

REVIEW OF APPLICATION FOR RE-CERTIFICATION BY THE LOW IMPACT HYDROPOWER INSTITUTE OF THE LAKE CHELAN HYDROELECTRIC FACILITY

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I. INTRODUCTION

This report summarizes the review of the application submitted by the Public Utility District No. 1 of Chelan County (Chelan PUD or Applicant) to the Low Impact Hydropower Institute (LIHI) for re-certification of the Lake Chelan Hydroelectric Project FERC P-637 (Lake Chelan or Project). The Project was initially certified by LIHI as Low Impact in 2008 and re-certified in December 2012 as LIHI Certificate No. 30. The expiration date of the Certificate has been extended to allow for this review. This current re-certification review was conducted in compliance with LIHI's Handbook, 2nd Edition, dated March 7, 2016.

The December 2012 Recertification Report can be accessed via the link below.

<https://lowimpacthydro.org/wp-content/uploads/2012/12/Recommendation-Memo-Lake-Chelan-2012.pdf>

The Project's December 2012 re-certification had no conditions.

II. RECERTIFICATION PROCESS AND INITIAL ASSESSMENT

Under the 2016 LIHI Handbook, 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, if the only issue is that there is some missing information, the applicant will have the opportunity to provide the missing information, and this may or may not trigger a Stage II review. These standards also state that "material changes" mean non-compliance and/or new or renewed issues of concern that are relevant to LIHI's criteria. If the answer to either question (2) or (3) is "Yes," the application must proceed through a second phase, which consists of a more thorough review of the application using the LIHI criteria in effect at the time of the recertification application, and development of a complete Stage II Report. Because the new Handbook involves new criteria and a new process, the answer to question three for all

projects scheduled to renew in 2017 or later is an automatic ‘YES.’ Therefore, all Projects applying for renewal now are required to proceed through both phases of the recertification process.

The 2017 approved change in minimum spawning flow release to 260 cubic feet per second (cfs) instead of 320 cfs for Steelhead Trout and Chinook salmon spawning in the Chelan River Habitat Channel is considered to be a “material change in the operation” of the facility. The unit replacement in 2012 and increase in generation capacity was assessed as part of the December 2012 LIHI recertification review/decision.

A review of the initial application, dated April 13, 2018, resulted in a Stage I or Intake Report, dated May 28, 2018. The response to the Stage I Report was provided in the form of a final application dated August 30, 2018.

This Stage II assessment included review of the application package, supplemental information provided by the Applicant, public records in FERC’s eLibrary since LIHI recertification in September 2012, agency input from outreach activities, and the annual compliance statements received by LIHI during the past term of certification.

III. PROJECT’S GEOGRAPHIC LOCATION

Figures and photographs of the Project are contained in Appendix A.

The Lake Chelan Project boundary extends from the upper end of Lake Chelan near Stehekin, to the City of Chelan, all in Chelan County Washington. (See Figure 1 for the general location of the Project.) The Lake Chelan Project utilizes the waters of the Lake Chelan drainage basin, which encompasses approximately 924 square miles. It is part of the much larger Columbia River Basin. Approximately 2,000 acres of land lie within the Lake Chelan Project boundary.

Lake Chelan is a long and narrow glacial lake which lies in a mountain valley on the eastern slope of the Cascade Range in North Central Washington. The terrain in the basin is rugged with bold topographic relief and prominent landforms that are the result of alpine and continental glaciation. From Twenty-Five Mile Creek uptake, the terrain is mountainous and rugged. In many cases, the steep slopes run directly into the lake with no flat beaches or shoreline. The terrain of the lower end of the lake is less severe and mainly arid or semi-arid. The upper end of Lake Chelan is bordered by approximately 50 miles of shoreline in National Forest lands and almost 12 miles of shoreline in National Park lands, more than half of which are designated as a National Recreation Area and Wilderness. The lower end of the lake is primarily in private ownership and a highly popular area for summertime recreation.

There are no other dams on the Chelan River, though the Chelan River flows into the Columbia River at river mile (RM) 674, approximately 20 miles upstream of the Rocky Reach Hydroelectric Project (FERC No. 2145).

The Chelan River below the dam has been defined into four Reaches: Reach 1 is the upper-most section from the diversion of the dam, downstream for 2.29 miles. Reach 2 is a 0.75-mile-long section located in the upper end of the Chelan River Gorge. Reach 3 is the gorge section of the

Chelan River, 0.38 miles in length. Reach 4 is a 0.49-mile long section extending from the mouth of the gorge to the powerhouse tailrace. Section V of this report relates these Reaches to the Zones of Effect (ZOE) used by LIHI. The four reaches of the River are illustrated on Figure 2 and the ZOEs identified for the Project are listed in the table below the map on Figure 2.

IV. PROJECT AND IMMEDIATE SITE CHARACTERISTICS

The Lake Chelan Project occupies 465.5 acres of federal lands administered by the U.S. Forest Service (USFS) or National Park Service (NPS). The Lake Chelan Project consists of (a) Lake Chelan, a 1,486-foot deep, 55-mile-long natural glacial lake that was raised 21 feet by the construction of the dam to a normal maximum water surface elevation of 1,100 feet mean sea level (msl); (b) a 40-foot-high, 490-foot-long concrete gravity dam; (c) a reinforced-concrete side discharge intake structure that is integral with the dam; (d) a 14-foot-diameter, 2.2-mile-long power tunnel; (e) a 45-foot-diameter by 125-foot-high steel surge tank; (f) a 90-foot-long penstock that transitions from 14 feet in diameter to 12 feet in diameter before bifurcating to two 90-foot-long, 9-foot-diameter steel penstocks; (g) a powerhouse containing two vertical-shaft, Francis-type turbine generators for a total rated capacity of 59.2 MW ; and (h) a 1,700-foot-long excavated tailrace adjacent to the confluence of the Chelan River and the Columbia River that returns the project flows to the Columbia River. Figure 3 in Appendix A illustrates the key features of the Project.

The Lake Chelan Project boundary extends along the 1,100-foot contour and continues down both sides of the 3.9-mile Chelan River to the confluence of the Chelan and Columbia rivers. Approximately 2,000 acres of land lie within the Lake Chelan Project boundary; 1,300 acres are inundated and the other 700 acres are part of Project facilities. This land is owned by the US Forest Service, National Park Service, several state agencies, Chelan PUD and private property owners. Approximately 465 acres are inundated federal lands.

The maximum width of Lake Chelan is 1.8 miles, and there are approximately 118.8 miles of shoreline. Lake Chelan is shown in Photograph 1 in Appendix A. The maximum depth of Lake Chelan is 1,486 feet when the lake is at elevation 1,100 feet. Lake Chelan is the third deepest freshwater lake in the United States, behind Crater Lake and Lake Tahoe. It has a maximum surface area of approximately 32,560 acres (ac) and contains 677,400 acre-feet (ac-ft) of usable storage between the Project operating range minimum elevation of 1,079 feet and a normal maximum elevation of 1,100 feet. The normal full pool water surface elevation is at 1,098 feet.

The reservoir is drawn down annually for power generation and storage of spring snowmelt beginning in early October, with the lowest lake levels being reached in April. The lake is refilled through May and June, to attain an elevation of 1,098 feet on or before June 30, where it is maintained above 1,098 feet through September 30. Spills typically occur during May, June, and July, when inflows exceed the hydraulic capacity of the powerhouse units (2,300 cubic feet per second (cfs)). Water is spilled over the spillway into the 4.5-mile-long reach of the Chelan River that is bypassed by the Project.

During normal operation of the Project, water is withdrawn from Lake Chelan for power

generation and discharges that water through the powerhouse into an excavated tailrace, which leads to the confluence of the Chelan River and the Columbia River. Flows released over the Chelan Dam spillway follow the natural channel of the Chelan River, ultimately joining with the powerhouse tailrace. The Habitat Channel, constructed in 2009 at the lower end of the Chelan River, is physically connected to the River; although additional flows are provided by pumps for Chinook salmon and steelhead spawning. The Habitat Channel can be seen on Figure 3.

An area commonly referred to as the gorge in the lower section of the river, passes through the glacial moraine and outwash deposits and then a segment of bedrock, dropping about 360.5 feet between the dam and its confluence with the Columbia River

The average annual electric generation by the Project was reported to be 412,400 MW.

V. ZONES OF EFFECT

Four Zones of Effect (ZOE) are identified for the Project and are shown on Figure 2.

- ZOE #1 – Lake Chelan (Impoundment)
- ZOE #2 – Bypass Reach – Upper Chelan River (Reaches 1-3)
- ZOE #3 – Bypass Reach and Habitat Channel – Lower Chelan River (Reach 4)
- ZOE #4 – Tailrace and Regulated Reach

VI. REGULATORY AND COMPLIANCE STATUS

The Lake Chelan Hydroelectric Project (FERC P-637) received its first federal operating license on May 8, 1926. The first generating unit was placed in commercial operation in September 1927, followed by the second unit 11 months later in August, 1928.

