benefits for two alternatives for the Weber Hydroelectric Project.

	No-Action[1]	Applicant's Proposal
Installed capacity (MW)	3.85	3.85
Annual generation (MWh)[2]	16,926	16,878 (up to 48 MWh of annual lost generation are estimated as a result of implementation of PM&E REC-9)
Annual power value ($/MWh)[3]	$38.99	$38.99
Annual cost ($/MWh)[4]	$41.19	$56.59[5]
Annual cost of Project minimum flow power lost ($/MWh)[6]	$6.04	$6.04
Subtotal of Nominal Levelized Cost ($/MWh)	$47.23	$62.63
Annual net benefit or (cost) ($/MWh)	$(2.20)	$(17.60)

[1] As defined, means the Project continues to operate as present.
[2] Note that this value does not include an average of 3,314 MWh (42 cfs) lost generation from existing minimum flow requirements, at an average annual cost of $129,212.86 (approximately 20 percent of the average annual generation).
[3] Discount rate = 6.59%. The nominal levelized $/MWh value of energy includes additional benefit from 1938 contract. The net energy benefits were valued using the GRID model. Note that the maximum length of a GRID analysis is 20-years, the remaining 24-years were escalated using the March 2017 official inflation forecast. The date of the Palo Verde OFPC used in the analysis was 12/31/2016.
[4] Includes capital costs to operate, remaining cost of depreciation of existing assets, and routine and non-routine O&M for 44 years.
[5] Includes the No-Action cost, plus $15.40/MWh of PM&E Implementation and O&M measure cost required by the potential license.
[6] That is, the on-going minimum stream flows (34-50cfs), result in lost generation that adds an additional approximate 15% (on average) to the Project's costs.

4.2.1 No-Action Alternative

Under the no-action alternative, the Project would continue to operate as it does now with no changes. The Project would have an installed capacity of 3.85 MW, and generate an average of 16,926 MWh of electricity annually valued at about $38.99/MWh. The average annual Project cost would be about $47.23/MWh, including $6.04/MWh for the value of the existing minimum stream flow. Overall, the Project under the no-action alternative would produce power at an annual net cost of about $2.20/MWh.

4.2.2 Applicant's Proposal

Under PacifiCorp's proposal, the Project would be licensed with the changes described in Section 2.2. The Project would have a total installed capacity of 3.85 MW, and an average annual generation of 16,878 MWh valued at about $38.99/MWh. The average annual Project cost would be about $62.63/MWh, including the same $6.04/MWh value for the proposed minimum stream flow (no change is proposed from the existing regime). Overall, the Project under the proposed action (PacifiCorp's proposal) would produce power at an annual net cost of about $17.60/MWh. While the Project under the proposed action and no-action alternatives would produce power at a net cost rather than a net benefit, PacifiCorp's proposal is the preferred course of action. The proposed action would result in the environmental benefits that accompany implementation of the PM&E measures described in Table 11 and PacifiCorp would continue to operate the Project as a dependable source of renewable electrical energy for its customers. In addition, implementation of the proposed action would provide favorable customer benefits over Project decommissioning. Project decommissioning was considered but dismissed from detailed analysis in Section 2.3.3. This alternative was dismissed from detailed analysis for the following reasons: (1) there would be substantial costs involved with decommissioning the Project and/or removing any Project facilities (this alone makes continued Project operations favorable despite producing power at an annual net cost), (2) removing Project facilities is likely to be unworkable and unreasonable from both a technical and economic perspective given the many constraints present in the Project vicinity (including the steep and narrow topography of Weber Canyon, the UPRC rail line, east- and west-bound sections of I-84, and transmission lines), and (3) water rights for other facilities (Echo Reservoir and Deer Creek Reservoir) are, by prior agreement, dependent upon water rights associated with the Project and if the Project were to be decommissioned these water rights would be adversely affected. Finally, annual power value is subject to somewhat unpredictable fluctuation over time. As a result, over the term of the license the annual power value may ultimately be greater than that calculated in this analysis and result in a lesser annual net cost or even an annual net benefit that is not currently foreseeable.

4.3 COST OF ENVIRONMENTAL MEASURES

Table 41 gives the capital cost and operation and maintenance cost of each of the proposed PM&E measures considered in the analysis.

Table 41. Cost of PM&E measures considered in assessing the environmental effects of continuing to operate the Weber Hydroelectric Project.

PM&E Measure	Capital Cost	Operation and Maintenance Cost
HYD-1 and FISH-1	NA	$129,213 annually; valued at approximately $5,440,000 total over the life of the new license
FISH-2	$2,889,000	$5,000 annually for facility maintenance; $185,000 total over the life of the license
FISH-3	$65,000	$40,000 periodically; $160,000 total over the life of the license
FISH-4	$0	$1,000 annually; $44,000 total over the life of the license
BOT-1	$0	$2,000 annually; $78,000 total over the life of the license (includes costs for WL-1, below)
BOT-2	$0	$2,000 annually; $76,000 total over the life of the license
WL-1	$0	$0 additional (included as part of BOT-1, above)
CULT-1	$6,000	$15,000 total over the life of the license
REC-1	$0	Included in routine operation and maintenance costs ($12,039,000 life-of-license total)
REC-2	$15,000	$25,000 over the life of the license
REC-3	$20,000	$0
REC-4	$64,000	Included in routine operation and maintenance costs ($12,039,000 life-of-license total)
REC-5	$20,000	$0 (maintained with overall recreation site $12 million life-of-license total)
REC-6	$100,000	As needed; $44,000 total over the life of the license
REC-7	$12,000	$2,000 periodically; $20,000 over the life of the license
REC-8a	$22,000	Included in REC O&M cost above; $0
REC-8b	$50,000	Included in REC O&M cost above; $0
REC-9	$10,000	$4,000 annually; $166,000 total over the life of the license.
TOTALS	**$3,273,000**	**$6,253,000 (over the life of the license; does not include operation and maintenance cost associated with REC-1, REC-4, and REC-5)**

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 COMPARISON OF ALTERNATIVES

In this section, the developmental and non-developmental effects of PacifiCorp's proposal and the no-action alternative are compared. The annual generation of the Project under the two alternatives identified above is also compared. This analysis shows that the annual generation would be approximately 16,878 MWh for the proposed action and 16,926 MWh for the no-action alternative. The environmental effects of the proposed action are summarized below. Under the no-action alternative, the existing conditions and trends described in the affected environment would persist for the term of the new license because the Project would continue to operate in its current manner with no changes.

Geological and Soil Resources

Fish ladder construction activities under the proposed action would require earthmoving activities below and both north and east of the ordinary high water line in the near vicinity of the Weber diversion dam's north bank. This would not result in a substantive change in the geological structure of the area as a result of the small acreage and volume of the deposits (0.16 acres and 1,130 cubic yards, respectively) relative to the Weber River system (125 linear miles of mainstem stream from its origin in the Uinta Mountains to its terminus in Great Salt Lake). The Project is situated within an area known to contain faults, landslide risks, and debris flow risks. The continued operation of the facility and the specific PM&E measures would not aggravate or contribute to risks associated with these hazards. However, faults, landslide risks, and debris flow risks do pose an ongoing risk to Project facilities and Project operations (similar to that under the no-action alternative).

Fish ladder construction would result in earthmoving activities which have the potential to result in localized erosion and soil loss. A total of 0.16 acres of earthmoving and construction activities are planned for fish ladder construction. Erosion control measures and other BMPs (e.g., silt fences, etc.) as required by regulatory authorities would be implemented to reduce sediment delivery to the Weber River during construction. In addition, the total area of earthmoving activities for fish ladder construction would be approximately 0.8 percent of the river area (the Weber River and a 25- foot buffer on either side), from the diversion dam area where fish ladder construction would occur, to the downstream end of the Project powerhouse.

Implementation of PM&E measure REC-9 would result in the release of up to approximately 320 cfs of water into the Weber River on four different occasions per year for a duration of four hours. These boater flow releases would raise the water level in the bypassed reach of the Weber River for short periods which may result in potential stream bank scouring and subsequent erosion of soils in the bypassed reach at times when flows (although uncommon) could be as low as 34-50 cfs in this reach. The degree of scouring and erosion of stream would be limited as a result of the amount of rock armoring in the

existing channel, the relatively small volume of water released for boater flows, and the relatively slow rate (1.5 feet/hour is proposed) at which water levels would rise in the bypassed reach during a flow release.

It is anticipated that trail improvement activities to satisfy PM&E measure REC-8, specifically step construction, on the trail within the Project Boundary leading south to the north bank of the Weber River may result in a small area of localized disturbance to surface soils along the trail. Step construction is unlikely to result in a substantive amount of soil loss and soil delivery to the river because of the limited construction activities and application of BMPs. The presence of the steps along this trail would ultimately reduce the potential for soil erosion and soil delivery to the river in the future.

Water Resources

Water Quantity (Flows)

Under the proposed action the Project would operate for a period of 30-50 years and the PM&E measures described above would be implemented. Available flows would not change as no actions are proposed that would influence (change) available flows in the Weber River. However, implementation of PM&E measure HYD-1 would ensure that existing seasonally-adjusted minimum stream flows of 34-50 cfs (or inflow) continue in the bypassed reach of the river. During low flow times of the year, maintaining this minimum flow in the bypassed reach requires PacifiCorp to curtail generation in favor of the provision of flows that contribute to flow-related benefits such as fish habitat. In addition, implementation of PM&E measure REC-9 could result in an additional 16 hours per year of flows up to 320 cfs in the bypassed reach. However, these flows do not represent a change in available flow nor do they represent a change in minimum flows. The provision of 16 hours per year of flows up to 320 cfs would require PacifiCorp to curtail generation during these flow releases which are intended to provide whitewater boating opportunities in the bypassed reach outside the typical higher flow period that occurs in the early spring.

Water Rights

Changes in water rights or water rights-related agreements are not proposed by the proposed action. As a result there would be no change in water rights with implementation of the proposed action.

Water Quality

Under the proposed action the Project would operate with specific PM&E conditions for a period of 30-50 years. Over this timeframe, Project operations would be largely similar to the current operations except for minor changes to facilitate PM&E measures FISH-2, FISH-3, FISH-4, and REC-9 (see Section 2.2.3). No substantive changes in temperature, pH, specific conductivity, DO, turbidity, TSS, or chlorophyll *a* are anticipated as a result of implementation of the proposed action as the Project has

little influence on these water quality parameters based on field studies conducted in 2016 and 2017. However, certain PM&E measures could influence some water quality constituents (specific conductivity, DO, turbidity, TSS). This information, on a parameter-by-parameter basis, is summarized below.

Parameter	Summary of Effects
Specific Conductivity	Fish ladder construction would result in earthmoving activities which have the potential to result in localized erosion and soil loss including potential soil constituents (e.g., salts and alkalis) that can contribute to salinity and therefore specific conductivity measurements in the Weber River. Erosion control measures and other BMPs (e.g., silt fences, etc.) as required by permitting authorities would be implemented to reduce sediment delivery to the Weber River during construction. In addition, the total area of earthmoving activities for fish ladder construction would be approximately 0.8 percent of the river area (the Weber River and a 25-foot buffer on either side) from the diversion dam area where fish ladder construction would occur to the downstream end of the Project powerhouse. During the release of boater flows to satisfy REC-9, specific conductivity in the bypassed reach of the Weber River is likely to temporarily decrease as a result of higher flows (up to approximately 320 cfs) in the bypassed reach diluting the salinity of the water. This effect would not exceed approximately 16 hours per year (four boater flows provided on four occasions), and is also limited spatially. That is, downstream of the powerhouse, the dilution effect would cease as the Project water is released back to the river at that point.
Dissolved Oxygen	Based on field studies conducted in 2016 and 2017 the Project currently contributes benefits to DO in the river. The Project appears to exert a stabilizing influence on DO fluctuations across the system from sampling point WR01 to WR04 as well as increasing DO concentrations at the downstream end of the Project powerhouse (WR04). Increased DO concentrations at the downstream end of the Project powerhouse are likely a result of water turbulence in the pipeline followed by water turbulence in the turbine. This effect is expected to continue into the future because the configuration of the Project would remain largely the same between the current condition and the proposed action. Further, implementation of PM&E measure REC-9 is likely to increase DO concentrations in the bypassed reach during the release of boater flows. This is largely a result of increased water turbulence during the boater flow events. This effect would not exceed approximately 16 hours per year (four boater flows provided on four occasions) and would likely occur between approximately late April and early July depending on the runoff in any given year and Project operational factors.
Turbidity	Field studies indicated that minimum turbidity values downstream of the Project powerhouse (sampling site WR04) never reached zero (3.5 NTUs was the minimum at WR04) whereas minimum turbidity values at all other sampling points were zero. This is likely a result of there being no opportunities for deposition in the diversion pipeline/penstock. In addition, the water turbulence caused by the turbine in the powerhouse suspends sediment. Implementation of PM&E measures FISH-2 and REC-9 may influence turbidity in the river. Fish ladder construction may result in localized erosion and sediment delivery to the river. This could occur during active earthmoving and construction activities. Required BMPs would ameliorate such impacts so that the Project stays within required limits for turbidity. Boater flow releases to satisfy REC-9 would increase the volume of water in the bypassed reach of the river by up to 320 cfs per release. The potential for scour and erosion of the streambank during releases is very low given the rocky and highly armored channel in the bypassed reach, as well as the relatively low volume of releases (the channel commonly handles up to 10 times the proposed boater flow, sometimes for weeks or months, rather than for hours). The boater flows could result in a temporary increase in suspended particles in the river though it would not likely increase turbidity. This is because of the larger volume of water also present in the river reducing the total concentration of suspended particles. In addition, this effect would not exceed approximately 16 hours per year (four boater flows provided on four occasions) and would likely occur between approximately late April and early July depending on the runoff in any given year and Project operational factors.

Parameter	Summary of Effects
Total Suspended Solids	Effects of implementation of the proposed action on TSS would be the same as those described for turbidity because of the close relationship between turbidity (a measure of the cloudiness or haziness of water caused by large numbers of individual particles) and TSS (a measure of the total amount, by weight, of solid material suspended in water).

Fisheries and Aquatic Resources

Under the proposed action the Project would be relicensed for a period of 30-50 years with the adoption and implementation of the PM&E measures summarized above. The continued presence and operation of the Project would generally result in the persistence of conditions and trends described in the affected environment with the exception of modifications created by implementation of water resources (hydrology) and fisheries and aquatic resources related PM&E measures (PM&E measures HYD-1 and FISH-1 through FISH-4; note that implementation of FISH-1 and HYD-1 would propose continuing the current minimum flow regime that has been in effect for many decades). In particular, the construction, operation, and maintenance of a fish ladder suitable for upstream passage of Bonneville cutthroat trout and bluehead sucker (PM&E measure FISH-2) would improve upstream fish passage opportunities for these, and perhaps other, species. Likewise, provisions to keep the low-level gate open during times when the fish ladder is inoperative (PM&E measures FISH-3 and FISH-4) would allow for upstream fish passage as well. The low-level gate also provides an additional opportunity for downstream fish passage when it is open. No changes in habitat other than the fish ladder are proposed. As a result, habitat conditions for aquatic species would remain the same, especially given the inclusion of HYD-1 and FISH-1 in the proposed PM&E measures (these PM&E measures are identical to each other), which propose continuing the existing 34-50 cfs minimum flows through the bypassed reach for the duration of any future license (30-50 years). This flow represents a substantial on-going investment in improved aquatic and fisheries habitat conditions within the Project Area.

Fish entrainment and turbine mortality would remain at or lower than current levels. Overall, entrainment and mortality potential of Bonneville cutthroat and bluehead sucker appears to be relatively low for the Weber Project. Entrainment and mortality risk at unscreened irrigation diversions, such as the DWCCC diversion just downstream from the power plant, may be greater for these populations. This is due to the high percentage of river flow removed and the presumably high mortality levels of entrained fish. The potential for fish entrainment and turbine mortality at the Project is described in detail in Section 3.3.3.1 based on studies conducted in 2016. With construction of the fish ladder and modification of the existing ice sluice as attraction flow coupled with spill, which can occur more often during the higher flow periods, there are several avenues for fish to move downstream without having to go through the turbines. This would reduce the potential for fish entrainment and turbine mortality.

Botanical Resources

Impacts to botanical resources as a result of implementation of the proposed action revolve largely around PM&E measures FISH-2, BOT-2, REC-5, REC-8, and REC-9. Other than implementation of these measures, the primary impact of the proposed action would be the persistence of the botanical resource conditions described in the affected environment.

Earth-moving activities associated with construction of the fish ladder to satisfy PM&E measure FISH-2 would largely affect space that is already developed or is sparsely vegetated. Approximately 31 percent (0.05 acres) of the 0.16 acres modified by fish ladder construction is currently developed space while much of the remainder (69 percent, 0.11 acres) is un-vegetated (e.g., area adjacent to the ice chute, sidewalk areas, etc.) or Weber Recreation Site lawn. Fish ladder construction would present opportunities for weed introduction and spread as a result of the use of earthmoving and other construction equipment. This equipment could carry weed seeds into the Project Area from elsewhere or facilitate the spread of weeds in the vicinity of construction activities. However, BMPs to control the introduction and spread of weeds would be implemented during construction, thereby reducing the magnitude of this potential effect. Furthermore, PM&E measure BOT-2 would require PacifiCorp to conduct and enhance weed control per historic practices subject to land owner weed control requirements and constraints.

Implementation of PM&E measure REC-5 would result in the creation of a new Americans with Disabilities Act (ADA)/Architectural Barriers Act (ABA) compliant accessible picnic site on the flat lawn area closest to the parking lot or modification of the existing but not fully ADA/ABA compliant site. Implementation of this PM&E measure could convert approximately 14 feet by 10 feet of surface area from cultivated grass cover (lawn) to concrete. While this does not represent a botanical loss in terms of native vegetation or an important element of the botanical community it would nonetheless result in the loss of 140 square feet of plant cover within the Project Area to benefit an underserved population.

Trail improvement actions associated with PM&E measure REC-8 would increase the likelihood of weed introduction and spread along the river corridor through the use of tools potentially carrying weed seed and through the presence of workers potentially carrying weed seed. This impact would be limited by the application of weed control BMPs in addition to the implementation of PM&E measure BOT-2 as described above.

Boater flow releases to satisfy REC-9 would increase the volume of water in the bypassed reach of the river by up to 320 cfs and therefore increase, although minimally (see Section 3.3.1 for further explanation), the potential for scour and erosion of the streambank during releases. Eroded stream banks could create barren stream bank surfaces that could provide opportunities for weed establishment and spread. However, given the existing rock armoring in the bypassed reach, this effect is unlikely. In addition, flows released for whitewater boaters would also serve to transport weed seed

downstream to portions of the bypassed reach and below, similar to existing conditions when the Project is off-line. Boater flows would not exceed approximately 16 hours per year (4-hour boater flows provided on four occasions) and would likely occur between approximately late April and early July depending on the runoff in any given year and Project operational factors. While boater flow releases would be limited to 16 hours per year the potential weed establishment and proliferation-related effects could extend beyond this timeframe, although this effect would be indistinguishable from current conditions when the Project is off-line.

Terrestrial Wildlife Resources

Because plant communities and associations are an essential component of wildlife habitat, potential impacts to wildlife habitats as a result of implementation of the proposed action are reflected in the impact analysis contained under the botanical resources heading. Implementation of the proposed action would result in the persistence of species and habitat conditions described in the affected environment because activities proposed under the proposed action are largely a continuation of current activities that make up the affected environment. Earth-moving activities (totaling 0.16 acres) associated with construction of the fish ladder under PM&E measure FISH-2 would largely affect space that is already developed or is sparsely vegetated and does not provide valuable habitat for the species that may pass through or inhabit the area. The Project Area is largely developed space. Approximately 66 percent of the Project Area is within the developed, open space medium high intensity land cover type. Also, under PM&E measure WL-1, before planned maintenance or operational measures that would require ground-disturbing activities are conducted by PacifiCorp, consultation with USFS would be required. This consultation process, while not impact-reducing in and of itself, would likely result in the implementation of resource protection measures as needed, depending on the maintenance or operational activity being conducted. Finally, implementation of PM&E measure REC-7 would provide minor benefits to wildlife foraging and traversing the area by removing impediments to movement.

Recreation

Continued operation of the Project in general would not change the status of recreation resources or their use. However, recreation-related effects would be associated with implementation of PM&E measures HYD-1, FISH-1, FISH-2, FISH-3, FISH-4, and all recreation specific PM&E measures.

Measures HYD-1 and FISH-1 are identical. These measures would continue the existing seasonally-adjusted minimum stream flows (34-50 cfs) for the bypassed reach of the river affected by the Project. Maintaining minimum stream flows for the bypassed reach of the river ensures that appropriate fish habitat conditions are maintained subject to adequate inflows (i.e., occasionally Project inflows are insufficient to meet even the minimum flows; at those times the Project passes all inflows and no generation occurs). As a result, in low flow conditions providing minimum stream flows of 34-50 cfs or

inflow maintains the quality of the fishing experience for recreationists fishing the bypassed reach of the river.

Fish ladder construction as part of implementing PM&E measure FISH-2 is expected to take approximately 9 months. During the construction period recreationists and other non-Project related visitors to the area would be temporarily prohibited from entering and using the recreation site and from accessing the bypassed reach of the river via the recreation site. Fish ladder construction would result in a likely nine-month loss of recreation opportunities for all recreation amenities and opportunities associated with the Project and the bypassed reach of the river. Fish ladder operation, on the other hand, is likely to improve the quality of the fishery by facilitating upstream passage of fish. This may also improve the quality of the fishing experience for recreationists fishing the bypassed reach of the river as well as the forebay and fishable portions of the river upstream of the forebay. Measures FISH-3 and FISH-4 would have similar effects in terms of maintaining the quality of the fishery by facilitating passage of fish.

All of the recreation-related PM&E measures (REC-1 to REC-9) would improve recreation amenities and uses associated with the Project. These effects are summarized below.

Recreation PM&E Measure	Summary of Recreation-related Effects
REC-1	Continued maintenance of the existing recreation site would facilitate the ongoing use of the recreation site as described in the affected environment section of this document.
REC-2	Implementation of measure REC-2 would improve the recreational experience for visitors by providing them with more information related to recreation and other resources present at the site.
REC-3	The creation of a webpage indicating approximate bypassed reach flows would improve access for recreationists to real-time information about flows in the river. Access to real-time information about flows would facilitate boater use of the river particularly during periods of high flow in the spring months. This information would also be useful to recreationists seeking to fish the bypassed reach of the river and wanting to ensure they do so during wadeable timeframes.
REC-4	This measure would improve visitors' enjoyment of the recreation site by facilitating dog waste clean-up by visitors with dogs and subsequently reducing the presence of dog waste left by other visitors. Also, the presence of a year-round permanent vault toilet facility would improve the recreational experience at the site during the off season months when a portable toilet is currently not provided at the site (currently in the off season visitors need to use the toilet facilities at the nearby rest stop upstream of the Project recreation facilities).
REC-5	The creation or modification of the ADA/ABA compliant accessible picnic site at the Weber Recreation Site would improve a recreation amenity for individuals with disabilities. Current information on the volume of visitors with disabilities that are using the site is unavailable.
REC-6	The maintenance/repaving of the access road to the recreation site and the maintenance/repaving of the existing asphalt path in the picnic area would improve the visitor experience for recreationists by creating a more even and continuous surface for driving to the site as well as walking in the picnic area either for purposes of picnicking or river access.
REC-7	The reconfiguration of fencing on the west end of the recreation site to remove the south, east, and west portions of the fence would improve the scenic quality of the picnic area for recreationists.

