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DECEMBER 8, 2020

KIMBERLY D. BOSE, SECRETARY FEDERAL ENERGY REGULATORY COMMISSION 888 FIRST STREET NE WASHINGTON, DC 20426

Re: Skagit River Hydroelectric Project FERC No. 553-235 - Filing of Proposed Study Plan

Dear Secretary Bose:

In accordance with Federal Energy Regulatory Commission (FERC or Commission) regulations at 18 CFR § 5.11, the City of Seattle, Washington, through its publicly-owned electric power utility Seattle City Light (City Light), herewith files with the Commission its Proposed Study Plan (PSP) for the relicensing of the Skagit River Hydroelectric Project (FERC No. 553) (Skagit River Project or Project). The current license for the Project expires on April 30, 2025.

The purpose of this filing is to provide the Commission, resource agencies, Indian tribes, First Nations, and other interested parties (collectively "licensing participants" or "LPs") with a PSP that provides descriptions of studies proposed by City Light.

City Light greatly appreciates the tremendous work and resources exerted by licensing participants in preparing their study requests and comments. A total of 23 comment letters from LPs were submitted to the Commission on the Skagit River Project PAD and the Commission's Scoping Document 1 (SD1), along with nearly 100 study requests. In addition, some LPs provided comments on City Light's early versions of study plans and suggestions for studies at voluntary Resource Work Group meetings held in 2019 and 2020. All of this information has been very helpful to City Light as it has reviewed this extensive material and prepared the enclosed PSP.

The enclosed PSP sets forth a proposed suite of 28 studies that City Light believes will meet information needs for federal and state regulators, together with all other LPs, to understand Project effects and inform regulatory analyses and decisions in this relicensing effort. In some instances, City Light has fully adopted studies requested by LPs. In others, City Light adopted requested studies, with amendment, or incorporated elements of requested studies into other proposed study plans. City Light also declined to include some requested studies in the PSP.

Recognizing the impressive effort by the LPs to prepare study requests and comments, City Light carefully reviewed, analyzed and considered each and every study request and comment received. Where City Light did not wholly adopt a study request, the PSP includes City Light's specific rationale for its decision,

as required by the Commission's regulations, 18 CFR § 5.11(b)(4), and out of respect for the work LPs put into preparing their study requests.

With regard to comments that some LPs filed that did not contain a study or information proposal, City Light notes that the purpose of the enclosed PSP is to set forth its proposal for environmental studies needed to inform decisionmakers in the relicensing process. Therefore, the PSP does not contain a response to all comments received at this time. City Light will address these comments in future relicensing filings, such as the Draft License Application and Final License Application.

As required by FERC's ILP regulations at 18 CFR § 5.11(e), City Light will hold study plan meetings regarding the PSP on January 6-7 and 12, 2021. These meetings will be held virtually with additional details to be provided at least two weeks prior to the meeting dates. The purpose of the meetings is to clarify the intent and content of City Light's PSP and identify any outstanding issues or information needed with respect to the proposed studies to be included in City Light's Revised Study Plan (RSP). City Light will also discuss its response to study requests and the context for studies proposed in this PSP during the study plan meetings.

Finally, in accordance with the Commission's process plan and schedule included in SD1, LPs have until March 8, 2021, to file comments on the PSP, after which City Light will file its RSP by April 7, 2021. City Light will give due consideration to all comments received, and work with LPs in refining the individual study plans over the next several months as the RSP is prepared. Following City Light's filing of the RSP, the Commission's study plan determination is expected by May 7, 2021.

City Light looks forward to continuing to work with LPs and FERC staff in finalizing the study plan for the Project's relicensing. If there are any questions about this filing, please contact me by phone at (206) 684-3496 or by email at <u>Andrew.Bearlin@seattle.gov</u>.

Sincerely,

Brand.

Andrew Bearlin Skagit License Manager Seattle City Light

Enclosure

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PROPOSED STUDY PLAN

SKAGIT RIVER HYDROELECTRIC PROJECT FERC NO. 553





December 2020

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AF	Access Fund
APE	area of potential effect
BIA	Bureau of Indian Affairs
BMP	best management practice
CFR	Code of Federal Regulations
City Light	Seattle City Light
СМА	climbing management area
CMZ	channel migration zone
CoSD	City of Seattle datum
COVID-19	Novel Coronavirus
CWA	Clean Water Act
DDE	dichlorodiphenyldichloroethylene
DEM	digital elevation model
DHSVM	Distributed Hydrology Soil Vegetation Model
DLA	Draft License Application
DMS	Digital Management System
DNR	Department of Natural Resources (Washington State)
Ecology	Washington State Department of Ecology
ELC	Environmental Learning Center
EO	executive order
EPA	Environmental Protection Agency
ESA	Endangered Species Act
FERC	Federal Energy Regulatory Commission
FLA	Final License Application
FSA	Fisheries Settlement Agreement
FTEC	fish tissue equivalent concentration
GIS	geographic information system
GRA	geospatial risk assessment
HSC	habitat suitability criteria
ISR	Initial Study Report
kV	kilovolt

SOW	.scope of work
SR	.State Route
SSIT	.Sauk-Suiattle Indian Tribe
STI	.Stillaguamish Tribe of Indians
TCL	.traditional cultural landscape
ТСР	.traditional cultural property
TDG	.total dissolved gas
ТНРО	Tribal Historic Preservation Officer.
TSS	.total suspended solid
USACE	.U.S. Army Corps of Engineers
U.S.C	.United States Code
USFS	.U.S. Forest Service
USFWS	.U.S. Fish and Wildlife Service
USGS	.U.S. Geological Survey
USIT	.Upper Skagit Indian Tribe
USR	.Updated Study Report
WCC	.Washington Climbers Coalition
WDFW	Washington Department of Fish and Wildlife.
WMRC	.Wildlife Management Review Committee
WRIA	.Water Resources Inventory Area

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1.0 INTRODUCTION AND BACKGROUND

The Skagit River Hydroelectric Project (Skagit River Project or Project), owned and operated by the City of Seattle, through its publicly-owned power utility Seattle City Light (City Light), is licensed by the Federal Energy Regulatory Commission (FERC or Commission) as Project No. 553. The existing license for the Skagit River Project was issued May 16, 1995 and will expire on April 30, 2025. In accordance with FERC regulations, City Light notified FERC on April 27, 2020 that it intends to apply for a new license for the Project. The Federal Power Act requires City Light to file its new license application with FERC by April 30, 2023.

In accordance with FERC regulations at 18 Code of Federal Regulations (CFR) Part 5, City Light is utilizing FERC's Integrated Licensing Process (ILP) for preparing its license application. This Proposed Study Plan (PSP) is being filed with FERC pursuant to 18 CFR § 5.11 and the Process Plan and Schedule referenced in FERC's Scoping Document 1 (SD1 – see Table 1.3-1 in this PSP). Notification of availability of this PSP is also being distributed to state and federal agencies, Indian tribes, First Nations, non-governmental organizations (NGO), and other interested parties (collectively, licensing participants, or LPs).

1.1 **Project Description**

1.1.1 Project Location

The Skagit River Project is located in northern Washington State, across Whatcom, Skagit and Snohomish counties, and consists of three power generating developments on the Skagit River – Ross, Diablo, and Gorge – and associated lands and facilities (Figure 1.1-1). The Project generating facilities are in the Cascade Mountains of the upper Skagit River watershed, between river miles (RM) 94 and 127. The Project has a total authorized installed capacity of 650.25 MW.¹ Power from the Project is transmitted via two 230-kilovolt (kV) powerlines that span over 100 miles and end just north of Seattle at the Bothell Substation. The Project also includes two City Light-owned towns (Newhalem and Diablo), the North Cascades Environmental Learning Center (ELC), several recreation facilities, and several parcels of fish and wildlife mitigation lands.

The Project Boundary is extensive, spanning over 133 miles from the Canadian border to the Bothell Substation just north of Seattle, Washington. In addition, there are "islands" of fish and wildlife mitigation lands and recreation facilities within the Skagit, Sauk, and South Fork Nooksack watersheds that are also within the Project Boundary. Project generating facilities are entirely within the Ross Lake National Recreation Area (RLNRA), which is administered by the National Park Service (NPS) as part of the North Cascades National Park Complex. The RLNRA was established in 1968 in the enabling legislation for North Cascades National Park to provide for the "public outdoor recreation use and enjoyment of portions of the Skagit River and Ross, Diablo, and Gorge lakes." The legislation maintains FERC's jurisdiction "in the lands and waters

¹ Authorized installed capacity values presented herein are those approved by the July 23, 1997 Order Approving Revised Exhibit M (80 FERC ¶ 62,056). On April 1, 2020, City Light requested to amend Exhibit M of its license to increase the Project's capacity to 700.27 MW, and as modified in an August 19, 2020 Response to FERC's May 21, 2020 Additional Information Request. Upon FERC's approval of City Light's revised Exhibit M, City Light will update the authorized installed capacity values in relevant licensing documents moving forward.

within the Skagit River Hydroelectric Project," as well as hydrologic monitoring stations necessary for the proper operation of the Project (16 United States Code [U.S.C.] § 90d-4; Public Law 90-544. Sec. 505 dated October 2, 1968, as amended by Public Law 100-668. Sec. 202 dated November 16, 1988).

1.1.2 Project Facilities

1.1.2.1 Ross Development

The Ross Development is the furthest upstream of the three Skagit River Project developments; the powerhouse and nearby dam are about 11 miles north of Newhalem. Most of the water used for Skagit River Project power generation originates in high mountain basins surrounding Ross Lake and upstream along the Skagit River in British Columbia.

Ross Powerhouse is about 1,100 feet downstream of Ross Dam, on the left bank at the eastern end of Diablo Lake. There are four Westinghouse generating units (Units 41, 42, 43, and 44), each with a nameplate rating of 90 MW. Units 42 and 43 each has an authorized installed capacity of 90 MW; Unit 41 has an authorized installed capacity of 76.875 MW; and Unit 44 has an authorized installed capacity of 81.75 MW. Two concrete-lined power tunnels deliver water from the reservoir to four penstocks and into the powerhouse. There is no surge tank. Diablo Lake backs up to the base of Ross Dam and there is no bypass reach or section of free-flowing river between the two developments.

Ross Dam is just upstream of Ross Powerhouse at RM 105.3. At 540 feet from bedrock to crest, it is the highest of the three Project dams. The dam has two spillways, one on each side and each with six gates operated by an electric hoist. Two of the spill gates can be controlled remotely; the others are operated locally at the dam. In addition to the spillways, Ross Dam has two concrete lined power tunnel intake structures, two butterfly valves at the 1,340-foot level² and two hollow jet valves near the right bank at 1,269 and 1,254 feet. The two sets of valves can be opened to evacuate the reservoir once water levels drop below the level of the spill gates. On the top of the dam, a shed houses two hoists, one for each of the broome gates that close off the six-foot-diameter water supply pipes to the hollow jet valve. There is also a gantry crane used to raise and lower the broome gates that isolate the six-foot conduits for the butterfly valves. The road on top of the dam is used by City Light and NPS vehicles and is open to pedestrian use by the public.

At nearly 23 miles long, Ross Lake is the largest reservoir in western Washington. It extends into Canada approximately another 1 mile (24 miles total), with about 500 acres in British Columbia. The reservoir has a surface area of 11,680 acres and storage volume of 1,435,000 acre-feet at the normal maximum water surface elevation of 1,602.5 feet.

² All elevations cited in this PSP are City of Seattle datum (CoSD) unless otherwise noted. In order to provide a consistent reference, some study plans include conversions to North American Vertical Datum of 1988 (NAVD 88) for representation of vertical datum. A table converting elevation values of key Project features from City of Seattle Datum to NAVD 88 and map of the features are appended to this PSP, both of which have been updated since the Pre-Application Document (PAD).



Figure 1.1-1. Location map of the Skagit River Project.

1.1.2.2 Diablo Development

The Diablo Development is between the Ross and Gorge developments and in addition to generating power, it reregulates flows between the other two developments. The powerhouse is on the north side of the Skagit River in the town of Diablo, about 4,000 feet downstream from Diablo Dam. Water from the reservoir to the powerhouse is conveyed by a single concrete lined tunnel for 1,900 feet that leads to three steel-lined penstocks. There is a surge tank located near the bottom end of the tunnel, uphill from the powerhouse.

Diablo Powerhouse holds two Westinghouse generators (Units 31 and 32) and each has a nameplate rating of 60 MW and authorized installed capacity of 75.2 MW. There are also two smaller, house-unit generators (Units 35 and 36), each with nameplate ratings and authorized installed capacities of 1.2 MW. A reinforced-concrete tailrace on the westerly edge of the powerhouse also serves to support transformers, a switching apparatus, and a crossing for a single-lane road.

Diablo Dam is located at RM 101, about five miles upstream of Gorge Dam and four miles downstream of Ross Dam. The concrete arch dam is 389 feet from bedrock to crest and has two spillways, one on each side, and a total of 19 spill gates, seven on the south spillway and 12 on the north. The three southern-most gates are automated via an electric hoist that can be locally or remotely operated. The remaining 16 gates are controlled locally at the dam using the "mule," an electric motor-driven hydraulic hoist that consists of two hydraulic cylinders to open or close the associated spill gate. The mule runs on rails along the road on top of the dam and is positioned over the desired gate. The lifting chains for the gates are accessed below the deck plates on the dam. A valve house on the face of the dam at elevation 1,047 feet has four outlets—three butterfly valves that can evacuate water from the reservoir at levels below the spill gates—and one Larner Johnson valve that is not used. There are two bifurcated intakes at the dam but only one is in use as the second intake was for planned future expansion of the powerhouse and a second tunnel, which were never constructed. The crest of the dam also serves as a road.

Diablo Lake has a surface area of about 770 acres and gross storage of 50,000 acre-feet at a normal maximum water surface elevation of 1,205 feet.

1.1.2.3 Gorge Development

Gorge Powerhouse is on the left bank (facing downstream) of the Skagit River just upstream of the town of Newhalem and is reached via a bridge across the river that connects to SR 20. There are four Westinghouse generating units (Units 21, 22, 23, and 24). Units 21 and 22 each has a nameplate rating of 24 MW, and authorized installed capacity of 31.5 MW; Unit 23 has a nameplate rating of 29.7 MW and authorized installed capacity of 30.2 MW. Unit 24 is significantly larger, with a nameplate rating of 60 MW and an authorized installed capacity of 65.625 MW.

In addition to generating power, Gorge Powerhouse is responsible for regulating flows to the river downstream of the Project for fish protection, as stipulated by the current Project license. Units 21, 22, and 23 are each connected to steel-lined penstocks through 10-foot-diameter, biplane-type butterfly valves equipped with relief valves, which will discharge a maximum of 65 percent of the turbine flow at full-load rejection. Equipment has also been installed to allow these valves to open

and stay open for any required period to maintain fish flows after a plant load rejection/shutdown. Unit 24 is connected to the steel-lined penstock through a 15-foot-diameter butterfly valve.