On October 8, 2003, Chelan PUD and participants in the relicensing process for the Project reached final agreement on a comprehensive settlement of all matters, including the water quality certification issued by the Washington Department of Ecology (WDOE) under Section 401 of the Clean Water Act. Parties to the Comprehensive Settlement Agreement include the USFS, the NPS, the National Marine Fisheries Service (NMFS), the U.S. Fish and Wildlife Service (USFWS), WDOE, the Washington State Department of Fish and Wildlife (WDFW), the Confederated Tribes of the Colville Reservation, the City of Chelan, and the American Whitewater Affiliation. The Comprehensive Settlement Agreement was incorporated into the license order, which was issued by the Federal Energy Regulatory Commission (FERC) on November 6, 2006. The license was amended in 2009 when the two existing 24-MW turbine generator units were replaced with two new 29.6 MW turbine generator units. Another amendment was issued on October 10, 2012 when subsequent data showed that the Project’s hydraulic capacity was 2,600 cubic feet per second (cfs), 100 cfs higher than anticipated. FERC again amended the Project license on December 7, 2017 and January 23, 2018 to incorporate the reduced pumped minimum spawning flow for Steelhead Trout and Chinook salmon from 320 cfs to 260 cfs following amendment of the WQC in November 2017 for these changes. These later two changes occurred since the Project was certified by LIHI in 2012. I view the change in hydraulic capacity as a “correction of information” from a LIHI criterion review perspective, although the reduction in flows released during spawning season is a

“material change”. However, given that agency review of this reduction was determined to be beneficial to these species, I believe this “material change” is in compliance with LIHI’s objectives.

A Water Quality Certificate (WQC) (Order No. 1233) was issued on June 1, 2004 by the WDOE. It was amended in 2008 to reflect the unit upgrade to 29.6 MW units, and in 2012 due to the corrected Project hydraulic capacity. WDOE determined there was reasonable assurance that the Project will comply with state and federal water quality standards and other relevant requirements of state law if operated in accordance with the certificate’s conditions. On November 3, 2017, the WDOE further amended the water quality certificate to allow a minimum total spawning flow of 260 cfs instead of 320 cfs for Steelhead Trout and Chinook salmon spawning in the Chelan River Habitat Channel. The Chelan River Fishery Forum, including federal and state agencies, supported implementing lower Chelan River spawning flows to achieve improved spawning habitat for Chinook salmon and Steelhead Trout.

Under the new license, Chelan PUD has slightly greater flexibility in managing lake levels by establishing target elevations to be achieved between May 1 and October 1, rather than a fixed elevation by a date certain. Chelan PUD manages minimum lake elevations based on snow pack conditions, lake levels, predicted precipitation and runoff conditions, and operational objectives of maintaining minimum instream flows in the Chelan River, reducing high flows (greater than 6,000 cfs) in the Chelan River, providing usable lake levels for recreation (between 1,090 and 1,098), and ensuring the Project can pass the probable maximum flood without dam failure, among other objectives. The previous license did not require a minimum flow release to the bypassed reach of the Chelan River. Now however, Chelan PUD passes a minimum flow of 80 cfs for the entire bypassed reach, supplemented with pumping of additional water from the tailrace into the lower portion of the Chelan River (Reach 4) to improve spawning habitat for listed salmon and steelhead.

Three flow release deviations were the only compliance issues identified in FERC’s eLibrary. None were noted by agency personnel who responded to my inquiry.

VII. PUBLIC COMMENT RECEIVED OR SOLICITED BY LIHI

The deadline for submission of comments on the LIHI certification application was December 22, 2018. No comments were received.

The following stakeholders were contacted by email during my review. Names in bold responded; the others did not. Their responses are included in Appendix B, and incorporated into the applicable criteria.

- Hugh Anthony; National Park Service; (360) 854-7324; hugh_anthony@nps.gov
- Ashley Rawhouser; National Park Service; North Cascades National Park; (360) 854 – 7317; Ashley_rawhouser@nps.gov
- Kari Grover Wier – District Ranger; U.S. Forest Service; (509) 682-4900; kgroverwier@fs.fed.us
- **Ana Cerro-Timpone**; U.S. Forest Service; (509) 784-1511 x570; avcerrotimpone@fs.fed.us
- **Mariah Mayfield**; U.S. Forest Service; 509-784-4620; mariahmayfield@fs.fed.us.

- Stephen Lewis; U.S. Fish and Wildlife Service; (509) 665-3508 x14;
Stephen.Lewis@fws.gov
- Justin Yeager; National Marine Fisheries Service; (509) 925-2618 x224;
Justin.yeager@noaa.gov
- Travis Maitland; Washington State Department of Fish and Wildlife; (509) 665-3337
Travis.maitland@dfw.wa.gov
- Graham Simon; Washington State Department of Fish and Wildlife; (509) 670-0742
Graham.simon@dfw.wa.gov
- Breean Zimmerman; Washington State Department of Ecology; (509) 575-2808
Bzim461@ecy.wa.gov
- **Jim Pacheco**; Washington State Department of Ecology; (360) 407-7458
Jpac461@ecy.wa.gov
- Mark Peterschmidt; Washington State Department of Ecology; (509) 454-7843
Mape461@ecy.wa.gov
- Chuck Brushwood; Confederated Tribes of the Colville Reservation; (509) 422 – 7749 or (509) 631-4605; Charles.brushwood@colvilletribes.com
- Bob Rose; Confederated Tribes and Bands of the Yakama Nation; (509) 945-0141
rosb@yakamafish-nsn.gov
- Paul Ward; Confederated Tribes and Bands of the Yakama Nation; (509) 949-4129
warp@yakamafish-nsn.gov

VIII. SUMMARY OF COMPLIANCE WITH CRITERIA

The following tables show the Standards selected for each criterion for the four ZOE's.

ZOE #1 – Lake Chelan (Impoundment)

Criterion		Alternative Standards				
		1	2	3	4	Plus
A	Ecological Flow Regimes	X				
B	Water Quality	X				
C	Upstream Fish Passage		X			
D	Downstream Fish Passage		X			
E	Watershed and Shoreline Protection		X			
F	Threatened and Endangered Species Protection	X				
G	Cultural and Historic Resources Protection		X			
H	Recreational Resources		X			

ZOE #2 – Bypass Reach – Upper Chelan River (Reaches 1-3)

Criterion		Alternative Standards				
		1	2	3	4	Plus
A	Ecological Flow Regimes		X			
B	Water Quality		X			
C	Upstream Fish Passage		X			
D	Downstream Fish Passage	X				
E	Watershed and Shoreline Protection		X			
F	Threatened and Endangered Species Protection	X				
G	Cultural and Historic Resources Protection		X			
H	Recreational Resources		X			

ZOE #3 – Bypass Reach – Lower Chelan River (Reach 4)

Criterion		Alternative Standards				
		1	2	3	4	Plus
A	Ecological Flow Regimes		X			
B	Water Quality		X			
C	Upstream Fish Passage		X			
D	Downstream Fish Passage	X				
E	Watershed and Shoreline Protection	X				
F	Threatened and Endangered Species Protection			X		
G	Cultural and Historic Resources Protection		X			
H	Recreational Resources		X			

ZOE #4 – Tailrace and Regulated Reach

Criterion		Alternative Standards				
		1	2	3	4	Plus
A	Ecological Flow Regimes		X			
B	Water Quality		X			
C	Upstream Fish Passage		X			
D	Downstream Fish Passage	X	X			
E	Watershed and Shoreline Protection	X				
F	Threatened and Endangered Species Protection			X		
G	Cultural and Historic Resources Protection		X			
H	Recreational Resources	X				

I found that these standards are appropriate except that Standard D-1 should also be used for Downstream Fish Passage for ZOE #4. The Applicant appropriately selected D-1 initially, but changed it in response to an error made in the Stage I Intake Review by me. Details of compliance with the criteria are presented in Section IX.

IX. 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.

Standards: All river reaches where stream flows are altered by the facility shall be defined. In all locations, appropriate flow management should apply an ecosystem-based approach that supports fish and wildlife resources by considering base flows, seasonal variability, high flow pulses, short-term rates of change, and year-to-year variability. Compliance with one of the alternative standards identified in the Low Impact Hydropower Certification Handbook issued March 7, 2016 must also be demonstrated.

Assessment of Criterion Passage

The Applicant selected **Standard A-1 Not Applicable/De Minimis Effect**, as suggested by Table B-2 of the 2016 LIHI Handbook, for ZOE #1, the impoundment and **Standard A-2 Agency Recommendation** for the other three ZOE's. However, because there is a bypass, the Project, has lake level license requirements and operates in a limited store and release mode, I also briefly discuss the compliance of the Project with these lake level requirements.

Chelan PUD operates in compliance with a FERC and agency approved Operations Compliance Monitoring Plan (OCMP), as required in License Article 405, which describes how Chelan PUD operates to meet: (1) the instream flows, ramping rates, and tailrace flows as set forth in Article 7 of the Lake Chelan Settlement Agreement and Chapter 7 of the Comprehensive Plan attached to the Settlement Agreement; and (2) the lake levels as set forth in the Settlement Agreement. The OCMP includes the specifics of flow measurement techniques, electronic flow data posting, quarterly and annual reporting requirements, and an implementation schedule.