Recreation PM&E Measure	Summary of Recreation-related Effects
REC-8	This measure prescribes the improvement of the user-created trail on the west end of the recreation site that provides access to the bypassed reach of the river just downstream from the diversion dam. Implementation of this measure would improve the recreational experience of recreationists accessing the bypassed reach of the river by increasing the ease and safety of river access. This measure also prescribes the provision of funds through an off-license agreement with TU to fund a cooperative effort to improve pedestrian river access at the under-freeway user-created trail extending west from the recreation site and outside the Project Boundary. Implementation of this measure would improve the recreational experience of recreationists using this trail by increasing the ease and safety of trail use in this location. Funds provided through the off-license agreement may be used by TU to provide another habitat benefit in the watershed in the event that improving pedestrian river access in the indicated location is infeasible or requires less funding than provided through the agreement. What this habitat benefit would be is unknown.
REC-9	Implementation of this measure would benefit whitewater boaters by providing them with a total of 16 hours of additional boatable flows per year. On the other hand, recreationists desiring to fish the bypassed reach of the river at these times would potentially encounter non-wadeable conditions limiting their access to the river other than from the river bank.

Socioeconomics

Under the proposed action the Project would be relicensed, with the proposed PM&E measures outlined in Table 11, for an additional 30-50 years. The socioeconomic benefits of the Project would continue for the duration of the term of the new license. This translates to an additional 30-50 years of annual economic contribution of the Project to the economy of the state of Utah as well as an additional 30-50 years of benefits to the storage water needs of several water conservancy districts which rely on the Project's winter water rights to allow water storage in several reservoirs. Furthermore, the Project would continue to provide a reliable supply of renewable energy to the area.

5.2 COMPREHENSIVE DEVELOPMENT AND RECOMMENDED ALTERNATIVE

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

Based on agency and public comments filed on this Project and the environmental effects of the Project under the proposed action and no-action alternatives, PacifiCorp

recommends the proposed action including the proposed PM&E measures outlined in Table 11, for a license term of 50 years due to the substantial investment in the PM&E measures specified. The proposed action includes all elements of PacifiCorp's proposal and PM&E measures developed in coordination with stakeholders through the ALP. PacifiCorp recommends this alternative for the following reasons: (1) issuance of a new hydropower license by the Commission would allow PacifiCorp to operate the Project as a dependable source of electrical energy for its customers; (2) the 3.85 MW of electrical energy generated from this renewable resource may offset the use of fossil-fueled, steam-electric generating plants, thereby conserving nonrenewable resources; (3) the public benefits of this alternative would exceed those of the no-action alternative; and (4) the PM&E measures would maintain substantial minimum stream flows, protect and enhance fisheries resources through the construction of a fish ladder suitable for passage of all species of concern in the lower mainstem Weber River, protect botanical and terrestrial wildlife resources, protect cultural and tribal resources, and provide improved recreation opportunities at the Project.

5.3 UNAVOIDABLE ADVERSE EFFECTS

Unavoidable adverse effects anticipated as a result of implementation of the proposed action are limited to effects associated with geological and soil resources, fisheries and aquatic resources, botanical resources, and recreation.

Geological and Soil Resources

The Project is situated within an area known to contain faults, landslide risks, and debris flow risks. The continued operation of the facility and the specific PM&E measures would not aggravate or contribute to risks associated with these hazards. However, faults, landslide risks, and debris flow risks do pose a risk to Project facilities and Project operations, similar to that expected under the no-action alternative.

Fish ladder construction would result in earthmoving activities which have the potential to result in localized erosion and soil loss. A total of 0.16 acres of earthmoving and construction activities are planned for fish ladder construction. Erosion control measures and other BMPs (e.g., silt fences, etc.) as required by regulatory authorities would be implemented to reduce sediment delivery to the Weber River during construction.

It is anticipated that trail improvement activities to satisfy PM&E measure REC-8, specifically step construction, on the trail within the Project Boundary leading south to the north bank of the Weber River may result in a small area of localized disturbance to surface soils along the trail. Step construction is unlikely to result in a substantive amount of soil loss and soil delivery to the river because of the limited construction activities. The presence of the steps along this trail would ultimately reduce the potential for soil erosion and soil delivery to the river in the future.

Fisheries and Aquatic Resources

Fish entrainment and turbine mortality would remain at or lower than current levels as the proposed fish ladder would allow an additional safe potential avenue for downstream movement of fish in the Project reach of the Weber River. Overall, entrainment and mortality potential of Bonneville cutthroat and bluehead sucker appears to be relatively low for the Weber Project. Entrainment and mortality risk at unscreened irrigation diversions, such as the DWCCC diversion just downstream from the power plant, may be greater for these populations. This is due to the high percentage of river flow removed and the presumably high mortality levels of entrained fish. The potential for fish entrainment and turbine mortality is described in detail in Section 3.3.3.1 based on studies conducted in 2016. With construction of the fish ladder and modification of the existing ice chute as attraction flow coupled with spill, which can occur more often during the higher flow periods, there are several avenues for fish to move downstream without having to go through the turbines. This would reduce the potential for fish entrainment and turbine mortality.

Botanical Resources

Fish ladder construction would present opportunities for weed introduction and spread as a result of the use of earthmoving and other construction equipment. However, BMPs to control the introduction and spread of weeds would be implemented during construction, thereby reducing the magnitude of this potential effect. Furthermore, PM&E measure BOT-2 would require PacifiCorp to conduct and enhance weed control per historic practices subject to land owner weed control requirements and constraints.

Implementation of PM&E measure REC-5 could convert approximately 14 feet by 10 feet of surface area from cultivated grass cover (lawn) to concrete. While this does not represent a botanical loss in terms of native vegetation or an important element of the botanical community it would nonetheless result in the loss of 140 square feet of plant cover within the Project Area.

Recreation

Fish ladder construction would result in a likely nine-month loss of recreation opportunities for all recreation amenities and opportunities associated with the Project and the bypassed reach of the river.

5.4 RECOMMENDATIONS OF FISH AND WILDLIFE AGENCIES

Under the provisions of §10(j) of the FPA, each hydroelectric license issued by the Commission shall include conditions based on recommendations provided by federal and state fish and wildlife agencies for the protection, mitigation, or enhancement of fish and wildlife resources affected by the Project. As part of the ALP, PacifiCorp coordinated directly with UDWR and FWS in the development of measures intended to protect, mitigate, or enhance fish and wildlife resources affected by the Project. All PM&E

measures are provided in Table 11. Those PM&E measures relating directly to fish and wildlife resources and also listed below.

- HYD-1: Continue existing seasonally-adjusted minimum stream flows (34-50 cfs). Implement annual change, if needed, in required minimum streamflow within 10 days of the final Weber River runoff forecast from Natural Resources Conservation Service (NRCS), using the current formula.
- FISH-1: Continue to provide minimum stream flow for the bypassed reach of the river affected by the Weber Project (identical to HYD-1, above).
- FISH-2: Construct, operate, and maintain a fish ladder suitable for upstream passage of both Bonneville cutthroat trout (BCT) and bluehead sucker, including a fish trap operated by UDWR and TU and maintained by PacifiCorp. PacifiCorp will consult annually with UDWR, TU, and USFS related to fish ladder and trap operation and maintenance according to a Communication Plan developed between UDWR, TU, USFS, FWS and PacifiCorp (see Appendix E, Communication Plan). The Communication Plan will also specify group contacts, alternates, and contact methods over the life of the license.
- FISH-3: Keep the low-level gate operational when forebay is dewatered subject to operational constraints and requirements such as extreme winter icing conditions (undertake periodic maintenance as required to ensure operation). If the forebay is dewatered and the low-level gate is inoperable for more than 10 days due to extreme temperature or flow conditions, PacifiCorp will consult with UDWR, TU, FWS), UDWQ, and USFS (per the Communication Plan methods) and open the low-level gate as soon as possible.
- FISH-4: In the event of a prolonged project outage, keep forebay full if possible to ensure fish ladder operation; PacifiCorp will consult with UDWR, TU, FWS, DWQ, and USFS (per the Communication Plan methods) to discuss fishway operation during any interim periods exceeding 10 days when neither the low-level gate nor the fishway are operable.
- BOT-1: Continue existing annual USFS consultation.
- BOT-2: Conduct weed control per historic practice, adding the area abutting improved project river access point in riparian habitat, subject to landowner weed control requirements and constraints.
- WL-1: Continue existing annual USFS consultation.

5.5 CONSISTENCY WITH COMPREHENSIVE PLANS

FPA §10(a)(2), 16 U.S.C. §803(a)(2)(A), requires the Commission to consider the extent to which a project is consistent with federal and state comprehensive plans for

improving, developing, or conserving a waterway or waterways affected by a project. Table 42 provides a listing of the plans that were reviewed to determine consistency as well as the outcome of the consistency review. See also Section 2.7 of Exhibit H for additional detail regarding consistency with comprehensive plans.

Table 42. Consistency with Comprehensive Plans.

Plan	Consistency Determination
Wasatch-Cache National Forest Land and Resource Management Plan (USFS 2003)	No inconsistencies found
Rangewide conservation agreement and strategy for Bonneville cutthroat trout (Lentsch et al. 2000)	No inconsistencies found
Conservation agreement and strategy for Bonneville cutthroat trout in the state of Utah (Utah Bonneville Cutthroat Trout Team 2008)	No inconsistencies found
Fisheries USA: the recreational fisheries policy of the U.S. Fish and Wildlife Service (FWS 1989)	No inconsistencies found
Conservation and management plan for three fish species in Utah (UDNR 2006a)	No inconsistencies found
Range-wide conservation agreement and strategy for roundtail chub, bluehead sucker, and flannelmouth sucker (UDNR 2006b)	No inconsistencies found
2014 Utah Statewide Comprehensive Outdoor Recreation Plan (SCORP) (UDNR 2014)	No inconsistencies found
Weber River Watershed Plan (Weber River Partnership 2014)	No inconsistencies found

6.0 FINDING OF NO SIGNIFICANT IMPACT

Continuing to operate the Weber Hydroelectric Project, with the proposed PM&E measures, involves little to no land-disturbing or land-clearing activities. Proposed PM&E measures would retain current minimum stream flows in the bypassed reach, enhance fish habitat, promote the protection and enhancement of botanical resources and terrestrial wildlife habitat, promote the protection of cultural resources, and promote and enhance recreational use of the Weber River in the Project Area. Construction of an upstream fish ladder at the Project diversion dam could cause minor, short-term increases in soil erosion and sedimentation that would be largely ameliorated by implementation of erosion control measures and other BMPs (e.g., silt fences, etc.) as required by regulatory authorities. Fish entrainment and turbine mortality would remain at or lower than current levels. Overall, entrainment and mortality potential of Bonneville cutthroat and bluehead sucker appears to be relatively low for the Weber Project. Fish ladder construction would present opportunities for weed introduction and spread as a result of the use of earthmoving and other construction equipment. However, BMPs to control the introduction and spread of weeds would be implemented during construction, thereby reducing the magnitude of this potential effect. Fish ladder construction would result in a likely short-term (nine-month) loss of recreation opportunities for all recreation amenities and opportunities associated with the Project and the bypassed reach of the river. Fish ladder operation, on the other hand, is likely to improve the quality of the fishery by facilitating upstream passage of fish. Also, all of the recreation-related PM&E measures (REC-1 to REC-9) would improve recreation amenities and uses associated with the Project.

On the basis of the analysis in this APEA, the issuance of a 50-year license for the Weber Hydroelectric Project (FERC No. 1744), with the proposed PM&E measures, would not constitute a major federal action significantly affecting the quality of the human environment.

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8.0 LIST OF PREPARERS

The individuals listed below prepared or provided substantive input into the preparation of this APEA. Several individuals listed did not prepare elements of the APEA proper but prepared all or substantive portions of technical reports that are the basis for much of the data and information in this APEA. Stakeholder reviewers of the APEA that provided comments on the preliminary draft APEA are also listed below.

Organization/ Preparer Name	Role	Highest Educational Degree Earned	Field of Degree
Cirrus Ecological Solutions			
Neal Artz	Recreation contributing author	Ph.D.	Range Science
Matt Westover	Recreation contributing author	M.S	Wildlife and Wildlands Conservation
ERM			
John Gangemi	Whitewater recreation contributing author	M.S.	Environmental Studies
Gaddis Consulting, LLC			
Benjamin Gaddis	APEA coordinator and primary author	M.E.M.	Water Resource Management
Kleinschmidt			
Finlay Anderson	Document review and Exhibits A and H contributing author	M.S.	Marine Resource Management
Jesse Waldrip	Fish passage contributing author	B.S.	Civil Engineering
PacifiCorp			
Connely Baldwin	Hydrology contributing author, generation data	M.S.	Civil and Environmental Engineering—Hydrology
Beth Bendickson	Document review and filing	A.A.	Business Administration
Eve Davies	Project manager	M.S.	Ecology
Tyler Dimick	Supporting Design Report master (Exhibit F)	M.E.	Civil and Structural Engineering
Stewart Edwards	Fish passage engineering review	M.S.	Civil Engineering
Russ Howison	Cultural and recreation resources review	B.S.	Environmental Geography
Mike Ichisaka	Exhibit G primary author, Exhibit F review	B.S.	Wildlife Management
Jack Kolkman	Document review	B.S.	Electrical Engineering
Todd Olson	Document review	B.S.	Biology

Organization/ Preparer Name	Role	Highest Educational Degree Earned	Field of Degree
Judy Schwab	Exhibit F contributing author	Certificate	Administrative Management
Frank Shrier	Fisheries and water quality contributing author	M.S.	Fish Ecology
RedFISH			
Justin Barker	Fisheries contributing author	B.S.	Geography
Ernesto de la Hoz	Fisheries contributing author	M.S.	Aquatic Ecology
Keith Lawrence	Fisheries contributing author	M.S.	Fisheries and Wildlife
SWCA			
John Christensen	Water resource contributing author	M.S.	Geology
Lindsey Kester	Document review, cultural and tribal resources	B.A.	Anthropology
Lisa Krussow	Cultural resource contributing author	M.S.	Anthropology
Stephanie Lechert	Cultural resource contributing author	M.S.	Historic Archaeology
Audrey McCulley	TES contributing author	B.S.	Biology
Lucy Parham	Water resource contributing author	M.S.	Natural Resources
Thomas Sharp	TES contributing author	M.S.	Biology
UDWQ			
Kari Lundeen	Stakeholder review	M.S	Geology
UDWR			
Paul Thompson	Stakeholder review	M.S.	Fisheries Biology

APPENDIX A

MEMORANDUM OF AGREEMENT AND LETTER OF SUPPORT

.

October 11, 2017

MEMORANDUM OF AGREEMENT
Regarding Protection, Mitigation and Enhancement Measures
at PacifiCorp's Weber Hydroelectric Project

This Memorandum of Agreement (MOA) is between PacifiCorp, Utah Division of Wildlife Resources (UDWR), U.S. Fish and Wildlife Service (FWS), U.S.D.A Forest Service (USFS), U.S. Bureau of Reclamation (BOR), American Whitewater (AW), Davis and Weber Counties Canal Company (DWCCC), Trout Unlimited (TU), Weber Basin Water Conservancy District (WBWCD) and Weber River Water Users Association (WRWUA), each of which may be individually referred to as a "Party" or collectively referred to as the "Parties."

RECITALS

A. PacifiCorp is Federal Energy Regulatory Commission (FERC) licensee of the Weber Hydroelectric Project, FERC Project No. 1744 (the Project), located on the Weber River in Weber, Morgan and Davis counties, Utah; and

B. PacifiCorp's current FERC license for the Project expires on May 31, 2020, and PacifiCorp has applied to FERC for a new license pursuant to the Federal Power Act (FPA), 16 U.S.C. § 791a *et. seq.*; and

C. The Parties to this MOA are all stakeholders with an interest in the relicensing of the Project; and

D. The Parties have agreed to a list of the protection, mitigation and enhancement measures (PM&E Measures) that the Parties believe best balance: the need to protect natural and cultural resources; the need for hydroelectric generation; the need to protect existing water rights; and the goal of enhancing recreational resources associated with the Project; and

E. The Parties wish to memorialize their agreement regarding the appropriate PM&E Measures for the relicensing of the Project and therefore enter into this MOA. This MOA will be submitted to FERC to demonstrate the Parties' support of and limitations to the PM&E Measures.

AGREEMENT

1. **Term.** This MOA will become effective when executed by all Parties. This MOA will remain in effect until the final 4(e) terms and license conditions have been submitted to and accepted by FERC, and the license is final.

2. **PM&E Measures.** The Parties agree that the PM&E Measures (as further defined by the Weber Final Technical Reports filed with FERC June 30, 2017), listed in Appendix A to this MOA are appropriate and represent a fair and acceptable balance of the interests involved, including without limitation: the need to protect natural and cultural resources; the need for hydroelectric generation; the need to protect existing water rights; and the goal of enhancing recreational resources associated with the Project. The Parties agree that during the FERC proceeding to relicense the Project, the Parties will advocate for the adoption of the PM&E measures listed in Appendix A. With the

exceptions noted below, the Parties agree that they will not request, advocate for, or prescribe any measures beyond those listed in Appendix A or that are contrary to those listed in Appendix A *unless* all Parties to this MOA have first agreed in writing that such additional measures should be proposed to FERC. The PM&E Measures listed in Appendix A are incorporated into this MOA by this reference.

3. **Reservation of Authority under Section 4(e), Section 10(j), and Section 18 of the FPA.** Certain Parties to this MOA (the "Conditioning Parties", which include the USFWS, USFS, and UDWR) have statutory authority under one or more of the following sections of the FPA to recommend or prescribe certain license conditions: Section 4(e), 16 U.S.C. § 797(e); Section 10(j), 16 U.S.C. § 803(j)(1); and Section 18, 16 U.S.C. § 811. The Conditioning Parties reserve their statutory authority to prescribe or recommend license conditions and nothing in this MOA is intended to waive or alter existing federal law; ***however***, the Conditioning Parties each agree to use their best efforts to recommend license conditions consistent with the PM&E Measures contained in Appendix A.

4. **Support for the Conditions.** To the extent the 4(e) conditions are consistent with this MOA and the PM&E Measures, the Parties shall support the 4(e) conditions. Support for 4(e) conditions consistent with this MOA and PM&E Measures in Appendix A means: no Party will submit a request for a trial type hearing or submit alternative conditions regarding consistent 4(e) conditions; and, no Party shall seek FERC rehearing or Appellate Court review of 4(e) conditions that are consistent with this MOA and the PM&E measures. To the extent allowed by applicable law, the Parties agree not to advocate to FERC for measures inconsistent with the PM&E Measures and consistent 4(e) conditions, or to any other federal, state, or local agency, or court, whose approval may be necessary to put the PM&E measures into effect.

5. **Conditioning Authorities.** Nothing in this MOA is intended to amend, waive, forfeit or in any manner modify the authorities of the USFS, UDWR, and USFWS under sections 4(e), 10(j), and 18 of the Federal Power Act or any other federal law.

6. **Miscellaneous Provisions.** Except as referenced in Appendix A, this MOA, including Appendix A, constitutes the entire agreement between the Parties regarding PM&E Measures for the Project. No supplement, modification or amendment of this MOA will be effective unless it is in writing and signed by all Parties. No waiver of any term of this MOA is a waiver of any other term, and no waiver of any term constitutes a continuing waiver of that term. No waiver is effective unless signed in writing by the waiving Party. This MOA may be signed in any number of counterparts, each counterpart is an original, and together all counterparts form one single document. The provisions of the MOA will not be construed against the drafter.

7. **Rights under Agreement.** This MOA creates no right, benefit, remedy, or trust responsibility, substantive or procedural, enforceable by law or equity by any Party or by the Parties.

8. **No Third Party Rights.** Nothing in this MOA is intended to confer any rights or remedies on any person other than the Parties to this MOA.

9. **Assignment.** Neither this MOA, nor any right, interest or obligation hereunder, may be assigned, sold, transferred or conveyed without the prior written consent of the other Parties.

10. **Amendment.** This MOA may be altered, amended, or modified only by an instrument in writing, executed by the Parties to this MOA.

11. **Termination.** Any of the parties, in writing, may terminate their participation in this MOA at any time by providing written notice to the other Parties.

12. **Anti-Deficiency Act.** Nothing in this MOA shall be interpreted as or constitute a commitment or requirement that the federal agencies obligate funds in contravention of the Anti-Deficiency Act, 31 U.S.C. 1341, or any other applicable law or regulation.

13. **Coordinated Efforts.** The Parties shall manage their respective resources and activities in a separate, coordinated manner to meet the purpose(s) of this MOA. Nothing in this MOA authorizes any of the Parties to obligate or transfer anything of value.

14. **Separate Agreements.** Specific, prospective projects or activities that involve the transfer of funds, services, property, and/or anything of value to a Party requires the execution of separate agreements and are contingent upon numerous factors, including, as applicable, but not limited to: agency availability of appropriated funds and other resources; cooperator availability of funds and other resources; agency and cooperator administrative and legal requirements (including agency authorization by statute); etc. This MOA neither provides, nor meets these criteria. If the Parties elect to enter into an obligation agreement that involves the transfer of funds, services, property, and/or anything of value to a Party, then the applicable criteria must be met. Additionally, under a prospective agreement, each Party operates under its own laws, regulations, and/or policies, and any Forest Service obligation is subject to the availability of appropriated funds and other resources. The negotiation, execution, and administration of these prospective agreements must comply with all applicable law.

15. **Reservation of Authority.** Nothing in this MOA is intended to alter, limit, or expand the agencies' statutory and regulatory authority.

16. **Notice.** Any notice required by this MOA shall be in writing. It shall be sent by first class mail, electronic mail, or comparable method of distribution to other Parties. For the purpose of notice, the authorized representatives of the Parties as of the Effective Date are:

17. **Authority.** Each signatory to this MOA certifies that he or she is authorized to execute this MOA.