Water from Gorge Lake is conveyed via an intake structure in Gorge Dam into an 11,000-footlong concrete lined power tunnel to the powerhouse. The power tunnel passes through the solid rock slope that is adjacent to the Skagit River and then splits into four penstocks. A surge tank and riser with restricted orifice is located at the lower end of the tunnel. There are also two adits that provide access to the power tunnel—one about halfway at Devil's Elbow and the other near Gorge Powerhouse.

Gorge Dam, located at RM 96.5, is about 2.5 miles upstream of Gorge Powerhouse and 4 miles downstream from Diablo Dam near Gorge Creek. The dam is a combination concrete arch and gravity structure that rises 300 feet from bedrock to crest. There are two spillways with gates that are operated by an electric hoist on top of the dam. One gate can be remotely controlled to a limited height; the other must be opened and closed locally at the dam. Training walls on either side of the spillway direct water into the river channel downstream. Two outlet valves on the face of the dam at elevation 764 feet can be used to evacuate water from Gorge Lake below the spill gate level. There is a log chute which allows wood to be passed downstream of the Project.

Gorge Lake is 4.5 miles long and extends upstream to the base of Diablo Dam. At the normal maximum water surface elevation of 875 feet, the lake has a surface area of 240 acres and gross storage of 8,500 acre-feet. Under normal operations at both the Gorge and Diablo developments there is a short section of free-flowing river between the Diablo tailrace and the upper end of Gorge Lake.

1.1.2.4 Transmission

The Project Boundary includes approximately 351.83 circuit miles of primary transmission lines connecting the Project to the bulk electrical grid. The lines terminate at Bothell Substation, just north of Seattle; the substation is located partially within the Project Boundary. The other substation associated with the lines is North Mountain, outside of the town of Darrington, which is jointly owned by City Light and Snohomish Public Utility District and began operations in 1991. This substation gives City Light the ability to interconnect with other utilities to balance regional supply and demand, if needed. The North Mountain Substation is not a Project facility and is not within the Project Boundary.

The Project transmission lines are primarily on double-circuit steel lattice towers, although a few towers have been replaced with monopoles. The various components of this system are described below:

- From Ross Powerhouse, two 230-kV transmission lines (R1 and R2) run for about 3.8 miles along the west side of Diablo Lake, down the hillside past Diablo Dam to Diablo Switchyard.
- The 230-kV Diablo Switchyard is adjacent to Diablo Powerhouse and serves to connect the Ross, Diablo, and Gorge developments into the Skagit transmission system. The R1 and R2 lines from Ross terminate at the switchyard
- From Diablo Switchyard, one 230-kV line (D4) runs for 5.8 miles and terminates at Gorge Switchyard, located just across the river from Gorge Powerhouse. The other three lines (D1,

D2, and D3) run 87.5 miles to the Bothell Switching Substation.

- From the Gorge Switchyard, a single 230-kV line (GO-NM) runs 36.8 miles to the North Mountain Substation.
- From there, the NM-SN line extends for 40.6 miles to Bonneville Power Administration's (BPA) Snohomish Substation and then another 7.6 miles to Bothell as SN-BO#1.

From Gorge Switchyard to North Mountain Substation the D1, D2, D3, and GO-NM lines are mostly within the same right-of-way (ROW), although there are a few sections where the ROW splits, with two lines in each, due to topographical constraints. At the North Mountain Substation, the NN-SN line joins the three lines originating at Diablo (D1, D2 and D3) and runs in the same ROW. Similarly, the SN-BO#1 line joins the ROW from the Snohomish Substation to Bothell. From Ross Powerhouse to Bothell Substation, the ROW is approximately 100 miles long and ranges from 150 to 400 feet wide.

1.1.2.5 Recreation Facilities

City Light operates and maintains several recreation and interpretive facilities at the Project, including:

- (1) North Cascades ELC
- (2) Skagit Tour Dock
- (3) West Ferry Landing
- (4) East Ferry Landing
- (5) Ross Lodge Picnic Shelter
- (6) Gorge Lake Boat Launch
- (7) Ladder Creek Falls Trail and Gardens
- (8) Trail of the Cedars
- (9) Gorge Powerhouse Overlook
- (10) Gorge Powerhouse Visitor Gallery
- (11) Skagit Information Center
- (12) Gorge Inn Museum
- (13) Newhalem Picnic Sites
- (14) Newhalem Parking Areas
- (15) Newhalem Interpretive Displays
- (16) Newhalem Playground

1.1.2.6 Fish and Wildlife Mitigation Lands

City Light owns several parcels of lands in the Skagit, Sauk, and South Fork Nooksack watersheds managed for wildlife and fish habitat, totaling more than 10,800 acres. Most of the fish and wildlife mitigation lands are within the Project Boundary.³

1.1.2.7 Project Boundary

The Skagit River Project Boundary encompasses 31,451 acres and includes all Project facilities, including the dams, powerhouses, reservoirs, power tunnels, switchyards, transmission lines, and the towns of Newhalem and Diablo, as well as most fish and wildlife mitigation lands and Project recreation sites. It terminates in Washington State, at the U.S.-Canada border, and thus does not include all the lands and waters around and within Ross Lake. Most of the City Light-owned fish and wildlife mitigation lands, as well as the U.S. Forest Service (USFS)-managed Marblemount and Sauk River boat launches, are non-continuous features within the Project Boundary and are mapped as "islands".

The Skagit River Project encompasses 19,281.93 acres of federal lands administered by the NPS and USFS - 19,060.06 acres that are non-transmission related, and 221.87 acres in the transmission line ROW.⁴

The Project Boundary along Diablo and Gorge lakes extends about 200 feet (horizontal measurement) beyond the normal maximum water surface elevation. For Ross Lake, the Project Boundary was established to accommodate potential future development subject to the High Ross Treaty. As a result, the Project Boundary around Ross Lake reaches significantly up several of the major tributaries, including Big Beaver, Little Beaver, Lightning, and Ruby creeks. While included within the Project Boundary, lands associated with the inundation zone of High Ross (5,213.78 acres)⁵ are not impacted by Project operations and therefore anticipated generally to be excluded from the geographic scope of relicensing studies.

1.1.3 Operations

The three Project developments are hydraulically coordinated to operate as a single project. Project operation under the existing license is designed to meet and prioritize four objectives: (1) flood control; (2) salmon and steelhead protection flows downstream of Gorge Powerhouse; (3) recreation; and (4) power generation. To achieve these goals, City Light must adhere to specific

³ City Light is currently amending the Project Boundary to include additional fish and wildlife mitigation lands that were recently acquired under ongoing implementation of the existing license (April 1, 2020 request to amend Exhibit K, as modified in its August 19, 2020 Response to FERC's May 21, 2020 Additional Information Request). Upon FERC's approval of City Light's revised Exhibit K, City Light will update the land acreage values in relevant licensing documents moving forward, including total lands within the Project Boundary.

⁴ The acreage values of federal lands within the Project Boundary are based on the description in the PAD and Exhibit K as approved by FERC's July 17, 2013 Order Amending License (144 FERC ¶ 62,044). In response to FERC's May 21, 2020 Additional Information Request, City Light submitted revised Exhibits K and M, which include updated federal lands values. Upon FERC's approval of City Light's revised Exhibits K and M, City Light will update the federal land acreage values in relevant licensing documents moving forward.

⁵ Per City Light's April 10, 2020 Application to Amend Article 201, as amended August 21, 2020 currently before FERC for consideration.

license requirements for Ross Lake levels and for streamflows and ramping rates downstream of Gorge Powerhouse.

1.1.3.1 Ross Development

Ross Lake, the impoundment created by Ross Dam, is the largest of the three Project reservoirs with a useable storage capacity of 1,052,000 acre-feet. City Light operates Ross Lake for storage for energy generation for the entire Project as well as for providing downstream flood control and recreation at the lake.

Under existing operations, Ross Lake is drawn down on a yearly basis during winter in order to capture flows from spring runoff and to provide for downstream flood control. The drawdown typically begins after Labor Day and continues until the lake reaches its lowest level in late March or early April. The current license requires City Light to draw down Ross Lake to a level that provides 60,000 acre-feet of storage for flood control by November 15 and 120,000 acre-feet by December 1 and to maintain this available storage through March 15.

Ross Lake levels are also managed to meet recreational needs during the summer months. The current license requires City Light to fill Ross Lake as soon as possible after April 15, achieve full pool depth by July 31, and maintain full pool depth through Labor Day.

City Light typically operates the Ross Powerhouse continuously to pass flow downstream, although it occasionally increases and decreases generation for short periods to help meet load-following demand or other Project purposes. Spills over Ross Dam are infrequent due to the large reservoir storage capacity. Spill is typically associated with gate testing and is usually short in duration and averages only a few cubic feet per second of flow per event.

1.1.3.2 Diablo Development

The Diablo Development is operated primarily to regulate flow between the Ross and Gorge Developments. Under normal operation, the reservoir level typically fluctuates between 4 and 5 feet per day. Because of its limited useable storage (8,820 acre-feet) relative to Ross Lake, the reservoir cannot absorb large fluctuations in flow under normal operations. Therefore, the Diablo Development spills much more frequently than the Ross Development, averaging about 30 days of spill per year. Spill generally occurs during periods of high runoff in the spring or early summer, or when the powerhouse units are offline or additional flow is needed to meet fish protection flows downstream of the Gorge Powerhouse.

Like the Ross Powerhouse, City Light typically operates the Diablo Powerhouse continuously to pass flow downstream, although it occasionally increases and decreases generation for short periods to help meet load-following demand or other Project purposes.

1.1.3.3 Gorge Development

The Gorge Development is operated primarily to regulate flows downstream of the powerhouse for salmon and steelhead protection in the upper Skagit River. The fish protection flow requirements are specified in the Revised Fisheries Settlement Agreement (FSA) Flow Plan that was approved by a July 17, 2013 Commission order amending license. The fish protection flows are generally designed to: (1) limit maximum flows when salmon and steelhead are spawning to

prevent redd building along the margins of the river where they could be subject to flow fluctuations or dewatering if flows are reduced; (2) maintain minimum flows throughout the incubation period to prevent desiccation of redds; and (3) limit ramping to protect sensitive life stages of salmon and steelhead from rapid increases or decreases in river flows.

In order to comply with the requirements of the FSA Flow Plan, City Light operates Gorge Lake and Powerhouse to provide a continuous, stable flow regime in the upper Skagit River. City Light typically limits reservoir fluctuations to about 3 to 5 feet and does not typically operate the powerhouse to meet load-following demand.

The Gorge Development creates a 2.5-mile-long bypassed reach of the Skagit River between the dam and powerhouse. There are no minimum flow requirements in the existing license for the Gorge bypassed reach. Therefore, except during spill events at Gorge Dam, bypassed reach flow is limited to accretion flow, spill-gate seepage, tributary input, and precipitation runoff.

Spill at Gorge Dam into the 2.5-mile-long Gorge bypassed reach occurs any time that inflow exceeds the generating capacity of the powerhouse, or if additional flow is needed to meet fisheries protection flows in the upper Skagit River. These spill events typically occur between 14 and 61 days per year.

1.1.3.4 Gorge Second Power Tunnel

The current Skagit River Project license includes a second power tunnel at the Gorge Development which has not yet been constructed.⁶ City Light will update the economic analysis using the market conditions projected over the next license period; results will be used to determine if the second tunnel should continue to be included as part of the Skagit River Project.

1.1.4 Proposed New Facilities and Maintenance Projects

As identified in the Pre-Application Document (PAD; City Light 2020a), City Light is considering two new facilities and rehabilitation activities at the Skagit River Project. The environmental impacts associated with these two proposals below will be analyzed during relicensing.

- Diablo Powerhouse Tailwater Restoration The proposed project would involve the dredging of deposits that have accumulated in the main channel downstream of the confluence of Stetattle Creek. Since the cessation of routine dredging prior to the current license, aggradation at the mouth of Stetattle Creek has raised the Diablo Powerhouse tailwater elevation approximately 10 feet, creating both flooding risks and powerplant efficiency degradation. The project would restore hydraulic head and associated hydroelectric generating capacity at the Diablo Powerhouse which has been reduced by approximately three percent since Project construction due to the deposits from Stetattle Creek. The project would restore original design specifications and alleviate operational and physical security (flooding) risks.
- Diablo Lake Tour Dock This project would involve construction of a new tour dock on the shoreline of Diablo Lake near the ELC, which is where check-ins for the Skagit Tours occur. The existing tour dock is about one-half-mile from the check-in site and requires that tour

 $^{^6}$ A second power tunnel at the Gorge Development was authorized in a license amendment issued by FERC July 17, 2013 (144 FERC \P 62,044).

participants either walk along a narrow road, without a shoulder, or take a shuttle bus. A dock near the ELC would improve pedestrian safety, the visitor experience, and access for the elderly and participants with disabilities. The new tour dock facility would consist of a float attached to the shoreline by stiff arms, as well as a gangway and pier. Approximately 100 feet of the existing peninsula trail leading to the facility would require improvements for Americans with Disabilities Act access. The existing tour dock would be removed and the site would be repurposed by the NPS or restored.

1.1.5 Potential Proposed New Facility

Originally described as "pumped storage" in the PAD (City Light 2020a), the conceptual project under feasibility assessment at the Ross Development is more accurately characterized as a pumpback project that would use energy during periods of low demand by utilizing the existing lowlevel outlet in Ross Dam and new pumps to move water from Diablo Lake back up to Ross Lake. During periods of high energy demand, the pumped water stored in Ross Lake would again be used to generate electricity at Ross Powerhouse. A pump-back project at the Ross Development could provide additional flexibility to City Light, the regional power grid, and the Skagit River, particularly as the climate changes. For example, in addition to capturing inflows from Ross Lake tributaries, Ross Lake could store winter inflows from tributaries to Diablo Lake to compensate for reduced snowmelt. This would help ensure available water during the summer for downstream flows. In addition, the increased operational flexibility at the Project could enhance flood control and would improve the ability to integrate increased renewable (wind and solar) and distributed energy sources into the regional grid.

The changes to Ross facilities needed to accommodate a pump-back project would be relatively modest and would primarily entail the installation of new pumps directly below the existing low-level outlet, a single span of transmission line across the Project tailrace, and excavation at the bottom of Diablo Lake to provide sufficient submergence for the pumps. The low-level outlet in Ross Dam would be re-purposed to create a benefit for the grid and expansion for renewable resources. A pump-back project would result in operational changes, particularly at Ross Powerhouse, and both Ross and Diablo reservoirs would experience greater daily fluctuations.

City Light will conduct a preliminary engineering and economic feasibility analysis of a pumpback project at Ross in early 2021. Depending on the results of this preliminary analysis, a decision will be made on whether to include this project in the license application and initiate an assessment of environmental impacts. City Light anticipates notifying parties of any intent to formally propose the project with adequate time to gather information needed to analyze environmental effects. Several studies in this PSP address baseline information needs that are relevant to this project should it be proposed.