Chelan PUD flow releases are also made in compliance with the FERC and agency approved Threatened and Endangered Species Protection Plan (TESPP), as required in License Article 408. The TESPP describes how Chelan PUD: (1) will release water at the Lake Chelan Dam or pump water from the Project powerhouse tailrace to the Chelan River to continuously maintain flows equal to or greater than the flows required for Chelan River Reach 4; (2) methods and schedules for monitoring of flows in the Project tailrace and in Reach 4 and annual reporting of the monitoring results, and (3) methods for timely determination of the need to take actions to improve water quality characteristics adversely affecting anadromous fish, and identification and implementation of appropriate actions.

Both the OCMP and TESPP require the recording and reporting of flows in the Chelan River, to evaluate conformance with minimum flow requirements, protection of fish habitat and protection of salmon and steelhead eggs incubating in the tailrace. These annual reports are required to be submitted to FERC by April 30 of the following year. This Annual Flow and Temperature Report meets the flow and temperature reporting requirements of License Articles 405 and 408.

Lake Chelan (ZOE #1)

As previously identified, under its license, Chelan PUD manages the elevation of Lake Chelan from October 1 through May 1 based on a variety of factors. This requires the lake to be kept at lower levels when larger snowpack exists in the watershed. The lake is drawn down through the winter to accommodate the amount of runoff anticipated the next spring.

Fish habitat within the zone are managed pursuant to the license and Comprehensive Settlement Agreement, in particular the Lake Chelan Comprehensive Fishery Management Plan (CFMP). The CFMP is designed to: 1) provide guidance for the management of the fishery resources in Lake Chelan; 2) maintain a healthy recreational sport fishery in Lake Chelan; and 3) develop a monitoring and evaluation program to assess the efficacy of management actions. Chelan PUD is required to provide an annual work plan, annual funding of \$20,000 for monitoring and evaluation; and make available an additional \$20,000 per year, for matching funding for monitoring and evaluation. The annual work plan, developed in coordination with Chelan PUD and adopted by the NPS, USDA Forest Service (FS), and WDFW, describes the methods and schedule used to demonstrate compliance with efforts to restore and enhance, where feasible, native fisheries in Lake Chelan and its tributaries, and to support the lake's recreational fishery. It describes the previous year's study results and develops the plan for the current year's activities.

With minor exception regarding the timing of impoundment refill, Chelan PUD has a good record of achieving lake level objectives. No deviations were reported during the current LIHI certification term.

Upper (Reaches 1-3) and Lower (Reach 4 and Habitat Channel) Chelan River (ZOEs #2 and #3)

A primary objective of WDOE during the relicensing process was to establish a minimum instream flow for the Chelan River in order to re-establish a functional aquatic ecosystem. The typical instream flow-setting methodology, the Instream Flow Incremental Methodology, additional studies and coordination/negotiation during re-licensing with the Natural Sciences Work Group (NSWG) resulted in an agreed upon minimum instream flow level of 80 cfs for Reaches 1 through 3 (ZOE #2) in the Chelan River. This required the construction of a new low-level outlet at the Lake Chelan Dam. The NSWG was comprised of state and federal fishery management agencies, Tribes, WDOE, city governments, non-governmental organizations, local interested stakeholders, and Chelan PUD. The Joint Fishery Parties (JFP), comprised of the state and federal fishery management agencies, Tribes, and WDOE, were instrumental in identifying appropriate spawning habitat enhancement for the target species (Chinook and Steelhead Trout), as part of these discussions. The following actions were also agreed to: construct a natural stream channel (Habitat Channel) in the lower Chelan River (ZOE #3) to provide additional spawning and rearing habitat for Steelhead Trout and Chinook salmon; provide additional spawning flows in the Habitat Channel via pumps only during spawning periods (originally 320 cfs and now 260 cfs); and fill in a portion of the tailrace to increase the amount of available spawning habitat.

Since the river had been dewatered for over 76 years, it was not known what level of support for fish and water temperature could reasonably be achieved in the river. To make that determination, WDOE agreed to proceed with a ten-year compliance schedule and adaptive management plan (The Chelan River Biological Evaluation and Implementation Plan (CRBEIP)) which identifies the biological objectives and monitoring methods to determine whether the biological objectives

could be achieved. Any changes to the implementation measures are made in coordination with the Chelan River Fishery Forum (CRFF); although WDOE retains authority to order additional changes or modifications to the extent necessary. The adaptive management plan contemplates, at the end of the ten years or sooner, WDOE will determine whether Chelan PUD has undertaken all known, reasonable, and feasible measures to achieve the biological objectives, and if so whether water quality standards have been fully achieved. This is further discussed under **Criterion B – Water Quality and Criterion F – Threatened and Endangered Species Protection**.

Only three minimum flow deviations occurred since LIHI re-certification in 2012. None were considered to be license violations by FERC. All reported agency notifications were made and no negative ecological impacts were found. These are summarized below:

- March 18, 2013 - A pump feeding the Habitat Channel tripped, was immediately restored and tripped again before additional flows from other online pumps were established. This resulted in a reduction of the water level in the Habitat Channel for about 2 hours.
- May 2, 2013 - One of five pumps feeding the Habitat Channel failed but additional flows were released from the low-level outlet, restoring the water level in the Habitat Channel in about 3.5 hours.
- December 5, 2016 - Minimum flow to the Chelan River was reduced below the 80 cfs requirement for about two hours before repairs could be made to the stuck gate at the low-level outlet.

Tailrace (ZOE #4)

The Chelan River is only suitable for anadromous fish in the tailrace. The habitat is maintained with suitable spawning flows and adequate intra-gravel flow for incubation through operation of the powerhouse at minimum flow levels.

To satisfy the minimum intra-gravel dissolved oxygen (DO) level of 6.0 mg/L, minimum powerhouse generation (approximately 23 MW from one unit) provides approximately 800 cfs flow in the tailrace from December 1 to April 1 each year as tailrace protection flows for Chinook salmon incubation. The powerhouse is limited to 3 hours off and 1 hour on during any 4-hour period during the Chinook salmon incubation period in the event that generation is curtailed to improve lake refill conditions. No deviations from these flows was reported by the Applicant nor were any found on FERC's eLibrary.

This Project passes Criterion A – Ecological Flow Regimes- Go to B

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.

Standards: Compliance with the appropriate state/provincial or federal water quality standards must be demonstrated with all waterbodies where water quality is directly affected by the facility, including those affected areas outside the facility boundary. In all cases, if any waterbody directly affected by the facility has been defined as being water quality limited (for example, on a list of waters with quality that does not fully support designated uses), it must be

demonstrated that that the facility has not contributed to that substandard water quality. Compliance with one of the alternative standards identified in the Low Impact Hydropower Certification Handbook issued March 7, 2016 must also be demonstrated.

Assessment of Criterion Passage

The Applicant selected **Standard B-1, Not Applicable/De Minimis Effect** for ZOE#1 and **B-2, Agency Recommendation** for the remaining three ZOE's.

Lake Chelan (ZOE #1)

Overall, the water quality of Lake Chelan is characterized as ultra-oligotrophic (unproductive), and is considered one of the most pristine waterbodies in North America. Limited watershed inputs of the critical nutrient, phosphorus, controls the growth of algae in the lake, and maintains its exceptional water clarity. Localized water quality degradation occurs near irrigation return flow drainage outfalls near population centers, but the majority of nutrient and bacterial inputs to Lake Chelan that could result in at least localized water quality effects are attributed to non-point sources. During re-licensing, FERC determined that adherence to the lake level management plan, approved by the resource agencies, would not likely affect water quality in Lake Chelan. Chelan PUD does not implement any specific enhancement measures to address water quality in Lake Chelan, although erosion control projects carried out by Chelan PUD pursuant to its license may improve water quality conditions by minimizing turbidity and suspended solids.

Chelan River (ZOE #2 and #3 bypass reaches)

Chelan PUD is on a 10-year compliance schedule to evaluate and monitor the beneficial uses of the Chelan River based on the biological objectives established in the water quality certificate and license. After 10 years of license implementation, Chelan PUD is required to provide WDOE with the information necessary to determine whether the biological objectives in the CRBEIP and the state water quality standards have been achieved. The WQC denotes that if WDOE determines that the biological objectives have been met, but non-compliance with water quality standards exists, WDOE will initiate a process to modify the applicable standards through rulemaking or such alternative process as may otherwise be authorized under applicable state and federal law. The license measures necessary to begin implementation of the water quality measures were initiated in 2009. The compliance schedule deadline is December 31, 2019.

In addition, the FERC order requires that Chelan PUD conduct general water quality assessments in 2012 and 2014 sufficient to demonstrate that the Chelan River meets water quality standards for dissolved oxygen, total dissolved gas (TDG), turbidity and pH. After 2014, additional data was collected to document water quality assessments that further address this requirement by providing monitoring during the winter of 2015-2016, and to monitor a higher spill level. During late summer and fall of 2017, data was collected for the Habitat Channel of Reach 4 of the Chelan River for turbidity, dissolved oxygen and pH. While the nine years of data was not provided for review for this LIHI assessment, I did review the extra water quality study results for 2015, 2016 and 2017.