PacifiCorp: Mark Sturtevant, Managing Director, Renewable Resources

Utah Division of Wildlife Resources: Michal D. Fowlks, Director

U.S. Fish and Wildlife Service: Larry Crist, Field Supervisor, Utah Ecological Services Field Office

U.S.D.A Forest Service: Nora B. Rasure, Regional Forester, Region 4

U.S. Bureau of Reclamation: Wayne Pullan, Area Manager

American Whitewater: Charles Vincent, Regional Representative

Davis and Weber Counties Canal Company: Richard D. Smith, P.E., General Manager

Trout Unlimited: Paul Burnett, Utah Water and Habitat Program Lead

Weber River Water Users Association: Richard D. Smith, P.E., General Manager

Weber Basin Water Conservancy District: Tage Flint, General Manager/CEO

The foregoing terms and conditions are hereby **AGREED:**

PacifiCorp:

Mark Sturtevant
Managing Director
Renewable Resources

10/23/2017
date

October 11, 2017

The foregoing terms and conditions are hereby **AGREED:**

Utah Division of Wildlife Resources:

Michal D. Fowlks 10/17/17
Director ACTING DIRECTOR

CONTRACT RECEIVED AND PROCESSED BY
DIVISION OF FINANCE

NOV 03 2017

L Braithwaite 10/16/17
Financial Mgr. Date
Division of Wildlife Resources

The foregoing terms and conditions are hereby **AGREED:**

U.S. Fish and Wildlife Service:

L. Crist 10/30/2017

Larry Crist — date
Field Supervisor
Utah Ecological Services Field Office

The foregoing terms and conditions are hereby **AGREED:**

U.S.D.A Forest Service:

for _____ 10/18/17
Nora B. Rasure date
Regional Forester

The foregoing terms and conditions are hereby **AGREED:**

U.S. Bureau of Reclamation:

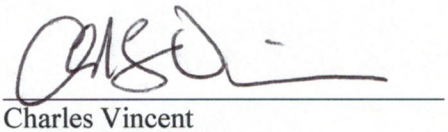
19OCT2017

Wayne Pullan
Area Manager

date

The foregoing terms and conditions are hereby **AGREED:**

American Whitewater:



Charles Vincent
Regional Representative

10/29/17
date

The foregoing terms and conditions are hereby **AGREED:**

Davis and Weber Counties Canal Company:

Richard D Smith 10-25-17

Richard D. Smith, P.E. date
General Manager

The foregoing terms and conditions are hereby **AGREED:**

Trout Unlimited:

11/20/2017

Paul Burnett — date
Utah Water and Habitat Program Lead

The foregoing terms and conditions are hereby **AGREED:**

Weber River Water Users Association:

Richard D Smith 10-25-17

Richard D. Smith, P.E. date
General Manager

The foregoing terms and conditions are hereby **AGREED:**

Weber Basin Water Conservancy District:

11/2/17

Tage Flint
General Manager/CEO

date

APPENDIX A

Memorandum of Agreement regarding PM&E Measures
at PacifiCorp's Weber Hydroelectric Project

RESOURCE	PROPOSED WEBER PM&E MEASURES
Geology and Soils	None
Water Resources -Hydrology	**HYD-1**: Continue existing seasonally-adjusted minimum stream flows (34-50 cfs). Implement annual change, if needed, in required minimum streamflow within 10 days of the final Weber River runoff forecast from Natural Resources Conservation Service (NRCS), using the current formula.
Water Resources -Water Rights	None No PM&E measure is proposed because existing 1938 and 1965 agreements and existing water rights [35-8061—365 cfs flow right, 35-8062—100 af storage, 35-8741—storage in Echo] will remain unchanged.
Water Resources -Water Quality	None No PM&E measure is proposed because adherence to existing O&M practices is protective of the resource (state water quality standards are being met).
Fisheries and Aquatic Resources	**FISH-1**: Continue to provide minimum stream flow for the bypassed reach of the river affected by the Weber Project (identical to **HYD-1**, above). **FISH-2**: Construct, operate, and maintain a fish ladder suitable for upstream passage of both Bonneville Cutthroat Trout (BCT) and bluehead sucker, including a fish trap operated by Utah Division of Wildlife Resources (UDWR) and Trout Unlimited (TU) and maintained by PacifiCorp. PacifiCorp will consult annually with UDWR, TU, and U.S. Forest Service (USFS) related to fish ladder and trap operation and maintenance according to a Communication Plan developed between UDWR, TU, USFS, U.S. Fish and Wildlife Service (FWS) and PacifiCorp. The Communication Plan will also specify group contacts, alternates, and contact methods over the life of the license. **FISH-3**: Keep the low-level gate operational when forebay is dewatered subject to operational constraints and requirements such as extreme winter icing conditions (undertake periodic maintenance as required to ensure operation). If the forebay is dewatered and the low-level gate is inoperable for more than 10 days due to extreme temperature or flow conditions, PacifiCorp will consult with UDWR, TU, FWS), Utah Division of Water Quality (UDWQ), and USFS (per the Communication Plan methods) and open the low-level gate as soon as possible. **FISH-4**: In the event of a prolonged project outage keep forebay full if possible to ensure fish ladder operation; PacifiCorp will consult with UDWR, TU, FWS, UDWQ, and USFS (per the Communication Plan methods) to discuss fishway operation during any interim periods exceeding 10 days when neither the low-level gate nor the fishway are operable.
Botanical Resources	**BOT-1**: Continue existing annual USFS consultation. **BOT-2**: Conduct weed control per historic practice, adding the area abutting improved project river access point in riparian habitat (see **REC-8**, below), subject to landowner weed control requirements and constraints.
Terrestrial Wildlife Resources	**WL-1**: Continue existing annual USFS consultation.

RESOURCE	PROPOSED WEBER PM&E MEASURES
Cultural and Tribal Resources	**CULT-1**: Finalize and implement the updated Historic Properties Management Plan (HPMP) (formerly approved as the Cultural Resources Management Plan [CRMP]).
Recreation Resources	**REC-1**: Continue to maintain the existing Weber Recreation Site, but with modifications outlined below. **REC-2**: Coordinate with USFS, UDWR, TU, UDWQ, FWS, and America Whitewater (AW) on improved interpretive signage; include potential for improved technology to include a code that is scan-able and that links to flow information (REC-3). Install signage instructing visitors on dog waste protocol and provide dog waste bags for disposal. **REC-3**: Create a webpage hosted and maintained by PacifiCorp (linked on both the Corporate website and the Project website) indicating approximate bypass reach flows (program subtracts generation flow from U.S. Geological Survey gage site flow and posts it to website)—when minimum streamflow only, the calculated number will be replaced by the phrase "minimum streamflow of approximately 50 cfs or inflow" to eliminate the risk of showing a calculated flow that could be less than the minimum for that period. **REC-4**: Install and maintain a year-round permanent vault Americans with Disabilities Act (ADA)/ Architectural Barriers Act (ABA)-compliant toilet facility (flush bathrooms are available at the Utah Department of Transportation (UDOT) rest stop upstream) **REC-5**: Consult with USFS to create a new ADA/ABA compliant accessible picnic site on flat lawn area closest to parking lot (consisting of a concrete pad, a grill, and an accessible picnic table), or to modify the existing site per USFS standards. **REC-6**: Maintain/repave access road to Weber Recreation Site and existing asphalt path in picnic area. **REC-7**: Reconfigure former sandbox area fencing to remove south, east, and west portions (retain north portion to partition recreation site from I-84) **REC-8**: Improve two existing user-created trails located in and outside the Weber FERC Project Boundary: a. In the Project Boundary, improve (construct steps) the existing dirt river access trail at the west end of the recreation site; b. Outside the Project Boundary, provide $30,000 through an off-license agreement with TU to fund cooperative effort to improve pedestrian river access (with concurrence from UDOT and the underlying land owner) at the under-freeway user-created trail extending west from the Weber recreation site—proposed improvements would involve breaking up the existing large-boulder surface or backfilling this surface to create a navigable path of smaller rock with minimal width (no paving). Funds provided through the off-license agreement may be used by TU to provide another habitat benefit in the watershed in the event that improving pedestrian river access in the indicated location is infeasible or requires less funding than provided through the agreement.

RESOURCE	PROPOSED WEBER PM&E MEASURES
	REC-9: Support whitewater boating use of bypass reach: If AW can identify access which it believes to be safe and legal, the USFS and Davis and Weber Counties Canal Company (DWCCC) agree to review the proposed access and the items and improvements needed for safe use, such as but not limited to signage, steps for the portage area, and hazard mitigation. If the USFS agrees, in its sole discretion, that the proposed access is appropriate for public use, PacifiCorp will annually provide boater flows to the bypass reach by curtailing generation (up to 320 cfs or inflow) for 4-hour segments on four Saturdays prior to July 15. Flow schedule and notice to be determined in conjunction with AW, and in coordination with DWCCC and USFS, with the provision that boater flows in the future may be subject to minimum boater use (fewer than a minimum threshold of boaters may result in suspension of boater flows). Specific use triggers and related release changes to be determined.
Land Use	None
Aesthetic Resources	None
Socioeconomic Resources	None

State of Utah
GARY R. HERBERT
Governor

SPENCER J. COX
Lieutenant Governor

Department of
Environmental Quality

Alan Matheson
Executive Director

DIVISION OF WATER QUALITY
Erica Brown Gaddis, PhD
Director

October 5, 2017

Eve Davies
Principal Environmental Scientist
PacifiCorp
1407 West North Temple
Salt Lake City, UT 84116

Re: Letter of support regarding Protection, Mitigation, and Enhancement (PM&E) Measures at PacifiCorp's Weber Hydroelectric Project (FERC Project No. 1744-039)

Dear Ms. Davies,

This letter is to express the Utah Division of Water Quality's (UDWQ) support of the PM&E Measures developed in a collaborative effort between PacifiCorp and stakeholders in the Weber River Watershed. This collaboration was undertaken as part of the Alternative Licensing Process (ALP) for the Weber Hydroelectric Project. UDWQ has participated in all stakeholder meetings associated with the ALP. UDWQ has provided feedback during all phases of PM&E measure development, including providing comments and recommendations on the water quality sampling plan, participating in scoping of sampling locations, and reviewing and commenting on the data analysis.

PacifiCorp conducted monthly water quality sampling during 2016, including deploying long-term monitoring sensors (Final Water Resource Technical Report, Weber Hydroelectric Project Relicensing FERC Project No. 1744 – June 30, 2017). Data collected indicated that the water emanating from the Weber Hydroelectric project is meeting water quality standards. Based on the results of the Water Resource Technical Report, UDWQ does not foresee the need for additional studies or sampling, nor does UDWQ foresee requesting additional provisions in Utah's 401 water quality certifications other than the agreed upon PM&E measures. However, UDWQ reserves the right to request additional provisions until the National Environmental Policy Act process is complete.

UDWQ appreciates PacifiCorp's commitment to engaging stakeholders in all aspects of the ALP and considering their input and concerns upfront. The UDWQ agrees that the PM&E measures developed by the stakeholders and PacifiCorp balance the need to protect natural and cultural

resources (including streamflow, water quality, and in-stream habitat), the need for hydroelectric generation, the need to protect existing water rights, and the goal of enhancing recreational resources associated with the Project.

If you have any questions or concerns, please contact Kari Lundeen of my staff at 801.536.4335 or klundeen@utah.gov.

Sincerely,

Kim Shelley
Acting Director

KS/KL/blj

cc: Kari Lundeen, DWQ, via email
William Damery, DWQ, via email

DWQ-2017-009709

APPENDIX B

DRAFT HISTORIC PROPERTIES MANAGEMENT PLAN

SWCA®
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Historic Properties Management Plan for PacifiCorp's Weber Hydroelectric Project Relicensing in Weber, Morgan, and Davis Counties, Utah,

FERC Project No. 1744

Prepared for

PacifiCorp

Prepared by

SWCA Environmental Consultants

December 2017

HISTORIC PROPERTIES MANAGEMENT PLAN FOR PACIFICORP'S WEBER HYDROELECTRIC PROJECT RELICENSING IN WEBER, MORGAN, AND DAVIS COUNTIES, UTAH,

FERC PROJECT NO. 1744

Prepared for

PacifiCorp
Hydro Resources
1407 West North Temple, Room 110
Salt Lake City, Utah 84116

Prepared by

R. Kelly Beck, Ph.D.

SWCA Environmental Consultants
257 East 200 South, Suite 200
Salt Lake City, Utah 84111-2048
(801) 322-4307
www.swca.com

SWCA Project No. 35579

December 2017

ABSTRACT

PacifiCorp, a subsidiary of Berkshire Hathaway Energy, filed a new application for relicense of the Weber Hydroelectric Project (Project), Federal Energy Regulatory Commission (FERC or Commission) Project No. 1744, on the Weber River in Weber, Morgan, and Davis Counties, Utah. Berkshire Hathaway Energy has prepared this document in support of that relicensing effort. The Project area is defined as all lands and waters within the existing FERC Project Boundary for FERC Project No. 1744. The Project is found among, and incorporates elements of, the Devil's Gate/Weber Hydroelectric Power Plant Historic District. Also found within the Project area are segments of the Union Pacific Railroad and of the old U.S. Highway 30 South, both significant historic localities that are eligible for the National Register of Historic Places. In an effort to better avoid, minimize, and mitigate any adverse effects that continued operation of the Project might pose to these historic properties, a historic properties management plan has been developed. This plan provides background information on the Project and describes changes likely to occur as a result of Project operation. It also describes various ongoing maintenance, operation, and improvement actions that could affect various aspects of the cultural resources. The plan details the standards and procedures that PacifiCorp will follow in evaluating the impacts of any proposed action or undertaking on the historic properties and the measures that would be used to mitigate the effects of those actions.

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OVERVIEW AND EXECUTIVE SUMMARY

PacifiCorp, a subsidiary of Berkshire Hathaway Energy, filed a new application for relicense of the Weber Hydroelectric Project (Project), Federal Energy Regulatory Commission (FERC or Commission) Project No. 1744, on the Weber River in Weber, Morgan, and Davis Counties, Utah. Berkshire Hathaway Energy has prepared this document in support of that relicensing effort. The Project area is defined as all lands and waters within the existing FERC Project Boundary for FERC Project No. 1744. The Project is found among, and incorporates elements of, the Devil's Gate/Weber Hydroelectric Power Plant Historic District. Also found within the Project area are segments of the Union Pacific Railroad and of the old U.S. Highway 30 South, both significant historic localities that are eligible for the National Register of Historic Places (NRHP). In an effort to better avoid, minimize, and mitigate any adverse effects that continued operation of the Project might pose to these historic properties, a historic properties management plan has been developed. This plan provides background information on the Project and describes changes likely to occur as a result of Project operation. It also describes various ongoing maintenance, operation, and improvement actions that could affect various aspects of the cultural resources. The plan details the standards and procedures that PacifiCorp will follow in evaluating the impacts of any proposed action or undertaking on the historic properties and the measures that would be used to mitigate the effects of those actions.

BACKGROUND INFORMATION

Facility Description

The Project is a run-of-river operation initially constructed in 1910 by Utah Light and Railway Company and was then known as the Devil's Gate-Weber Hydroelectric Power Plant. The Project was later acquired by Utah Power & Light in 1944. The Project has a generating capacity of 3.85 megawatts. The original license was made effective on January 1, 1938, and expired on June 30, 1970. Subsequently, a FERC operating license was issued each year for the period from June 30, 1970, to June 28, 1990. After PacifiCorp completed a follow-up relicensing process with FERC, the current license was issued on June 28, 1990. This license expires on June 1, 2020.

The existing Project consists of the following components:

1. A 27-foot-high, 79-foot-long concrete diversion dam, having two radial gates approximately 29 feet wide, and a 35-foot-wide intake structure, for a total width of 114 feet, on the Weber River
2. A 9,107-foot-long, 5-foot- to 6.3-foot-diameter steel pipeline partially encased in concrete beginning at the intake and terminating at the powerhouse on the Weber River
3. A 3 × 18–foot non-operative fish-passage structure (used however to pass the minimum flow through the calibrated slide gate opening)
4. A forebay with a surface area of 8.4 acres and total water storage capacity of approximately 42 acre-feet
5. A powerhouse containing a generating unit with a rated capacity of 3,850 kilowatt operating under a head of 185 feet producing a 30-year average annual energy output of 16,932 megawatt-hours
6. A discharging pipe returning turbine flows into the Weber River at the powerhouse
7. A 77-foot-long, 46-kilovolt transmission line that connects to the Weber substation

Recreational uses around the Project include day uses such as picnicking and fishing. The approximately 8-acre forebay is too small and shallow to accommodate boating; however, the adjacent Weber recreation site does have a small Americans with Disabilities Act–accessible fishing platform, lawn area, and several

picnic tables and barbeque stands. Fishing access is also available at the Weber Dam, beginning approximately 200 yards downstream of the dam.

Historic Context

The following sections provide a general context in which to evaluate the resources that have been newly identified in the Project area. Only those periods where known or suspected cultural resources are present in the Project area are discussed here.

Early Exploration and Settlement (A.D. 1776–1870)

The first documented occurrence of non-native peoples to visit northern Utah happened in 1776, when an expedition led by Spanish friars Francisco Atanasio Dominguez and Silvestre Velez de Escalante entered the Utah Valley (May 1987:24). The Spanish expedition never made it as far north as the Salt Lake Valley, and no permanent Spanish presence was established along the Wasatch Front as a result of their explorations (Sillitoe 1996:17). Other Euro-American explorers soon followed the Spaniards, and by the 1820s, trappers Louis Vasquez, Etienne Provost, and Jim Bridger had all been separately credited with "discovering" Great Salt Lake (Sillitoe 1996:17). Famed fur trader Jedediah Strong Smith was also reported to have explored the northern portion of the Salt Lake Valley in 1826 and 1827 on behalf of the Smith, Jackson, and Sublette Fur Company (DeLafosse 1998; May 1987:35–36).

In the following decades, trappers and traders frequented the streams and lakes of the area in search of beaver and other fur-bearing mammals. Numerous trading posts and rendezvous locales were soon established across the entire Great Basin where pelts could be traded or sold for money or goods. Many Native Americans in the region benefited from the fur trade, trading pelts and other goods for weapons, iron utensils, and other items of use; however, in the process of interacting with Euro-American trappers, many Native Americans were also exposed to new diseases for which they had no immunity and which reduced their overall health and ultimately their population (Alexander 1996:65; Sillitoe 1996:18). The availability of liquor also introduced alcoholism, a Euro-American vice, to the tribes, thus further undermining native cultures (Alexander 1996:65; Sillitoe 1996:18). Declining beaver populations, shifting fashions, and falling fur prices eventually led to a nationwide collapse of the fur trade by the early 1840s (Alexander 1996:62; May 1987:37; Sillitoe 1996:18). By 1844, most of the regional trading posts had been abandoned, effectively ending the fur business in Utah.

In the early 1840s, the federal government took a more concerted interest in the area, sending several surveyors to develop more accurate and comprehensive maps of the western United States. Among these surveyors was John C. Frémont who, in 1843 and 1845, issued reports on the Salt Lake Valley and Wasatch Mountains. Frémont's reports would later serve as a reference for Brigham Young during the Mormon migration westward (Leonard 1999:8; May 1987:52).

In 1841, an immigrant party from Missouri led by John Bidwell and John Bartleson traveled along the northern boundary of Great Salt Lake while in search of an alternate route to California (May 1987:50). The establishment of this route to California through the Great Basin increased the number of travelers through northern Utah. Within a few years, five wagon parties had followed the alternate route through what would later become Davis County. Among these groups was the ill-fated Donner-Reed party who passed through the area in 1846. The Donner-Reed party deviated from the well-known immigrant route through Weber Canyon, opting instead to travel a route proposed by Lansford Hastings through Emigration Canyon, the route that would be followed later by the Mormon pioneers (Carlstrom and Furse 2003:23–26; Leonard 1999:2).

Railroads

The construction of the railroad was of vital importance to the development of the western United States. Following the passage of the Pacific Railway Act of 1862, Union Pacific was organized on October 29, 1863. The railroad officially arrived in Utah by way of Echo Summit in the last week of December 1868. Construction was completed to the mouth of Weber Canyon by February 28, 1869. The first Union Pacific train arrived in Ogden on March 8, 1869 (Strack 1997). The Union Pacific Railroad became the first transcontinental railroad in 1869 when the eastern and western tracks met in Promontory Point, Utah (Ambrose 2000). While the Union Pacific line was being constructed, the Central Pacific line originating in Sacramento was moving eastward and was making considerable progress. Both railroad companies were operating with grants under the Pacific Railway Act, and rights-of-way were being granted according to how much construction was completed. Central Pacific had design plans for a track extending into Weber Canyon. It came to the attention of the U.S. Congress that both railroad designs were parallel and were close to overlapping in many places, and the government quickly mandated that a meeting point be established by the two companies. As a result, the meeting at Promontory Point was fixed. On May 9, 1869, an official telegraph was sent stating that the road to Promontory Point was completed. It was also established in the agreement that a permanent junction between the two lines would be located within 8 miles of Ogden (Strack 1997). This junction eventually came to be known as "Hot Springs." However, because of the mediocre public response in purchasing lots at this location, a new junction location was chosen near present-day Harrisville and was named "Junction City." The first locally generated freight shipped on this line was ore from mining operations in the Wasatch Mountains and the Oquirrh Mountains (Strack 1997).

Within a week of the golden spike ceremony on May 10, 1869, which was held to commemorate the junction of the Union Pacific and Central Pacific lines at Promontory Point, ground-breaking for a railway connecting Ogden with Salt Lake City had begun. Brigham Young began construction of the Utah Central line in late May 1869, when he realized that the Union Pacific and Central Pacific lines were to be routed north of Great Salt Lake and not through Salt Lake City and south around Great Salt Lake. Union Pacific provided the equipment and track to construct the line. Young also collected on the debts owed to him by Union Pacific to assist in constructing grades for the line heading to Promontory Point. The Utah Central line was completed in early January 1870, connecting Salt Lake City, the largest city between Denver and San Francisco, to the trans-continental line and to Ogden.

Highways

Road construction during the early part of Utah's Historic period was funded by tolls, poll taxes, private funds, and, occasionally, the Territorial Government of Utah. Wagon roads were in demand to help transport goods and people across the state, especially before the completion of the railroad in 1869. It was not until 1909 that the Utah State Road Commission was created to address the issue of state highways (Knowlton 1963:135). "By 1920, the commission had inventoried 1,200 miles of roads" and "almost all roads were constructed or maintained by federal money" (Haymond 2008). With the passage of the Federal Highway Act of 1921, "which provided money to improve seven percent of states' road systems," Utah began building even more roads (Haymond 2008). A consistent, national method of numbering highways was recommended by the American Association of State Highway Officials to the federal government in 1924, and this method was officially adopted in 1925 (Weingroff 2013). This would lead to Utah's efforts to get one of their roads officially designated U.S. Highway 30 (U.S. 30). Eventually, the numbering committee decided to split the number into U.S. 30 North (N) and U.S. 30 South (S), with Utah being given the U.S. 30S designation in 1926 (Weingroff 2013). With the creation of the national system of interstate and defense highways in the 1950s, Utah found itself with several interstate highways: I-15, I-70, I-80, and I-80N (U.S. Department of Transportation 1976:474).

