REVIEW OF APPLICATION FOR RECERTIFICATION BY THE LOW IMPACT HYDROPOWER INSTITUTE OF THE SIPHON POWER PROJECT, LIHI #73

Prepared by Stephen Byrne
May 6, 2021

I. INTRODUCTION

This report summarizes the review findings of the application submitted by The Central Oregon Irrigation District (Applicant or licensee) to the Low Impact Hydropower Institute (LIHI) for recertification of the Siphon Power Hydroelectric Project FERC (P-3571). The Project is a 5.5 MW diversion and run-of-river facility located on the Deschutes River in Bend, Oregon. On March 2, 2021 LIHI received a complete application package for recertification of the Project. This current review was made using the new 2nd Edition LIHI Certification Handbook (Revision 2.04, April 1, 2020).

II. RECERTIFICATION PROCESS AND MATERIAL CHANGE REVIEW

Under the current LIHI Handbook (Revision 2.04: April 1, 2020), recertification reviews are a two-phase process starting with a limited review of a completed LIHI application, focused on three questions:

(1) Is there any missing information from the application?
(2) Has there been a material change in the operation of the certified facility since the previous certificate term?
(3) Has there been a change in LIHI criteria since the Certificate was issued?

In accordance with the Recertification Standards, all Projects currently applying for renewal must go through a full review unless their most recent certification was completed using the 2016 version of the Handbook. While there were no material changes at the Project, the LIHI Handbook was materially changed, thus, this Stage II report was required for the Project.

A review of the initial application, dated December 14, 2020, resulted in a Stage I Report dated February 1, 2021 that indicated some additional data was needed, which was sent as a supplement to the application on March 12, 2021.

This Stage II assessment included review of the application package, public records in FERC's eLibrary since the last LIHI certification in 2015, and annual compliance statements received by LIHI during the past term of Certification.

III. PROJECT'S GEOGRAPHIC LOCATION

The Project is located between river miles 170.9 and 169.4 on the Deschutes River in Deschutes County, Oregon (Figure 1). There is no dam associated with the Project. There are seven dams on the Deschutes River downstream of the Project and to the confluence with the Columbia River (Figure 2). The Wickiup Dam is the next dam located upstream of the Project impounding Wickiup Reservoir that is the largest of the Cascade Lakes. There is also a diversion dam approximately 3.5 miles upstream of the Siphon Power diversion.

IV. PROJECT AND IMMEDIATE SITE CHARACTERISTICS

The Siphon Power Project diversion was originally constructed in 1903 and later modified into the current configuration in the mid 1970's. The hydropower facilities have been operating since 1989. The Project consists of the use of the Applicant's pre-existing Central Oregon Canal system including the Deschutes River diversion and the approximate two miles of water conveyance system downstream which delivers water to the Project penstock and powerhouse. Immediately downstream of the diversion intake is the downstream fish louver array that guides and returns entrained fish back to the Deschutes River. Downstream of the fish protection facility, water enters the 10-foot diameter double inverted siphon pipe. About 1,200 feet downstream of the start of the open canal, a buried 9-foot diameter pipe is utilized to deliver excess water to the powerhouse. About a mile and a quarter downstream from the diversion structure, an underground powerhouse contains two turbines and generators. From the penstock intake to the river downstream, there is a 135-foot drop available to drive the two turbines. At the powerhouse, the water enters one or both of the two turbines before being discharged back to the Deschutes River (see Figures 3 - 7).