From May 6 to December 31, 2015, water temperature, dissolved oxygen and pH were obtained from two locations in the Reach 4 Habitat Channel. The dissolved oxygen levels met the water quality criterion of 8.0 mg/l. The pH data collected were also within the criteria specified for the current designated uses for the Chelan River. Temperature however exceeded the standard at times.

Total dissolved gas percent saturation was also measured in 2015 for spillway flows up to 2,000 cfs. The highest TDG measurement of 103.1 percent was below the maximum criterion of 110 percent.

From January 1 to May 4, 2016 water temperature, dissolved oxygen and pH were also obtained from two locations in the Reach 4 Habitat Channel from January 1 – May 4. Water quality standards were met for dissolved oxygen and pH but not consistently for temperature, during these monitoring periods. Total dissolved gas percent saturation was measured for spillway flows up to 9,000 cfs. The highest TDG measurement of 106.5 percent was below the maximum criterion of 110 percent.

Data taken from September 14 through December 5, 2017, showed that the dissolved oxygen and pH data collected were within the criteria specified for the current designated uses for the Chelan River. The dissolved oxygen level in both the Habitat Channel and tailrace met the water quality criterion of 8.0 mg/l. The pH readings were within the water quality criteria of 6.5 – 8.5.

These data also showed that the Habitat Channel was never without sufficient flow during these three periods to maintain intra-gravel dissolved oxygen.

The three reports for 2015, 2016 and 2017 referenced above can be found at:

http://www.chelanpud.org/departments/licensingCompliance/lc_implementation/ResourceDocuments/48283.pdf

http://www.chelanpud.org/departments/licensingCompliance/lc_implementation/ResourceDocuments/51068.pdf

http://www.chelanpud.org/departments/licensingCompliance/lc_implementation/ResourceDocuments/53284.pdf

Based on the above data, it appears that the measures being taken are allowing achievement of some water quality standards in Reach 4 of the Chelan River.

Tailrace (ZOE #4)

The Chelan PUD is required to provide minimum dissolved oxygen levels of 6.0 mg/l in the tailrace for Chinook salmon redds. This is achieved by maintaining powerhouse flows with one turbine operating at minimum generation flows (approximately 800 cfs) throughout the spawning and incubation period.

Overall

I believe that the Chelan PUD has satisfied all required water quality monitoring requirements during the past five years. James Pacheco of the Water Resource Program of the WDOE responded to my inquiry stating that his area of expertise is water quality and that “that I believe the district has met it's instream flow obligations.” However, satisfaction of this criterion cannot be fully demonstrated until the results of the 10-year water quality study of the Chelan River are available, which is expected in December 2019, and results are analyzed by WDOE. Thus, I am recommending a condition to address this near-future assessment.

This Project Conditionally Passes Criterion B – Water Quality- Go to C

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, sustainable fish and wildlife resources in areas affected by the facility.

Standards: The applicant shall list all migratory fish species (for example, anadromous, catadromous, and potamodromous species) that occur now or have occurred historically at the Facility. Maintenance of upstream passage sufficient to support sustainable populations of these migratory species must be demonstrated by compliance with one of the alternative standards identified in the Low Impact Hydropower Certification Handbook issued March 7, 2016.

Assessment of Criterion Passage

The Applicant has selected **Standard C-2, Agency Recommendation** for all ZOE's.

Lake Chelan (ZOE #1)

Pursuant to the license and Settlement Agreement, under the Lake Chelan Comprehensive Fishery Management Plan (CFMP), Chelan PUD is required to make available \$100,000 for developing a Food Web Model; provide annual funding of \$20,000 for monitoring and evaluation; and make available an additional \$20,000 per year, for matching funding for monitoring and evaluation. In consultation with the resource agencies, Chelan PUD agreed to conduct mechanical excavation of existing tributary barriers in up to 10 high priority tributaries over the first five years of the new license, monitor up to 10 tributaries with existing barriers to determine if the new lake level operating regime is sufficient to naturally remove existing barriers; monitor up to 10 selected tributaries, with modified barrier analysis methodology to determine if barriers are present or have reformed; and treat up to two tributaries within the drawdown zone annually to remove barriers for the life of the license.

Chelan PUD has removed alluvial barriers at the mouths of tributaries to Lake Chelan in order to facilitate spawning access for salmonid, specifically the potamodromous species Westslope Cutthroat Trout. Barriers to upstream fish passage were identified in seven of nine major tributaries entering Lake Chelan during relicensing studies. In coordination with the Lake Chelan Fishery Forum, Chelan PUD develops work plans to remove existing tributary barriers as needed. Mechanical barrier removal and stream reconstruction activities were conducted in Mitchell and Gold creeks, simultaneously, in 2011. No further mechanical treatment is planned for any Lake Chelan tributary at this time. Lake operations included in the existing license for the Project have allowed storm and large flow events to scour through gravel deposits and remove barriers to upstream fish passage in the remaining five tributaries where barriers were identified previously. Monitoring will continue in future years to document passage ability for trout between elevations 1086 ft. and 1100 ft. No barriers to upstream fish passage have been observed since 2011 during annual monitoring surveys. Chelan PUD and the LCCF continue to monitor tributaries to determine whether barriers are present or have reformed.

Links to monitoring reports and other compliance information required under the CMFP were provided in the application. The monitoring reports include extensive photographs showing the

good condition of the tributaries flowing into Lake Chelan. A report on the food-web model, developed by the University of Washington in 2010, was also linked to the application. The goal of the food-web model was to provide guidance to managers by identifying the major predators of salmonids in the lake, quantifying spatial, seasonal, and size-structured patterns of predation, and describing trends in lake trout harvest and population dynamics. None of the fisheries agency personnel conducted during this LIHI review shared any comments about this study.

Upper Chelan River (Reaches 1-3) (ZOE #2)

Species observed during snorkel surveys conducted in Reach 1 of the Chelan River, in order of frequency, include the following: Westslope Cutthroat Trout, smallmouth bass; Rainbow Trout; Northern pikeminnow; suckers; Tench; mountain whitefish; and cyprinid fry. Migratory (potamodromous) species likely moving between the dam and the end of Reach 2 would be Westslope Cutthroat and Rainbow trout.

A barrier analysis study prepared for relicensing the Project concluded that five natural barriers in the Chelan River gorge would be impassible to Steelhead Trout and other anadromous salmonid species at all flows. Without passage through the river, these species are not, and were never, present in the lake. Based on these results, and the lack of historic evidence indicating the presence of anadromous fish in Lake Chelan, the Chelan River is only suitable for anadromous fish in Reach 4 (ZOE #3) which is discussed below. Both NMFS and USFWS reserved their Section 18 fishway prescription authority during the Lake Chelan Project relicensing process. Neither Service currently require upstream fish passage at the dam because they acknowledged that anadromous fish penetration to the dam is precluded by impassible barriers in Reach 3 of the Chelan River under current conditions.

Lower Chelan River (Reach 4 and the Habitat Channel) (ZOE #3) and Tailrace (ZOE# 4)

Reach 4 of the Chelan River provides anadromous fish spawning habitat for fish migrating up the Columbia River. Anadromous species observed in the Habitat Channel in Reach 4 of the Chelan River include the following: Steelhead/Rainbow Trout; and Chinook salmon. Other species that are likely making migrations into, and out of, the Habitat Channel are: Westslope Cutthroat Trout; Northern pikeminnow; and suckers.

Under the license, Chelan PUD provides spawning and rearing habitat for Chinook salmon in Reach 4, the Habitat Channel and the tailrace. Chelan PUD modified the tailrace area in 2008 with suitable sized substrate material to create braided bars with low velocity rearing and spawning habitat. The habitat is maintained with suitable spawning flows and adequate intra-gravel flow for incubation in the tailrace. As needed, flows are maintained through operation of the powerhouse at minimum flow levels. The success of spawning and incubation through emergence is monitored and evaluated pursuant to license reporting requirements.

Chelan PUD constructed the Chelan River Habitat Channel in 2008 and 2009 to improve spawning and rearing habitat in Reach 4 of the Chelan River. Minimum flows were initiated in 2009. Flow provided in the Chelan River Habitat Channel for Steelhead Trout and Chinook salmon was initially a minimum of 320 cfs by a combination of spill and pumping. As previously noted, this flow level was later reduced to 260 cfs. It was determined by the Chelan River Fishery Forum

(CRFF) that the lower flows would enhance spawning in the area. The attached FERC Order documents and authorizes this agreement can be found on FERC eLibrary here: [Highlighted Version](#)

No agency concerns were expressed by any fishery agency contacted during this assessment. Mariah Mayfield, Zone Fisheries Biologist with USFWS stated that “the PUD fish biologists are fully willing to follow the settlement agreement and have been pro-active in getting projects going. The only difficult part is trying to make sure all the accounting and agreements are done.” I believe the Project satisfies this criterion.

This Project Passes Criterion C – Upstream Fish Passage- Go to D

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. All migratory species are able to successfully complete their life cycles and to maintain healthy, sustainable fish and wildlife resources in the areas affected by the Facility.

Standards: The applicant shall list all fish species (for example, riverine, anadromous, catadromous, and potamodromous) that occur now or have occurred historically in the area affected by the Facility. To pass the downstream fish passage and protection criterion, compliance with one of the alternative standards identified in the Low Impact Hydropower Certification Handbook issued March 7, 2016 must be demonstrated.