Eventually, I-80N through Weber Canyon would be renumbered I-84 in 1977 to reduce confusion over the I-80 and I-80N designations (Utah Department of Transportation 2008).

Power Generation

Between 1890 and 1910, a combination of factors led to the industrialization of Utah, especially to the urban settlements concentrated near the mouths of canyons on the west slope of the Wasatch Mountains (Fiege and Ore 1988). Industrialization spawned rapid urban growth, which stimulated demands for the necessities of city living, such as public transportation and lighting. These urban improvements required electricity. By the 1890s, technological advancements allowed for the generation of relatively inexpensive electrical power that could be transmitted long distances. Stimulated by these improvements, power companies and entrepreneurs began acquiring hydroelectric power sites in the nearby canyons to supply electricity for electric streetcar systems, street lights, and domestic uses. Numerous firms, mostly centered in Salt Lake City, Provo, and Ogden, sprang up with their own power sources to compete for the urban market. By the late 1890s, the competition between the rival power companies stimulated a wave of corporate consolidations. In 1904, a second merger movement occurred, further narrowing the number of competing power companies.

One of the firms created in 1904 was the Utah Light and Railway Company (UL&RC). Formed from the merger of Utah Power & Light and the Consolidated Railway and Power Company, UL&RC combined streetcar lines in Salt Lake City, electrical power and lighting companies, and gas lighting concerns in both Salt Lake City and Ogden. During the first year of its existence, UL&RC directors consolidated and improved the company's electrical generating system to provide for the efficient transmission of power to customers in Ogden and the Salt Lake Valley (Fiege and Ore 1988).

In 1906, E.H. Harriman, president of the Union Pacific Railroad, acquired control of UL&RC by purchasing 60 percent of the firm's stock (Fiege and Ore 1988). The company name remained the same, although the board of directors was reorganized, and W.H. Bancroft, Harriman's Rocky Mountain regional representative and vice-president/general manager of the Oregon Short Line, became president. With the purchase of UL&RC, Harriman hoped to create a model electric streetcar operation in Salt Lake City and took immediate steps to upgrade the system with new rails, transmission lines, and equipment.

Historic Properties

42DV184/42WB344/42MO59, Union Pacific Railroad

A segment of the Union Pacific Railroad is found along the Weber River in Weber Canyon in the Project area. An Intermountain Antiquities Computer System (IMACS) site form from 2015 documenting this segment is provided in Appendix A. This segment is located in Davis, Weber, and Morgan Counties (42DV184/42WB344/42MO59) and measures 2,380 meters (7,808 feet) long. Other segments of the Union Pacific Railroad have been previously documented in multiple Utah counties: Davis (42DV87 and 42DV184), Grant (42GR3429), Iron (42IN1751 and 42IN2731), Juab (42JB1041), Millard (42MD1581 and 42MD1792), Morgan (42MO59 and 42MO60), Sanpete (42SA183 and 42SA550), Salt Lake (42SL300 and 42SL344), Summit (42SM452), Tooele (42TO1298), Utah (42UT1029), Wasatch (42WA75 and 42WA291), Box Elder (42BO822), and Beaver (42BE2012 and 42BE2013).

The construction of the railroad was of vital importance to the development of the western United States. The Union Pacific Railroad became the first transcontinental railroad in 1869 when the eastern and western tracks met in Promontory Point, Utah (Ambrose 2000). The Weber Canyon section was first built

in 1868, and the second line was placed in 1916 (Strack 1997). The railroad has experienced modifications and upgrades since that time and is still in use.

This segment of the Union Pacific Railroad consists of two active railroad tracks and an upgraded modern bridge. One of the bridge supports is stamped with "1916," the date of the second line construction, and, although this alignment appears historic, it has been subjected to modern modifications including standard-gauge tracks, modern ties, and modern utility facilities. The grade is non-native crushed rock fill, and no artifacts or additional historic features were associated with this newly recorded segment.

This segment contributes to the Union Pacific Railroad's historic significance and is eligible for the NRHP under Criterion A. Relicensing of the Weber Hydroelectric Project and associated activity will not adversely affect those characteristics of this site that make it eligible for the NRHP.

42MO75/42WB523, Historic U.S. 30S

A segment of the U.S. 30S alignment in Weber Canyon is found within the Project area. An IMACS site form from 2015 documenting this segment is provided in Appendix A. The road segment follows the northern bank of the Weber River and the Union Pacific Railroad through the bottom of Weber Canyon. Surrounding sediments consist of light brown gray loam with some gravels. Vegetation consists of various riparian grasses and forbs growing up through the remaining asphalt road. The depositional context consists of primarily colluvium with some alluvial deposits.

This segment of U.S. 30S is approximately 13 feet (4 meters) wide and 3,816 feet (1,163 meters) long and has an asphalt and dirt surface. Approximately 650 feet (198 meters) of the east end of the segment is dirt, and the portion from the edge of I-84 to the start of a major oxbow in the central portion of the segment is also dirt. The portion along the oxbow has an asphalt surface and concrete retaining walls on the river side. The retaining walls were built with two different construction methods, but the walls extend only 5 to 12 inches above the roadbed. One section was built using formed concrete and has a footer along the bottom portion where the wall meets a layer of riprap. The other section is built of mortared rock using shaped stones and a formed concrete cap. The formed concrete portion is in poor condition, and the rock wall is in fair to good condition. The roadbed is approximately 3 inches thick and is visible in areas where the roadbed is damaged. Overall, the road is in poor condition, and although it is suspected that the road continues east and west along Weber Canyon, no evidence of the historic alignment was observed.

The old road alignment ran between Granger, Wyoming, and Burley, Idaho, via Ogden, Utah (U.S. Geological Survey 1956 [1955]; Weingroff 2013; Workers of the Writers' Program of the Works Projects Adminstration for the State of Utah 1941:353–354). The road was likely constructed over the original path, which was used by settlers and pioneers who traveled through Weber Canyon, and was used between 1926 and 1972 (Droz 2010; Weingroff 2013). It was designated I-80N as part of the development of the interstate system (Droz 2008, 2010) and was re-designated I-84 in 1977 by the Utah Department of Transportation, and conditionally approved by the American Association of State Highway and Transportation Officials (Utah Department of Transportation 2008).

The road has also been affected by the construction and subsequent updates to the Union Pacific Railroad and the construction of I-80N/I-84. The portion of the road within the Project area is located partially within the Devil's Gate/Weber Hydroelectric Power Plant Historic District and partially within the Utah Department of Transportation right-of-way, where it has been disturbed by road construction activities and the installation of a buried pipeline through the area.

This segment of U.S. 30S is eligible for the NRHP under Criterion A. Relicensing of the Weber Hydroelectric Project and associated activity will not adversely affect those characteristics of this site that make it eligible for the NRHP.

42WB328, Devil's Gate/Weber Hydroelectric Power Plant Historic District

The Project was initially constructed in 1910 and was known then as the Devil's Gate-Weber Hydroelectric Power Plant. It is located roughly 10 miles southeast of Ogden, Utah. The brief description of the Devil's Gate/Weber Hydroelectric Power Plant Historic District provided here derives from the site's NRHP nomination form prepared by Fiege and Ore (1988). This form is provided in Appendix A. The plant consists of a powerhouse, reinforced-concrete dam (and related structures), concrete and steel conduit, and an operators' camp, within which are two residences and four ancillary structures. Of the ten structures included at the plant site, eight are contributing and two noncontributing. One noncontributing structure—the conduit—has been left out of the district. Therefore, the historic district is made up of two discontinuous elements, the dam and the powerhouse site. Since its construction, the Weber powerhouse site and dam have sustained alterations, such as the removal of two residences. However, these changes do not compromise the overall integrity of location, setting, design, materials, workmanship, feeling, and association. The Weber Hydroelectric Power Plant continues to represent an early twentieth century, medium-head hydroelectric power plant.

The power plant lies in a narrow stretch of Weber Canyon along the Weber River. Squeezed between the steep canyon wall and the river are three buildings and four outbuildings that make up the plant site. Until the mid-1970s, a state highway directly above the site provided the northern boundary. Higher on the canyon wall, the Union Pacific Railroad tracks parallel the highway. In the 1970s, western-bound lanes of I-84 superseded the state highway, and eastern lanes were constructed on the south side of the Weber River, effectively isolating the camp from direct highway access. Partial rock riprapping and newer metal supports stabilize the embankment behind the camp and below the interstate. Similar rock riprapping forms a retaining wall along the river. Along the driveway through the camp are a line of shade trees and lights at the top of the rock wall. Approximately 1.75 miles east and upstream from the powerhouse is the reinforced-concrete dam, which diverts water into the conduit. On the south side of the dam are an intake house and dam tender's residence, which partially sits over the concrete conduit.

This historic district is listed on the NRHP and is eligible under Criteria A, B, and C. Relicensing of the Weber Hydroelectric Project and associated activity may affect those characteristics of this site that make it eligible for the NRHP, and the remainder of this HPMP provides a detailed plan for addressing those affects should they occur.

PROJECT EFFECTS AND MANAGEMENT MEASURES

Anticipated Changes during the License Period

During the current license term, PacifiCorp made the following capital improvements to the Project dam structure and access:

- 1992: Weber recreation site improvements (mandated by the current license);
- 1993: North radial gate automated (south gate was previously automated);
- 1996: Automatic leak-detect system installed;

- 2004 – Weber Dam spillway apron extended;
- 2009 – Weber load controller replaced and bearing rerabbited;
- 2010 – Weber Powerhouse battery bank replacement;
- 2013 – Weber radial gate seal repaired;
- 2014–2016: Tunnel penstock recoating and support structure improvement;
- 2017 – Turbine bearing, seal, and runner repair.

The following routine (non-license related) Project improvements to ensure reliable and safe operation are anticipated in the next license period (all items and their dates are subject to modification and/or update):

- 2021: Weber intake modernization;
- 2021: Butterfly valve section penstock replacement;
- 2021: Turbine overhaul and bearings replacement;
- 2021: Intake modernization with partial removal of current intake structure;
- 2022: Penstock support structure upgrade;
- 2022-2025: ODSP analysis and implementation;
- 2022: Pipeline river crossing recoat;
- 2024: Weber #2 house removal;
- 2025: Cathodic protection;
- 2029: Weber penstock and gate painting;
- 2030: Weber journal bearing rerabbiting;
- 2030: Weber flow monitor replacement;
- 2034: Weber roof
- 2034: Weber relay replacement.

Potential Changes during License Period

The normal maintenance, operation, and improvement actions that would occur during the license period may affect aspects of historic properties. Because all potential actions cannot be known in advance, a list of general categories of potential actions is presented below to provide a basis for discussing necessary management steps.

The following categories of actions are based on those used for determination of effect as outlined in the Preservation Standard subsection of this HPMP. Following each category is a list of specific actions that are likely to occur during the period that the Project license is in effect. This list was compiled based on discussions with the hydro superintendent who is responsible for the operation and maintenance of the Project.

Destruction or Alteration of All or Part of the Property

This category includes normal maintenance procedures such as cleaning, painting, caulking, and repair work that replaces damaged features with new like materials.

The work anticipated to occur includes the following:

- Replacement of conduits with in-kind materials
- Repairs to spill gates, intake gates, sluice gates, and other structures or equipment
- Replacement of intake screens, intake decking, and log booms with in-kind materials
- Maintenance or replacement of concrete walls that make up the diversion structure with in-kind materials
- Replacement of glazing as well as painting and caulking of windows at the powerhouse and on other associated buildings at the plant site or at the dam

Alterations to Buildings, Structures, and Sites

This category includes modifications of, or additions to, buildings, structures, or sites that may be because of changes in use, modernization, operational efficiency, or technological advances. This category also includes replacement of features with unlike materials.

The work anticipated to occur includes the following:

- Replacement of turbines or electrical equipment in the powerhouse or at the dam with modern equipment to maintain operational efficiency
- Alterations to the powerhouse structure for safety and to maintain adequate clearances around equipment in response to changing regulations
- Replacement of the existing roof with other materials and a protective coating on the plant or associated buildings

Alteration of the Property's Surrounding Environment

This category includes changes and additions to (or subtractions from) the physical setting of the building.

The work anticipated to occur includes the following:

- Construction and operation of a fish ladder suitable for upstream passage of both Bonneville Cutthroat Trout (BCT) and bluehead sucker, including a fish trap operated by Utah Division of Wildlife Resources (UDWR) and Trout Unlimited (TU) and maintained by PacifiCorp
- Installation of a year-round permanent vault toilet facility (flush bathrooms are available at the rest stop upstream), maintained by PacifiCorp.
- Possible removal of associated buildings that no longer provide operational value.

Introduction of Elements Out of Character with the Property or Setting

This category includes changes to characteristic features of the larger area that have the potential to be out of character with the setting of the property.

No changes to characteristic features of the larger area are anticipated.

Transfer or Sale of the Property without Preservation Conditions

This category includes the transfer or sale of buildings or structures.

No transfer or sale of buildings or structures is anticipated.

IMPLEMENTATION PROCEDURES

Management Techniques for Historic Places

Various management techniques for historic places are briefly described below, along with their applicability to the Project. The preservation standards and evaluation procedures in the sections that follow are based on the concept that actions involving the least degree of intervention are most preferable. The techniques described in this section are listed in order of their degree of intervention (from least to most).

Protection

This technique involves the application of measures to defend a property from loss, deterioration, or injury. Because the resources in the Project have been properly maintained over the years, protection techniques are not anticipated.

Stabilization

This technique involves measures to reestablish the structural stability of an unsafe or deteriorated property. Although the resources at the Project have been properly maintained over the years, the normal deterioration of materials may require stabilization or replacement.

Preservation

This technique involves measures to sustain the existing form, integrity, and material of a historic resource. Preservation techniques have been applied in maintaining the existing facility and equipment through painting, retooling, and repairing existing equipment, and in using in-kind material when replacement is needed. These practices will continue this aspect of preserving the resource wherever possible.

Rehabilitation

This technique involves preserving the character-defining features of a historic property while making changes or additions to extend the useful life of the property. Rehabilitation involves major repairs or additions that allow the extension of the current use or a different use of the property (also termed adaptive reuse). This technique would be applicable if expansion of the powerhouse or changes to the dam or water conveyance system were needed to allow for efficient continued operation.

Restoration

This technique involves accurately recovering the form and details of a property and its setting as it appeared at a particular period of time by means of the removal of later work or the replacement of missing earlier work. This technique is not applicable to the Project as long as the Project remains in operation, because efficient and economical operation requires that previous changes remain.

Reconstruction

This technique involves reproducing by new construction the exact form and detail of a vanished structure as it appeared at a specific period of time. This technique is not applicable to the Project as long as the Project remains in operation, because efficient and economical operation requires that previous changes remain.

Preservation Standards and Evaluation Procedures

Preservation Standards

Stabilization, preservation, and rehabilitation are the three techniques that have the most suitability for the Project because it is a working industrial plant. The standards that will guide future actions by PacifiCorp as long as the Project is owned and operated by PacifiCorp are included in Appendix B. These standards have been adapted from the Secretary of the Interior's Standards for Historic Properties (*Federal Register* 60(133):35842–35844). They apply to both the interior and exterior of the powerhouse, dam and intake, and other registered facilities.

The Project's preservation standards are based on the preservation of significant archaeological, historic, and cultural resources. The standards recognize that change is an essential part of operational engineering facilities. The application of these standards allows PacifiCorp the flexibility to upgrade the facility and equipment while maintaining an efficient and economical operation.

Evaluation Procedures

Various types of actions may impact the historic, archaeological, and cultural resources at the Project. Three levels of procedures for evaluating and minimizing impacts on resources are defined below. Each level corresponds to the significance of the proposed action in terms of the extensiveness of the proposed change.

LEVEL ONE EVALUATION

Level one procedures apply to normal maintenance activities such as cleaning, painting, caulking, and repair work that replaces damaged features with new like materials.

The work anticipated to occur includes the following:

1. Replacement of conduit
2. Repair to spill gates, sluice gates, intake gates, and other structures or equipment
3. Replacement of intake screens, intake decking, and log trash booms with in-kind materials
4. Maintenance of the diversion structure
5. Replacement of glazing along with painting and caulking of windows at the powerhouse and on other associated buildings
6. Ongoing maintenance, repair, or replacement of project components

7. Changes to the physical setting of the Project such as improvements to the recreation area

The procedures to be followed for this type of work are listed below:

1. PacifiCorp shall identify character-defining features for the resources to be altered, as listed in Appendix C.
2. If the proposed change will not alter a character-defining feature, work proceeds.
3. If the proposed change will alter any of the character-defining features, PacifiCorp's staff will apply the Weber Project's preservation standards as listed in Appendix B to identify any additional historically sensitive approaches to accomplishing the needed improvement.
4. PacifiCorp will apply the criteria for determination of effect as listed in Appendix D to identify what effect the proposed change will have on the Project's archaeological and cultural resources.
5. If PacifiCorp can define an alternative historically sensitive approach that will result in no adverse effect, work will proceed.
6. If PacifiCorp cannot define an alternative historically sensitive approach that will result in no adverse effect, or if the effects are unclear for the specific work proposed, PacifiCorp will consult with the staff of the Utah State Historic Preservation Office (SHPO) who will have 30 calendar days to review and comment upon PacifiCorp's proposed approach (move to Step #7 of level two review procedure).

LEVEL TWO EVALUATION

Level two procedures include modifications or additions to buildings, structures, or sites. These modifications may be because of changes of use, modernization, operational efficiency, or technological advances. This category also includes replacement of features with unlike materials.

The work anticipated to occur includes the following:

1. Replacement of turbines or electrical equipment in the powerhouse or at the dam with modern equipment
2. Alterations to the powerhouse structure or other structures of the project
3. Replacement of the existing roof

Because this work is more extensive than the level one maintenance work and has a greater probability of adversely affecting historic materials or archaeological and cultural resources, a more extensive evaluation procedure will be followed for its review. This process includes review and approval by the Utah SHPO.

The evaluation procedure to be followed is described below:

1. PacifiCorp will identify character-defining features for the resource to be altered as listed in Appendix C.
2. If the proposed change will not alter a character defining feature, work proceeds.
3. If the proposed change will alter any of the character-defining features, PacifiCorp's staff will apply the Weber Project preservation standards as listed in Appendix B to identify any additional historically sensitive approaches to accomplishing the needed improvement.
4. PacifiCorp will apply the criteria for determination of effect as listed in Appendix D to identify what effect the proposed change will have on the Project's archaeological and cultural resources.
5. If PacifiCorp can define an alternative historically sensitive approach that will result in no adverse effect, work will proceed.
6. If PacifiCorp cannot define an alternative historically sensitive approach that will result in no adverse effect, or if the effects are unclear for the specific work proposed, PacifiCorp will consult

with the Utah SHPO who will have 30 calendar days to review and comment upon PacifiCorp's proposed approach.

7. If the Utah SHPO determines that the Project will have an adverse effect, they will recommend alternative approaches or mitigation measures. PacifiCorp will review alternative approaches and mitigation measures and will reach an agreement on an approach.
8. When an alternative approach or mitigation measure determined by the Utah SHPO has been agreed upon and documented by letter or email, work will proceed.
9. If an agreement is not reached in Step 6, PacifiCorp will notify FERC that an agreement cannot be reached. FERC reserves the right to direct any necessary work to be done.

LEVEL THREE EVALUATION

Level three procedures apply to the same actions as defined for level two procedures except that the changes proposed are more extensive and are likely to affect 1) multiple character-defining features, or 2) an extensive portion of the historic fabric.

The same procedures for a level two review (steps 6 through 9) will be followed and an engineering documentation of the resources in detail may also be required by the Utah SHPO.

In the event that major changes to the historic character of the Project are required to continue operations and alternative designs involving lesser impacts are not feasible, PacifiCorp will commit to having the historic resources documented to Level 1 standards of the Historic American Building Survey (HABS) and the Historic American Engineering Record (HAER). This HABS/HAER study includes engineering survey and documentation of the dam, hydraulic and generating facilities, and supporting structures resulting in a HABS/HAER Level 1 report. The HABS/HAER study will encompass only those portions of the Project listed on the NRHP.

Dispute Resolution

Should disputes arise regarding this HPMP, implementation of its measures, or treatment of cultural resources, FERC shall consult with the objecting party to resolve the concern. If FERC and the disputing party cannot reach a resolution, FERC will forward all documentation relevant to the dispute, including FERC's proposed resolution to the Advisory Council on Historic Preservation (ACHP). Within 30 calendar days of receiving all pertinent documentation the ACHP may provide FERC with its advice on the resolution of the concern or may notify FERC that it will comment pursuant to 36 C.F.R 800.7(c)(3). Prior to reaching a final decision on the dispute, FERC shall prepare a written response that takes into account any timely advice or comments regarding the dispute from the ACHP, and provide them with a copy of this written response. FERC will then proceed according to its final decision.

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APPENDIX C

UPSTREAM FISH PASSAGE CONCEPTUAL DESIGN REPORT

STUDY 1:
UPSTREAM FISH PASSAGE
CONCEPTUAL DESIGN REPORT

WEBER HYDROELECTRIC PROJECT
(FERC NO. 1744)

Prepared for:

PacifiCorp
Salt Lake City, Utah

Prepared by:

Kleinschmidt

www.KleinschmidtGroup.com

October 2016

UPSTREAM FISH PASSAGE
CONCEPTUAL DESIGN REPORT

WEBER HYDROELECTRIC PROJECT
(FERC NO. 1744)

PACIFICORP
SALT LAKE CITY, UTAH

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1.0 INTRODUCTION

1.1 PROJECT DESCRIPTION

PacifiCorp's Weber Hydroelectric Project is located on the Weber River, in Weber, Morgan, and Davis counties in Utah. The Project is partially on federal lands managed by the Wasatch-Cache National Forest and partially on lands owned by the Union Pacific Railroad Company. The Project's license from the Federal Energy Regulatory Commission (FERC) expires in May of 2020, and PacifiCorp is relicensing the Project using the Alternative Licensing Process (ALP), pursuant to 18 CFR Part 5. The ALP is highly collaborative and relies on development of consensus-based protection, mitigation, and enhancement (PM&E) measures that will be evaluated by the FERC during its National Environmental Policy Act (NEPA) review. PacifiCorp engaged Kleinschmidt to evaluate upstream fish passage options at the Weber Hydroelectric Project and develop a conceptual design of a preferred alternative.

The Weber Hydroelectric Project is situated on the Weber River approximately 10 miles southeast of the Ogden, Utah. The concrete diversion dam extends across the river in the north-south direction and consists of two radial gates, a historic but likely ineffective fish passage flume that is used to pass the minimum flow, a low level outlet gate, and a penstock intake structure. A 5-foot to 6.3-foot diameter penstock runs from the intake 9,107 feet downstream to the powerhouse. The powerhouse contains one generating unit with a rated capacity of 3,850 kilowatts (kW).