Figure 1 – Siphon Power Project Location

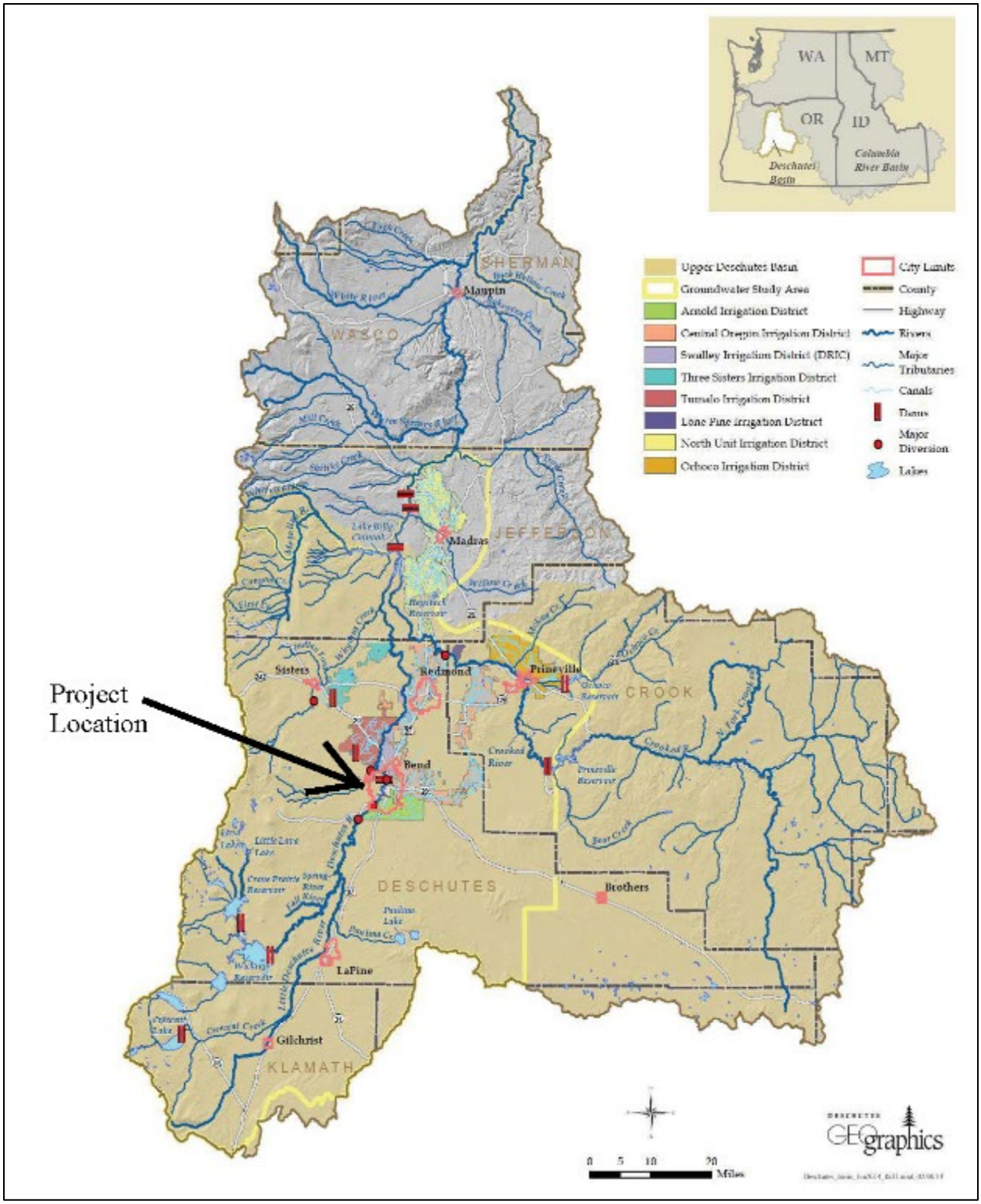

Figure 2 –Deschutes River Basin

Figure 3 – Siphon Power Diversion Intake Area.

Figure 4 –Siphon Power Diversion Intake.

Figure 5 – Downstream Fish Louver Array.

Figure 6 –Siphon Power Powerhouse Area.

Figure 7 – Required Portable Toilet and Trash Receptacle at Recreation Area.