Assessment of Criterion Passage

The Applicant has selected **Standard D-1, Not Applicable/De Minimis Effect** for the two bypass reaches (ZOE #2 and ZOE #3), and **Standard D-2, Agency Recommendation**, for ZOE#1, the impoundment and ZOE#4, the tailrace.

Lake Chelan (ZOE #1)

Pursuant to the license and Settlement Agreement, under the Lake Chelan Comprehensive Fishery Management Plan, Chelan PUD is required to conduct entrainment sampling to determine the potential for entrainment of adult Westslope Cutthroat Trout at the Project intakes. In coordination with the Lake Chelan Fishery Forum (LCFF), the entrainment study has not been implemented yet due to the low numbers of Westslope Cutthroat Trout documented in the Project area. Less than 120 Westslope Cutthroat Trout and rainbow trout (combined) were observed in the entire length of Reach 1 of the Chelan River during the October 2016 snorkel survey. This indicates that a low number of trout are likely near the dam during spill operations, and, therefore, a low number of fish are likely in the vicinity of the power tunnel intake with the potential to become entrained.

Currently, there is no schedule for conducting an entrainment investigation at the Lake Chelan Dam. The LCFF did not support conducting an investigation in either 2017 or 2018 due to continued low numbers of the target species. Although the LCFF initially supported study plan

development in 2017 for LCFE review so it would be ready when it is determined the entrainment study should be initiated. At the 2018 meeting, LCFE did not specifically set a deadline for the study plan creation, as noted in the Lake Chelan Fishery Forum 2018 Annual Work Plan, dated May 4, 2018.

Chelan River and Tailrace (ZOE #2, #3 and #4)

There are no barriers to downstream passage in these reaches. As previously identified, anadromous species are only found in Reach 4 of the River, the Habitat Channel and the tailrace.

Overall

Fishery agencies contacted did not identify any concerns with downstream passage. I believe this criterion has been conditionally met. I am recommending a Condition addressing actions to be taken by Chelan PUD if the entrainment study is initiated during the next LIHI Certification term.

*The Project Conditionally Passes Criterion D – Downstream Fish Passage and Protection -
Go to E*

E. SHORELINE AND WATERSHED PROTECTION

Goal: The Facility has demonstrated that sufficient 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.

Standards: To pass the watershed protection criterion for LIHI certification, the applicant shall demonstrate compliance with one of the alternative standards identified in the Low Impact Hydropower Certification Handbook issued March 7, 2016.

Assessment of Criterion Passage

The Applicant has selected **Standard E-1, Not Applicable/De Minimis Effect** to pass this criterion for ZOE #1, the impoundment and ZOE #2, the Upper Chelan River and **Standard E-2, Agency Recommendation**, for ZOE#3, the Lower Chelan River and ZOE#4, the tailrace.

Lake Chelan (ZOE #1)

Chelan PUD does not control much of the activities on the shoreline because the NPS owns and manages about 10 miles of shoreline; the USFS owns and manages about 30 miles of shoreline, the Confederated Tribes of the Colville Reservation has allotments at Wapato Point; Washington State owns and manages two parks along the shoreline, the cities of Manson and Chelan own and manage shoreline property; and there are numerous private holdings along the shoreline.

However, Chelan PUD does address erosion associated with fluctuating lake levels by monitoring erosion on USFS lands; coordinating, funding and monitoring erosion control measures at seven sites on NPS land; coordinating and funding the transport of large woody debris to be used for bank protection/stabilization; and coordinating and funding NPS efforts to control dust and to

monitor dust abatement measures at the mouth of the Stehekin River. Chelan PUD also provided engineering and design services to help control erosion at Don Morse Park beach area and marina breakwater on Lake Chelan.

The Applicant stated that the Lake Chelan Erosion Control Plan, Lake Chelan Large Woody Debris Management Plan, and Stehekin Area Implementation Plan all address various aspects of shoreline management and erosion control. No large woody debris management have occurred since 2012. Chelan PUD is required to “make available” to WDFW “\$5,000 per year for each of the first 20 years of the New License.” WDFW staff participating in the LCFF have not chosen to exercise use of any available funding to date. The total accrued amount to date is \$126,874.90.

I believe that the Wildlife Habitat Plan (WHP), required by license Article 406, also addresses issues covered by this LIHI criterion. The primary goal of the plan is to enhance wildlife habitat along Lake Chelan to accomplish the following goals: restore, maintain, or improve ecological quality and diversity; restore, maintain, or increase habitat for key indicator wildlife species; and to provide for public use that is compatible with the ecological quality, diversity, and carrying capacity for key wildlife species. The WHP is updated every five years, with the most recent update approved by FERC on October 29, 2018. Primary indicator species for 2018-2022 under the plan include: mule deer and bighorn sheep; threatened, endangered, sensitive, species of special concern or survey management species; and riparian and wetland indicator bird and amphibian species.

Chelan PUD provides funds to the Forest Service and WDFW for: 1) upland habitat improvements consisting of conservation easement acquisition, upland habitat improvements, and noxious weed control; and 2) riparian habitat improvements. Wildlife surveys are also conducted in the Lake Chelan Basin. The latest WHP notes that due to lack of interest from private landowners, additional conservation easements will not be obtained, although funding is still provided for other wildlife enhancement projects. Many of the activities conducted under the WHP are within ZOE #1.

The funds allocated under the WHP are expended on resources that are most valuable to wildlife and most compatible with wildlife land use in Chelan County. Those lands include key habitat types, migration corridors, and shrub steppe, grassland, and riparian/wetland habitats that offer restoration or improvement opportunities. The updated WHP notes that \$138,322 was spent between 2013-2017 and \$393,500 is expected to be spent between 2018 and 2022.

Upper Chelan River (Reaches 1-3) (ZOE #2)

There are no agency recommendations for shoreline management specific to the Chelan River. However, the Chelan River Fishery Forum (CRFF) did recommend conducting a riparian revegetation feasibility investigation and developing a planting plan, based on the results of the feasibility investigation, for Reach 1 of the Chelan River.

The Chelan River Riparian Revegetation Feasibility Investigation was completed in 2015 and the resulting Chelan River Riparian Planting Plan was completed in 2017. Both documents were developed with the Chelan River Fishery Forum (CRFF) and included agency participation in selecting the consultant, report reviews, and identification of next steps. The CRFF will determine when to implement the planting plan. Currently, the plan is to implement the Riparian Planting Plan in the fall of 2019.

Lower Chelan River (Reach 4) (ZOE #3) and the Tailrace (ZOE #4)

There are no agency recommendations for shoreline management specific to the Reach 4 or the tailrace. Property in these areas is owned by Chelan PUD, and both are influenced by high spill flows in the Chelan River that are required for lake level control. A primary goal of the CRBEIP is to minimize high spill levels in the Chelan River in excess of 6,000 cfs. High spill levels have the potential for causing gravel scour, excessive gravel deposition, and compromising the integrity of habitat features (log jams, boulder clusters, vegetation, etc.) in the Habitat Channel.

When asked about the Applicant's compliance with wildlife and habitat related requirements, Ana Cerro-Timpone, Wildlife Biologist with USFWS, stated that "I do believe that Chelan PUD is meeting their FERC license and settlement agreement obligations". She also stated that "the PUD has been reasonable and accommodating for acquiring funding for purposes outlined in the settlement agreement." Her full response, contained in Appendix B, identifies some examples of how they have met these obligations. Based on review of the above noted plans and monitoring reports, it appears that this criterion has been satisfied.

*The Project Passes Criterion E – Shoreline and Watershed Protection - Go to F***F. THREATENED AND ENDANGERED SPECIES PROTECTION**

Goal: The Facility does not negatively impact listed species.

Standards: Facilities shall not have caused or contributed in a demonstrable way to the extirpation of a listed species. However, a facility that is making significant efforts to reintroduce an extirpated species may pass this criterion. To pass the Threatened and Endangered Species criterion compliance with at least one of the alternative standards identified in the Low Impact Hydropower Certification Handbook issued March 7, 2016 must be demonstrated.

Assessment of Criterion Passage

The Applicant has selected and demonstrated compliance with **Standard F-1, Not Applicable/De Minimis Effect** to pass this criterion for ZOE #1, the impoundment and ZOE #2, the Upper Chelan River and **Standard F-3, STANDARD F-3, Recovery Planning and Action** for ZOE #3, the Lower Chelan River and ZOE #4, the tailrace.

Based on studies conducted during re-licensing, the FERC license notes the federally listed species that may occur in the area of the Lake Chelan Hydroelectric Project are bull trout, Upper Columbia River (UCR) steelhead, UCR spring-run Chinook salmon, bald eagle, Canada lynx, northern spotted owl, gray wolf, grizzly bear, and Ute ladies-tresses.