In anticipation of a new FERC license, PacifiCorp is designing a new upstream fish passage facility to pass Bonneville cutthroat trout (Oncorhynchus clarkii) and bluehead sucker (Catostomus discobolus) at the Weber Hydroelectric Project diversion dam. Four distinct types of fishways were investigated as potential options. Variations on two of these types of fishways resulted in a total of six options that were considered in an alternatives analysis performed with input from PacifiCorp and the Fisheries Working Group (FWG). Working collaboratively with the FWG, the preferred option, which was selected during the alternatives analysis, was developed to a conceptual design level.

2.0 PROJECT OPERATIONS

This section is intended to provide a summary of the existing operations of the Weber Hydroelectric Project and a review of what operational considerations were made during the conceptual design of the upstream fishway at the site. The existing standard operation of the Project is summarized based on discussions with PacifiCorp operations personnel.

2.1 EXISTING OPERATIONS

2.1.1 STANDARD OPERATIONS

The Project currently operates on pond level controls to keep the headpond 3-4 inches below the top elevation of the two radial spillway gates. The top of the radial gates is identified as the normal pond elevation and this elevation was identified as El. 4798.2' in a survey performed by Diamond Land Surveying, LLC on February 24, 2016. There are no restrictions on the headpond operating level, but the pond is held below an elevation that would cause flooding of the intake house (approximately 8 inches above normal pond). Minimum flows into the bypassed reach are the lesser of 34 cfs or inflow from October 1 – March 1, and 34 – 50 cfs (the range is dependent on the annual runoff forecast) or inflow, whichever is less, from April 1 – September 30. Minimum flows are passed via the historic but likely ineffective fish passage flume on the north side of the spillway, and controlled via an annually calibrated manual slide gate at the upstream end of the flume.

2.1.2 HIGH FLOW OPERATIONS

When flows exceed the combined hydraulic capacity of the turbine (320 cfs[1] normal maximum) and the minimum flow release structure, the water level increases, exceeds the normal pond level and overtops the radial gates. If flows increase and cause the headpond to rise 3-4 inches above the normal pond level, the north spillway gate opens via automated controls to maintain the headpond elevation within 3 or 4 inches of the normal pond level. When the pond level falls to the normal pond elevation, the north gate closes completely. Under high flow conditions, the north spillway gate continues to rise until the water level exceeds the normal pond level by a set

[1] While the normal full load steady state hydraulic capacity of the turbine is 320 cfs, the licensed capacity of the Project is 365 cfs.

point of not more than six inches, at which point an alarm for high water is tripped and operators are dispatched to manually raise the south gate. Manual operation of the south gate continues through the high flow event, after which the south gate is closed and standard operation resumes.

2.1.3 LOW FLOW OPERATIONS

If the headpond falls four inches below the top of the spillway gate, turbine flows are reduced via automated pond level control. Flows are continually reduced until the unit shuts down, at which point all flow is passed through the minimum flow gate (and spillway gates as required). During winter months, the pond level controls are set to maintain a low water set point 12 inches below the normal pond level. Storage at the upstream Echo reservoir typically reduces inflows during the fall and winter months, except during very wet years. In the event insufficient water is expected for generation on a long-term basis (sometimes from mid-October – February or March), the headpond is drawn down and emptied by raising the spillway gates and opening the low level outlet gate. The Weber Project functions in run-of-river mode under all operational conditions, but particularly during low flow operations when the headpond is emptied and the river channel carries water directly to and through the low-flow outlet in the Weber dam. As part of this relicensing process, a future potential operating condition has been agreed to: when the headpond is dewatered, PacifiCorp has committed to ensuring the low-level outlet will operate to allow fish passage when the proposed ladder is non-functioning. Depending on the outcome of this licensing process, this stipulation is expected to become part of the operational requirements of a new Weber Project operating license.

2.2 CONCEPTUAL DESIGN FISHWAY LOCATION AND OPERATION

The proposed location of the new upstream fish passage facility is on the north side of the spillway immediately adjacent to the historic fish passage flume where the minimum flow is released. The proposed layout of the upstream fish passage facility will not affect the existing historic fish passage flume and minimum flow gate. Locating the proposed new fishway on the south side of the river would interfere with the intake, penstock, and railroad; and is therefore not feasible.

Effective upstream fish passage requires an attraction flow, or a quantity of flow that fish can detect and follow into the fishway and upstream past the Project. A portion of the required minimum flow will be passed through the proposed fishway to act as attraction flow and the remainder of the required minimum flow will continue to be passed through the existing minimum flow gate and historic fish passage flume. The entrance to the proposed fishway will be located immediately adjacent to the current minimum flow discharge location, therefore the entire quantity of the required minimum flow will act as attraction flow to guide fish toward the proposed fishway entrance.

2.3 OPERATIONAL CONSIDERATIONS AND CHALLENGES

2.3.1 GATE PRIORITIZATION

Currently the north spillway gate is operated for pond level control. However, this means that as the river flow increases above the hydraulic capacity of the turbine, the excess flow will be discharged through the north spillway gate immediately upstream of and adjacent to the proposed fishway entrance. As river flow increases, the north spillway gate will be opened further and further, quickly exceeding the fishway attraction flow that is being released immediately downstream. This operating protocol would effectively "drown out" the attraction flow from the proposed fishway and make it more difficult for fish to find the entrance to the proposed fishway during spill conditions. Because of this, PacifiCorp intends to switch the gate prioritization and use the south gate for pond level control, rather than the north gate. This change in gate prioritization will require some mechanical retrofits to the south spillway gate that will be completed as part of the proposed new fishway construction.

2.3.2 POTENTIAL FOR LIMITATIONS ON HEADPOND FLUCTUATION

Fishways are designed for a range of flow conditions to accommodate passage by target species. The defining parameters of water velocity and water depth within the fishway are generally determined by the headpond elevation. As elevation of the headpond affects the water velocities and water depths in the fishway, the range of fluctuation in headpond elevations must be reviewed to confirm that effective fish passage will be provided throughout the range. Existing standard headpond fluctuations will be incorporated as fishway design criteria. The existing

normal range of headpond fluctuation at the Weber Project is considered to be +/- 3 or 4 inches above and below the normal pond elevation. This range of headpond fluctuation would not have a significant impact on the water velocities or water depths within the proposed fishway, therefore no changes are proposed or anticipated for the existing Project operations or range of headpond fluctuations.

2.3.3 MAINTENANCE IMPLICATIONS

Required maintenance related to debris cleaning and handling is anticipated to increase with the installation of the proposed fishway due to the flow obstructions that would be part of the proposed fishway design. The proposed fishway will include a coarse-spaced bar rack at the upstream end and a number of pools and baffles with 12-inch-wide vertical slots. The coarse-spaced bar rack is intended to prevent large debris from entering the fishway and will need to be cleaned regularly to allow fish to freely pass upstream into the reservoir. The coarse-spaced bar racks should filter out most debris that would be large enough to get caught in the 12-inch-wide vertical slots where the fishway flow passes from pool to pool, however the vertical slots and pools within the fishway should be routinely inspected and cleaned of debris as required to maintain effective fish passage.

The proposed fish trap that may be installed at the upstream end of the proposed fishway will likely be constructed of bar rack material with clear spacings close enough to prevent passage of fish. Therefore it will accumulate debris and likely require frequent cleaning when it is in operation. When the fish trap is not in operation it will be raised up out of the water to prevent continued debris collection. Operation of the proposed fish trap and daily maintenance would be completed by members of the FWG (specifically Utah Division of Wildlife Resources and Trout Unlimited); construction and major maintenance of the proposed fish trap would be completed by PacifiCorp.

Cleaning or maintenance efforts may occasionally require temporarily shutting off flow through the proposed fishway, during which time compliance with continuous minimum flow requirements will require adjustment of the minimum flow gate or opening of one of the spillway radial gates.

2.3.4 MINIMUM FLOW COMPLIANCE

Minimum flow compliance is currently achieved via the existing historic concrete fish passage flume, controlled with the slide gate at the upstream end. The slide gate is partially closed to limit flow releases and changes in pond elevation have little effect on flows through the gate opening. The gate is calibrated annually and is operated such that the required minimum flow is passed even when the headpond is at the low end of its range of fluctuation, and a flow quantity slightly higher than the required minimum flow is passed when the headpond is higher in its range of fluctuation. Once the proposed fishway is installed a portion of the required minimum flow will be passed through the proposed fishway to act as attraction flow and the remainder of the required minimum flow will continue to be passed through the existing minimum flow gate and historic fish passage flume. After the proposed fishway is installed a flow evaluation will be done to determine the range of flow through the fishway corresponding to the range of normal headpond fluctuation. Then the existing minimum flow gate will be calibrated to pass the remainder of the required minimum flow.

3.0 DESIGN CRITERIA

This section is intended to provide a summary of the design criteria for the conceptual design of the proposed upstream fishway at PacifiCorp's Weber Hydroelectric Project. During the upstream fish passage conceptual design kick-off meeting held on March 7, 2016 at SWCA's office in Salt Lake City, Kleinschmidt met with the members of the FWG which includes individuals representing the U.S. Fish and Wildlife Services, U.S. Forest Service, Utah Division of Wildlife Resources, Utah Division of Water Quality, Trout Unlimited, FERC, and PacifiCorp. The primary purpose of the meeting was to establish the design criteria for the proposed upstream fish passage facility. Below is a description of the design criteria that was discussed during the kick-off meeting and a second meeting on May 4, 2016 at UDWR's Northern Region office, then finalized and accepted by the FWG at a third meeting on July 13, 2016, also at UDWR's Northern Region office.

3.1 TARGETED FISH SPECIES

Scoping Document 1, completed as part of the ALP, and the subsequent scoping meeting with stakeholders, identified upstream fish passage for Bonneville cutthroat trout and bluehead sucker as a PM&E measure likely to be required in any new license issued for the Project. Bonneville cutthroat trout and bluehead sucker are species of concern present in the Weber River both upstream and downstream of the Project. Although the proposed fishway is intended primarily for adult fish, it is anticipated that all life stages 150 mm and larger will be capable of using the fishway.

3.2 RELEVANT DESIGN CRITERIA

The following table summarizes all of the relevant design criteria for upstream fish passage at the Weber Project.

TABLE 1 UPSTREAM FISH PASSAGE DESIGN CRITERIA FOR THE WEBER PROJECT

(1)	Target Species	Bonneville Cutthroat Trout (BCT) and Bluehead Sucker.
(2)	Life Stage of Target Species	Fishway is intended primarily for adult fish, however it is anticipated that all life stages 150 mm and larger will be capable of using the fishway.
(3)	Fishway Water Velocity Targets (Based on Fish Swim Speed)	Bonneville Cutthroat Trout – 3-5 ft/sec (sustained speed). Bluehead Sucker – 4 ft/sec (sustained speed) or less preferable.
(4)	Design Population	No set design population criteria
(5)	Station Hydraulic Capacity	320-365 cfs
(6)	Minimum Flow	34-50 cfs
(7)	Low Level Gate Hydraulic Capacity	• Approximately 200 cfs under normal pond conditions • When headpond is dewatered the low level gate will pass approximately 100 cfs before water starts to spill over the concrete invert of the open spillway gates.
(8)	Spillway Radial Gate Hydraulic Capacity	Each gate (two total) has a capacity in the range of 2,300 to 2,700 cfs under normal pond conditions.
(9)	Period of Operation of Fishway	Fishway will be in operation anytime the headpond is full. The headpond is dewatered during winter freezing conditions when the river flow is below the turbine operating range. In order for the turbine to operate the river flow must be in the range of 85-95 cfs. The fishway will not be operated during periods when the headpond is dewatered. When the headpond is dewatered the low level outlet gate will be opened to allow fish passage. The following water velocities have been calculated for various flow conditions through the low level outlet gate: Q = 34 cfs ➔ V = 2.7 fps Q = 40 cfs ➔ V = 3.2 fps Q = 50 cfs ➔ V = 4.0 fps Q = 60 cfs ➔ V = 4.8 fps Q = 70 cfs ➔ V = 5.6 fps Q = 80 cfs ➔ V = 6.4 fps Q = 90 cfs ➔ V = 7.2 fps Q = 100 cfs ➔ V = 8.0 fps

(10)	River Flow Operating Range	When the headpond is full the fishway will remain in operation for river flows of 34 cfs to approximately 2,500 cfs. As river flow increases above the turbine capacity the south spillway gate will be opened to pass excess flow. Once the south spillway gate reaches its maximum capacity the north spillway gate will be opened to pass increasing river flows. The fishway entrance will likely be inaccessible to fish once the north spillway gate is opened, due to high velocity and turbulence from the north spillway gate discharge. The north spillway gate is currently used to control the headpond level. Modifications will be made to the south spillway gate operator to allow it to act as the primary gate used to control headpond level.
(11)	Headpond Operating Range	Typical headpond level fluctuation is in the range of 1-3 inches, but may fluctuate as high as 7 inches.
(12)	Diversion Dam Tailwater Operating Range	The normal water surface elevation in the tailwater immediately downstream of the spillway gates is El. 4785.9. Additional information is being gathered to confirm the full range of tailwater elevations across the river flow operating range. The range of tailwater elevations will be available for the final design of the fishway and will not affect the selection of the preferred fishway alternative or the conceptual design of the fishway.
(13)	Entrance Location	North side of river immediately downstream of spillway. Reuse existing opening in retaining wall where minimum flow is currently discharged.
(14)	Exit Location	North side of river within 60 feet upstream of the spillway. Locating the exit further upstream could require additional excavation of sediment in the headpond to provide adequate water depth.
(15)	Minimum Water Depth in Fishway	The minimum water depth at the fishway entrance and exit will be 2.0 ft. Likewise, if a pool type fishway is selected, the minimum water depth in the pools will be 2.0 ft.
(16)	Fish Entrance Gate	Downward opening gate for adjusting attraction flow depth is preferred if tailwater depth is adequate.
(17)	Fishway Entrance Invert Related to Adjacent River Bottom	Fishway entrance will be perched in water column.

(18)	Attraction Flow	34-50 cfs Attraction flow will match the minimum flow requirement.
(19)	Supplemental Attraction Flow System	If fishway is selected that has a conveyance flow capacity less than the 34-50 cfs attraction flow, then a supplemental attraction flow system will be needed.
(20)	Sampling Facility	Fishway will be designed to accommodate a temporary sampling facility (i.e, a removable trap).
(21)	Viewing Window	A viewing window for public outreach may be desired pending feasibility. Considerations will include space constraints, security, ADA accessibility, and cost (shared cost??). Potential alternative would be an underwater camera within the fishway. *Note: Final determination was made at the July FWG meeting to not include a viewing window.*
(22)	Slope of Fishway	• Denil (chute type) Fishway − 1:10 slope • Pool & Weir and Vertical Slot Fishways − 1:10 to 1:20 slope, pending flow and drop/pool • Natural Channel Fishway − 1:20 slope • Velocity criteria will control the slope of the fishway. For pool & weir and vertical slot type fishways the drop per pool will be 9" or less.
(23)	Energy Dissipation Factor (EDF=γQh/V)	If a pool type fishway is selected, then the pools will be sized such that the calculated energy dissipation factor will not be greater than 4.0.
(24)	Debris Handling	Look into feasibility – floating/skirted boom. Angled bar racks.
(25)	Fishway Access	A means of access into the fishway is preferred if feasible.
(26)	Grating Covering Fishway	Serrated bar grating across the top of the fishway is preferred if a structural type fishway is selected.

4.0 ALTERNATIVES ANALYSIS

A summary of the alternatives that were considered for providing upstream fish passage at the Weber Hydroelectric Project is provided in this section. This section also includes a summary of the preferred alternative selection process and discussions that took place during the May 4, 2016 meeting with the FWG at UDWR's Northern Region office.

4.1 UPSTREAM FISH PASSAGE ALTERNATIVES

Based on the design criteria that were agreed upon with the FWG, the four types of fishways described below were considered for providing upstream fish passage at the Weber Project.

Appendix A includes a drawing showing a general plan view of the existing conditions at the Weber Hydroelectric Project. Sketches showing the proposed conceptual layout of the four types of fishways that were considered at the Project are included in Appendix B.

4.1.1 ALTERNATIVE 1 – DENIL FISHWAY

Alternative 1 consists of a concrete Denil fishway along the northern shore of the river, adjacent to the existing spillway. Denil fishways are artificially roughened channels that use regularly spaced baffles to create a zone of low velocity flow that fish can negotiate. Typical Denil fishway baffles are angled upstream at a 45 degree angle and are spaced at 2.5 feet on center. Baffles can be constructed from an array of materials including, wood, aluminum, and fiberglass. Denil fishways are typically in the range of 2-4 feet wide, with 4 feet in width being the most commonly used. Denil fishways are typically constructed with a floor slope in the range of 10-20% (1:10 to 1:5). The conceptual Denil fishway layout proposed for the Weber Project would be 4 feet wide with a slope of 10% (1:10). Conveyance flow through a Denil fishway is typically in the range of 15-35 cfs. To accommodate the proposed fishway attraction flow of 34-50 cfs a supplementary attraction flow system would be required. Supplementary attraction flow for Denil fishways is typically provided via a screened inlet in the floor of the exit channel at the upstream end of the fishway, leading into a pipe which would deliver flow to a diffusion chamber beneath the entrance channel of the fishway, where the supplementary attraction flow would come up through a floor screen and rejoin the conveyance flow coming down the fishway

before being discharged at the fishway entrance. The supplementary attraction flow pipe would be equipped with a valve to control the amount of flow and accommodate the varying attraction flow requirement. The entrance to the fishway would be located adjacent to the existing minimum flow discharge and would require cutting an opening in the existing concrete retaining wall. The fishway entrance would be equipped with a downward opening gate used to dewater the fishway and to control the velocity of the flow at the entrance based on varying tailwater levels during fishway operation. The fishway exit would be equipped with an upward opening dewatering gate.

Below are some reference photos of typical Denil fishways.

4.1.2 ALTERNATIVE 2 – POOL AND WEIR FISHWAY

Alternative 2 consists of a concrete pool and weir style fishway along the northern shore of the river, adjacent to the existing spillway. Pool and weir fishways consist of a sequential series of stepped pools that are created by flow control weirs. The conceptual pool and weir fishway layout proposed for the Weber Project would have pools that were approximately 12 feet wide by 12 feet long by 5.5 feet deep. The proposed head drop per pool would be 9 inches. The pool

size was estimated assuming an energy dissipation factor (EDF) of 4.0. An EDF of 4.0 is adequate for the weaker swimming fish that may be present at this site. A 1 foot wide by 1 foot tall submerged orifice would also be included at the bottom of each weir to provide passage for bottom-oriented species. The entrance to the fishway would be located adjacent to the existing minimum flow discharge and would require cutting an opening in the existing concrete retaining wall. The fishway entrance would be equipped with a downward opening gate used to dewater the fishway and to control the velocity of the flow at the entrance based on varying tailwater levels during fishway operation. The fishway exit would also be equipped with a downward opening gate used to dewater the fishway and to control the flow through the fishway.

Below are some reference photos of typical pool and weir fishways.

4.1.3 ALTERNATIVE 3 – VERTICAL SLOT FISHWAY

Alternative 3 consists of a vertical slot style fishway along the northern shore of the river, adjacent to the existing spillway. Vertical slot fishways are similar to pool and weir fishways, but instead of a concrete overflow weir to control flow they use a full height vertical slot. The conceptual vertical slot fishway layout proposed for the Weber Project would have pools approximately 12 feet wide by 15 feet long with a depth of 4-6 feet. The proposed head drop per pool would be 9 inches, with flow passing through an 18-inch-wide vertical slot which is typical for weaker swimming fish species. The entrance to the fishway would be located adjacent to the existing minimum flow discharge and would require cutting an opening in the existing concrete retaining wall. The fishway entrance would be equipped with a downward opening gate used to dewater the fishway and to control the velocity of the flow at the entrance based on varying tailwater levels during fishway operation. The fishway exit would also be equipped with a downward opening gate used to dewater the fishway and to control the flow through the fishway.

Below are some reference photos of typical vertical slot fishways.

4.1.4 ALTERNATIVE 4 – NATURAL CHANNEL FISHWAY

Alternative 4 consists of a natural channel fishway along the northern shore of the river, adjacent to the existing spillway. Natural channel fishways typically consist of gravel, boulders, and other common stream bed material placed in a manner that mimics a natural stream. The conceptual natural channel fishway layout proposed for the Weber Project would be approximately 15 feet wide with a slope of 5%. Rock weirs would be positioned along the length of the channel to provide a 9 inch drop per weir. The channel entrance would be located adjacent to the existing minimum flow discharge and would require demolition of some or all of the existing concrete retaining wall. The channel would extend approximately 70 feet downstream before making a 180 degree bend and continuing approximately 140 feet upstream to the headpond. A new concrete flow control structure would be constructed at the exit of the natural channel. Due to the limited space available at the site, sheet pile cut off walls may be required to stabilize the channel.

Below is a reference photo of a natural channel fishway.

4.2 PREFERRED ALTERNATIVE

The four types of fishways described above were initially presented at the May 4, 2016 meeting with the FWG. After some discussion a couple of variations were added to the list of potential fishway alternatives. Below is the list of fishway alternatives that were discussed during the May 4th meeting:

1. Denil Fishway
2A. Pool and Weir Fishway – sized to accommodate the full range of fishway flow
2B. Pool and Weir Fishway – with reduced pool size and additional supplementary attraction flow system
3A. Vertical Slot Fishway – Serpentine style
3B. Vertical Slot Fishway – Traditional style
4. Natural Channel Fishway

Alternative 1, the Denil fishway alternative, was identified as having the smallest footprint and therefore the low cost. However, this alternative was also noted to potentially be the least biologically effective of the alternatives. Therefore, the Denil fishway was not considered as the preferred alternative.

Alternative 4, the natural channel fishway alternative, was identified as likely having similar biological effectiveness as the pool and weir and vertical slot fishway alternatives. It was also agreed that it would be the most aesthetically pleasing alternative, although at the Weber site (adjacent to the freeway and between the parking lot and the Project diversion dam), site aesthetics were determined to be less important than might be the case at other dam sites. However, there was significant concern regarding the stability and durability of the downstream end of the natural channel (below the spill gates) which would be inundated during high flow events, and this could cause scouring and erosion of the natural channel streambed. Disturbance of the natural channel streambed during high flow events would be a significant maintenance concern due to the cost of rehabilitation/reconstruction and the time that the fishway would be out of service if repairs were required. Therefore, the natural channel fishway was not considered as the preferred alternative.