V. ZONES OF EFFECT AND STANDARDS SELECTED

Three Zones of Effect (ZOEs) were designated by the Applicant and were determined to be appropriate. Zone 1 includes the diversion structure and the intake water; Zone 2 includes the bypassed reach of the Deschutes River from the diversion structure downstream to the Project tailrace; and Zone 3 includes the tailrace and downstream reach. The bypassed reach is a steep and narrow canyon. Table 1 shows the Standards selected for each criterion for the three ZOEs. Where applicable, reviewer recommendations for alternate standards are show in **red**.

Table 1. Standards Matrix for the Siphon Power Project.

	Zone:	1: Diversion	2: Bypass	3. Downstream Reach
	River Mile Extent:	RM 170.9	RM – 170.9-169.4	RM 169.4
Criterion		**Standard Selected**		
A	***Ecological Flows***	2	2	2
B	***Water Quality***	1	1	1
C	***Upstream Fish Passage***	1	1	1
D	***Downstream Fish Passage***	2	2	2
E	***Shoreline and Watershed Protection***	~~1~~, **2**	~~1~~, **2**	~~1~~, **2**
F	***Threatened and Endangered Species***	3	3	3
G	***Cultural and Historic Resources***	1	1	1
H	***Recreational Resources***	3	~~3~~, **2**	~~3~~, **2**

VI. REGULATORY AND COMPLIANCE STATUS

The Project was issued a license order from the Federal Energy Regulatory Commission (FERC) in 1987. The Oregon Department of Environmental Protection (Oregon DEP) waived its right to issue a Water Quality Certificate (WQC) for the operation of the Project on September 23, 1982. On February 7, 1990 FERC issued an order amending the Project license to remove Article 410 that required consultation with resource agencies to develop a plan to monitor whitewater boating use in the bypass reach. FERC license articles 406 and 407 required modification of the pre-project fish passage facility and evaluation of the louver array, and to quantify fish losses at the existing facility. An evaluation of downstream fish passage options was conducted and fixed panel vertical screens with one-eighth inch openings was proposed and agreed to by the Oregon Department of Fish and Wildlife (Oregon DFW) and the U. S. Fish and Wildlife Service (FWS). The new facility was evaluated in cooperation with Oregon DFW who determined that the facility met the survival criteria of Oregon DFW and FWS for all fish passing through the facility, including fry. The Project is also in compliance with resource agency recommendations for riverine fish entrainment protection, such as tailrace barriers. Following tailrace monitoring for fish injury and mortality in response to comments from Oregon DFW, tailrace screens were removed, and ongoing monitoring of the site is performed and reported on a quarterly basis.

The current LIHI certification includes two conditions:

- Condition 1. As part of their annual Compliance statement to LIHI, the Owner shall include electronic copies of or electronic addresses to the reports that they file with the Oregon Department of Fish and Wildlife related to conservation flows and tailrace fish observations, covering the prior four quarters.

- Condition 2. The Owner shall notify LIHI within 30 days of any changes in the level of mitigation enhancement funding for fish and wildlife, with particular attention to changes at or around January 1, 2021.

A review of annual compliance statements indicate that the Applicant has consistently submitted the required documentation under Condition 1. Condition 2 was deemed satisfied with submittal of the recertification application that included the new level of mitigation funding.

VII. PUBLIC COMMENT RECEIVED OR SOLICITED BY LIHI

The application was posted for public comment on March 2, 2021 and the notice was forwarded to agencies and stakeholders listed in the application. The deadline for submission of comments was May 1, 2021. No formal comments were submitted. Based on the completeness of the application and documents available on the FERC elibrary, I did not need to contact resource agencies.

VIII. DETAILED CRITERIA REVIEW

A. ECOLOGICAL FLOW REGIMES

Goal: The flow regimes in riverine reaches that are affected by the facility support habitat and other conditions suitable for healthy fish and wildlife resources.

Assessment of Criterion Passage: The Applicant correctly selected Standard A-2, Agency Recommendation for all Zones.