Bull trout, listed as threatened under the federal Endangered Species Act (ESA), were once found in Lake Chelan, but the last verified bull trout observations were on July 16, 1957. They have been determined to be extirpated from the basin by the USFWS and NPS. Numerous surveys conducted between 2001 and 2017 have failed to locate any bull trout in the basin. Based on information provided in the application, *"although the reason for bull trout disappearance from the Lake Chelan Basin is not known, several hypotheses have been suggested with flooding of spawning grounds, an introduced pathogen, and subsequent over-fishing being the most*

commonly cited (Leman 1969; Buckner and Campbell 1977; Brown 1984; WDFW 2002). Nowhere in Nelson (2012) is operation of the Lake Chelan Hydroelectric Project identified as a potential causative agent for the extirpation of Bull Trout in the Lake Chelan Basin.” However, bull trout critical habitat has been designated in Lake Chelan uplake from Twenty-Five Mile Creek, hence, any development above Twenty-Five Mile Creek requires ESA consultation and the acquisition of appropriate permits prior to construction activities.

Ute Ladies’-tresses have not been observed in the Chelan River. Populations of this species occur along the shoreline of the Columbia River upstream of the confluence of the Chelan and Columbia rivers and are not affected by Lake Chelan Project operations.

The final Environmental Assessment (EA) issued in October 2003 for the Lake Chelan Hydroelectric Project found that relicensing the Project would not affect the Canada lynx, northern spotted owl (or its critical habitat), gray wolf, and grizzly bear, and would not likely adversely affect the bald eagle, and UCR spring-run spring Chinook salmon. However, operation would likely adversely affect UCR steelhead due to displacement and disturbance of juvenile, and perhaps adult steelhead, during construction of habitat improvements in the bypassed reach and tailrace. On November 29, 2002, Commission staff requested USFWS’s concurrence on its effect determinations for the bald eagle, Ute ladies-tresses, and bull trout. On December 30, 2003, USFWS filed its concurrence with Commission staff’s determination. On November 29, 2002, the Commission staff requested formal consultation with NMFS under section 7(a)(2) of the ESA on UCR steelhead. On October 20, 2005, NMFS filed its biological opinion on relicensing the Lake Chelan Project in accordance with the terms of the Agreement. NMFS determined that relicensing the Lake Chelan Project would not jeopardize the continued existence of the UCR spring-run Chinook salmon, UCR steelhead, Snake River (SR) spring/summer Chinook salmon, SR fall Chinook salmon, SR steelhead, SR sockeye salmon, MCR steelhead, LCR Chinook salmon, LCR steelhead, LCR coho salmon, Columbia River chum salmon, Upper Willamette River (UWR) Chinook salmon, and UWR steelhead; or result in the adverse modification or destruction of any designated critical habitat for these species. NMFS’ biological opinion includes an incidental take statement with reasonable and prudent measures to minimize take of listed salmon and steelhead along with terms and conditions to implement the measures. The conditions of the license address these measures and terms and conditions by requiring the licensee to implement specific provisions of the Agreement relating to the protection of anadromous salmonids. It appears that these measures are being appropriately implemented, based on monitoring studies that were provided with the application.

Information from FERC’s Final EA identified eleven plant, fish and wildlife species listed on the Regional Forester’s Sensitive Species list or the State of Washington sensitive species list that are either known to occur or may potentially occur in the Project area, however of these species, only the giant helleborine, common bluecup, Sierra cliffbrake, Western lady’s-tresses, common loon, Western gray squirrel, and Westslope Cutthroat Trout have been documented in the Project area. A Sensitive Species Management Plan was required and has been implemented to help ensure noxious weeds that may affect the plant species were managed. Project operation was determined to not affect habitat used by the Western gray squirrel. Suitable habitat for the common loon was determined to be likely limited to the Stehekin Flats and the slightly earlier drawdown of the reservoir was found to not affect survival of young because most juveniles are

likely to be leaving their natal grounds by August. Any improvement to shoreline vegetation would also help improve nesting cover for the common loon.

The application also noted that Pygmy Whitefish, a Washington State sensitive species, occurs in the Lake Chelan Basin, but have been documented to only inhabit Lake Chelan according to a September 1998 report issued by the WDFW. Given that WDFW has been actively involved in the Project but has not identified any concerns about impacts to Pygmy Whitefish, it has been assumed that impacts to this species is not expected from Project operations.

The Settlement Agreement required measures to be taken to minimize impacts to the endangered Steelhead Trout and Chinook Salmon from Project operations. As previously identified, the CRBEIP identifies the biological objectives to be achieved, which focus on improvements to spawning habitats for these species, as well as other anadromous species. Through CRBEIP implementation, Chelan PUD has been providing biological objectives status updates every two years. These reports are issued to the WDOE and members of the Chelan River Fisheries Forum (CRFF) for a 30-day review period prior to submission to FERC. Members of the CRFF include the NMFS, Forest Service, NPS, USFWS, WDOE, WDFW, Confederated Tribes of the Colville Reservation, Yakima Indian Nation, Confederated Tribes of the Umatilla Indian Reservation, City of Chelan, and Lake Chelan Sportsman Association.

Since last certified by LIHI, the minimum spawning flow for Steelhead Trout and Chinook salmon was reduced from 320 cfs to 260 cfs. This change was supported by the Chelan River Fishery Forum, including federal and state agencies, and was approved by amendments of both the WQC and FERC license. As previously noted, this change in flows was considered to be beneficial to these species.

Review was made of the 2015 and 2017 Status Reports. On the 2015 report, the Chelan PUD only received comments from WDOE, which were summarized and incorporated into the 2015 final status report. No comments were received on the 2017 report. This suggests that these entities are satisfied with the progress being made on meeting the biological objectives. Accordingly, I believe this criterion has been satisfied.

The Project Passes Criterion F – Threatened and Endangered Species Protection - Go to G

G. CULTURAL AND HISTORIC RESOURCE PROTECTION

Goal: The Facility does not inappropriately 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.

Standards: To pass the Cultural and Historic Resource criterion compliance with one or more of the alternative standards identified in the Low Impact Hydropower Certification Handbook issued March 7, 2016 must be demonstrated.

Assessment of Criterion Passage

The Applicant has selected **STANDARD G-3, Approved Plan** pass the Cultural and Historic Protection criterion for the Project for all ZOE's.

To protect cultural resources, Chelan PUD is implementing a Historic Properties Management Plan (HPMP) and programmatic agreement with the Commission, the State Historic Preservation Officer (SHPO), and the Confederated Tribes of the Colville Reservation Tribal Historic Preservation Officer. License Article 410 and Settlement Agreement Article 10 require the HPMP.

Chelan PUD implements measures to minimize vandalism of known cultural resources, such as at Chelan PUD-owned recreational facilities. Chelan PUD also implements measures to protect cultural resources during construction of new roads or major improvements to existing roads.

Chelan PUD also consults with the Lake Chelan Cultural Forum established under the license to develop treatment plans for historic properties. The Lake Chelan Cultural Forum includes the licensee, Washington SHPO, the Confederated Tribes of the Colville Reservation, the Confederated Tribes and Bands of the Yakama Nation, Forest Service, NPS, Bureau of Land Management, Washington State Parks and Recreation Commission, and WDFW. Treatment plans include protection of the resource from Project effects, if practical measures exist to prevent Project effects from occurring. Where complete protection cannot be assured, then actions are taken to limit Project effects or address adverse effects through data recovery or other measures. Chelan PUD considers agency and Tribal recommendations when considering data recovery measures, and when addressing adverse effects on traditional cultural properties.

Annual monitoring reports are completed under the HPMP. The reports are prepared following consultation with the Lake Chelan Cultural Forum. Links to these reports were provided in the application and several were reviewed as part of this assessment.

The only change to the cultural resources requirements since 2012 has been the required 5-year update to the HPMP. The update was completed in December 2017 after incorporating comments received from the agencies. FERC approved the revised HPMP by an order dated August 7, 2018.

The Project Passes Criterion G - Cultural and Historic Resource Protection - Go to H

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.

Standards: To pass the recreation criterion, compliance with at least one of the alternative standards identified in the Low Impact Hydropower Certification Handbook issued March 7, 2016 must be demonstrated. In all cases, it must be demonstrated that flow-related recreational impacts are mitigated to a reasonable extent in all zones where there is flow-related recreation. Where there is recognized, flow-related recreational use, the facility shall provide the public with relevant and up-to-date information on reservoir levels and river flows, preferably real-time updates. It is understood that recreational activities must be consistent with the assurance of reasonable safety of employees and the public, and with critical infrastructure protection dictated by state or federal authorities.

Assessment of Criterion Passage

The Applicant has selected **Standard H-2, Agency Recommendation** to pass the Recreational Resources criterion for all ZOE's except ZOE #4, the tailrace. **Standard H-1, Not Applicable/De Minimis Effect** was selected for the tailrace.

Recreational features are found in all ZOE's except ZOE #4. Compliance with these requirements are discussed below. The applicant stated that no FERC environmental inspection was conducted at the site in the last five years.

Lake Chelan (ZOE #1)

Chelan PUD provides a specific level of funding to federal agencies for the purpose of repairing, expanding, operating and maintaining and replacing USFS and NPS docks on Lake Chelan. Chelan PUD also provides specific funding to the USFS and NPS for recreational enhancements within or adjacent to the Lake Chelan Basin for USFS and NPS recreation sites. This funding is available for the agencies to use, but Chelan PUD maintains the funding in a liability account until the agencies perform and invoice for the work. The actual amount paid out each year varies based on the capacity of the agencies and the scope of work performed. Supplemental information from the Applicant indicated the following funding levels for the past five years: 2013 - \$662,084; 2014 - \$192,353; 2015 - \$368,863; 2016 - \$472,377; and 2017 - \$351,958.