1.2 Initiation of ILP

Pursuant to 18 CFR § 5.5(a), City Light filed a Notice of Intent (NOI) to relicense the Project and a PAD with FERC on April 27, 2020 (City Light 2020a). Copies of the NOI and PAD can be accessed through FERC's e-library <u>www.ferc.gov/docs-filing/elibrary.asp</u> or the Skagit Relicensing Public Document Library on City Light's website at <u>http://www.seattle.gov/light/skagit/Relicensing/default.htm</u>.

1.3 ILP Process Plan and Schedule

Following City Light's filing of its NOI and PAD, several parties requested a modification of the ILP process plan and schedule presented in the PAD. FERC granted the extension request, in part, on June 25, 2020, in response to extension request letters by several agencies and Indian tribes, City Light's June 16, 2020 support letter, and in light of extenuating circumstances of the Novel Coronavirus (COVID-19) pandemic on LP participation in the study planning phase of the ILP. As a result, FERC issued a modified ILP Process Plan and Schedule waiving the timing requirements of 18 CFR §§ 5.10, 5.11, 5.12, and 5.13 and extending the due dates for each milestone up to the Director's study plan determination, by 60 days, and maintaining the original deadlines for Initial and Updated Study Reports (ISR/USR) of March 8, 2022 and March 8, 2023, respectively. Table 1.3-1 details the current Process Plan and Schedule as established by FERC.

Table 1.3-1.ILP milestones for the Skagit River Project through filing of the Final License
Application (FLA).

Significant Pre-filing Milestones	Responsible Party	Timeframe	Date ¹	FERC Regulation
Filing of NOI and PAD	City Light	As early as 5.5 years, but no later than 5 years prior to license expiration	4/27/2020	18 CFR § 5.5 and §5.6
Initial Tribal Consultation Meeting(s)	FERC	No later than 30 days after filing NOI and PAD	5/27/2020	18 CFR § 5.7
Notice of NOI/PAD and Issuance of Scoping Document 1 (SD1)	FERC	Within 60 days of filing NOI and PAD	6/26/2020	18 CFR § 5.8
Scoping Meeting/Site Visit	FERC	Within 30 days of NOI/PAD notice and issuance of SD1	N/A Waived ²	18 CFR § 5.8(b)(viii)
Comments on PAD, SD1, and Study Requests	FERC, LPs	Within 60 days of NOI/PAD notice and issuance of SD1	10/24/2020	18 CFR § 5.9
Issuance of Scoping Document 2 (SD2), if necessary	FERC	Within 45 days of deadline for filing comments on SD1	12/8/2020	18 CFR § 5.10
File Proposed Study Plan (PSP)	City Light	Within 45 days of deadline for filing comments on PAD	12/8/2020	18 CFR § 5.11(a)
Study Plan Meeting(s)	City Light	Initial meeting to be held within 30 days of filing PSP	1/7/2021	18 CFR § 5.11(e)
Comments on PSP	FERC, LPs	Within 90 days after PSP is filed	3/8/2021	18 CFR § 5.12
File Revised Study Plan (RSP)	City Light	Within 30 days of deadline for comments on PSP	4/7/2021	18 CFR § 5.13(a)
Comments on RSP	LPs	Within 15 days following RSP	4/22/2021	18 CFR § 5.13(b)
Issuance of Study Plan Determination	FERC	Within 30 days of RSP	5/7/2021	18 CFR § 5.13(c)
Formal Study Dispute Resolution Process if requested ³	Agencies with mandatory conditioning authority	Within 30 days of Study Plan Determination	5/27/2021	18 CFR § 5.14(a)
Significant Pre-filing Milestones	Responsible Party	Timeframe	Date ¹	FERC Regulation
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Select Third Dispute Resolution Panel Member, if necessary	Dispute Resolution Panel	Within 15 days of notice of study dispute	6/11/2021	18 CFR § 5.14(d)(3)
Dispute Resolution Panel convenes	Dispute Resolution Panel	Within 20 days of notice of study dispute	6/16/2021	18 CFR § 5.14(d)
Comments on Study Plan disputes	City Light	Within 25 days of notice of study dispute	6/21/2021	18 CFR § 5.14(i)
Dispute Resolution Panel technical conference	Dispute Resolution Panel, City Light, LPs	Prior to engaging in deliberative meetings	6/26/2021	18 CFR § 5.14(j)
Dispute Resolution Panel findings and recommendations	Dispute Resolution Panel	No later than 50 days after notice of dispute	7/16/2021	18 CFR § 5.14(k)
Study Dispute Determination	FERC	No later than 70 days after notice of dispute	8/5/2021	18 CFR § 5.14(1)
Conduct First Season of Studies	City Light		2021	18 CFR § 5.15(a)
Initial Study Report (ISR)	City Light	Pursuant to the Commission- approved study plan and schedule provided in §5.13 or no later than 1 year after Commission approval of the study plan	3/8/2022	18 CFR § 5.15(c)(1)
ISR meeting	City Light and LPs	Within 15 days of filing the Initial Study Report	3/23/2022	18 CFR § 5.15(c)(2)
File ISR Meeting Summary	City Light	Within 15 days of study results meeting	4/7/2022	18 CFR § 5.15(c)(3)
File Meeting Summary disagreements ³	LPs	Within 30 days of study results Meeting Summary	5/7/2022	18 CFR § 5.15(c)(4)
File responses to Meeting Summary disagreements	City Light	Within 30 days of filing Meeting Summary disagreements	6/6/2022	18 CFR § 5.15(c)(5)
Study Dispute Determination	FERC	Within 30 days of filing responses to disagreements	7/6/2022	18 CFR § 5.15(c)(6)
Conduct Second Season of Studies	City Light		2022	18 CFR § 5.15(a)
File Preliminary Licensing Proposal (PLP) or Draft License Application (DLA)	City Light	No later than 150 days prior to the deadline for filing a new or subsequent license application	12/1/2022	18 CFR § 5.16(a)-(c)
Comments on PLP or DLA	LPs	Within 90 days of filing DLA	3/1/2023	18 CFR § 5.16(e)

Significant Pre-filing Milestones	Responsible Party	Timeframe	Date ¹	FERC Regulation
File Updated Study Report (USR)	City Light	Pursuant to the Commission- approved study plan and schedule provided in §5.13 or no later than 2 years after Commission approval	3/11/2023	18 CFR § 5.15(f)
USR meeting	City Light and LPs	Within 15 days of USR	3/26/2023	18 CFR § 5.15(f)
File USR Meeting Summary	City Light	Within 15 days of USR meeting	4/10/2023	18 CFR § 5.15(f)
File Meeting Summary Disagreements ³	LPs	Within 30 days of study results meeting summary	5/7/2023	18 CFR § 5.15(f)
File Responses to Meeting Summary Disagreements	City Light	Within 30 days of filing meeting summary disagreements	6/6/2023	18 CFR § 5.15(f)(5)
Study Dispute Determination	FERC	Within 30 days of filing responses to disagreements	7/6/2023	18 CFR § 5.15(f)
File FLA	City Light	No later than 24 months before the existing license expires	4/30/2023	18 CFR § 5.17

1 If the due date falls on a weekend or holiday, the deadline is the following business day.

2 Due to the proclamation declaring a National Emergency concerning COVID-19, issued by the President March 13, 2020, FERC waived § 5.8(b)(viii) of its regulations and does not intend to conduct a public scoping meeting.

3 Shaded actions are not necessary if there are no study or meeting summary disputes.

1.4 Study Program Schedule Overview

1.4.1 Environmental Scoping

On June 26, 2020, FERC issued public notice of the PAD and NOI and commencement of the relicensing pre-filing process. FERC's June 26, 2020 notice also designated City Light as FERC's non-federal representative for carrying out informal consultation pursuant to Section 7 of the Endangered Species Act (ESA) and to fulfill its responsibilities under Section 106 of the National Historic Preservation Act (NHPA). In addition, the notice requested that LPs provide comments regarding the PAD and provide study requests. Concurrently, FERC issued SD1 to outline the subject areas to be addressed in its environmental analysis of the Project pursuant to the National Environmental Policy Act (NEPA).

Due to the proclamation declaring a National Emergency concerning COVID-19, issued by the President on March 13, 2020, FERC waived 18 CFR § 5.8(b)(viii) and notified the public that it does not intend to conduct a public scoping meeting or site visit for this relicensing proceeding. Instead, FERC solicited written comments, recommendations, and information, on the SD1. If needed, a site visit may be held later in the study plan development and review process.

On December 4, 2020, FERC issued its SD2 for the relicensing of the Project.

1.4.2 Comments and Study Requests

Pursuant to the current Process Plan and Schedule (Table 1.3-1), comments on the PAD and SD1 and study requests were due to FERC by October 24, 2020. See Sections 4.3 and 6 of this PSP for details regarding comments and study requests provided by FERC and LPs.

1.4.3 PSP

In accordance with 18 CFR § 5.11(a) and pursuant to the current Process Plan and Schedule (Table 1.3-1), City Light is filing this PSP within 45 days after deadline for filing comments on the PAD and SD1 and study requests.

1.4.4 PSP Meeting

In accordance with 18 CFR § 5.11(e) and pursuant to the current Process Plan and Schedule (Table 1.3-1), City Light is to hold a Study Plan Meeting(s) within 30 days after deadline of filing the PSP (no later than January 7, 2021). The purpose of the meetings is to clarify the intent and content of City Light's PSP and identify any outstanding issues or information needed with respect to the proposed studies. The background, concepts, and studies described in this PSP will be presented during the Study Plan Meetings. City Light has scheduled the meetings for January 6-7 and 12, 2021. Due to the Novel Coronavirus Disease (COVID-19) public health emergency, the meetings will be held virtually with a draft agenda to be provided at least 2 weeks prior to the meetings.

1.4.5 Comments on the PSP

In accordance with 18 CFR § 5.12 and pursuant to the current Process Plan and Schedule (Table 1.3-1), comments on City Light's PSP, including any revised information or study requests, are due to FERC within 90 days of the PSP being filed (no later than March 8, 2021). Comments must also include an explanation of any study plan concerns and any agreements reached with City Light regarding those concerns. Proposed modifications to the PSP must address the requisite Study Criteria described in Section 4.

1.4.6 RSP

By April 7, 2021, within 30 days of the due date for comments on the PSP, City Light will file a RSP with FERC that will specifically address all comments received on the PSP. In accordance with 18 CFR § 5.13(a) the RSP will also include a description of the efforts made to resolve differences over study requests. As with the PSP, for any requested study not adopted in the RSP, City Light will explain the rationale for its decision.

1.4.7 Early Study Implementation

The ILP schedule extension provides a challenge for timely commencement of field studies if study teams do not begin pre-field preparations, data review, and permitting prior to FERC's Study Plan Determination. City Light is committed to gathering information necessary for the relicensing. Where there is agreement with LPs on study plans included in this PSP, City Light will initiate study planning for field work to allow for a full field season of data collection in 2021. In anticipation of such, many of the study schedules indicate study plan implementation starting in late winter or spring of 2021. The RSP will provide a list of studies initiating early implementation. If there are significant disagreements with LPs in the RSP for specific study plans,

schedules may be modified to allow for resolution of these disagreements. However, City Light will make every effort to prepare for field work to be implemented in 2021 as soon as practicable following FERC's determination and any subsequent disputes.

1.4.8 Study Plan Determination

FERC will issue its Study Plan Determination by May 7, 2021, within 30 days of City Light's filing of the RSP. If any portions of the Study Plan Determination are formally disputed by federal agencies with Section 4(e) and Section 18 authority or the Washington State Department of Ecology (Ecology) with respect to its water quality certification for the Project, a formal dispute resolution process will be initiated, as provided for under 18 CFR § 5.14, and a final Study Dispute Determination for the disputed study components (serving as an amendment to the Study Plan Determination) will be issued in early August 2021.

1.4.9 Study Reporting and Study Plan Modification

As required by 18 CFR § 5.15, City Light will provide periodic progress updates as study work progresses. The updates will be provided during Resource Work Group (RWG) meetings. City Light will work with RWG members to determine the frequency and format of these meetings to accommodate LP interests in study plan progress updates related to the study program.

In accordance with 18 CFR § 5.15(f) and pursuant to the current Process Plan and Schedule (Table 1.3-1), at the conclusion of each study season, City Light will file an ISR and USR, and hold a meeting with LPs and FERC staff to discuss the initial and updated study results (ISR meeting and USR meeting), respectively. City Light will submit all study documents that must be filed with FERC via FERC's e-library system www.ferc.gov/docs-filing/elibrary.asp as well as through the Skagit Relicensing Public Document Library on City Light's website at http://www.seattle.gov/light/skagit/Relicensing/default.htm.

Following each study report meeting, the FERC ILP regulations provide the opportunity for City Light and/or LPs to request modifications to the study plan in light of progress of the study program and results to date (18 CFR §§ 5.15(c)(3) and (4)).

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2.0 CONTEXT OF PSP WITHIN LICENSING PROCESS

As outlined in Section 1 of this PSP, City Light is using the default ILP for relicensing the Project. In addition to the regulatory requirements of the ILP, City Light has engaged in voluntary work group meetings to provide a structure for consultation with LPs. City Light intends to continue these work groups. To date during discussions with LPs, many questions have arisen regarding the process of consultation and its relationship to the study program, and ultimately development of a Project proposal for the next license term. In addition to the regulatory requirements for each document in the ILP described in Section 1 of this PSP, this section outlines more general information on how each of the documents will be used to build an information base that will ultimately inform the Project proposal to be included in the license application.

2.1 Role of PAD

Over the course of the current license term, substantive background information on resources within the Project Boundary and surrounding watershed was developed. The PAD serves as the first document in a phased process to provide the information necessary to both review existing conditions and inform development of a comprehensive proposal for operation, inclusive of resource measures, over the term of the next license. The ILP provides LPs opportunities to comment to both City Light and FERC regarding available background information the parties would like considered in the licensing process, and additional information needs.

In order to facilitate the development of a shared information base, the PAD provides an extensive description of Project facilities and operations and the resource information presented is intended to summarize available information and incorporate references into the Project record that are relevant to understanding the existing environment. The PAD also provides a preliminary assessment of known Project effects and proposed resource measures that may be implemented as a starting point for discussions with LPs. The PAD outlined goals and objectives of 24 studies that have since been further developed and expanded to 28 studies as presented in this PSP.

Comments on the PAD and identification of additional references relevant to the Project have been noted by many LPs in their filings with FERC. This information is incorporated into the record and will be drawn upon in the implementation of studies (as applicable) and new information will be reflected in the study reports. City Light will address comments on the PAD or other comments that some LPs filed, that did not contain a study or information proposal, in future relicensing filings, such as the DLA or FLA.