The Project operates in a run-of-river mode with outflow equaling inflow and no useable storage. There is no dam therefore no concerns related to impoundment water level fluctuations. The run-of-river operation and lack of operational impoundment fluctuations are conducive for impoundment habitat that is suitable for fish and wildlife.

A minimum bypass flow of 400 cfs was agreed upon by the Applicant and Oregon DFW on

March 24, 1987, by FWS on March 27, 1987, and subsequently incorporated into the Project's FERC license as Article 402. The 400 cfs minimum bypass flow was developed using data collected from the licensee's instream flow study performed during the FERC licensing process. The 400 cfs continual minimum flow along with off-site fisheries mitigation was agreed to by resource agencies as protection of fish resources in the Deschutes River. License article 405 requires a ramping rate of no more than 3 inches per hour at the point of diversion in order to protect the river from rapid flow reductions during turbine startup and to avoid fish stranding in the bypass and downstream of the tailrace as flows are diverted from the river to the powerhouse.

The Project diverts on average, 25% of stream flow. The amount of water diverted varies from a minimum of about 80 cfs up to about 640 cfs and is dependent on the capacity of the siphon pipe in excess of irrigation water demand and the minimum flow requirement. The water available for power generation depends on irrigation flow releases from upstream storage reservoirs during the irrigation season and typically the flow in the bypassed reach is much more than the minimum 400 cfs. During the non-irrigation season, flow available will range from none to the maximum generation capacity of about 640 cfs. A stream gage was installed per license article 404 and flows are electronically monitored, and quarterly streamflow reports are provided to FERC, FWS, Oregon DFW, and LIHI

Based on my review of the application, supporting documentation, and publicly available information, the Project is operated in a manner such that it does not affect fish and wildlife resources under its limited flow regime. As such, the Project continues to satisfy the Ecological Flow Regimes criterion.

B. WATER QUALITY

Goal: Water Quality is protected in waterbodies directly affected by the facility, including downstream reaches, bypassed reaches, and impoundments above dams and diversions.

Assessment of Criterion Passage: The Applicant appropriately selected Standard B-1, Not Applicable/De Minimis Effect for all Zones.

The Deschutes River upstream of the Project is listed as impaired for flow modification, habitat modification, sedimentation, turbidity and some temperature exceedances. The river downstream is listed as impaired for flow modification, temperature, and pH. The entire 112.5 miles of the river from Wickiup Dam to Lake Billy Chinook are identified as water temperature limited under Section 303(d) of the Clean Water Act for exceeding the year-round 7-day average of the daily maximum (7-DADM) of 18°C for salmon and trout rearing and migration.

The Project has no dam or impoundment and consequently no water storage. The Project also operates in a run-of-river mode, and the minimum bypass flow ensures sufficient water quality to

support aquatic habitat per the IFIM study and agency agreement on flows. The WQC was waived by a letter from Oregon DEC to FERC on September 23, 1982.

In 2010 Oregon DEQ determined that there was no net summertime water temperature increase between the diversion point and the tailrace, and therefore no dissolved oxygen concerns. Additionally, the department concluded that the Project neither contributes to the water quality impairments nor to violations of state water quality standards. Project operations have not changed since that assessment.

A review of the FERC eLibrary and the Applicant's annual compliance letters to LIHI, indicated that no issues related to water quality have occurred at the Project.

Based on my review of the application, supporting documentation, and publicly available information, the Project does not appear to impact water quality in the river nor contribute to the listed impairments and therefore continues to satisfy the Water Quality criterion.

C. UPSTREAM FISH PASSAGE

Goal: The facility allows for the safe, timely, and effective upstream passage of migratory fish. This criterion is intended to ensure that migratory species can successfully complete their life cycles and maintain healthy populations in areas affected by the facility.

Assessment of Criterion Passage: The Applicant appropriately selected Standard C-1, Not Applicable/De Minimis Effect for all Zones.

The Project does not act as a barrier to upstream fish passage because there is no dam associated with the Project.