To enhance the lake fishery, Chelan PUD funded Washington Fish and Wildlife efforts to rear and stock salmonid fingerlings, a combination of kokanee and Westslope Cutthroat Trout, and catchable-size salmonids, currently all Westslope Cutthroat Trout, in Lake Chelan. To satisfy license requirements, Chelan PUD pays WDFW to raise and stock these fish from the Chelan Hatchery at a cost of approximately \$30,000 annually.

Upper (Reaches 1-3) and Lower (Reach 4) Chelan River (ZOE's #2 and #3)

Whitewater boating is the only recreation allowed in the Gorge, other than a 1-mile trail in Reach 1. Chelan PUD has constructed the non-motorized, non-paved, multi-use trail below the Lake Chelan Dam in Reach 1 of the Chelan River to provide managed access to the Chelan River and connect to the existing Riverwalk Loop Trail. The approximate one-mile trail was completed in November 2008 and includes a 20-space parking lot and two observation lookouts with benches.

On July 16, 2012, FERC issued an order amending the Project's Recreation Resources Management Plan (RRMP) after the licensee completed a whitewater boating monitoring study. The order approved several modifications to the whitewater boating section of the RRMP that were recommended by the licensee and agreed to by American Whitewater (AW). These include: annual whitewater flow releases scheduled for the third Saturday and Sunday in September, at 375 cfs and 400 cfs, respectively; continued paddler use of a reservation system that includes both on-line and on-site registration; and paddler adherence to various requirements concerning safety, equipment, and liability.

The amended RRMP also requires that surveys of paddlers be conducted following each release, an annual meeting be held between the licensee and AW, and a report evaluating whitewater boating releases, including recommendations on future releases, be submitted to FERC every three years. Most survey respondents were "extremely satisfied" and felt flows were acceptable and

crowding was not a problem. In 2015, Chelan PUD asked FERC to modify the reporting schedule, changing it from every three years to every 10 years. FERC approved the request on May 20, 2015 and the next whitewater boating report is due on May 1, 2025.

Based on review of the application materials it appears this criterion has been met.

The Project Passes Criterion H – Recreational Resources

X. GENERAL CONCLUSIONS AND REVIEWER RECOMMENDATION

Based on my review, I believe that this Project conditionally meets the requirements of a Low Impact facility and recommend it be re-certified for a five-year period with the conditions noted below. This will ensure satisfaction of the criteria addressing water quality and downstream fish passage.

- The Owner shall notify LIHI within 90 days of receipt of the determination made by WDOE as to whether or not the results of the 10-year study have shown achievement of water quality standards or if not, what actions will be taken by WDOE in response to the study findings. Submission of the ten-year study results is expected in December 2019.
- The Owner shall notify LIHI within 90 days of notification that the entrainment study must be initiated. This LIHI notification shall include the schedule for implementing the study and when the results of the study are expected to be available. The annual compliance statements to LIHI shall include a status update of the study. Should it be completed with the term of this Certification, a copy of the study report along with agency comments on the results shall be provided.