2.2 PSP and RSP

Building upon the existing information identified and summarized in the PAD and informed by the over 60 work group meetings held prior to filing of this PSP, City Light's proposed study program is comprised of studies that meet either of the following considerations:

• Consistent with FERC's seven criteria for study plans (described in Section 4.1 of this PSP), in particular, studies that fill data gaps necessary to inform relicensing and that are able to be completed during the relicensing timeframe. Also, proposed studies will provide information

related to operations and potential effects of the Project that can be addressed by a license condition.

• Information relevant to a shared resource interest and/or an identified agency, tribal, or City Light Project-related resource management goal or requirement.

City Light's process in developing this PSP is described further in Section 4 of this document. Following the filing of this PSP, City Light intends to continue to meet with LPs to refine studies for submittal to FERC in its RSP.

City Light's submittal of the RSP will provide the basis for FERC's Study Plan Determination in early May.

2.3 Study Implementation

City Light began implementation of several studies in 2020 that will provide baseline information to supplement the PAD and inform other proposed studies. These early implementation studies are detailed in Section 5 and include the TR-01 Vegetation Mapping Study, TR-02 Wetland Assessment, and the CR-01 Cultural Resources Data Synthesis.

While the ILP allows for up to two years of field studies, City Light has proposed study plan schedules that are front-loaded in an effort to have the initial study results available by early 2022 to allow for robust review of study results with LPs prior to the submittal of the DLA. As proposed in this PSP, 21 of the 28 proposed studies will complete field work in 2021 and preliminary data analysis and study reports will be available by the ISR deadline in March 2021.

City Light anticipates ongoing coordination with LPs in the RWGs on field work and will provide information on field schedules, periodic updates on data collection, and summarize draft results as they become available.

In addition, several studies include designated workshops and model training opportunities (e.g., OM-01 Operations Model Study, FA-02 Instream Flow Model Development Study, and FA-05 Skagit River Gorge Bypass Reach Hydraulic and Instream Flow Model Development Study) at identified milestones during the study implementation to provide specific consultation and feedback opportunities on technical studies in addition to the regular RWG progress updates noted in Section 1.4.9 of this PSP.

2.4 ISR and USR

Study reports will be provided to LPs for review and comment. The reporting steps identified in the ILP include the ISR (March 2022) and USR (March 2023) which will describe the progress in implementing the studies at that time. City Light envisions completing all field work for 21 of the 28 proposed studies prior to filing of study reports in the ISR, and progress reports will be filed for the remaining six studies. Each report in the ISR will identify variances from the final study plans and will identify any proposed additional data collection based on first year study results, as necessary.

Final study reports will be provided no later than the USR in March 2023. Due to the tight timeframe between the USR and the FLA filing date with FERC, City Light will strive to provide study information from the 2023 field season as it becomes available to LPs.

2.5 Coordinated Review of Study Results

Many LPs have raised concerns that results of individual studies (or resource protection measures based on one particular resource issue) will not provide a comprehensive picture of potential Project effects. During reviews of draft study plans, LPs noted the need for "cross-resource" analysis of study results and a process through which parties can work together to identify opportunities for a unified analytical approach and a desire for discussions of a comprehensive, ecologically sound Project proposal. City Light shares LPs interest in a cross-resource, comprehensive review of resource information related to the Project. Another important consideration for development of a Project proposal is the context of study results and proposed resource measures in relationship to other projects and activities in the watershed (cumulative effects).

City Light recognizes the complexity of resource issues under discussion in this relicensing process and anticipates structured discussions with LPs through RWG or other venues. Two tools proposed in this PSP, the Instream Flow Model (inclusive of the Gorge bypass reach) and the Operations Model, will be available for LPs to not only review and understand existing conditions, but to test hypotheses regarding potential future operations, or scenarios.

These flow analysis tools will provide a powerful analytical basis to compare relative changes in resource conditions of interest to LPs and City Light. These tools will provide information on potential direct effects of the Project under different optional scenarios and/or future hydrologic conditions (e.g., climate change).

LPs and City Light have begun discussions regarding potential analytical processes that could be applied to create a shared set of evaluation criteria for parameters of concern in the relicensing. One such approach is structured decision making, an approach for careful and organized analysis of natural resource management decisions. Based in decision theory and risk analysis, structured decision making encompasses a simple set of concepts and helpful steps, rather than a rigidly-prescribed approach for problem solving. City Light anticipates further discussions with LPs on how this or other analytical tools may be applied in the relicensing process to inform development of resource measures to be included in the DLA and FLA.

2.6 Development of Management Plans

Management plans are a typical means for identifying resource management objectives and outlining specific actions to occur over the course of a new license. Resource management plans are a convenient mechanism to outline what, how, why, and where activities are to occur. Management plans can contain a range of different activities such as best management practices (BMP), additional investigations needed to support management objectives, or monitoring and adaptive management components. Consultation approaches, schedules for updates to the plans, and other compliance requirements of the plan can be included in management plans. While each plan may differ in the level of detail available and approach based on resource specific needs, City

Light intends to work collaboratively with LPs to develop management plans for submittal with the license application to FERC that are in a format consistent with FERC's guidelines regarding development of resource measures and license conditions.

Based on existing information summarized in its PAD filing, City Light identified the need for numerous management plans to detail BMPs, address known ongoing Project effects, and contribute to the shared resource management efforts in the Skagit River over the term of the new license. During early issue identification discussions with LPs, and in review of comments on the PAD and study requests filed with FERC in October 2020, several recommendations for management plan updates and actions were identified. A preliminary list of subject areas that City Light anticipates appropriate for inclusion in management plans may include:

- Cultural Resources
- Invasive Species
- Erosion Control
- Wood Management
- Fish and Aquatic Resources
- Fire
- Mitigation Lands
- Vegetation
- Recreation
- Education and Interpretation
- Avian Protection
- Water Quality

City Light anticipates discussing a schedule for development of management plans with LPs during RWG meetings in 2021. While general concepts for management plans have been discussed to date, many plans will rely upon review and discussion of draft study results before specific details may be developed. City Light anticipates coordinated discussions regarding management plans with LPs during and following the review of study results that will begin in earnest in late 2021 and early 2022.

2.7 DLA and FLA

The license application will set forth City Light's Project proposal, including any facility operations and associated PME measures. Such measures may be described as proposed license articles or as draft management plans. The license application will include a comprehensive analysis of existing information from the PAD, combined with results from the studies implemented during the relicensing timeframe and cross-resource analysis of anticipated Project effects and associated PMEs (resource measures) related to the proposed operating proposal.

It is also City Light's intent to engage in discussions with LPs with a goal of reaching mutual agreement on appropriate PME measures and management plans.

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3.0 ON-GOING STUDIES AND DATA COLLECTION ACTIVITIES

3.1 Existing Data Collection Activities

City Light continues to collect, evaluate, and provide to LPs resource monitoring information from the Project in accordance with the terms of its current license. These study and information gathering activities are summarized in the following reports:

- Annual Project Expenditures Statement (April)
- Semi-annual Flow Compliance Report (April and October)
- Annual Non-flow Program Report (July)
 - Steelhead Program
 - Chinook Research Program
 - Off-Channel Chum Habitat Development and Improvement Program
 - Diablo and Gorge Lake Fisheries
- Erosion Control Report (every 2 years; May)
- Wildlife Report (every 5 years; April)
- Archaeological Report (every 5 years; May)
- Historical Report (every 5 years; May)

Further, through discussions with LPs in early study plan development, City Light and LPs have identified several information-gathering activities related to implementation of current license requirements that, while not included in this PSP, will provide information relevant to the relicensing process and future management plans:

- Erosion monitoring at cultural resources sites around Ross Lake City Light has contracted with NPS to conduct a geomorphology investigation and map erosion patterns in Ross Lake to aid in cultural resources protection. Through this effort, City Light and NPS are coordinating to update archaeological monitoring techniques and this new data will be used to improve efficacy of monitoring and help prioritize recommendations for stabilization of historic properties.
- Reed canary grass control City Light and NPS are partnering to inventory known occurrences of reed canary grass and exploring treatment options.
- Recording observations of invasive bullfrogs NPS, BC Parks, and City Light are collaborating on documenting bullfrog occurrences. Distribution information on bullfrogs may inform future partnership management actions.

3.2 On-Going Studies

In 2018-2019, City Light initiated two baseline studies resulting from discussions with LPs involved in current license compliance. City Light contracted with NPS to conduct a Landform Mapping Study and with the U.S. Geological Survey (USGS) to conduct a Food Web Study.

In addition, three of the study plans included in this PSP were identified for early implementation in discussions with LPs. These studies are:

- CR-01 Cultural Resources Data Synthesis anticipated completion in early 2021.
- TR-01 Vegetation Mapping Study anticipated completion in 2021.
- TR-02 Wetland Assessment anticipated completion in early 2021.

See Section 5 and full study plans appended to this PSP for study details.

3.2.1 Landform Mapping

The Memorandum of Agreement (MOA) with NPS for the Landform Mapping Study is appended to the PAD (City Light 2020a). This study will provide a baseline map of land and channel forms within the channel migration zone of the Skagit River. This baseline map will provide background information for GE-02 Erosion and Geologic Hazards at Project Facilities and Transmission Line Right-Of-Way Study and GE-04 Skagit River Geomorphology Between Gorge Dam and the Sauk River Study provided in this PSP. NPS will be providing a draft map of the area down to the confluence with the Sauk River by the end of 2020.

3.2.2 Food Web Study

During 2017–2018, City Light and the Skagit River Project Non-Flow Plan Coordinating Committee (NCC) determined that an evaluation was needed to assess an observed demographic shift and apparent recruitment limitations in the Ross Lake Rainbow Trout population, thought to be related to the introduction of Redside Shiners⁷ to the Project reservoirs. In 2018, City Light agreed to fund a comprehensive food web assessment. At City Light's request, the USGS developed a proposed scope of work (SOW) for a comprehensive study, i.e., Factors Limiting Native Salmonids above Skagit River Dams ("Food Web Study").

The goal of the Food Web Study is to identify and quantify factors that limit recruitment or production of native adfluvial salmonids in Project reservoirs and their associated tributaries. The study was designed so that the following objectives would be addressed according to a phased approach:

- Phase 1: (1) data review; (2) analysis of existing samples; (3) tributary assessments; and (4) development of genetic markers to support eDNA assessments.
- Phase 2: (1) quantify seasonal and size-structured food web interactions in the reservoirs based on directed sampling; (2) develop a bioenergetics model for Redside Shiner; (3) explore the ontogenetic connections of adfluvial salmonids between life stages in tributary and reservoir

⁷ Redside Shiners are members of the minnow family and are not native to the Upper Skagit River where they have been observed since approximately 2004.

habitats using water chemistry and elemental analysis or stale isotope analysis of otoliths, scales, or other diagnostic hard parts from char and rainbow trout; (4) expand on the habitat suitability and production capacity of select tributaries; (5) expand on first-year efforts to explore the presence and geographic extent of native and non-native fishes in the basin; and (6) determine the extent of hybridization among char (Bull Trout, Dolly Varden, and Brook Trout) and between Rainbow and Cutthroat Trout.

According to the USGS SOW, a draft final report will be ready for review in March 2021, and a revised report is to be completed by June 2021. The complete scope of work for the Food Web Study is appended to the PAD (City Light 2020a). The results of these studies will be available prior to the DLA to inform the relicensing process.

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4.0 DEVELOPMENT OF CITY LIGHT'S PSP

The purpose of this PSP is to describe City Light's proposed approach for conducting studies and to address LPs' study requests. This PSP also provides FERC and LPs with the opportunity to comment on the studies proposed by City Light. The individual study plans for the proposed studies are provided in an appendix to this PSP.

4.1 FERC's Study Plan Criteria

FERC's ILP regulations at 18 CFR § 5.9 specify required components of study requests to allow City Light, as well as FERC staff, to determine the relevance of the proposed study to the relicensing. The required components (the "Study Criteria") apply to study requests filed in response to the PAD and for any modifications to the PSP requested by parties for the RSP. The Study Criteria are as follows:

(1) Describe the goals and objectives of each study and the information to be obtained $(\S 5.9(b)(1));$

This section describes why the study is being requested and what the study is intended to accomplish, including the goals, objectives, and specific information to be obtained. The goals of the study should clearly relate to the need to evaluate the effects of the Project on a particular resource. The objectives are the specific information that needs to be gathered to allow achievement of the study goal.

(2) If applicable, explain the relevant resource management goals of the agencies or Indian tribes with jurisdiction over the resource to be studied (§ 5.9(b)(2));

This section should clearly establish the connection between the study request and management goals or resource of interest. A statement by an agency connecting its study request to a legal, regulatory, or policy mandate needs to be included that thoroughly explains how the mandate relates to the study request, as well as the Project impacts.

(3) If the requester is not a resource agency, explain any relevant public interest considerations in regard to the proposed study (§ 5.9(b)(3));

This section is for non-agency requestors or Indian tribes to establish the relationship between the study request and the relevant public interest considerations.

(4) Describe existing information concerning the subject of the study proposal, and the need for additional information (§ 5.9(b)(4));

This section should discuss any gaps in existing data by reviewing the available information presented in the PAD or information relative to the Project that is known from other sources. This section should explain the need for additional information and why the existing information is inadequate.

(5) Explain any nexus between Project operation and effects (direct, indirect, and/or cumulative) on the resource to be studied, and how the study results would inform the development of license requirements (§ 5.9(b)(5));

This section should clearly connect Project operations and Project effects on the applicable resource. This section should also explain how the study results would inform the development of PME measures.

(6) Explain how any proposed study methodology is consistent with generally accepted practices in the scientific community or, as appropriate, considers relevant tribal values and knowledge. This includes any preferred data collection and analysis techniques, or objectively quantified information, and a schedule including appropriate field season(s) and the duration (§ 5.9(b)(6));

This section should provide a detailed explanation of the study methodology. The methodology may be described by outlining specific methods to be implemented or by referencing an approved and established study protocol and methodology.

(7) Describe considerations of level of effort and cost, as applicable, and why any proposed alternative studies would not be sufficient to meet the stated information needs $(\S 5.9(b)(7));$

This section should describe the expected level of cost and effort to conduct the study. If there are proposed alternative studies, this section should address why the alternatives would not meet the stated information needs.

4.2 Consultation Effort to Date

In January 2019, City Light began a voluntary Study Plan Development Process with LPs in preparation for initiating the relicensing process. The purpose of this early process was to provide a forum, a structure, and additional time for discussion with LPs with the goal of identifying resource issues that may warrant study during relicensing. These discussions resulted in the development of a suite of issues and associated studies included in the PAD (City Light 2020a).

Following filing of its PAD, City Light continued meeting with LPs and provided early drafts of study plans for comment and discussion of studies necessary to inform the relicensing process. The proposed study plans in this PSP include documentation of comments received on these early drafts and City Light's responses, in addition to reflecting responses to study requests due to FERC by October 24, 2020.