The Project waters support coldwater fish species, mainly brown and rainbow trout, with a few warmwater species. Non-migratory fish that occur in the Deschutes River include mountain whitefish, several species of sculpin, longnose and speckled dace, chiselmouth, and largescale and bridgelip sucker. Upper watershed populations of bull trout and redband are also considered resident species. Non-native species that occur in the Upper Deschutes River include brook trout, largemouth and smallmouth bass, white and black crappie, brown bullhead catfish, bluegill, three-spined stickleback, tui and blue chub, goldfish and carp.

Migratory bull trout, steelhead, redband trout (*O. mykiss gairdneri*), summer/fall and spring chinook salmon, and sockeye and kokanee salmon historically were able to migrate up the Columbia River and into the Deschutes River as far as the natural 30-foot tall Big Falls at river mile 132 northwest of Terrebone, OR, about 20 miles due north (downstream) of Bend.

No mandatory prescriptions (Section 18 or similar) or recommendations for upstream fish passage were required for the Project at the time of licensing. The Project previously had tailrace screens installed to act as a barrier and prevent fish entrainment into the turbines. By letter dated May 30, 1990 Oregon DFW indicated that they felt that the barrier was not needed for the riverine fish present at the site due to the velocity of the water exiting the turbines and the configuration of the water flow entering the river. The Applicant subsequently monitored the tailrace area for indications of fish injury or mortality and reported the results to Oregon DFW, FWS, and FERC. The screens were removed, and ongoing monitoring of the site is performed and reported on a quarterly basis. A review of the Applicant's annual compliance letters to LIHI over the previous certification period showed that no fish were observed in the tailrace area during routine monitoring.

Based on my review of the application, supporting documentation, and publicly available information, the Project continues to satisfy the Upstream Fish Passage criterion.

D. DOWNSTREAM FISH PASSAGE AND PROTECTION

Goal: The facility allows for the safe, timely, and effective downstream passage of migratory fish. For riverine (resident) fish, the facility minimizes loss of fish from reservoirs and upstream river reaches affected by Facility operations. Migratory species are able to successfully complete their life cycles and maintain healthy populations in the areas affected by the Facility.

Assessment of Criterion Passage: The Applicant appropriately selected Standard D-2, Agency Recommendation for all zones.

As noted previously in Criterion C - Upstream Fish Passage, the natural 30-foot tall Big Falls at river mile 132 northwest of Terrebone, OR, about 20 miles due north (downstream) of Bend, acts as a natural barrier to fish migration.

The 400-cfs minimum bypass flow facilitates downstream movement past the Project. This minimum flow was developed from an instream flow study performed by the licensee during the FERC licensing process and approved by the resource agencies.

Because there is no dam associated with the Project, the Project does not act as a barrier to downstream movement. However, fish can nonetheless accidently enter the diversion canal that leads to the Project powerhouse. A pre-project louver array was constructed during the 1970's to rectify entrainment into the irrigation diversion. FERC license articles 406 and 407 required modification of the passage facility and evaluation of the louver array, and to quantify fish losses at the existing facility. The evaluation was performed after the facility was operational and it was determined that fish losses were unacceptable. An evaluation of downstream fish passage

options was conducted and fixed panel vertical screens with one-eighth inch openings was proposed and agreed to by the Oregon DFW and FWS. The criteria established for the facility was for juvenile fish since the evaluation did not find any fry present at the diversion. The new facility was evaluated in cooperation with Oregon DFW who determined that the facility met the survival criteria of Oregon DFW and USFWS for all fish passing through the facility, including fry.

Based on my review of the application, supporting documentation, and publicly available information, the Project continues to satisfy the Downstream Fish Passage and Protection criterion.

E. SHORELINE AND WATERSHED PROTECTION

Goal*:* The Facility has demonstrated that enough action has been taken to protect, mitigate and enhance the condition of soils, vegetation and ecosystem functions on shoreline and watershed lands associated with the facility.