Alternatives 2 and 3, the pool and weir and the vertical slot alternatives, were identified as likely being similar in biological effectiveness, similar in size and cost, and similar in strength/stability being constructed of concrete that would resist the potential scour and erosion due to high flow events. Since there are some vertical slot fishways currently in use in the region and at least one of these vertical slot fishways has been shown to effectively pass bluehead sucker, it was decided that the vertical slot fishway would be the preferred alternative. Further, vertical slot fishways could potentially take the entire minimum stream flow, eliminating the need for any supplemental water system. The differences between alternatives 3A and 3B the serpentine vertical slot fishway and the traditional vertical slot fishway were discussed. The geometry and layout of the traditional vertical slot was preferable to that of the serpentine vertical slot primarily due to the constraints of the site, reduced width at the upstream end of the fishway, and minimizing the distance that the fishway extends upstream into the shallower region of the headpond. Also, the other vertical slot fishways in the region are the traditional style layout. Therefore, Alternative 3B, the traditional style vertical slot fishway was selected as the preferred alternative at the conclusion of the May 4, 2016 meeting with the FWG.

After the May 4th meeting some detailed hydraulic analysis was performed for the selected traditional style vertical slot fishway. During the hydraulic analysis it was identified that a vertical slot fishway would not be able to accommodate the required 16 cfs range of fishway flows (34 cfs to 50 cfs) without a significant head drop (2 ft +/-) at the flow control gate located at the fishway exit. In order to accommodate the proposed range of fishway attraction flows a supplemental attraction flow system would still have to be incorporated into the vertical slot alternative. During the discussions at the May 4th meeting it was identified that a supplemental attraction flow system with screens to prevent the entrainment of fish and debris was not preferred due to the significant cleaning and maintenance that would be required to keep the system operational. Therefore, the idea of using the existing minimum flow gate and historic fish passage flume to provide the supplemental attraction flow was considered. Since the proposed entrance to the vertical slot fishway would be immediately adjacent to the existing minimum flow discharge it was determined that this would provide effective attraction to the proposed fishway entrance. Further, the existing minimum flow discharge is perched above the normal tailwater level which will minimize the ability for upstream migrants to enter the minimum flow sluiceway and be distracted from the proposed fishway entrance.

A subsequent conference call with the FWG was held on Thursday June 2, 2016 to inform them of the results of the hydraulic analysis and get their concurrence with the proposed approach of using the existing minimum flow gate and historic fish passage flume to provide supplemental attraction flow for the preferred traditional vertical slot fishway alternative. The group agreed with the approach and settled on a design flow of 20 cfs through the proposed fishway with the remaining flow to be passed via the existing minimum flow gate and historic fish passage flume. The 20 cfs through the fishway will remain constant with the existing minimum flow gate being used to provide the flow adjustment required to accommodate the varying minimum flow requirement.

5.0 SUMMARY

One of the objectives of the FWG was to work together to come to consensus on a recommended fish passage design alternative for detailed consideration in the FERC relicensing process. The step-wise process used for the FWG to achieve this objective consisted of the following (dates refer to various meetings in person or via conference call of the FWG during the process):

1. Develop design criteria – Initiated on March 7, 2016 and finalized on July 13, 2016.

2. Develop and workshop draft alternatives for upstream fish passage and select a recommended upstream fish passage alternative (traditional vertical slow fishway) – May 4, 2016.

3. Amend the recommended upstream fish passage alternative to include supplemental attraction flow provided via the existing minimum flow gate and historic fish passage flume – June 2, 2016.

4. Finalize the conceptual design for the recommended upstream fish passage alternative (traditional vertical slot fishway with supplemental attraction flow provided via the existing minimum flow gate and historic fish passage flume) – July 13, 2016.

As a result of this collaborative process, the conceptual design drawings for the preferred alternative have been prepared and are included in Appendix C.

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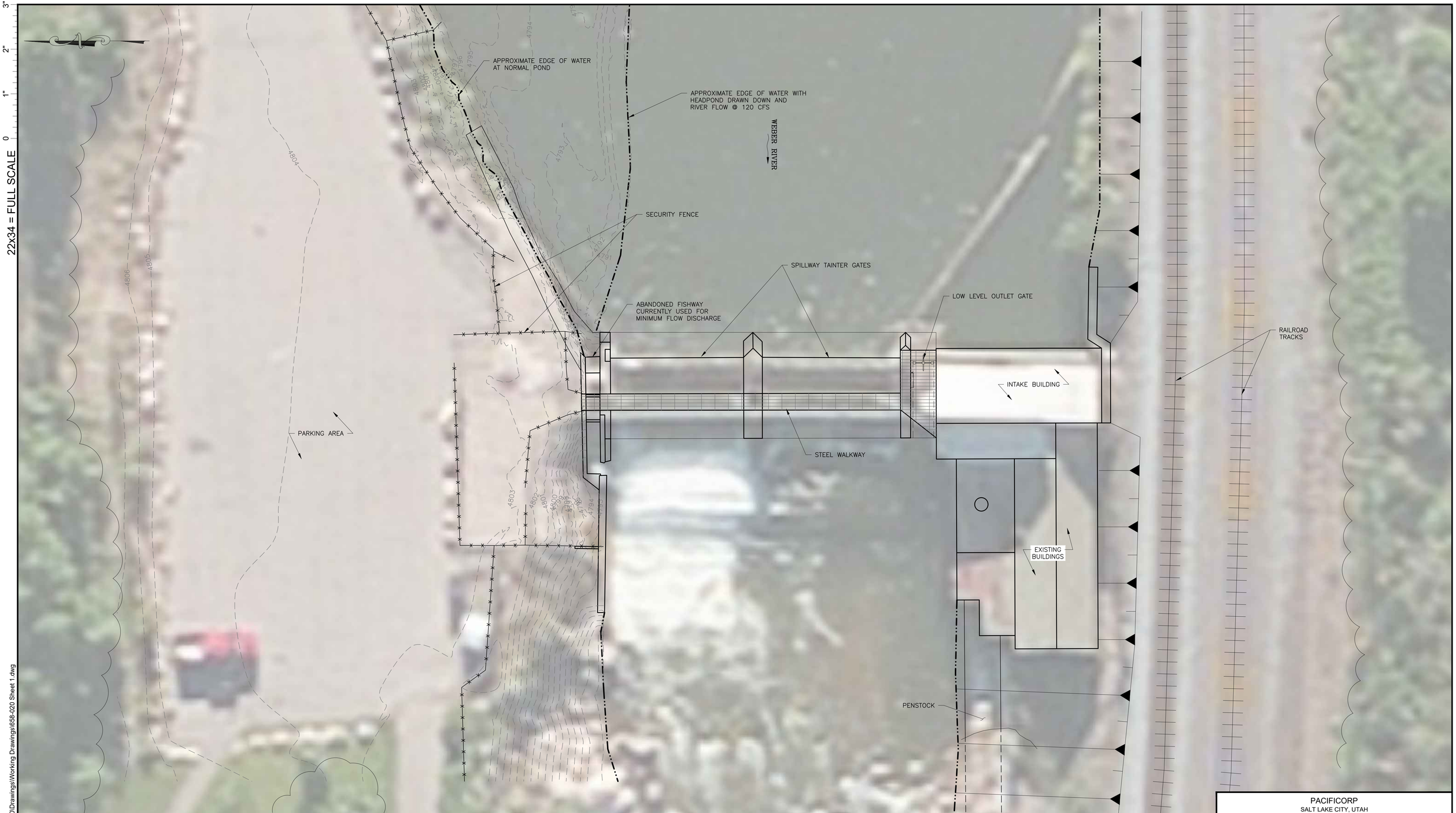
APPENDIX A

GENERAL PLAN VIEW OF EXISTING CONDITIONS

22x34 = FULL SCALE

3" 2" 1" 0



NOTES:
1. ALL ELEVATIONS IN NAVD 1988 DATUM.

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Designed	Drawn	Checked
-	RL	LDS

Project No.	Date Revised	Drawing No.
658-020	04-26-16	1

PACIFICORP
SALT LAKE CITY, UTAH

WEBER HYDROELECTRIC PROJECT
FISH PASSAGE

EXISTING SITE PLAN

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APPENDIX B

CONCEPTUAL SKETCHES OF FISHWAY ALTERNATIVES

22x34 = FULL SCALE

3" 2" 1" 0

APPROXIMATE EDGE OF WATER AT NORMAL POND

APPROXIMATE EDGE OF WATER WITH HEADPOND DRAWN DOWN AND RIVER FLOW @ 120 CFS

WEBER RIVER

FISHWAY EXIT

4.00

EXIT CHANNEL

SECURITY FENCE

18.00

SPILLWAY TAINTER GATES

ABANDONED FISHWAY CURRENTLY USED FOR MINIMUM FLOW DISCHARGE

LOW LEVEL OUTLET GATE

RAILROAD TRACKS

INTAKE BUILDING

40.00

PARKING AREA

STEEL WALKWAY

FISHWAY ENTRANCE

3.00

8.00

8.00

16.00

ENTRANCE CHANNEL WITH FLOOR SCREEN FOR SUPPLEMENTAL ATTRACTION FLOW

EXISTING BUILDINGS

RESTING POOL

3 SLOPING SECTIONS WITH WOODEN BAFFLES 10% SLOPE (1V:10H)

40.00

PENSTOCK

TURNING POOL / RESTING POOL

12.00

VIEWING WINDOW

VIEWING ROOM

NOTES:
1. ALL ELEVATIONS IN NAVD 1988 DATUM.

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No.	Revision	Date	Drawn	Checked
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WEBER HYDROELECTRIC PROJECT
FISH PASSAGE

DENIL FISHWAY ALTERNATIVE

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-	RL	LDS	658-020	04-26-16	SK-1

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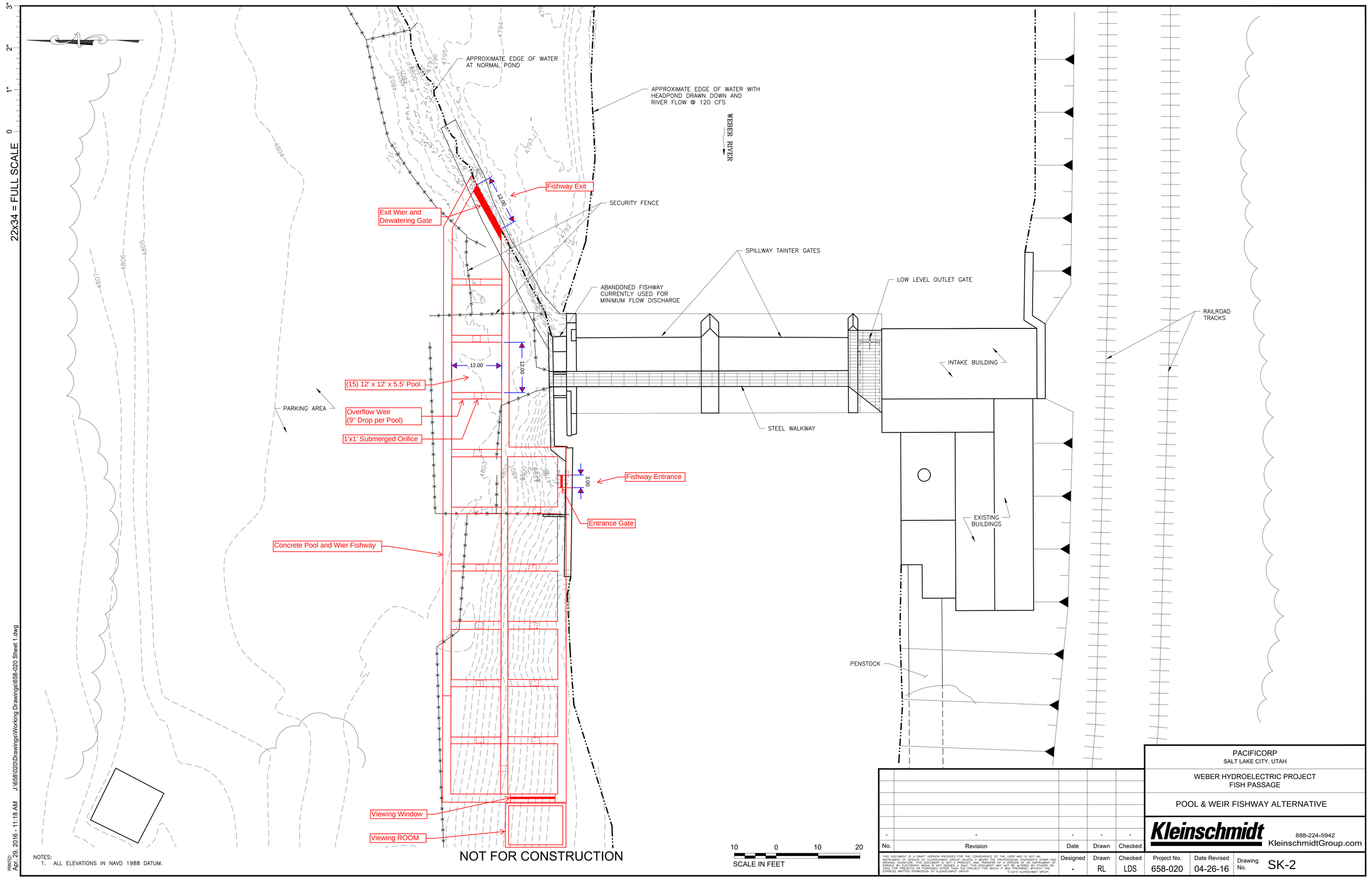
22x34 = FULL SCALE

3" 2" 1" 0



NOTES:
1. ALL ELEVATIONS IN NAVD 1988 DATUM.

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Designed	Drawn	Checked	Project No.	Date Revised	Drawing No.
-	RL	LDS	658-020	04-26-16	SK-2

PACIFICORP
SALT LAKE CITY, UTAH

WEBER HYDROELECTRIC PROJECT
FISH PASSAGE

POOL & WEIR FISHWAY ALTERNATIVE

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22x34 = FULL SCALE

3" 2" 1" 0

APPROXIMATE EDGE OF WATER AT NORMAL POND

FISHWAY EXIT

EXIT WIER AND DEWATERING GATE

APPROXIMATE EDGE OF WATER WITH HEADPOND DRAWN DOWN AND RIVER FLOW @ 120 CFS

WEBER RIVER

SECURITY FENCE

SPILLWAY TAINTER GATES

LOW LEVEL OUTLET GATE

ABANDONED FISHWAY CURRENTLY USED FOR MINIMUM FLOW DISCHARGE

BAFFLE

18" WIDE VERTICAL SLOT (9" DROP PER POOL)

RAILROAD TRACKS

INTAKE BUILDING

PARKING AREA

STEEL WALKWAY

FISHWAY ENTRANCE

CONCRETE VERTICAL SLOT FISHWAY

ENTRANCE GATE

VIEWING WINDOW

VIEWING ROOM

EXISTING BUILDINGS

PENSTOCK

NOTES:
1. ALL ELEVATIONS IN NAVD 1988 DATUM.

NOT FOR CONSTRUCTION

10 0 10 20
SCALE IN FEET

No.	Revision	Date	Drawn	Checked
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SALT LAKE CITY, UTAH

WEBER HYDROELECTRIC PROJECT
FISH PASSAGE

VERTICAL SLOT FISHWAY ALTERNATIVE

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-	RL	LDS	658-020	04-26-16	SK-3A

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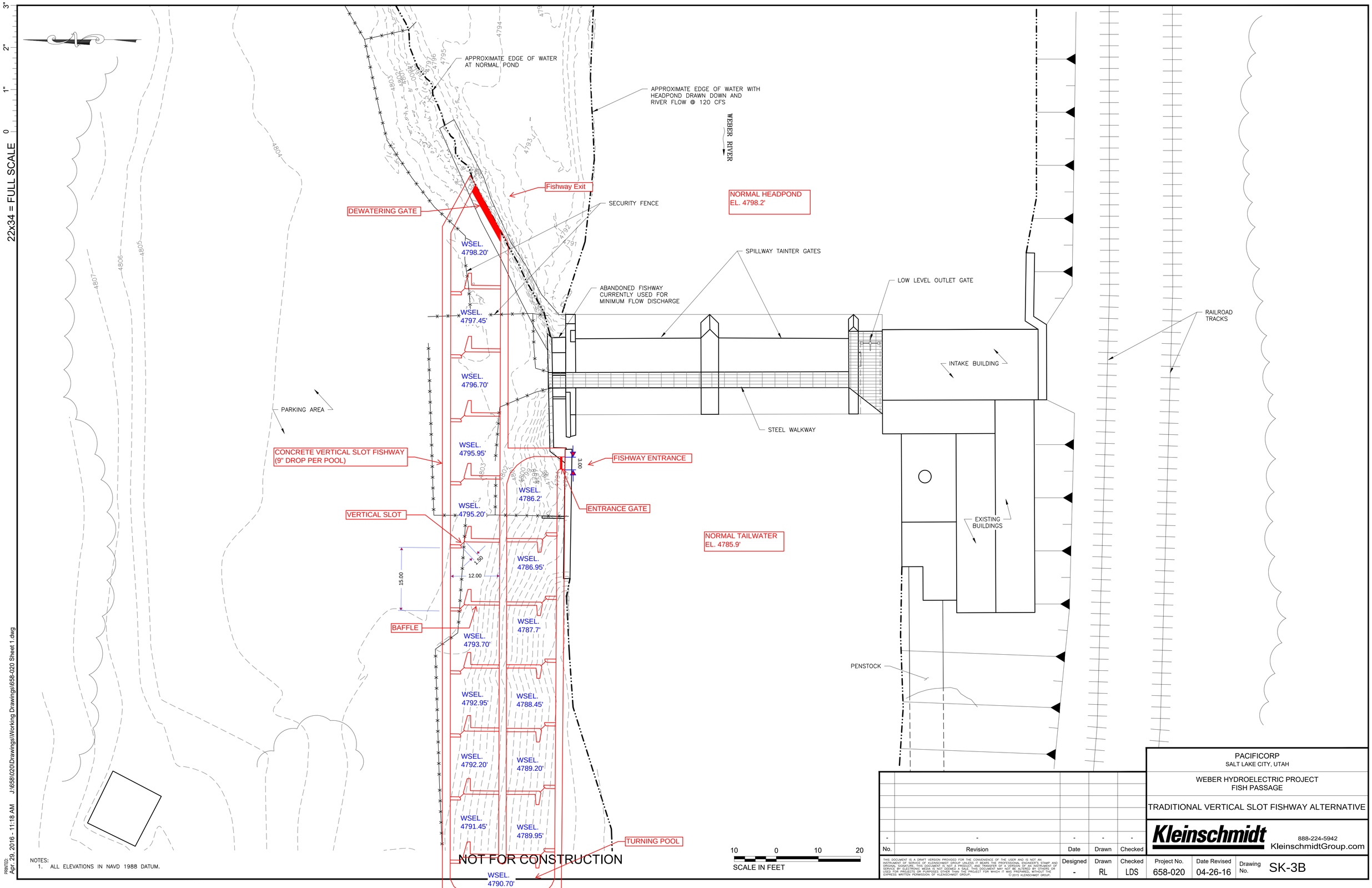

NOTES:
1. ALL ELEVATIONS IN NAVD 1988 DATUM.

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WEBER HYDROELECTRIC PROJECT
FISH PASSAGE

TRADITIONAL VERTICAL SLOT FISHWAY ALTERNATIVE

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Designed	Drawn	Checked	Project No.	Date Revised	Drawing No.
-	RL	LDS	658-020	04-26-16	SK-3B

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22x34 = FULL SCALE

3" 2" 1" 0

APPROXIMATE EDGE OF WATER AT NORMAL POND

APPROXIMATE EDGE OF WATER WITH HEADPOND DRAWN DOWN AND RIVER FLOW @ 120 CFS

WEBER RIVER

CONCRETE FLOW CONTROL STRUCTURE

FISHWAY EXIT

SECURITY FENCE

CHANNEL CENTER LINE

FLOW CONTROL GATES

SPILLWAY TAINTER GATES

ABANDONED FISHWAY CURRENTLY USED FOR MINIMUM FLOW DISCHARGE

LOW LEVEL OUTLET GATE

ROCK WEIR
9 INCH DROP IN WATER LEVEL PER WEIR

INTAKE BUILDING

RAILROAD TRACKS

PARKING AREA

STEEL WALKWAY

NATURAL CHANNEL FISHWAY WITH 5% SLOPE

FISHWAY ENTRANCE

EXISTING BUILDINGS

PENSTOCK

SHEET PILE CUT OFF WALL

15.00

15.00

45.00

14.00

15.00

80.00

70.00

19.00

4804 4805 4806 4807 4800 4799 4798 4797 4796 4795 4794 4793 4792 4791 4803 4802 4801

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SCALE IN FEET

NOTES:
1. ALL ELEVATIONS IN NAVD 1988 DATUM.