Nearly 40 organizations have participated in the working group discussions regarding study plans to date, which consists of a two-tier working group structure comprised of a policy-level Steering Committee and the following technical RWGs:

- Fish and Aquatic Resources Work Group (FARWG)
- Recreation and Aesthetic Resources Work Group (RARWG)
- Terrestrial Resources and Reservoir Erosion Work Group (TRREWG)
- Cultural Resources Work Group (CRWG)

The RWGs are comprised of LPs with technical expertise in applicable resource areas, while the Steering Committee is comprised of organization representatives focused on policy-level decisions for the organizations. A list of the organizations that have participated in RWG and Steering Committee meetings to date is appended to this PSP.

In total, the Study Plan Development Process has consisted of nearly 60 meetings through November 2020, as identified in Table 4.2-1.

Steering Committee Meeting Dates	CRWG Meeting Dates	FARWG Meeting Dates	RARWG Meeting Dates	TRREWG Meeting Dates	Geomorphology Subgroup Meeting Dates	Fish Passage Subgroup Meeting Dates
2/12/19	1/29/19	1/29/19	1/29/19	1/29/19	4/15/19	10/3/19
4/17/19	3/18/19	3/18/19	3/18/19	3/19/19	5/28/19	10/30/19
6/19/19	5/21/19	4/9/19	5/22/19	5/21/19	6/25/19	
9/4/19	8/7/19	5/20/19	7/31/19	7/30/19		
10/9/19	10/16/19	7/29/19	3/24/20	10/15/19		
11/6/19	3/19/20	3/31/20	5/7/20	3/17/20		
12/5/19	5/4/20	5/5/20	6/25/20	5/6/20		
1/23/20	6/22/20	6/2/20	9/17/20	6/23/20		
3/12/20	9/14/20	6/24/20	11/19/20	9/15/20		
4/8/20	11/16/20	9/16/20		11/17/20		
5/20/20		11/18/20				
7/22/20						
11/10/20						

 Table 4.2-1.
 Study Plan Development Process meeting dates through November 2020.

In addition to the RWG and Steering Committee meetings, City Light requested meetings between senior City of Seattle officials and leadership with Indian tribes and First Nations to discuss their individual interests. Meetings were held October through December 2020. Additional meetings are planned.

Once City Light files the RSP, FERC will issue its Study Plan Determination, which will identify all studies and information necessary to meet its NEPA obligations and information required under the Federal Power Act. In deciding which studies to require, FERC will apply the seven Study Criteria descried in Section 4.1 of this PSP. City Light has reviewed study requests leading up to this PSP and considered both Study Criteria and identified interests of LPs expressed during consultation on early drafts of study plans, and in study requests filed with FERC.

The ILP and FERC's Study Plan Determination do not preclude City Light from gathering additional Project-related information that is of shared interest to LPs and City Light in support of anticipated discussions, or that is required to meet other statutory or regulatory responsibilities of LPs. City Light deeply appreciates the participation of all parties in the interests of robust consultation.

4.3 PAD and SD1 Comments and Study Requests Overview

Pursuant to the current Process Plan and Schedule (Table 1.3-1 of this PSP), comments on the PAD and SD1 and study requests were due to FERC by October 24, 2020. A total of 23 comment letters from federal and state agencies, Indian tribes, First Nations, NGOs, and other LPs were filed with FERC. At least 98 study requests were made by LPs to FERC.⁸ City Light has taken these requests into consideration when preparing the PSP. The 28 proposed studies are summarized in Section 5 and full study plans included in an appendix to this PSP. City Light's response to study requests is summarized in Section 6 of this PSP.

City Light will give due consideration and incorporate PAD comments into its Exhibit E Environmental Exhibit of the license application. FERC addressed public comments on SD1 in its SD2, which it issued on December 4, 2020.

The comment letters and study requests received by LPs are listed in an appendix to this PSP. Comments letters and all documents filed with FERC can be accessed through FERC's eLibrary at <u>www.ferc.gov/docs-filing/elibrary.asp</u> by searching under Docket P-553-235.

⁸ On October 26, 2020, the Upper Skagit Indian Tribe filed information with the Commission, which the Tribe designated as privileged and confidential. City Light understands that this filing may contain additional requests for studies or information. City Light has been in contact with the Upper Skagit Indian Tribe regarding this matter and looks forward to working with the Tribe in fully and fairly considering its requests for studies and information within the timeframes allowed to prepare the RSP.

5.0 SUMMARY OF CITY LIGHT'S PROPOSED STUDIES

Based on studies proposed in the PAD, working group discussions with LPs, and in response to written study requests and comments received during the scoping period, City Light is proposing the following 28 studies.

	Study Number and Title
1.	CR-01 Cultural Resources Data Synthesis
2.	CR-02 Cultural Resources Survey
3.	CR-03 Gorge Bypass Reach Cultural Resources Survey (Bypass Cultural Resources Survey)
4.	CR-04 Inventory of Historic Properties with Traditional Cultural Significance Study (Properties with Traditional Cultural Significance Study)
5.	FA-01 Water Quality Monitoring Study (WQ Monitoring Study)
6.	FA-02 Instream Flow Model Development Study
7.	FA-03 Reservoir Fish Stranding and Trapping Risk Assessment (Stranding and Trapping Assessment)
8.	FA-04 Fish Passage Technical Studies Program (Fish Passage Study)
9.	FA-05 Skagit River Gorge Bypass Reach Hydraulic and Instream Flow Model Development Study (Bypass Instream Flow Model Development Study)
10.	GE-01 Reservoir Shoreline Erosion Study
11.	GE-02 Erosion and Geologic Hazards at Project Facilities and Transmission Line Right-Of-Way Study (Erosion and Geologic Hazards Study)
12.	GE-03 Sediment Deposition in Reservoirs Affecting Resource Areas of Concern Study (Sediment Deposition Study)
13.	GE-04 Skagit River Geomorphology Between Gorge Dam and the Sauk River Study (Geomorphology Study)
14.	OM-01 Operations Model Study
15.	RA-01 Recreation Use and Facility Assessment (Recreation Assessment)
16.	RA-02 Gorge Bypass Reach Safety and Whitewater Boating Study (Bypass Safety and Whitewater Boating Study)
17.	RA-03 Project Facility Lighting Inventory
18.	RA-04 Project Sound Assessment
19.	TR-01 Vegetation Mapping Study
20.	TR-02 Wetland Assessment
21.	TR-03 Rare, Threatened, and Endangered Plants Study (RTE Plants Study)
22.	TR-04 Invasive Plants Study
23.	TR-05 Marbled Murrelet Study
24.	TR-06 Golden Eagle Habitat Analysis
25.	TR-07 Northern Goshawk Habitat Analysis
26.	TR-08 Special-status Amphibian Study
27.	TR-09 Beaver Habitat Assessment
28.	TR-10 Northern Spotted Owl Habitat Analysis (NSO Habitat Analysis)

5.1 CR-01 Cultural Resources Data Synthesis

City Light proposes a Cultural Resources Data Synthesis as part of this PSP to develop a baseline of cultural resources information. The goal of this study is to develop a baseline dataset for known cultural resources within the study area. This information will facilitate the design of other relicensing studies, an assessment of effects, and inform cultural resource management plans in compliance with Section 106 of the NHPA and other applicable federal and state laws and regulations, executive orders (EO), and FERC guidelines. The full study plan with further details on overall study and methodology is included in an appendix to this PSP.

No formal study requests were filed with FERC related to this study. However, this study will provide information requested as part of the following study requests: Nlaka'pamux Nation Tribal Council (NNTC)-01 Completion of Traditional Cultural Property Survey, NNTC-02 Evaluation of Identified Sites, NNTC-04 Traditional Cultural Properties Mitigation and Management Study, Swinomish Indian Tribal Community (SITC)-03 Cultural Resources Study, Sauk-Suiattle Indian Tribe (SSIT)-04 Cultural Resources Transmission Line Study, SSIT-05 Cultural Resources Battle Site Study, and Stillaguamish Tribe of Indians (STI)-01 Comprehensive Ethnographic Study.

Tasks associated with the study include:

- (1) Compiling a list of available resources and repositories for the study area (Summer-Autumn 2020);
- (2) Working with NPS to identify and gather documents not available through other repositories (Summer-Autumn 2020);
- (3) Conducting outreach to Indian tribes and First Nations to solicit existing information (Summer 2020);
- (4) Compiling a list of all materials gathered (Autumn 2020);
- (5) Adding materials not already available through City Light's Digital Management System (DMS) to this system, with appropriate restrictions for confidential items; and
- (6) Conducting a review of existing cultural resources requirements and compliance work that has been or should be conducted under the existing license.

Results from the Cultural Resources Data Synthesis will provide initial data on cultural resources and data gaps within the study area to inform the CR-02 Cultural Resources Survey, CR-03 Gorge Bypass Reach Cultural Resources Survey, and CR-04 Inventory of Historic Properties with Traditional Cultural Significance Study.

City Light will prepare a study report that includes the following sections: (1) study goals and objectives; (2) methodology; (3) results, including tables listing resources and studies relevant to the study area, along with an overview of cosmography and worldview system for each participating Indian tribe and First Nation, as well as known geographical areas, historic properties, and resources of concern for each Indian tribe and First Nation; (4) discussion, including identification of data gaps of information or types of studies; and (5) description of variances from the FERC-approved study plan, if any.

This study is intended to be a 1-year study. This study is currently under implementation and is expected to be completed in early 2021. Steps 1-6 above have been implemented and reporting is underway.

5.2 CR-02 Cultural Resources Survey

City Light proposes a Cultural Resources Survey as part of this PSP in partial fulfillment of Section 106 of the NHPA requirements to identify historic properties and assess potential Project-related effects to historic properties within the area of potential effect (APE) that may be affected by the continued operations and maintenance (O&M) of the Project under a new FERC license. This information will inform cultural resource management plans in compliance with Section 106 of the NHPA and other applicable federal and state laws and regulations, EOs, and FERC guidelines. The full study plan with further details on overall study and methodology is included in an appendix to this PSP.

The following study requests pertaining to cultural resources covered under CR-02 Cultural Resources Survey (archaeological and historical resources) were submitted: SITC-03 Cultural Resources Study, SSIT-04 Cultural Resources Transmission Line Study, STI-02 Historic Properties Study, and STI-03 Study of Specific Sites as Archaeological District. The Cultural Resources Survey Study Plan addresses some of the elements identified in the study requests listed above, as explained in Section 6 of this PSP. Those elements of the study requests that were not adopted are primarily not adopted because they include studying areas and/or resources that fall outside the APE. City Light believes its study plan methods are sufficient to meet the study objectives and information needs.

Tasks associated with the study include:

- (1) Developing a research design and establishing survey areas (Winter Spring 2021);
- (2) Conducting field survey
 - a. June-October 2021 (first field season)
 - b. March-September 2022 (second field season); and
- (3) Post-field documentation and analysis (September 2021 December 2022).

The Cultural Resources Survey will be informed by the results from the CR-01 Cultural Resources Data Synthesis, which will provide initial data on cultural resources and data gaps within the study area. The Cultural Resources Survey will also be informed by the GE-01 Reservoir Shoreline Erosion Study and the GE-04 Skagit River Geomorphology Between Gorge Dam and the Sauk River Study, both of which may inform high priority areas for cultural resources survey.

City Light will prepare one or more reports that include the following sections: (1) study goals and objectives; (2) methodology; (3) results; (4) discussion, including assessment of potential Project-related effects to historic properties; and (5) description of variances from the FERC-approved study plan, if any.

This study is intended to be a 2-year study. Final study results will be reported in the USR.

5.3 CR-03 Gorge Bypass Cultural Resources Survey

City Light proposes a Gorge Bypass Reach Cultural Resources Survey (Bypass Cultural Resources Survey) as part of this PSP to identify historic properties and assess potential Project-related effects to historic properties within the Gorge bypass reach study area. The goal of this study is to assess the potential effects of the Project's O&M on historic properties in partial compliance with Section 106 of the NHPA. This information will inform cultural resource management plans in compliance with Section 106 of the NHPA and other applicable federal and state laws and regulations, EOs, and FERC guidelines. The full study plan with further details on overall study and methodology is included in an appendix to this PSP.

City Light consulted with agencies, Indian tribes, and First Nations to develop this proposal. No formal study requests related to this study were filed with FERC.

Tasks associated with the study include:

- (1) Reviewing Gorge bypass reach study area (January-March 2021);
- (2) Developing a research design (March-May 2021);
- (3) Conducting field survey (June-July 2021); and
- (4) Post-field documentation and analysis.

The Bypass Cultural Resources Survey will be informed by the results from the CR-01 Cultural Resources Data Synthesis, which will provide initial data on cultural resources and data gaps within the study area. The results of the Bypass Cultural Resources Survey will inform the RA-02 Gorge Bypass Reach Safety and Whitewater Boating Study by providing cultural resources concerns that could affect whitewater boating in the Gorge bypass reach.

City Light will prepare one or more reports that include the following sections: (1) study goals and objectives; (2) methodology; (3) results; (4) discussion, including assessment of potential Project-related effects to historic properties; and (5) description of variances from the FERC-approved study plan, if any.

This study is intended to be a 1-year study. Final field results will be reported in the ISR.

5.4 CR-04 Inventory of Historic Properties with Traditional Cultural Significance Study

City Light proposes an Inventory of Historic Properties with Traditional Cultural Significance Study (Properties with Traditional Cultural Significance Study) as part of this PSP to identify historic properties with traditional cultural significance within the study area, and preliminarily assess potential Project-related adverse effects on them. The primary goals of this study are to ensure historic properties with traditional cultural significance to Indian tribes and First Nations are identified and assessed for potential adverse effects on them. The objective is to assist FERC in meeting its compliance requirements under Section 106 of the NHPA. This information will inform cultural resource management plans in compliance with Section 106 of the NHPA and other applicable federal and state laws and regulations, EOs, and FERC guidelines. The full study plan with further details on overall study and methodology is included in an appendix to this PSP.

The following study requests pertaining to cultural resources covered under the Properties with Traditional Cultural Significance Study were submitted: NNTC-01 Completion of Traditional Cultural Property Survey, NNTC-02 Evaluation of Identified Sites, NNTC-04 Traditional Cultural Properties Mitigation and Management Study, SITC-03 Cultural Resources Study, SSIT-04 Cultural Resources Transmission Line Study, SSIT-05 Cultural Resources Battle Site Study, and STI-01 Comprehensive Ethnographic Study. Several parties also noted interests related to the study plan in outreach meetings associated with implementation of the CR-01 Cultural Resources Data Synthesis. The Properties with Traditional Cultural Significance Study Plan, with modification, addresses some of the elements identified in the study requests listed above, as explained in Section 6 of this PSP. Those elements of the study requests that were not adopted are primarily not adopted because they include studying areas and/or resources that fall outside the APE. The modifications made to the study plan in response to study requests includes modifying the field schedule to allow for field survey during drawdown in the Project reservoirs, including pedestrian survey as a potential study method, and clarifying the language regarding the hiring of multiple ethnographers to implement the study. City Light believes its study plan methods are sufficient to meet the study objectives and information needs.