Assessment of Criterion Passage: The Applicant selected Standard E-1, Not Applicable/De Minimis Effect for all Zones, but for reasons discussed below this review finds that Standard E-2, Agency Recommendation is more appropriate.

The FERC Project boundary covers approximately 22.3 acres. Vegetative buffers are present along the river shorelines, which consist of the ponderosa pine shrub type. Land use in the immediate Project vicinity is mostly undeveloped although residential development and the City of Bend and its suburbs are located nearby.

The Project is not required to have, nor does it have a shoreline management or similar plan. The Project also operates in a run-of-river mode with no dam or impoundment. License Article 408 approved an agreement between the licensee and Oregon DFW for annual payments to Oregon DFW for a mitigation and enhancement fund intended to compensate for lost spawning habitat. The Applicant and Oregon DFW entered into an Agreement in March 1987 "…*to ensure no net loss of wild game fish or fish and wildlife-related recreation opportunities results from construction and operation of the Project*." Payments for the first 30 years of commercial operation vary from $45,000 to $95,000, and then become subject to negotiation for the remainder of the license term, subject to a floor of $95,000, that becomes effective in 2021. Funds are to be directed towards design and construction of mitigation and enhancement measures in the bypassed reach and throughout the greater Deschutes basin, with a focus on the former.

In the early years of the mitigation and enhancement (M&E) agreement a lot of focus was on fairly isolated habitat enhancement projects and rebuilding of riparian areas. As time went by

and funds grew in the M&E account from continued Applicant payments, larger projects were envisioned and completed, the most recent was the partial funding of a fish passage ladder at the downstream North Canal Dam. In the last couple of years Oregon DFW has felt strongly that more data from studies is needed in order to identify areas to focus M&E efforts. The M&E Committee agreed with this approach and Oregon DFW is heading up the research and data acquisition. Oregon DFW is hoping to get at least five years of data and they are currently two years into it.

A review of the FERC eLibrary indicated that no issues related to shoreline and watershed protection have occurred during the FERC licensing period.

Based on my review of the application, supporting documentation, and publicly available information, the Project operators take sufficient action to protect, mitigate and enhance the condition of soils, vegetation and ecosystem functions on shoreline and watershed lands. Therefore, the Project continues to satisfy the Shoreline and Watershed Protection criterion.

F. THREATENED AND ENDANGERED SPECIES PROTECTION

Goal: The facility does not negatively impact federal or state listed species.

Assessment of Criterion Passage: The Applicant appropriately selected Standard F-3, Recovery Planning and Action, for all Zones.

Based on the FWS IPaC report generated by the Applicant, the federally-endangered gray wolf, and the federally-threatened yellow-billed cuckoo and Oregon spotted frog may occur in the Project area. The Oregon spotted frog became state-listed in August of 2014 and while the species is present upstream and downstream of the Project it is not present within the Project area. The Applicant and the City utilize waters of the Deschutes River and its tributaries where their activities have the potential to incidentally harm (take) the Oregon spotted frog and two fish species (steelhead trout and bull trout) that are currently listed as threatened under the ESA.

Eight irrigation districts in the Deschutes Basin of Oregon and the City of Prineville, Oregon prepared the Deschutes Basin Habitat Conservation Plan (Plan). The Plan is the result of nearly twelve years of collaboration between irrigators, federal and state agencies, the Confederated Tribes of the Warm Springs Reservation, cities, counties, multiple non-governmental organizations, and the general public in the Deschutes Basin of Central Oregon. The Plan protects habitat for three species of fish and one amphibian (steelhead trout, bull trout, sockeye salmon, and the Oregon spotted frog) for the next 30 years, and addresses the effects of eight irrigation districts and the City of Prineville on over 480 miles of rivers and creeks. The Plan includes adaptive management to provide long-term certainty for irrigations, fish and frogs alike and provides year-round habitat for Oregon spotted frogs in Crane Prairie Reservoir, the upper

Deschutes River, Crescent Creek, and the little Deschutes River. The irrigation districts and the City of Prineville collectively contribute $174,000 annually to fish and wildlife habitat conservation funds in the basin.