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WEBER HYDROELECTRIC PROJECT
FISH PASSAGE

NATURAL CHANNEL FISHWAY ALTERNATIVE

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No.	Revision	Date	Drawn	Checked
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Designed	Drawn	Checked	Project No.	Date Revised	Drawing No.
-	RL	LDS	658-020	04-26-16	SK-4

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APPENDIX C

CONCEPTUAL DESIGN DRAWINGS FOR THE PREFERRED ALTERNATIVE

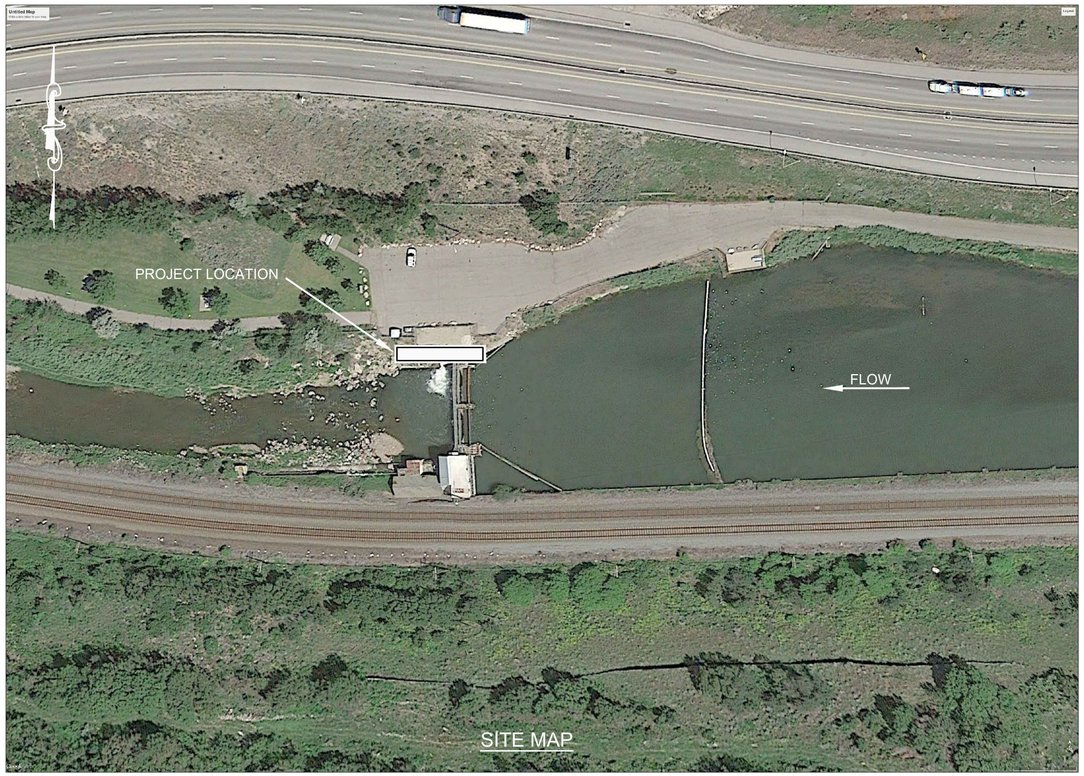
PACIFICORP

SALT LAKE CITY, UTAH

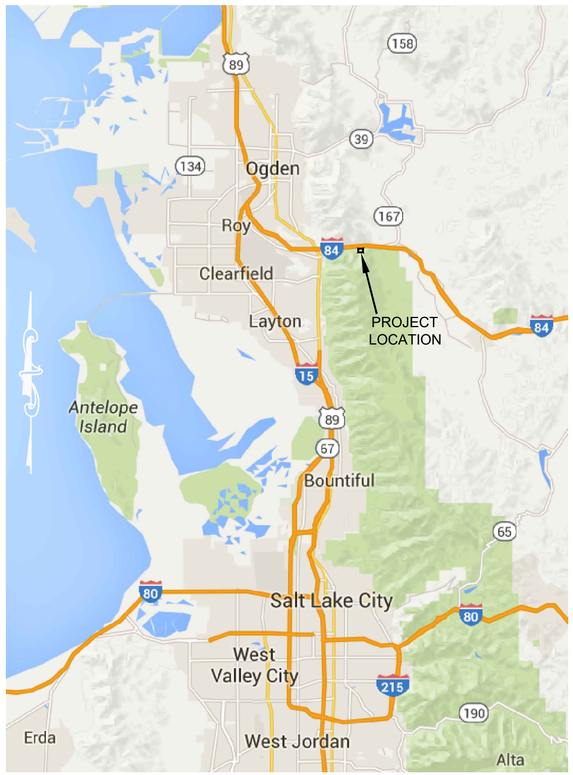
WEBER HYDROELECTRIC PROJECT
UPSTREAM FISH PASSAGE

DRAWING LIST				
SHEET NO.	SHEET DESCRIPTION	DATE	REVISION	STATUS
1	COVER SHEET & DRAWING LIST	8-01-16	B	CONCEPTUAL DESIGN
2	EXISTING SITE PLAN	6-15-16	A	CONCEPTUAL DESIGN
3	PROPOSED SITE PLAN	8-01-16	B	CONCEPTUAL DESIGN
4	FISHWAY PLAN	8-01-16	B	CONCEPTUAL DESIGN
5	FISHWAY PROFILE & BAFFLE/POOL DETAIL	8-01-16	B	CONCEPTUAL DESIGN

CONCEPTUAL DESIGN
8-01-16



SITE MAP



PACIFICORP

Kleinschmidt

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SAP# –	WEBER HYDROELECTRIC PROJECT UPSTREAM FISH PASSAGE COVER SHEET & DRAWING LIST		
PL#			
DATE 06-14-16			
ENG JEW / DES –			
DR TLT / CH –			
APPROVAL	PACIFICORP A PACIFICORP COMPANY / Kleinschmidt / HYDRO		
–	SCALE: AS SHOWN	SHEET 1	0658020 / REV. B

No.	DATE	REVISION	BY	CHK	APP
A	6-15-16	CONCEPTUAL DESIGN			
B	8-01-16	CONCEPTUAL DESIGN			

PLOT SCALE: 1 = 1

REFERENCE DRAWINGS / DRAWING No.

REFERENCE DRAWINGS / DRAWING No.

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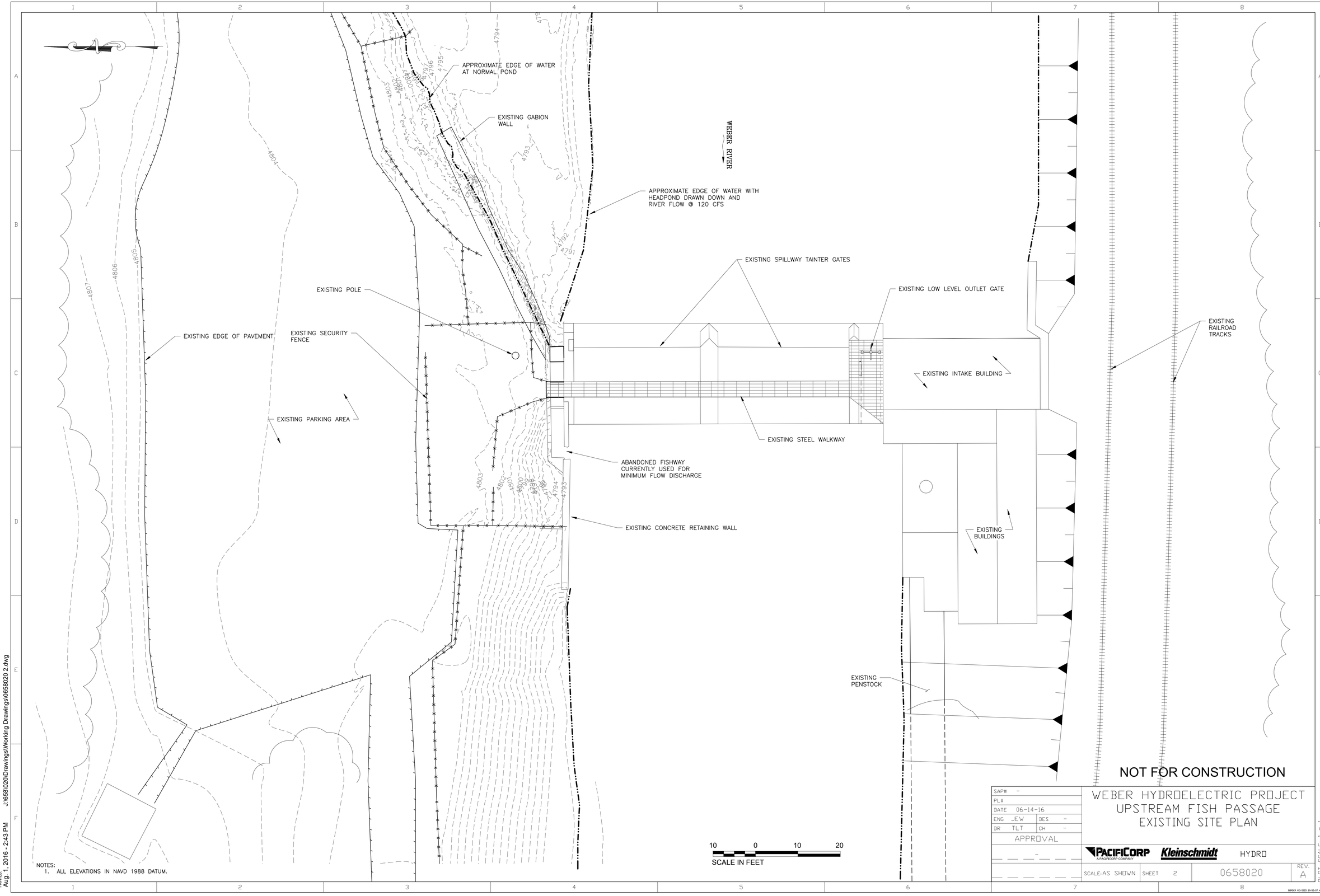

NOTES:
1. ALL ELEVATIONS IN NAVD 1988 DATUM.

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PL#			
DATE 06-14-16			
ENG JEW	DES -		
DR TLT	CH -		
APPROVAL			
-		PACIFICORP A PACIFICORP COMPANY / Kleinschmidt HYDRO	
		SCALE: AS SHOWN / SHEET 2 / 0658020	REV. A

No.	DATE	REVISION	BY	CHK	APP
A	6-15-16	CONCEPTUAL DESIGN			

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DRAWING No.
REFERENCE DRAWINGS
DRAWING No.

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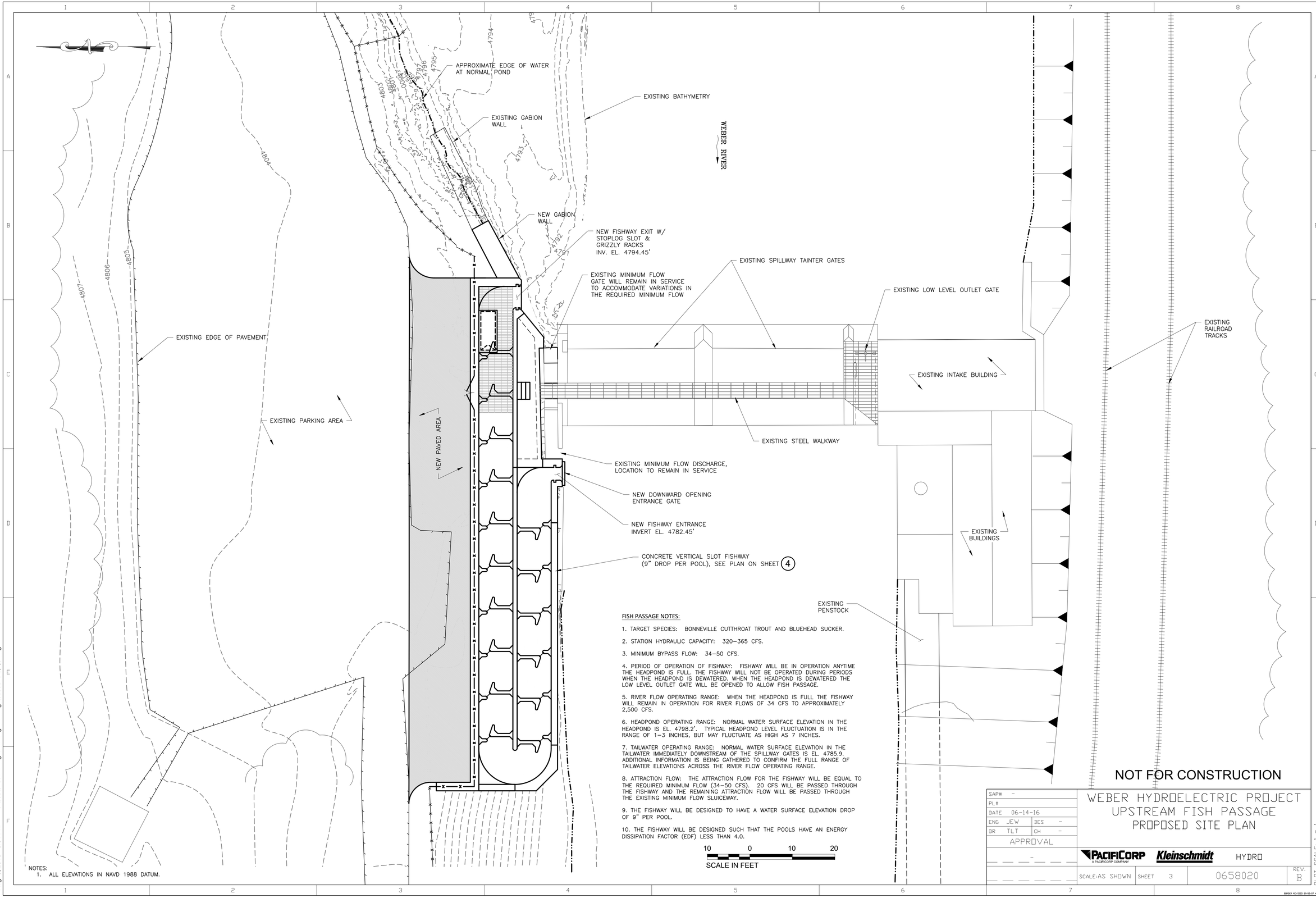

NOTES:
1. ALL ELEVATIONS IN NAVD 1988 DATUM.

FISH PASSAGE NOTES:

1. TARGET SPECIES: BONNEVILLE CUTTHROAT TROUT AND BLUEHEAD SUCKER.

2. STATION HYDRAULIC CAPACITY: 320–365 CFS.

3. MINIMUM BYPASS FLOW: 34–50 CFS.

4. PERIOD OF OPERATION OF FISHWAY: FISHWAY WILL BE IN OPERATION ANYTIME THE HEADPOND IS FULL. THE FISHWAY WILL NOT BE OPERATED DURING PERIODS WHEN THE HEADPOND IS DEWATERED. WHEN THE HEADPOND IS DEWATERED THE LOW LEVEL OUTLET GATE WILL BE OPENED TO ALLOW FISH PASSAGE.

5. RIVER FLOW OPERATING RANGE: WHEN THE HEADPOND IS FULL THE FISHWAY WILL REMAIN IN OPERATION FOR RIVER FLOWS OF 34 CFS TO APPROXIMATELY 2,500 CFS.

6. HEADPOND OPERATING RANGE: NORMAL WATER SURFACE ELEVATION IN THE HEADPOND IS EL. 4798.2'. TYPICAL HEADPOND LEVEL FLUCTUATION IS IN THE RANGE OF 1–3 INCHES, BUT MAY FLUCTUATE AS HIGH AS 7 INCHES.

7. TAILWATER OPERATING RANGE: NORMAL WATER SURFACE ELEVATION IN THE TAILWATER IMMEDIATELY DOWNSTREAM OF THE SPILLWAY GATES IS EL. 4785.9. ADDITIONAL INFORMATION IS BEING GATHERED TO CONFIRM THE FULL RANGE OF TAILWATER ELEVATIONS ACROSS THE RIVER FLOW OPERATING RANGE.

8. ATTRACTION FLOW: THE ATTRACTION FLOW FOR THE FISHWAY WILL BE EQUAL TO THE REQUIRED MINIMUM FLOW (34–50 CFS). 20 CFS WILL BE PASSED THROUGH THE FISHWAY AND THE REMAINING ATTRACTION FLOW WILL BE PASSED THROUGH THE EXISTING MINIMUM FLOW SLUICEWAY.

9. THE FISHWAY WILL BE DESIGNED TO HAVE A WATER SURFACE ELEVATION DROP OF 9" PER POOL.

10. THE FISHWAY WILL BE DESIGNED SUCH THAT THE POOLS HAVE AN ENERGY DISSIPATION FACTOR (EDF) LESS THAN 4.0.

10 0 10 20
SCALE IN FEET

NOT FOR CONSTRUCTION

SAP# –
PL#
DATE 06-14-16
ENG JEW DES –
DR TLT CH –
APPROVAL
–

WEBER HYDROELECTRIC PROJECT
UPSTREAM FISH PASSAGE
PROPOSED SITE PLAN

PACIFICORP A PACIFICORP COMPANY | Kleinschmidt | HYDRO

SCALE: AS SHOWN | SHEET 3 | 0658020 | REV. B

REVISION	BY	CHK	APP	No.	DATE
CONCEPTUAL DESIGN				A	6-15-16
CONCEPTUAL DESIGN				B	8-01-16

REFERENCE DRAWINGS | DRAWING No.
REFERENCE DRAWINGS | DRAWING No.

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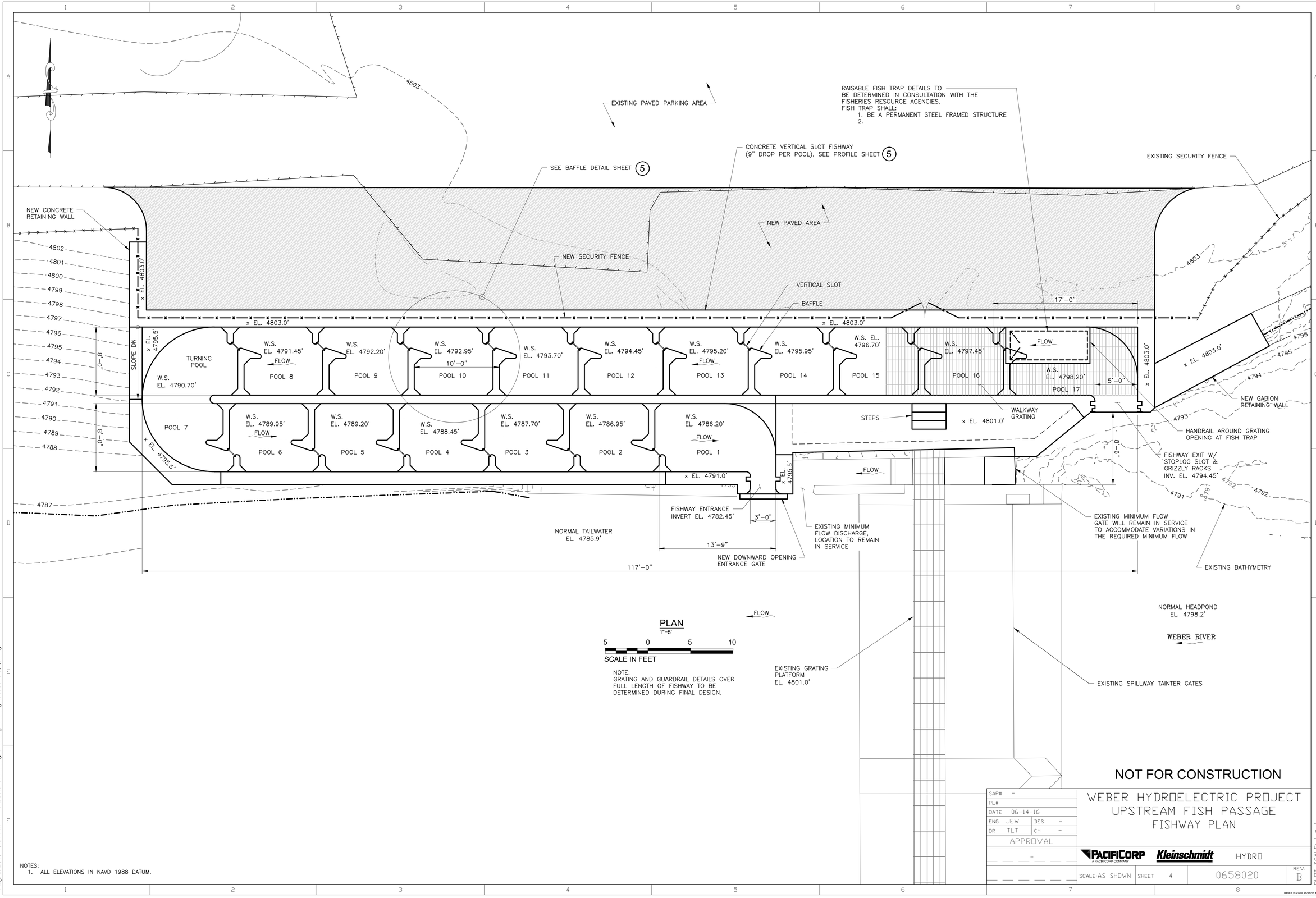

PLAN
1"=5'

5 0 5 10
SCALE IN FEET

NOTE:
GRATING AND GUARDRAIL DETAILS OVER FULL LENGTH OF FISHWAY TO BE DETERMINED DURING FINAL DESIGN.

NOTES:
1. ALL ELEVATIONS IN NAVD 1988 DATUM.

NOT FOR CONSTRUCTION

SAP#	-
PL#	
DATE	06-14-16
ENG	JEW
DES	-
DR	TLT
CH	-
APPROVAL	
-	

WEBER HYDROELECTRIC PROJECT
UPSTREAM FISH PASSAGE
FISHWAY PLAN

PACIFICORP A PACIFICORP COMPANY | Kleinschmidt | HYDRO

SCALE: AS SHOWN | SHEET 4 | 0658020 | REV. B

No.	DATE	REVISION	BY	CHK APP
A	6-15-16	CONCEPTUAL DESIGN		
B	8-01-16	CONCEPTUAL DESIGN		

REFERENCE DRAWINGS | DRAWING No. | REFERENCE DRAWINGS | DRAWING No.