Tasks associated with the study include:

- (1) Selecting ethnographers (January-February 2021);
- (2) Indian tribes and First Nations outreach and development of research design (February-May 2021);
- (3) Ethnohistorical and ethnographic data and information gathering (May-December 2021);
- (4) Properties with traditional cultural significance documentation and NRHP evaluation (December 2021 April 2022); and
- (5) Assessment of potential Project-related adverse effects on historic properties with traditional cultural significance (April-June 2022).

The Properties with Traditional Cultural Significance Study will be informed by the results from the CR-01 Cultural Resources Data Synthesis, which will provide initial data on cultural resources and data gaps within the study area.

City Light will prepare one or more reports documenting the activities and the results of the study. The report will summarize what historic properties with traditional cultural significance have been identified through the course of the study. The report will also preliminarily identify Project-related adverse effects to such properties, and any potential treatment identified by individual Indian tribe and First Nation communities. It is anticipated that the report(s) will include multiple components with varying protocols for access and availability to Section 106 consulting parties. However, it is expected that a summary report outlining completed efforts and conclusions of this study will be provided to participating Indian tribes and First Nations, FERC, and other agencies for review and comment, and subsequent submission to the State Historic Preservation Officer (SHPO) and/or Tribal Historic Preservation Officers (THPO), as appropriate, for review and

concurrence on any assessments of NRHP eligibility and Project effects. The summary report will then be filed with FERC as privileged (i.e., confidential).

This study is intended to be a 2-year study. Final field results will be reported in the USR.

5.5 FA-01 Water Quality Monitoring Study

City Light proposes a Water Quality Monitoring Study (WQ Monitoring Study) as part of this PSP to collect water quality data, which along with existing water quality information, is intended to support Ecology's certification of the Project under Section 401 of the Clean Water Act (CWA), and the data needs of FERC, while also addressing other data needs of resource agencies, Indian tribes, First Nations, and other LPs in the context of FERC relicensing. The goal of the study is to monitor water quality parameters for which existing information is insufficient to characterize conditions within the study area. The full study plan with further details on overall study and methodology is included in an appendix to this PSP.

The WQ Monitoring Study Plan addresses, with modifications, elements of the following study requests, as explained in Section 6 of this PSP: Ecology-01 Water Quality Study, National Marine Fisheries Service (NMFS)-01 Water Quality, NPS-02 Skagit Project Water Quality Assessment and Modeling, U.S. Fish and Wildlife Service (USFWS)-03 Skagit Project Water Quality Assessment and Modeling, Upper Skagit Indian Tribe (USIT)-07 Water Quality Impacts above and below SCL Project Infrastructure, and Washington Department of Fish and Wildlife (WDFW)-17 Water Quality Impacts above and below SCL Project Infrastructure. City Light has addressed specific comments and suggested edits to the study plan that were provided by Ecology.

- (1) Providing a detailed summary of all relevant existing water quality information identified in Table 2.3-1 of the study plan;
- (2) Characterizing background levels of turbidity and total suspended solids (TSS) in Ross, Diablo, and Gorge lakes;
- (3) Measuring fecal coliform levels at targeted location in Ross Lake;
- (4) Measuring temperature, dissolved oxygen, and pH in Diablo and Gorge lakes;
- (5) Continuously monitoring temperature, dissolved oxygen, total dissolved gas (TDG), and turbidity at two locations in the Gorge bypass reach;
- (6) Continuously measuring TDG in the Diablo Dam tailrace and Gorge Lake forebay;
- (7) Continuously measuring dissolved oxygen, pH, TDG, and turbidity below Gorge Powerhouse; sample TSS during periods when turbidity levels below Gorge Powerhouse are considered by the RWG to be elevated;
- (8) Continuously measuring temperature by installing probes at three USGS stage or discharge gage stations established in the Skagit River downstream of the Gorge Powerhouse for FA-02 Instream Flow Model Development Study; and

(9) Sampling benthic macroinvertebrates in riffle habitat at the USGS three locations in the Skagit River between Gorge Powerhouse and the Sauk River confluence where continuous temperature probes will be installed.

Field work associated with the tasks above will be conducted from June 2021 through May 2023, with the period of data collection varying by parameter and location.

Temperature data from the WQ Monitoring Study will inform the Instream Flow Model Development Study.

City Light will prepare a report that includes the following sections: (1) study goals and objectives; (2) methodology; (3) results and analysis; (4) discussion; and (5) description of variances from the FERC-approved study plan, if any.

This study is intended to be a 2-year study. Final field results will be reported in the USR.

5.6 FA-02 Instream Flow Model Development Study

City Light proposes an Instream Flow Model Development Study as part of this PSP to develop an updated flow/habitat management and evaluation tool for the Skagit River between the Gorge Powerhouse and the confluence with the Sauk River. The full study plan with further details on overall study and methodology is included in an appendix to this PSP.

The Instream Flow Model Study Plan addresses, with modifications, elements of the following study requests, as explained in Section 6 of this PSP: Ecology-02 Instream Flow Study, NMFS-02 Geomorphology and Aquatic Habitat, NPS-13 Impact of the Operations of Skagit Hydroelectric Project (#553) on Process Flows of Water, Wood and Sediment Below Gorge Dam, USFWS-13 Impact of the Operations of Skagit Hydroelectric Project (#553) on Process Flows of Skagit Hydroelectric Project (#553) on Process Flows of Water, Wood, and Sediment below Gorge Dam, USFWS-15 Geomorphology and Aquatic Habitat Complexity Study Request, USIT-08 Geomorphology and Anadromous Salmonid Habitat, WDFW-05 Geomorphology and Anadromous Salmonid Habitat, and WDFW-08 Impact of the Operations of Skagit Hydroelectric Project (#553) on Process Flows of Water, Wood and Sediment Below Gorge Dam. City Light has addressed specific comments and suggested edits to the study plan that were provided by LPs.

- (1) Developing an instream flow model for the reach of the Skagit River from Gorge Powerhouse to the Sauk River confluence;
- (2) Modeling topographic data for the river reach;
- (3) Developing model geometry;
- (4) Specifying model boundary conditions;
- (5) Conducting field monitoring including acquisition of water level and concurrent discharge data, mapping substrate and cover, and collecting depth, velocity, and discharge data at agreed-upon transects (August 2020 July 2021);

- (6) Calibrating and validating the model (May-November 2021);
- (7) Developing habitat suitability criteria (HSC) (April-July 2021); and
- (8) Conducting five consultation workshops with LPs during model development to solicit input and report results (April-November 2021).

Temperature data from the FA-01 Water Quality Monitoring Study will inform the Instream Flow Model Development Study. Results from the Instream Flow Model Development Study will provide data to assist with verifying aquatic habitat and to extrapolate measured substrate movement as part of the GE-04 Skagit River Geomorphology between Gorge Dam and the Sauk River Study. The OM-01 Operations Model Study will be developed in conjunction with the Instream Flow Model Development Study.

City Light will prepare a report that includes the following sections: (1) study goals and objectives; (2) methodology; (3) evaluation of existing information; (4) field data collection; (5) model calibration and validation; (6) development and integration of biological/physical inputs; (7) discussion; and (8) description of variances from the FERC-approved study plan, if any.

This study is intended to be a 1-year study. Final field results will be reported in the ISR.

5.7 FA-03 Reservoir Fish Stranding and Trapping Risk Assessment

City Light proposes a Reservoir Fish Stranding and Trapping Risk Assessment (Stranding and Trapping Assessment) as part of this PSP to assess the risk of native fish species stranding and trapping within the study area under normal Project operations. The full study plan with further details on overall study and methodology is included in an appendix to this PSP.

No formal study requests related to this study were filed with FERC.

Tasks associated with the study include:

- (1) Conducting reconnaissance level field surveys of Ross Lake in 2020-2021 during the drawdown cycle;
- (2) Performing a desktop analysis consisting of the following actions:
 - a. Assembling and analyzing digital elevation models (DEM) (winter 2020–2021);
 - b. Inventorying areas presenting stranding and trapping risk;
 - c. Analyzing DEMs for stranding and trapping risk;
 - d. Analyzing reservoir drawdown rates;
 - e. Performing a native species lifestage and periodicity analysis; and
- (3) Performing field surveys (December 2021 April 2022) and desktop analysis updates; and
- (4) Post fieldwork analysis (May-June 2022).

Results from the Stranding and Trapping Assessment will provide habitat data for TR-08 Specialstatus Amphibians Study. City Light will prepare a report that includes the following sections: (1) study goals and objectives; (2) methodology; (3) summary of the areas presenting a stranding and trapping risk by species and life stage; (4) summary of reservoir elevations and drawdown rates in the periods preceding each field survey; (5) summary of the data on fish stranding and trapping; (6) discussion; and (7) description of variances from the FERC-approved study plan, if any.

This study is intended to be a 2-year study. Final field results will be reported in the USR.

5.8 FA-04 Fish Passage Technical Studies Program

City Light proposes a Fish Passage Technical Studies Program (Fish Passage Study) as part of this PSP to identify and describe methods to be used to address issues related to fish passage through the Gorge bypass reach and at Project dams, and assess habitat suitability in select tributaries to Gorge, Diablo, and Ross lakes. The full study plan with further details on overall study and methodology is included in an appendix to this PSP.

The Fish Passage Study Plan addresses, with modifications, elements of the following study requests, as explained in Section 6 of this PSP: (1) assessment of potential upstream fish passage barriers in the Gorge bypass reach (WDFW-01 Evaluation of Fish Barriers and Fish Species in the Bypass Reach); (2) feasibility analysis of anadromous and resident fish passage facilities (NMFS-04 Feasibility Analysis of Fish Passage, NPS-01 Feasibility Analysis of Anadromous and Resident Fish Passage, USFWS-01 Feasibility Analysis of Fish Passage at the Skagit River Hydroelectric Project, USIT-01 Feasibility Analysis of Fish Passage at the Skagit River Hydroelectric Project, and WDFW-02 Feasibility Analysis of Fish Passage at the Skagit River Hydroelectric Project); and (3) evaluating fish habitat and potential fish productivity upstream of Gorge Dam, with emphasis on ESA-listed salmonids (NMFS-03 Quantifying Habitat and Production Potential of Chinook and Coho Salmon and Steelhead above Ross Dam, NPS-08 Quantifying the Productivity Potential of Reservoir Tributary Habitat, USFWS-02 Quantifying the Habitat and Production Potential of ESA-Listed Salmon, Steelhead, and Bull Trout above Dams, USIT-02 Quantifying Habitat and Production Potential of ESA-listed Chinook Salmon, Steelhead, Bull Trout, Coho Salmon, and Sockeye Salmon above Gorge Dam, and WDFW-03 Quantifying Habitat and Production Potential of ESA-listed Chinook Salmon, Steelhead, Bull Trout, Coho Salmon, and Sockeye Salmon above Gorge Dam). City Light has addressed specific comments and suggested edits to the study plan that were provided by Ecology.

The study will be conducted in a phased manner. Tasks associated with the study include the following:

Phase 1

- (1) Conducting a field investigation to characterize channel features in the Gorge bypass reach considered to be potential upstream fish passage barriers (Quarter 2 Quarter 3, 2021).
- (2) Assessing whether these channel features constitute total or partial (i.e., passable under certain flow ranges) passage barriers to upstream passage of anadromous salmonids (Quarter 2 Quarter 3, 2021).

(3) If the field investigation indicates that barriers may be passable, conducting hydraulic modeling (i.e., as part of the FA-05 Skagit River Gorge Bypass Reach Hydraulic and Instream Flow Model Development Study [Bypass Instream Flow Model Development Study]; see Section 5.9 of this PSP) to identify the flow ranges under which steelhead, Chinook Salmon, and Coho Salmon in the Skagit River could pass the barriers (Quarter 4 2021–Quarter 1, 2022).

Phase 2

- (1) Evaluating whether habitat in accessible reaches of Stetattle Creek, Gorge Creek, and the riverine reach downstream of Diablo Dam could support various life-history stages of the target anadromous species (Quarter 4 2021 Quarter 3 2022).
- (2) Conducting a fish passage alternatives assessment to identify, develop, and evaluate concept-level upstream and downstream fish passage alternatives for Gorge Dam (Quarter 4 2021 Quarter 4 2022).

It is expected that this study will be conducted concurrently with the Bypass Instream Flow Model Development Study.

Results from the FA-02 Instream Flow Model Development Study and the Bypass Instream Flow Model Development Study will provide input to the Fish Passage Study to identify flow ranges under which the barriers may be passable by anadromous salmonids.

City Light will prepare a report that includes the following sections: (1) study goals and objectives; (2) methodology; (3) results; (4) discussion; and (5) description of variances from the FERC-approved study plan, if any.

This study is intended to be a 2-year study. Final field results will be reported in the USR.

5.9 FA-05 Skagit River Gorge Bypass Reach Hydraulic and Instream Flow Model Development Study

City Light proposes a Skagit River Gorge Bypass Reach Hydraulic and Instream Flow Model Development Study (Bypass Instream Flow Model Development Study) as part of this PSP to develop flow and habitat data in the Gorge bypass reach (defined as the reach between Gorge Dam to Gorge Powerhouse) to support evaluation of instream flows for the Skagit River between Gorge Dam and the Sauk River and to develop hydraulic data necessary for the evaluation of fish passage, particularly at two previously identified potential upstream passage barriers (Envirosphere 1989) within the Gorge bypass reach. The full study plan with further details on overall study and methodology is included in an appendix to this PSP.

The Bypass Instream Flow Model Development Study Plan addresses, with modifications, elements of the Evaluation of Fish Barriers and Fish Species in the Bypass Reach Study request submitted by WDFW (WDFW-01) and also addresses, with modifications, elements of the Instream Flow Study request submitted by Ecology (Ecology-02), as explained in Section 6 of the PSP. City Light has addressed specific comments and suggested edits to the study plan that were provided by LPs.

Tasks associated with the study include:

- (1) Modeling topographic data for the Gorge bypass reach (May-December 2021);
- (2) Developing model geometry (May-December 2021);
- (3) Specifying model boundary conditions (May-December 2021);
- (4) Conducting field monitoring, including acquisition of water level and concurrent discharge data and mapping substrate and cover (June-July 2021);
- (5) Calibrating the model (May-December 2021);
- (6) Modeling to identify the flow ranges under which steelhead, Chinook Salmon, and Coho Salmon in the Skagit River could pass upstream barriers (December 2021 February 2022) (if warranted by the findings of the field investigations conducted under the FA-04 Fish Passage Technical Studies Program [Fish Passage Study]; see Section 5.8 of the study plan); and
- (7) Conducting five consultation workshops with LPs during model development to solicit input and report results (April-November 2021).

It is expected that this study will be conducted concurrently with the Fish Passage Study. Results from the Bypass Instream Flow Model Development Study will provide input to the Fish Passage Study, as well as provide data to assist with verifying aquatic habitat and to extrapolate measured substrate movement as part of the GE-04 Skagit River Geomorphology between Gorge Dam and the Sauk River Study.