FWS subsequently issued a Biological Opinion[1] on the Plan to determine, in part, if the service should issue an ESA section 10(a)(1)(B) incidental take permit to the eight irrigation district members (including the Applicant) of the Deschutes Basin Board of Control and the City of Prineville for implementation of the Plan. The Biological Opinion determined that the proposed action will not destroy or adversely modify designated critical habitat for the spotted frog or the bull trout. On December 21, 2000, FWS issued an incidental take permit to the Applicant.

A review of the Project's record on the FERC eLibrary indicated that no issues related to threatened and endangered species have occurred.

Based on my review of the application, supporting documentation, and publicly available information, the Project continues to satisfy the Threatened and Endangered Species criterion.

G. CULTURAL AND HISTORIC RESOURCE PROTECTION

Goal: The facility does not unnecessarily impact cultural or historic resources that are associated with the Facility's lands and waters, including resources important to local indigenous populations, such as Native Americans.

Assessment of Criterion Passage: The Applicant appropriately selected Standard G-1, Not Applicable/De Minimis Effect for all Zones.

A cultural resources survey was completed as part of Project licensing and no resources were found within the Project's area of potential effect. The State Historic Preservation Office (SHPO) issued a finding of no effect on cultural or historic resources. License article 412 requires consultation with the SHPO in the event that previously undiscovered resources are found. In that event, the Applicant states it would file a cultural resources management plan with the SHPO to protect or mitigate those resources. To date no cultural resources have been found within the vicinity of the project.

A review of the National Register of Historic Places database did not find any resources listed inside the project boundary.

[1] https://www.fws.gov/oregonfwo/documents/DeschutesHCP/DeschutesFinalWebDocs/DBHCP_BO_Final_Signed.pdf

Based on a review of the application, supporting documentation, and publicly available information, the Project continues to satisfy the Cultural and Historic Resource Protection criterion.

H. RECREATIONAL RESOURCES

Goal: The facility accommodates recreation activities on lands and waters controlled by the facility and provides recreational access to its associated lands and waters without fee or charge.

Assessment of Criterion Passage: The Applicant selected Standard H-3, Assured Accessibility for all zones. However, for reasons discussed below this review finds that Standard H-2, Agency Recommendation is more appropriate for the Bypass and Downstream Zones.

No fee is charged for public access to recreational facilities at the Project. Whitewater boating in the bypass reach is not encouraged or supported by the Applicant due to hazardous, life-threatening rapids. Despite posted warning signs however, some advanced boaters have been observed using the reach.

License Article 411 required that the Applicant, following consultation with the Oregon Parks and Recreation Division and the Bend Metro Park and Recreation District, construct a 6,400-foot-long foot trail from the intersection of the Pilot Butte Canal, to the Central Oregon Canal and Project powerhouse. The access trail ties into a public river access trail developed by the Bend Metro Park and Recreation District. The Applicant provided an easement for the river trail to continue about 0.75 miles upstream where a foot bridge was installed by the park district to connect with a river trail on the opposite side of the river and extend about 1.5 miles downstream to complete about 3 miles of loop trail along the river. Article 411 also required the Applicant to provide a portable toilet at the powerhouse and signs and trash receptacles at appropriate points along the access trail. These facilities are provided approximately due east of the powerhouse (Figure 7).

A review of the FERC eLibrary indicated that no issues related to recreation have occurred during the FERC licensing period.

Based on my review of the application, supporting documentation, and publicly available information, the Project continues to satisfy the Recreational Resources criterion.

IX. GENERAL CONCLUSIONS AND REVIEWER RECOMMENDATION

Based on my review, I believe that the Project meets the requirements of Low Impact Certification and recommend it be certified for a five-year period with no conditions. Given the history of compliance with the existing certification Condition 1, it is no longer needed to ensure compliance and any issues that may arise would be reported in annual compliance statements.