PLOT SCALE: 1 = 1

PRINTED: Aug. 3, 2016 - 5:01 PM
J:\65810\020\Drawings\Working Drawings\0658020 3,4,5.dwg

BORDER REVISED 09/05/07 KWL

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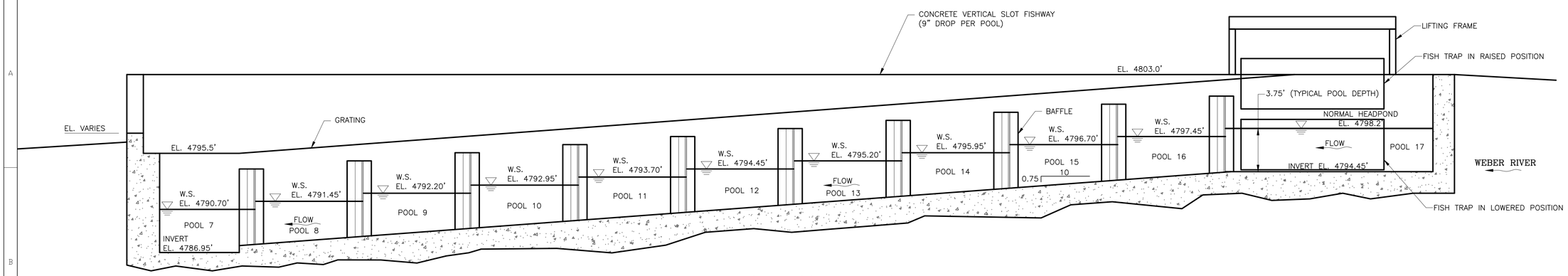
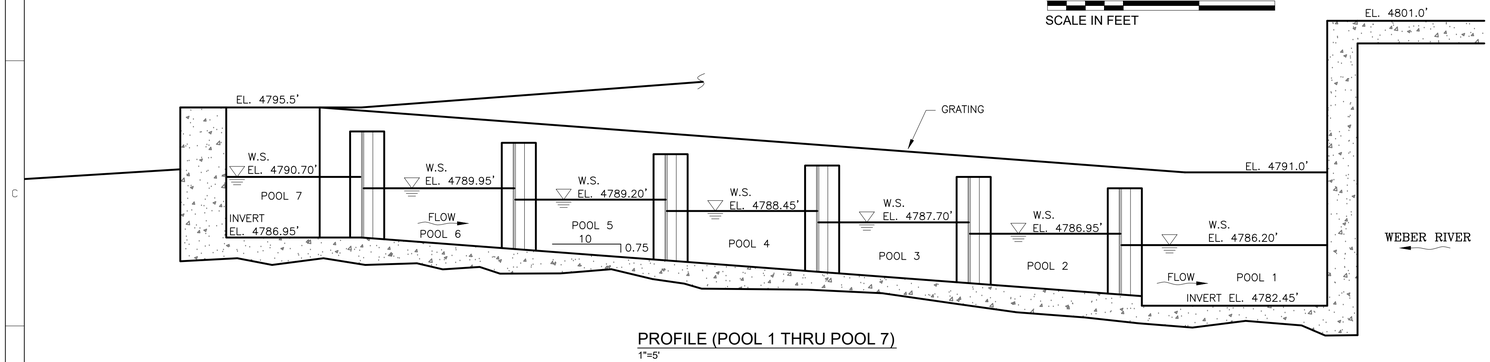
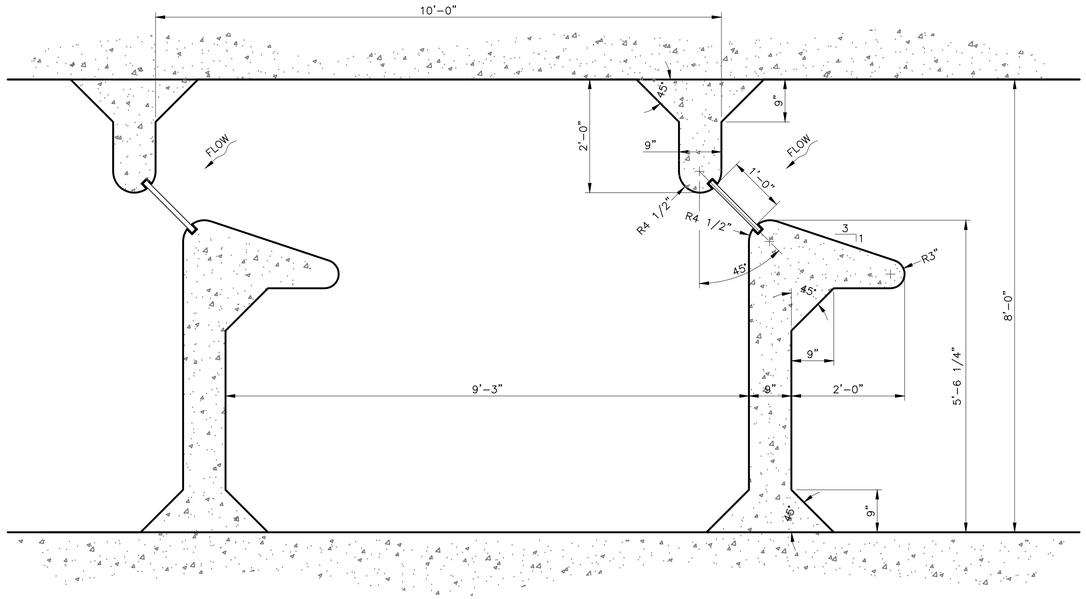


PROFILE (POOL 7 THRU POOL 17)
1"=5'

5 0 5 10
SCALE IN FEET



PROFILE (POOL 1 THRU POOL 7)
1"=5'



TYPICAL BAFFLE/POOL DETAIL
3/4"=1'-0"

NOT FOR CONSTRUCTION

SAP# -	WEBER HYDROELECTRIC PROJECT
PL#	UPSTREAM FISH PASSAGE
DATE 06-14-16	FISHWAY PROFILE &
ENG JEW / DES -	BAFFLE/POOL DETAIL
DR TLT / CH -	PACIFICORP A PACIFICORP COMPANY · Kleinschmidt · HYDRO
APPROVAL	SCALE: AS SHOWN · SHEET 5 · 0658020 · REV. B

No.	DATE	REVISION	BY	CHK	APP
A	6-15-16	CONCEPTUAL DESIGN			
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PLOT SCALE: 1 = 1

PRINTED: Aug. 3, 2016 - 5:01 PM J:\6581020\Drawings\Working Drawings\0658020 3,4,5.dwg

BORDER REVISED 09/05/07 KAG

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APPENDIX D

LETTER: OPERATION OF 1938 POWER WATER AGREEMENT

GARY R. HERBERT
Governor
SPENCER J. COX
Lieutenant Governor

State of Utah
DEPARTMENT OF NATURAL RESOURCES
Division of Water Rights

MICHAEL R. STYLER
Executive Director

KENT L. JONES
State Engineer/Division Director

January 21, 2014

REED COZENS
WEBER RIVER COMMISSIONER
PO BOX 151
LAYTON UT 84041

RE: Operation of 1938 Power Water Agreement

Dear Reed:

The purpose of this letter is to provide you instructions regarding the operation of the 1938 Power Water Agreement. As you know, we have met with many of the water users and held a public meeting on October 29, 2013 to discuss this issue. We have received comments from several entities and we have included our response to many of these comments at the end of this letter, which we are copying to interested parties. The background and concepts regarding the agreement are described in the draft document presented at the public meeting and in other records.

These instructions address three different periods: a storage period, a trade period, and a spill period.

STORAGE PERIOD

Power Company Entitlement (PCENT)
The power company is entitled to divert up to 365 cfs under its 1903 priority water right (35-8061) when it is available in priority. The power company entitlement (PCENT) is determined by calculating the natural flow of the river at Gateway and subtracting the water that prior rights are entitled to receive. The natural flow at Gateway is the measured flow at Gateway plus the net storage above Gateway plus the exports above Gateway. The lone, significant prior right on the system during the storage period is Davis and Weber Counties Canal Company's (DWCCC's) 1896 priority right to 13,000 AF of storage in East Canyon Reservoir. The remaining natural flow at Gateway, up to 365 cfs, is PCENT. The storage period starts at the end of the irrigation season on approximately October 15 and goes to April 15.

Power Water Originating Above Echo Dam (PWOAE)
During the storage period, power water may be diverted directly through the Weber-Provo Canal (WPC), it may be stored, or it may be used to generate power. In order to ensure that the power right is not enlarged, only power water originating above Echo Dam (PWOAE) may be diverted through the WPC or stored. PWOAE only exists when the natural flow of the river between Gateway and Echo Dam (minus DWCCC's portion) is not sufficient to provide 365 cfs. In some cases PWOAE may be the entire natural flow of the river above Echo Dam, but PWOAE cannot

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be greater than what is needed to supply 365 cfs at Gateway. PWOAE is a crucial value because it represents the maximum amount of power water available under the agreement. PWOAE can be 1) diverted through the WPC, 2) stored, or 3) allowed to flow downstream for power generation, as described respectively in the next three paragraphs.

Power Water Diverted Through the WPC (PWDIV)
The first portion of PWOAE that needs to be accounted for is power water diverted through the WPC (PWDIV). PWDIV may be all or a portion of PWOAE on a given day. There may also be days when the amount of water diverted through the WPC exceeds PWOAE. On those days, the extra diversion should be charged to Provo River Water Users Association (PRWUA) power water storage and credited to Weber River Water Users Association (WRWUA) under Water Right 35-8739 (A9568).

Power Water Stored (PWSTO)
PWOAE that does not get diverted through the WPC may be stored. The actual amount of power water stored (PWSTO) may, however, be less than what was available to store. PWSTO includes water stored by WRWUA and PRWUA as well as water stored by the power company.

Power Water Not Diverted or Stored (PWNDS)
Not all PWOAE has to be diverted or stored. The power water not diverted or stored (PWNDS) flows down the river and is available for direct diversion into the power plant.

Withheld Weber River Waters (WWRW)
Withheld Weber River Waters (WWRW) is the sum of PWDIV and PWSTO minus any power water stored by the power company. At the end of the storage period, WWRW is divided equally between WRWUA and PRWUA.

Power Water Accounting
In addition to WRWUA's half of WWRW, they may have also stored water under Water Right 35-8739 (A9568). All of this storage, as well as any other storage belonging to them under the agreement, must be accounted for under 35-8739, which has an annual limit of 74,000 AF. PRWUA's half of WWRW should be accounted for as "power water."

TRADE PERIOD

At the end of the storage period on April 15, diversion and storage of power water ceases and the trade period begins. PRWUA may trade its power water storage across the WPC only when there are "excess flows" in the river above Echo Reservoir. This will ensure that other water rights on the system are not impaired by the trade.

Excess Flows in the River Above Echo Reservoir
Excess flow may be diverted into the WPC from the Weber River or from Beaver Creek. Excess flow is natural flow that, in the absence of the agreement, would have flowed in the stream past these diversions in order to satisfy either storage rights in Echo Reservoir or direct flow rights below Echo Dam. These "excess flows" are thus excess to the upper river, but not excess to the river as a whole.

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Operating the Trade

Excess flows that are diverted into the WPC must be replaced by PRWUA's stored power water. If Echo Reservoir is filling under 35-8739 while the water is being traded across the WPC, then a like quantity of PRWUA's stored power water must be credited to WRWUA to complete the trade. The power water traded to WRWUA is part of the 74,000 AF they are entitled to store under 35-8739. If water is being traded across the WPC when the natural flow of the system is insufficient to allow storage in Echo Reservoir, then a like quantity of PRWUA's stored power water must be released below Echo Dam to satisfy direct flow demands. This trade can be completed–regardless of the priority cut on the river–to the extent that excess flows exist at the WPC diversions.

SPILL PERIOD

Power water not owned by WRWUA is stored on a space-available basis, meaning that it can be spilled out of storage if not used or traded first. Any storage owned by the power company is the first water to spill; PRWUA power water spills next. Since Echo Water is often stored in other reservoirs, a "paper spill" normally occurs before a physical spill. Once Echo Reservoir is credited with 74,000 AF of storage in any or all reservoirs, a spill begins as additional water is stored. Additional physical storage must be credited to WRWUA and any water that is "paper spilled" must be credited to the next appropriator, which is Weber Basin Water Conservancy District (WBWCD). Any PRWUA storage remaining on July 1 becomes property of WRWUA, except that WRWUA is limited to 74,000 AF of storage and additional storage is credited to WBWCD.

IMPLEMENTATION

These instructions should be followed unless and until written instructions are received from the State Engineer that modify these procedures. Thanks for your efforts in learning the system and distributing water in what has been less than optimal circumstances.

Sincerely,

Kent Jones, P.E.
Utah State Engineer

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RESPONSE TO SELECTED WATER USER COMMENTS

Comment (General): Several water users requested that we provide direction on issues not specifically related to the power water agreement.

Response: The purpose of these instructions to the commissioner is to address the operation of the 1938 power water agreement, so the instructions are generally limited to that issue. We understand that there are additional concerns about operations on the system such as: priority of the various water rights, administration of storage in Smith and Morehouse Reservoir, maximizing water use for all federal projects, capturing diurnal flows, allocating extra allotment water, delivery of Echo shares, distribution in times of shortage, and other issues. We urge all parties to continue to study these issues and to continue to cooperate in addressing them. We will also continue to work with the various entities to resolve issues not specifically covered by these instructions.

Comment from Provo Reservoir Water Users Company (PRWUC): Delivery of Echo shares has priority over delivery of power water through the WPC.

Response: This comment appears to be supported by the power water agreement. We recognize that Echo Shares delivery has, at times, been difficult to coordinate with simultaneous delivery of power water and that Echo Shares delivery has not always corresponded optimally with demand. We will work with the Weber River and Provo River Commissioners, with input from the water users, to develop a process that ensures fair delivery of Echo Shares through the WPC.

Comment from WBWCD: WBWCD is dependent on high flows of the Weber River. Any changes in operation resulting in less water available jeopardizes the water supply to its customers.

Response: The intent of the instructions to the commissioner is for water to be distributed in accordance with the water rights and historical distribution practices such that there is no harm to any water right. Additionally, we expect that water rights owned by the Bureau of Reclamation will be managed by the Bureau, subject to the limitations of each of the water rights, in accordance with their interests.

Comment from WBWCD: We are supportive of online tools that will help in the accounting of water.

Response: Experience has shown us that transparency in the distribution of water helps the water users to gain trust in the system. There may be costs to some water users to make this data available on a real-time basis, but we think that the benefits to the water users will be well worth the costs.

Comment from PRWUA: In order to address disputes in a timely and cost-effective manner, there needs to be an informal process involving the state engineer, the river commissioner, and the affected parties to resolve these disputes.

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Response: We are hopeful that this ongoing process of water user participation and education, in conjunction with future tools that provide transparency and clarity to operations, will help us avoid many potential disputes. However, as new issues do arise, we agree that these issues need to be addressed quickly. If there are disputes between Federal Project Operators we expect that the Bureau will take the lead in arbitrating these disputes. Disputes between other water users should be handled by the River Commissioner, if possible. When necessary, the State Engineer may issue specific instructions to the commissioner in order to address an issue.

Comment from Dennis Marchant: Winter power water should be assigned a 1938 priority date and delivered based on that date in accordance with 73-3-21.1(2)(a).

Response: Winter power water is stored under a 1903 priority date. Delivery of storage water is governed by 73-3-20(1) which says, in part, "Any person having stored that person's appropriated water in a reservoir for a beneficial purpose shall be permitted to withdraw the water at the times and in the quantities as the person's necessities may require if the withdrawal does not interfere with the rights of others." This applies to storage water taken "either above or below the point where emptied into the stream, body of water or reservoir."

Comment from Dennis Marchant: Upstream storage water owned by Fish Lake Reservoir Co., Marchant Extension Irrigation Co., Smith and Morehouse Reservoir Co., Kamas Lake, and Weber Basin should not be called on to implement upstream Echo Exchanges.

Response: We believe this to be correct. Echo storage may only be exchanged above the reservoir by diverting excess natural flow.

Comment from Dennis Marchant: Water delivered through the WPC should be measured at the points of diversion and at the end of the canal to properly account for gains or losses occurring in the canal.

Response: Since 1970 the commissioner has reported the WPC measurement at the end of the canal at the gage in Francis. However, between 1932 and 1969 the commissioner reported measurements at the beginning of the canal in Oakley, or at Oakley plus the diversion from Beaver Creek, or at Oakley and Francis. It's not clear why the change was made in 1970, but perhaps it was because it was easier to make one measurement rather than two or three. For 2014 we are instructing the commissioner to continue to use the measurement obtained at Francis as in recent years. However, we are reviewing this aspect of the operation and may change it in a future year.

Comment from WRWUA: The priority of original water rights should be followed except where change applications have been approved.

Response: Water right priorities are the basis for distribution of water in Utah and must be protected. Changes, exchanges, and agreements between water users may not operate to the detriment of any other water user. The primary purpose for issuing instructions to the commissioner regarding the power water agreement, while following a public process to allow for input from water users, is to ensure that third-party water rights are not impaired.

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Comment from WRWUA: There needs to be better measurement, accounting, reporting, coordination and communication regarding the water.

Response: These things are all important in the operation of the river. We support improvements in all of these areas and believe that this ongoing process of water user participation and cooperation has been, and will continue to be, helpful in addressing these areas.

Comment from Bureau of Reclamation: We hope to have regular meetings in the future with PRWUA, WRWUA, WBWCD, and the State to discuss water operations of the Weber River Basin.

Response: We are supportive of ongoing meetings and discussions to coordinate the operation of the Weber River and to address ongoing issues.

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APPENDIX E

COMMUNICATION PLAN

Weber Hydroelectric Project (FERC Project No. 1744)

DRAFT Communication Plan to Accompany PM&E Measures FISH-2, FISH-3, and FISH-4

Introduction

During the Federal Energy Regulatory Commission (FERC) relicensing process for the Weber Hydroelectric Project (the Project) (FERC Project No. 1744) PacifiCorp and stakeholders worked collaboratively to develop effective and appropriate environmental protection, mitigation, and enhancement (PM&E) measures that balance the need to protect natural and cultural resources, the need for hydroelectric generation, the need to protect existing water rights, and the goal of enhancing recreational resources associated with the Project. PM&E measures FISH-2, FISH-3, and FISH-4 (listed below) call for a Communication Plan that guides and governs communication between the parties over the life of the license. The Communication Plan is specific to PM&E measures FISH-2, FISH-3, and FISH-4 and does not apply to Project or PM&E measure communications other these. Consultation practices and communications referred to in other PM&E measures shall follow historical practices. The Communication Plan provided below specifies the parties, methods for gathering and maintaining primary and alternate group contacts on an annual basis, and contact methods over the life of the license.

Relevant PM&E Measures

FISH-2:	Construct, operate, and maintain a fish ladder suitable for upstream passage of both Bonneville Cutthroat Trout (BCT) and bluehead sucker, including a fish trap operated by Utah Division of Wildlife Resources (UDWR) and Trout Unlimited (TU) and maintained by PacifiCorp. PacifiCorp will consult annually with UDWR, TU, and U.S. Forest Service (USFS) related to fish ladder and trap operation and maintenance according to a Communication Plan developed between UDWR, TU, USFS, U.S. Fish and Wildlife Service (FWS) and PacifiCorp. The Communication Plan will also specify group contacts, alternates, and contact methods over the life of the license.
FISH-3:	Keep the low-level gate operational when forebay is dewatered subject to operational constraints and requirements such as extreme winter icing conditions (undertake periodic maintenance as required to ensure operation). If the forebay is dewatered and the low-level gate is inoperable for more than 10 days due to extreme temperature or flow conditions, PacifiCorp will consult with UDWR, TU, FWS, Utah Division of Water Quality (UDWQ), and USFS (per the Communication Plan methods) and open the low-level gate as soon as possible.
FISH-4:	In the event of a prolonged project outage keep forebay full if possible to ensure fish ladder operation; PacifiCorp will consult with UDWR, TU, FWS, UDWQ, and USFS (per the Communication Plan methods) to discuss fishway operation during any interim periods exceeding 10 days when neither the low-level gate nor the fishway are operable.

Parties and Primary and Alternate Contacts

The parties to this Communication Plan consist of the following entities:

- PacifiCorp
- Trout Unlimited (TU)
- Utah Division of Wildlife Resources (UDWR)
- Utah Division of Water Quality (UDWQ)
- U.S. Forest Service (USFS)
- U.S. Fish and Wildlife Service (FWS)

PacifiCorp shall communicate with each party on an annual basis in the month of January to gather relevant contact information for one primary and one alternate contact from each party. PacifiCorp shall communicate, via email and/or telephone (unless another method of communication becomes more applicable), with the primary and alternate contacts on file in this Communication Plan for the preceding year to gather this information. In the event that primary and/or alternate contacts change during the calendar year it is the responsibility of each party to notify PacifiCorp and the other parties of these changes and provide PacifiCorp and the other parties with relevant contact information for the new primary and alternate contacts. Contact information retained within the Communication Plan (in the table provided below) and made available to the parties shall include, at a minimum, first and last name, title, street and postal office addresses, email addresses, office and mobile telephone numbers (mobile telephone number may be used for text messaging and voice calls and/or messages), and organizational URL. If contact methods other than these become applicable during the term of the license this contact information shall also be retained within the Communication Plan. Likewise, if contact methods specified below become obsolete during the term of the license this contact information shall be stricken from the Communication Plan. An annual updated Communication Plan that provides all the necessary and relevant contact information shall be retained and provided to the parties by PacifiCorp for each calendar year. The annual plan will also note preferred contact method for each party for that year, as well as any known extended periods that any party may be unavailable. Primary and alternate contacts and contact information from previous years shall be retained in archive by PacifiCorp.

Party	**Contact Information**	**Primary Contact (*preferred contact mode)**	**Alternate Contact (*preferred contact mode)**
PacifiCorp	First Name		
	Last Name		
	Title		
	Office Street Address		
	Office Postal Address		
	Email Address		
	Office Telephone		
	Mobile Telephone (includes text)		
	Organizational URL		
	Extended unavailable dates?		
UDWR	First Name		
	Last Name		
	Title		
	Office Street Address		
	Office Postal Address		
	Email Address		
	Office Telephone		
	Mobile Telephone (includes text)		
	Organizational URL		
	Extended unavailable dates?		
UDWQ	First Name		
	Last Name		
	Title		
	Office Street Address		
	Office Postal Address		
	Email Address		

Party	Contact Information	Primary Contact (*preferred contact mode)	Alternate Contact (*preferred contact mode)
	Office Telephone		
	Mobile Telephone (includes text)		
	Organizational URL		
	Extended unavailable dates?		
USFS	First Name		
	Last Name		
	Title		
	Office Street Address		
	Office Postal Address		
	Email Address		
	Office Telephone		
	Mobile Telephone (includes text)		
	Organizational URL		
	Extended unavailable dates?		
FWS	First Name		
	Last Name		
	Title		
	Office Street Address		
	Office Postal Address		
	Email Address		
	Office Telephone		
	Mobile Telephone (includes text)		
	Organizational URL		
	Extended unavailable dates?		
TU	First Name		
	Last Name		
	Title		
	Office Street Address		
	Office Postal Address		
	Email Address		
	Office Telephone		
	Mobile Telephone (includes text)		
	Organizational URL		
	Extended unavailable dates?		

Communication Methods

The subjects of communication, associated PM&E measures, and specific primary and secondary communication methods planned are enumerated below. Primary communication methods will be used in all cases. Secondary communication methods shall be used in the event that no response is received by the communicating party from the other parties within one work week following the delivery of the communication to the other parties. Primary *and* alternate contacts for each party shall be included on all primary and secondary communications that occur via email or text message to prevent lost communications in the event that primary or alternate contacts are unavailable for an extended period of time. Primary and secondary communication methods may be revisited and revised in the event that

any communication method specified becomes obsolete during the term of the license and/or any new communication method becomes applicable during the term of the license.

Subject (associated PM&E measure)	**Party Typically to Initiate Communication**	**Primary Communication Method(s) [1] (to all parties)**	**Secondary Communication Method(s) [1] (to all parties)**
Annual consultation regarding fish ladder and trap operation and maintenance (FISH-2)	PacifiCorp, although any party may initiate communication to arrange for annual consultation	Email *and* office telephone	Follow up email, follow up office telephone, *and* mobile telephone
Forebay is dewatered and the low-level gate is inoperable for more than 10 days due to extreme temperature or flow conditions (FISH-3)	PacifiCorp	Email, office telephone, *and* mobile telephone	Follow up email, follow up office telephone, follow up mobile telephone, *and* text message
Discuss fishway operation during any interim periods exceeding 10 days when neither the low-level gate nor the fishway are operable (FISH-4)	PacifiCorp	Email, office telephone, *and* mobile telephone	Follow up email, follow up office telephone, follow up mobile telephone, *and* text message

[1] Communication methods may occur in any order. All methods are not required if parties have already responded to an earlier communication.

APPENDIX F

DRAFT LICENSE CONDITIONS RECOMMENDED BY STAFF

This is a place holder. Appendices will be created as separate files and combined with the EA in PDF file format at a later date.

APPENDIX G

RESPONSE TO COMMENTS ON THE DRAFT EA

This is a place holder. Appendices will be created as separate files and combined with the EA in PDF file format at a later date