City Light will prepare a report that includes the following sections: (1) study goals and objectives; (2) methodology; (3) results; (4) discussion; and (5) description of variances from the FERC-approved study plan, if any.

This study is intended to be a 1-year study. Final results will be reported in the ISR.

5.10 GE-01 Reservoir Shoreline Erosion Study

City Light proposes a Reservoir Shoreline Erosion Study as part of this PSP to characterize existing areas of erosion along Project reservoir shorelines and identify any Project-related factors resulting in erosion at each locale. The goal of the study is to provide information to determine whether and the extent to which certain Project O&M activities may have potential to cause erosion that affects resources of concern. The full study plan with further details on overall study and methodology is included in an appendix to this PSP.

No formal study requests related to this study were filed with FERC.

- (1) Analyzing existing information;
- (2) Conducting field inventory (June-August 2021); and
- (3) Conducting data analysis.

A field inventory and assessment of existing erosion control measures will also be conducted.

Results from the Reservoir Shoreline Erosion Study will inform the CR-02 Cultural Resources Survey. Rockfall and mass wasting features identified as part of the Reservoir Shoreline Erosion Study will be analyzed in more detail as part of the GE-02 Erosion and Geologic Hazards at Project Facilities and Transmission Line Right-of-Way Study.

City Light will prepare a report that includes the following sections: (1) study goals and objectives; (2) methodology; (3) results, including GIS-based maps of erosion locations; (4) discussion, including a narrative describing the geologic, soil, and landform setting relevant to shoreline erosion, an overview of Project-related lake surface elevation fluctuations, and information on areas of reservoir shoreline erosion and erosion control measures; and (5) description of variances from the FERC-approved study plan, if any.

This study is intended to be a 1-year study. Final field results will be reported in the ISR.

5.11 GE-02 Erosion and Geologic Hazards at Project Facilities and Transmission Line Right-of-Way Study

City Light proposes an Erosion and Geologic Hazards at Project Facilities and Transmission Line Right-Of-Way Study (Erosion and Geologic Hazards Study) as part of this PSP to evaluate how Project O&M activities affects slope stability and erosion, and how resources may be affected. The goals of the study are to characterize where Project O&M activities are affecting erosion, mass wasting, and runoff that could impact terrestrial, aquatic, fisheries, riparian, rare, threatened and endangered (RTE) plants, or cultural resources; and to determine where existing erosion, mass wasting, and channel migration/bank erosion have the potential to affect Project facilities. The full study plan with further details on overall study and methodology is included in an appendix to this PSP.

The Sauk-Suiattle Indian Tribe submitted the following study request pertaining to aquatic habitat and riparian zone within the transmission line ROW: SSIT-03 Impacts of Transmission Line Right of Way (ROW) on Aquatic Habitat and Riparian Zone for the Skagit River Hydroelectric Project. The Erosion and Geologic Hazards Study Plan addresses some of the elements identified in this study request, with modifications; some of the elements in the study request involve requests for management actions or the study request element did not provide evidence of a Project effect, as explained in Section 6 of this PSP.

- (1) Compiling and reviewing existing information;
- (2) Inventorying and analyzing data via desktop pre-field (January-June 2021);
- (3) Verifying and inventorying data in the field (April-November 2021); and
- (4) Analyzing data post-field.

Methods specific to the type of erosion or geohazard (mass wasting hazards; erosion and runoff associated with Project-related roads and townsites; and channel migration and stream crossings) are detailed further in the study plan.

Results from the TR-01 Vegetation Mapping Study, TR-02 Wetland Assessment, and GE-04 Skagit River Geomorphology Between Gorge Dam and the Sauk River Study, specifically on aquatic habitat, bank conditions, and riparian habitat, will be used to inform inventories of erosion and geohazards. Rockfall and mass wasting features identified as part of the GE-01 Reservoir Shoreline Erosion Study will be analyzed in more detail as part of the Erosion and Geologic Hazards Study.

City Light will prepare a report that includes the following sections: (1) study goals and objectives; (2) methodology; (3) results, including GIS-based maps of erosion and geohazard locations; (4) discussion; and (5) description of variances from the FERC-approved study plan, if any.

This study is intended to be a 2-year study. Final field results will be reported in the USR.

5.12 GE-03 Sediment Deposition in Reservoirs Affecting Resource Areas of Concern Study

City Light proposes a Sediment Deposition in Reservoirs Affecting Resource Areas of Concern Study (Sediment Deposition Study) as part of this PSP to evaluate the effects of deposition on four specific recreational resources and operations areas within Ross, Diablo, and Gorge lakes. The full study plan with further details on overall study and methodology is included in an appendix to this PSP.

Three LPs submitted study requests related to potential backwater effects on tributaries to Project reservoirs: NPS-10 Impact of the Operation of Skagit Hydroelectric Project (#553) Backwater on Major Streams and its Influence on Habitat Quality, USFWS-09 Impact of the Operation of Skagit Hydroelectric Project (#553) Backwater on Major Streams and its Influence on Habitat Quality, and WDFW-11 Impact of the Operation of Skagit Hydroelectric Project (#553) Backwater on Six Major Streams Tributary to Ross Lake and its Influence on Habitat Quality. The LPs requested information on eight tributaries entering Project reservoirs: Big Beaver, Little Beaver, Skagit River, Lightning Creek, Devils Creek, and Ruby Creek that enter Ross Lake; Thunder Creek that enters Diablo Lake; and Stetattle Creek that enters Gorge Lake. The purpose of the Sediment Deposition Study Plan is to study sediment accumulations and backwater effects in three of the tributaries requested by the LPs (Skagit River where it enters Ross Lake, Thunder Creek on Diablo Lake, and Stetattle Creek on Gorge Lake), i.e., locations of documented effects on recreation or Project operations due to deposition within reservoir delta deposits. City Light does not believe it is necessary to collect information on the remaining five tributaries for the reasons provided in Section 6 of this PSP.

- (1) Compiling and assessing existing information;
- (2) Collecting field data including bathymetry and distribution and grain size of inlet and delta deposits (March-September 2021); and

(3) Mapping of inlet area deposits.

Results from other studies are not needed to complete this study.

City Light will prepare a report that includes the following sections: (1) study goals and objectives; (2) methodology; (3) results; (4) discussion; and (5) description of variances from the FERC-approved study plan, if any.

This study is intended to be a 1-year study. Final field results will be reported in the ISR.

5.13 GE-04 Skagit River Geomorphology Between Gorge Dam and the Sauk River Study

City Light proposes a Skagit River Geomorphology between Gorge Dam and the Sauk River Study (Geomorphology Study) as part of this PSP to characterize the current condition of aquatic habitat in the reach, and to characterize how Project-related changes in peak flows affect geomorphic processes, which will be used to evaluate the Project's contribution to cumulative effects in the reach. The full study plan with further details on overall study and methodology is included in an appendix to this PSP.

Five LPs submitted a total of 13 study requests related to geomorphology and aquatic habitat in the Skagit River and Project effects on sediment, instream large wood, channel forming flows, and/or floodplain connectivity/off-channel aquatic habitat: NMFS-02 Geomorphology and Aquatic Habitat, NPS-11 Impact of Operations of Skagit Hydroelectric Project (#553) on Sediment Capture Within Reservoirs and Sediment Recovery Below Gorge Dam and Its Influence on Endangered Species Habitat, NPS-12 Impact of the Operations of Skagit Hydroelectric Project (#553) on Sediment Storage, Stability and Transport on Skagit River and its Influence on Endangered Species Habitat, NPS-13 Impact of the Operations of Skagit Hydroelectric Project (#553) on Process Flows of Water, Wood and Sediment Below Gorge Dam, USFWS-11 Impact of Operations of Skagit Hydroelectric Project (#553) on Sediment Capture Within Reservoirs and Sediment Recovery Below Gorge Dam and Its Influence on Endangered Species Habitat, USFWS-12 Impact of the Operations of Skagit Hydroelectric Project (#553) on Sediment Storage, Stability and Transport on Skagit River and its Influence on Endangered Species Habitat, USFWS-13 Impact of the Operations of Skagit Hydroelectric Project (#553) on Process Flows of Water, Wood, and Sediment below Gorge Dam, USFWS-15 Geomorphology and Aquatic Habitat Complexity Study Request, USIT-08 Geomorphology and Anadromous Salmonid Habitat, WDFW-05 Geomorphology and Anadromous Salmonid Habitat, WDFW-08 Impact of the Operations of Skagit Hydroelectric Project (#553) on Process Flows of Water, Wood and Sediment Below Gorge Dam, WDFW-09 Wood Budget, Inventory and Assessment, and WDFW-10 Impact of Operations of Skagit Hydroelectric Project (#553) on Sediment Capture Within Reservoirs and Sediment Recovery Below Gorge Dam and Its Influence on Endangered Species Habitat.

The Geomorphology Study Plan addresses, with modifications, many of the elements identified in the study requests listed above, as explained in Section 6 of this PSP. City Light has addressed LPs specific comments and suggested edits to the study plan.

- (1) Collecting existing information;
- (2) Analyzing geomorphic change;
- (3) Inventorying aquatic habitat;
- (4) Inventorying the status of side channels;
- (5) Inventorying the status of substrate; and
- (6) Inventorying the status of large wood.

Field work associated with the tasks above will be conducted from January through September 2021 (depending on flows). In addition, field work for the redd scour monitoring portion of the study will extend from August 2019 through August 2022.

Results from the TR-01 Vegetation Mapping Study will provide riparian vegetation type and size to assist with evaluating the potential for future large wood loading. The FA-02 Instream Flow Model Development Study and the FA-05 Skagit River Gorge Bypass Reach Hydraulic and Instream Flow Model Development Study results will be used to estimate average bankfull width and depth and existing substrate conditions. Results from TR-02 Wetland Assessment will provide habitat-related data to inform the Geomorphology Study. The Geomorphology Study may provide data for GE-02 Erosion and Geologic Hazards at Project Facilities and Transmission Line Right-of-Way Study and may inform high priority areas for CR-02 Cultural Resources Survey.

City Light will prepare a report that includes the following sections: (1) study goals and objectives; (2) methodology; (3) results, including a summary of geomorphic change and GIS-based maps, summary tables and analyses of aquatic habitat, side channels, substrate, and large wood; (4) analysis of current side channel conditions and side channel formation/maintenance processes; (5) analysis to evaluate current amount and quality of spawning and rearing habitat for all salmonid species within the study area; (6) estimate of potential future loading of large wood and gravel/cobble in the Skagit River between Gorge Dam and the Sauk River confluence; (7) synthesis of the interaction among flow, sediment loading, large wood input, channel migration/side channel formation, floodplain connectivity and aquatic habitat; (8) discussion; and (9) description of variances from the FERC-approved study plan, if any.

This study is intended to be a 1-year study. Final field results will be reported in the ISR.

5.14 OM-01 Operations Model Study

City Light proposes an Operations Model Study as part of this PSP to develop an Operations Model that represents existing Project operations with reasonable accuracy for purposes of relicensing, and which can be used to simulate potential future operations under a variety of operating scenarios. The goal of the study is to develop a Base Case scenario representation of Project operations. For purposes of Operations Model development, the Base Case represents the Project's operations under the current FERC license. The full study plan with further details on overall study and methodology is included in an appendix to this PSP.

The Skagit County Drainage and Irrigation Special Purpose Districts represented by the Skagit County Drainage and Irrigation District Consortium LLC (SDIDC) and the Skagit County Dike and Drainage District Flood Control Partnership, submitted the study request SDIDC-01 Flood

Storage Timing: Study Plan Seattle City Light Skagit River Hydroelectric Project FERC No. 553. SDIDC also submitted the study request SDIDC-02 Irrigation Water Supply: Study Plan Seattle City Light Skagit River Hydroelectric Project FERC No. 553.

SDIDC-01 and SDIDC-02 request the simulation of alternative operating scenarios under varying hydrologic conditions. City Light recognizes the need to model a range of alternative operating scenarios for the Project as part of relicensing, many of which will be identified by LPs. However, the OM-01 Operations Model Study Plan is aimed at describing how the model will be developed and applied. Identifying and evaluating specific alternative operating scenarios, such as those identified by SDIDC, will take place later in the relicensing process. Although the study plan was not revised to address these study requests, the requests will be accommodated by the overall process, as explained in Section 6 of this PSP.

Tasks associated with the study include:

- (1) Developing the operations model;
- (2) Consultation workshops (January, April and August 2021);
- (3) Validating the model (January 2021 March 2021);
- (4) Developing Base Case and current operations baseline (January 2021 March 2021); and
- (5) Preparing a model logic and validation report.

The Operations Model will be developed in conjunction with the FA-02 Instream Flow Model Development Study.

City Light will prepare a report that includes the following sections: (1) Project introduction and background; (2) study area; (3) methodology; (4) discussion of the hydrologic data review, and inflows utilized in the Operations Model; (5) discussion of Operations Model setup, operating rules for each development and downstream modeled nodes, validation of input parameters, and definition of modeled Base Case and Current Operations Baseline scenarios; (6) results provided in graphical and tabular format compared to historical reservoir elevation and flow release data including discussions of Operations Model validation; (7) any LP correspondence and/or consultation; (8) literature cited; and (9) description of variances from the FERC-approved study plan, if any.

This study is intended to be a 1-year study. Final field results will be reported in the ISR.

5.15 RA-01 Recreation Use and Facility Assessment

City Light proposes a Recreation Use and Facility Assessment (Recreation Assessment) as part of this PSP to evaluate existing Project recreation facilities, opportunities, preferences, and uses potentially affected by continued O&M of the Project. The goals of the study are to determine: (1) the condition, accessibility, and use impacts of the Project's recreation facilities; (2) the preferences, attitudes, and characteristics of the Project's recreation users at Project recreation facilities and reservoirs; (3) current Project recreation use and activities; and (4) future demand for Project recreation facilities and opportunities. The full study plan with further details on overall study and methodology is included in an appendix to this PSP.

The following study requests pertaining to recreation facilities and visitor use were submitted: USFS-01 Recreation Facility and Use Study, and NPS-15 Recreation Facilities and Visitor Use Study. The NPS and USFS study requests are substantially identical. The Recreation Assessment Study Plan addresses, with modifications, some of the elements identified in the study requests listed above, as explained in Section 6 of this PSP. In particular, the study plan was revised to update the visitor survey instrument (as attached to the study plan) to include questions requested by the NPS and USFS. Much of the NPS and USFS study requests were not adopted because City Light deems the methods in its study plan to be sufficient for meeting the study objectives and information needs.

Tasks associated with the study include:

- (1) Conducting an inventory and evaluating the condition, accessibility, and use impacts of the existing Project recreation facilities (June-July 2021);
- (2) Assessing the usable periods of the Project's developed boat launch;
- (3) Identifying recreation uses and visitor attitudes, beliefs, and preferences within the Project boundary via field observation and visitor surveys (April-October 2021);
- (4) Estimating current recreation use at Project recreation resource areas; and
- (5) Identifying future use and demand opportunities.