**THE LAKE CHELAN PROJECT
CONDITIONALLY MEETS THE LIHI
CRITERIA FOR RE-CERTIFICATION AS A
LOW IMPACT FACILITY**

APPENDIX A
Figures and Photographs

Figure 1 – General Location of the Project

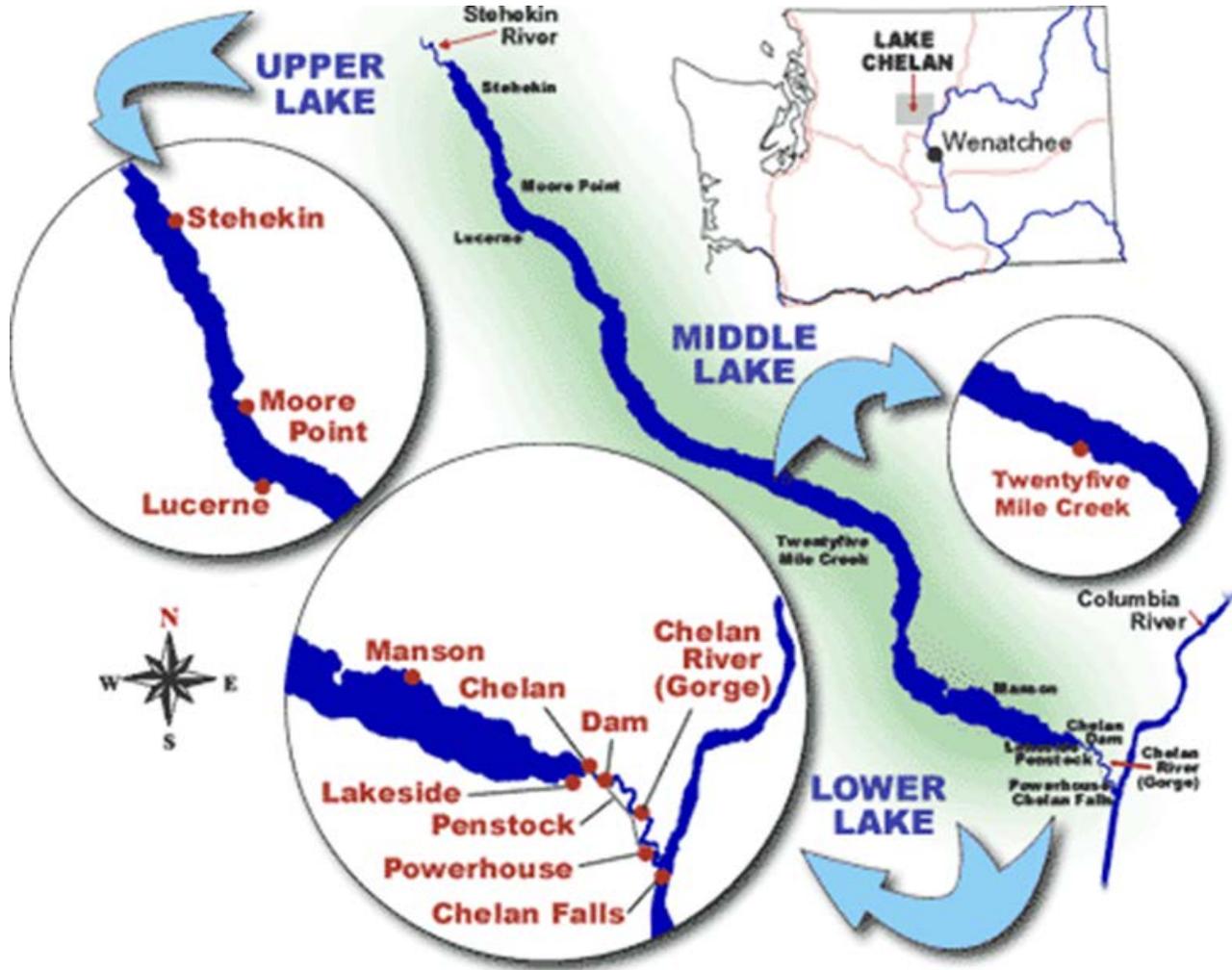
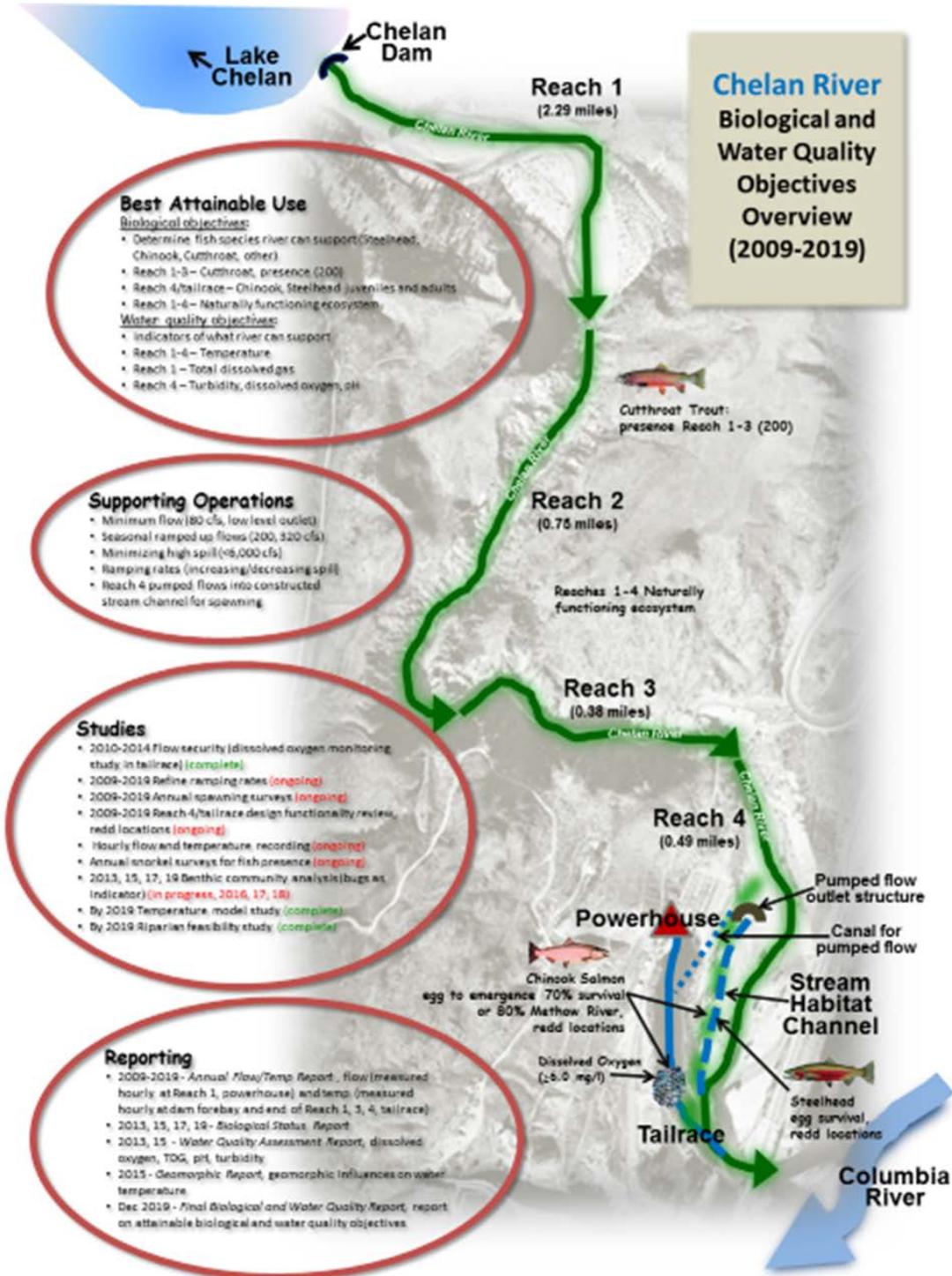
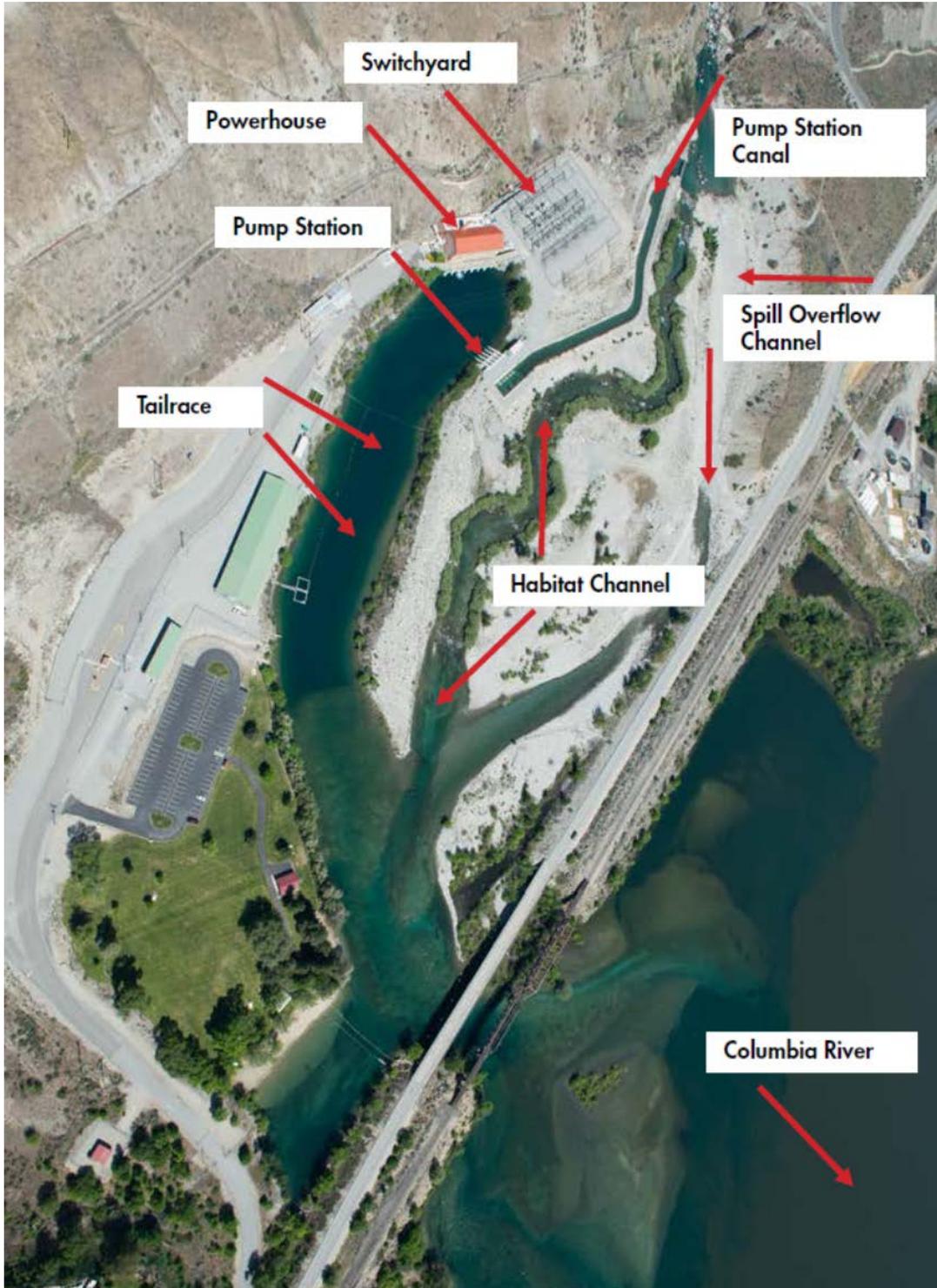


Figure 2 – Chelan River Reaches and Project Zones of Effect



ZOE #1 – Lake Chelan	ZOE #3 - Bypass Reach and Habitat Channel – Lower Chelan River (Reach 4)
ZOE #2 – Bypass Reach – Upper Chelan River (Reaches 1-3)	ZOE #4 – Tailrace and Regulated Reach

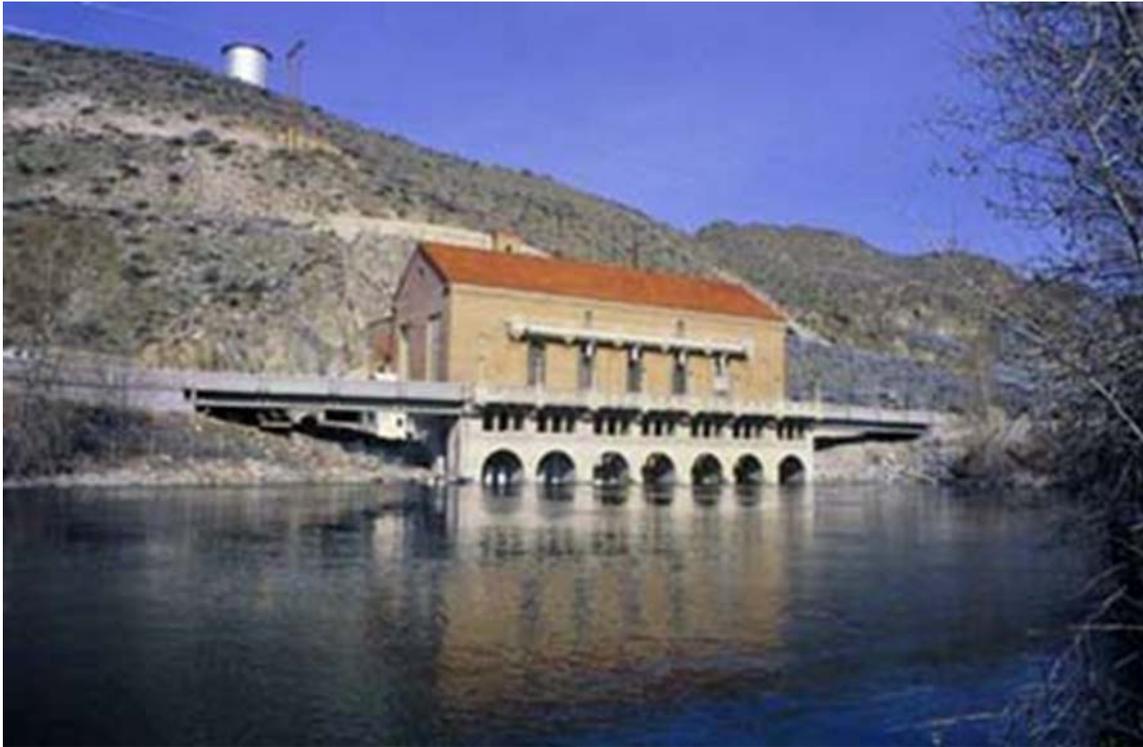
Figure 3 – Key Project Features



Photograph 1 –Lake Chelan



Photograph 2 – Powerhouse



Photograph 3 – Spillway and Upper Chelan River