Results from other studies are not needed to complete this study.

City Light will prepare a report that includes the following sections: (1) study goals and objectives; (2) methodology; (3) results; (4) discussion; and (5) description of variances from the FERC-approved study plan, if any.

This study is intended to be a 1-year study. Final field results will be reported in the ISR.

5.16 RA-02 Gorge Bypass Reach Safety and Whitewater Boating Study

City Light proposes a Gorge Bypass Reach Safety and Whitewater Boating Study (Bypass Safety and Whitewater Boating Study) as part of this PSP to evaluate the safety and whitewater boating opportunities of the Skagit River in the Gorge bypass reach under current and future conditions. The goal of this study is to evaluate the suitability of the Skagit River in the Gorge bypass reach for whitewater boating under current conditions, inform future operational scenarios that include the range of instream flow measures that may be included in a future license, and assess potential constraints such as Project operations and safety concerns. The study is designed to investigate whitewater suitability for expert paddlers only and not commercial whitewater boating opportunities. The full study plan with further details on overall study and methodology is included in an appendix to this PSP.

No formal study requests specific to this study in the Gorge bypass reach were filed with FERC. However, Ecology provided a study request (Ecology-02 Instream Flow Study) related to instream flow that included recreation flow components below the Gorge bypass reach. The Bypass Safety and Whitewater Boating Study Plan addresses, with modifications, some of the elements identified in the study request, as explained in Section 6 of this PSP.
Tasks associated with the study include:

- (1) Conducting a Level 1 desktop analysis, including literature reviews, structured interviews, hydrology summary, Gorge Dam spill gate operation summary, physical river channel description, of existing river access description, and a summary of regulatory agency resource management goals and tribal interests (Winter 2020/2021);
- (2) Conducting a Level 2 field reconnaissance, including opportunistic shore-based observation of flow in the Gorge bypass reach during a spill event (Spring Fall 2021); and
- (3) Conducting a Level 3 multiple flow evaluation using a team of boaters paddling two to four flows based on volumes from the Level 2 field reconnaissance (Summer Fall 2022).

The study consists of a three-phased sequential investigation referred to as Levels 1, 2, and 3. The phased sequential approach is designed to increase study resolution as investigations progress from one level to the next, as well as share interim results earlier in the relicensing process across resource disciplines. Advancing to more intensive study levels is dependent on results and recommendations in the prior study level.

Information obtained from other studies examining resources in the Gorge bypass reach, such as FA-05 Skagit River Gorge Bypass Reach Hydraulic and Instream Flow Model Development Study (Bypass Instream Flow Model Development Study), will be considered in the Bypass Safety and Whitewater Boating Study analysis.

City Light will prepare a report that includes the following sections: (1) description of the observed whitewater boating opportunity in the Gorge bypass reach; (2) description of the existing access to the Gorge bypass reach; (3) public safety concerns; (4) summary of natural and cultural resources and operations that could be affected by providing whitewater opportunities; (5) a comparative analysis of multiple flow evaluations (if the Level 3 investigation is warranted); and (6) description of variances from the FERC-approved study plan, if any.

This study is intended to be a 2-year study. Final field results will be reported in the USR.

5.17 RA-03 Project Facility Lighting Inventory

City Light proposes a Project Facility Lighting Inventory as part of this PSP to conduct an inventory and map the locations of outdoor lighting equipment installed at Project facilities and identify the current use and need for lighting at Project facilities. The goal of this study is to inventory Project facilities located within the Project Boundary and within the RLNRA that utilize lighting at night. The full study plan with further details on overall study and methodology is included in an appendix to this PSP.

No formal study requests related to this study were filed with FERC.

Tasks associated with the study include:

(1) Conducting a site survey to catalog the physical characteristics of existing lighting for lights that do not have existing documented information (May to September 2021); and

(2) Documenting the purpose and parameters of each Project facility lighting source (e.g., quantity, locations, voltage, luminaires, type, wattage, etc.).

Results from other studies are not needed to complete this study.

City Light will prepare a report that includes the following sections: (1) study goals and objectives; (2) methodology; (3) results; (4) discussion; and (5) description of variances from the FERC-approved study plan, if any.

This study is intended to be a 1-year study. Final field results will be reported in the ISR.

5.18 RA-04 Project Sound Assessment

City Light proposes a Project Sound Assessment as part of this PSP to characterize the existing outdoor soundscape near Project facilities and define the extent of Project-related noise emitting from Project facilities, equipment, or activities within the Project Boundary. The goal of this study is to develop estimates of Project-related noise to facilitate analysis of how Project-related noise may affect other resources (e.g., wildlife, cultural resources, recreation resources, etc.). The full study plan with further details on overall study and methodology is included in an appendix to this PSP.

No formal study requests related to this study were filed with FERC.

Tasks associated with the study include:

- (1) Conducting an inventory and assessing noise-emitting Project facilities and activities (June-September 2021);
- (2) Assessing the land use to identify areas where Project-related noise may have a potential adverse effect on Project resources;
- (3) Selecting sites and performing long-term ambient field noise measurements and short-term Project-related noise measurements (June-September 2021);
- (4) Processing and analyzing the 7-day noise measurement results to characterize the hourly ambient noise; and
- (5) Performing noise modeling to evaluate transmission line noise (corona noise) and noise from other Project features and activities.

Results from other studies are not needed to complete this study.

City Light will prepare a report that includes the following sections: (1) study goals and objectives; (2) methodology; (3) results; (4) discussion, and (5) a description of variances from the FERC-approved study plan, if any.

This study is intended to be a 1-year study. Final field results will be reported in the ISR.

5.19 TR-01 Vegetation Mapping Study

City Light proposes a Vegetation Mapping Study as part of this PSP to develop a complete and systematic vegetation mapping geographic information system (GIS) database. The goal of the study is to describe existing conditions, assess potential Project-related habitat effects, and inform development of terrestrial resource management plans and, as needed, PME measures. The full study plan with further details on overall study and methodology is included in an appendix to this PSP.

No formal study requests related to this study were filed with FERC. However, this study will provide information requested as part of the following study requests: SSIT-03 Impacts of Transmission Line Right of Way (ROW) on Aquatic Habitat and Riparian Zone for the Skagit River Hydroelectric Project, STI-06 Spotted Owl Habitat Map, and USFWS-19 Impact of the Operations of Skagit Hydroelectric Project (#553) on Northern Spotted Owl.

Tasks associated with the study include:

- (1) Compiling and reviewing of existing information;
- (2) Validating field and remote sensing methods;
- (3) Pre-processing geospatial resources;
- (4) Assessing NPS vegetation mapping and classification;
- (5) Applying field and remote sensing methodology;
- (6) Testing input datasets;
- (7) Developing preliminary model;
- (8) Collecting of model training and verification data (Summer Autumn 2020);
- (9) Developing draft and final vegetation map; and
- (10) Conducting accuracy assessment.

Results from the Vegetation Mapping Study will provide initial data on wetland communities within the study area to inform the TR-02 Wetland Assessment; information on potential occurrences and suitable habitats for the TR-03 Rare, Threatened, and Endangered Plants Study and the TR-04 Invasive Plants Study; information for assessing wildlife habitat for the TR-05 Marbled Murrelet Study, TR-06 Golden Eagle Habitat Analysis, TR-07 Northern Goshawk Habitat Analysis, TR-08 Special-status Amphibian Study, and TR-09 Beaver Habitat Assessment; and information on the large woody debris (LWD) component of the GE-04 Skagit River Geomorphology Between Gorge Dam and the Sauk River Study. The vegetation mapping data will also be available for the GE-02 Erosion and Geologic Hazards at Project Facilities and Transmission Line Right-Of-Way Study.

City Light will prepare a report that includes the following sections: (1) study goals and objectives; (2) methodology; (3) results, including GIS-based maps of vegetation at group or cultural group level within the study area; (4) discussion, including accuracy assessment; and (5) a description of variances from the FERC-approved study plan, if any.

This study is intended to be a 1-year study This study is currently under implementation and is expected to be completed in 2021. Steps 1–7 above have been implemented and final verification data collection, vegetation map development, accuracy assessment, and reporting, are underway.

5.20 TR-02 Wetland Assessment

City Light proposes a Wetland Assessment as part of this PSP to map and describe wetlands within the study area that may be affected by Project operations. The goal of the study is to map and rate the capability of these wetlands to provide water quality, hydrologic, and habitat functions and evaluate the overall condition and existing sources of impairment. The full study plan with further details on overall study and methodology is included in an appendix to this PSP.

No formal study requests related to this study were filed with FERC. However, this study will provide information requested as part of the following study requests: NMFS-02 Geomorphology and Aquatic Habitat, SSIT-03 Impacts of Transmission Line Right of Way (ROW) on Aquatic Habitat and Riparian Zone for the Skagit River Hydroelectric Project, USFWS-15 Geomorphology and Aquatic Habitat Complexity Study Request, USIT-08 Geomorphology and Anadromous Salmonid Habitat, and WDFW-05 Geomorphology and Anadromous Salmonid Habitat.

Tasks associated with the study include:

- (1) Compiling and reviewing existing information;
- (2) Collecting model training data (Summer–Autumn 2020);
- (3) Conducting wetland remote-sensing analysis;
- (4) Developing disturbance potential overlay for study area;
- (5) Conducting field data collection of wetlands potentially affected by the Project in the study area (Summer Autumn 2020; 2021 as needed); and
- (6) Conducting data analysis.

Results from the TR-01 Vegetation Mapping Study will provide data on wetland communities for the Wetland Assessment. Results from the Wetland Assessment will provide habitat and occurrence information relevant to the TR-03 Rare, Threatened, and Endangered Plants Study, TR-04 Invasive Plants Study, TR-05 Marbled Murrelet Study, TR-06 Golden Eagle Habitat Analysis, TR-08 Special-status Amphibian Study, and TR-09 Beaver Habitat Assessment. The wetland data will also be available for the GE-02 Erosion and Geologic Hazards at Project Facilities and Transmission Line Right-Of-Way Study, GE-04 Skagit River Geomorphology Between Gorge Dam and the Sauk River Study, and other fish and aquatics studies.

City Light will prepare a report that includes the following sections: (1) study goals and objectives; (2) methodology; (3) results, including GIS-based maps of wetlands within the study area and wetland classifications, functions, and impairments; (4) discussion; and (5) a description of variances from the FERC-approved study plan, if any.

This study is intended to be a 1-year study. This study is currently under implementation and is expected to be completed in early 2021. Steps 1–5 above have been implemented and final data analysis and reporting, are underway. Supplemental data collection will occur as needed in 2021 in conjunction with other terrestrial studies.

5.21 TR-03 Rare, Threatened, and Endangered Plants Study

City Light proposes a Rare, Threatened, and Endangered (RTE) Plants Study as part of this PSP to identify existing RTE plant species and populations in areas potentially affected by ongoing Project activities. The goal of the study is to provide information to determine whether and to what extent certain Project O&M activities may have potential to adversely affect RTE plant species. The full study plan with further details on overall study and methodology is included in an appendix to this PSP.

No formal study requests related to this study were filed with FERC.

Tasks associated with the study include:

- (1) Developing a list of RTE plant species that may occur in areas affected by the Project;
- (2) Determining survey locations;
- (3) Preparing for field effort;
- (4) Conducting field surveys (April-November 2021);
- (5) Compiling data; and
- (6) Conducting a threats assessment.

It is expected that this study will be conducted concurrently with the TR-04 Invasive Plants Study.

Results from the TR-01 Vegetation Mapping Study and TR-02 Wetland Assessment, specifically on species habitat associations, will be used to inform survey locations for the target RTE species.

City Light will prepare a report that includes the following sections: (1) study goals and objectives; (2) methodology; (3) results, including GIS-based maps of RTE plant occurrences; (4) discussion, including threats assessment; and (5) description of variances from the FERC-approved study plan, if any.

This study is intended to be a 1-year study. Final field results will be reported in the ISR.

5.22 TR-04 Invasive Plants Study

City Light proposes an Invasive Plants Study as part of this PSP to document occurrences of a target list of plant species designated as invasive. The goal of the study is to provide information to determine locations of invasive plant occurrences, which could potentially be spread by Project O&M and Project-related recreation activities, and to assess impacts. The full study plan with further details on overall study and methodology is included in an appendix to this PSP.

No formal study requests related to this study were filed with FERC. However, this study will provide information requested as part of the following study request: SSIT-03 Impacts of Transmission Line Right of Way (ROW) on Aquatic Habitat and Riparian Zone for the Skagit River Hydroelectric Project.

Tasks associated with the study include:

- (1) Compiling and reviewing of existing information;
- (2) Developing a target invasive plant species list;
- (3) Prioritizing survey locations;
- (4) Gathering data and preparing for field efforts;
- (5) Conducting field surveys (April-November 2021); and
- (6) Processing data.

It is expected that this study will be conducted concurrently with the TR-03 Rare, Threatened, and Endangered Plants Study.

Results from the TR-01 Vegetation Mapping Study and TR-02 Wetland Assessment, specifically on invasive plant species occurrences will inform the Invasive Plants Study. Invasive plant species presence will also be noted incidentally during fieldwork for other studies.

City Light will prepare a report that includes the following sections: (1) study goals and objectives; (2) methodology; (3) results, including GIS-based maps of invasive plant occurrences, a list of observed ubiquitous or widespread species, and likely disturbance or pathways for the target invasive plant occurrences; (4) discussion; and (5) description of variances from the FERC-approved study plan, if any.

This study is intended to be a 1-year study. Final field results will be reported in the ISR.

5.23 TR-05 Marbled Murrelet Study

City Light proposes a Marbled Murrelet Study as part of this PSP to provide information needed to characterize potential Project effects on the marbled murrelet. The goal of the study is to map potentially suitable marbled murrelet nesting habitat within the study area and assess likelihood of marbled murrelet nesting. The full study plan with further details on overall study and methodology is included in an appendix to this PSP.

No formal study requests related to this study were filed with FERC.

Tasks associated with the study include:

- (1) Mapping potential marbled murrelet nesting habitat;
- (2) Conducting limited ground surveys to verify accuracy of habitat mapping (April-May 2021);
- (3) Conducting radar and audio-visual surveys (May-July 2021); and

(4) Analyzing data.

Results from the TR-01 Vegetation Mapping Study and TR-02 Wetland Assessment, specifically on species habitat associations, will be used to map potential murrelet habitat and provide information on the availability of suitable limb nesting platforms to help refine location of surveys.

City Light will prepare a report that includes the following sections: (1) study goals and objectives; (2) methodology; (3) results, including GIS-based maps of potentially-suitable marbled murrelet habitat; (4) discussion; and (5) description of variances from the FERC-approved study plan, if any.

This study is intended to be a 1-year study. Final field results will be reported in the ISR. If 2021 is deemed a poor nesting season for marbled murrelets in Washington State, an additional year of radar and audio-visual surveys may be necessary in 2022.

5.24 TR-06 Golden Eagle Habitat Analysis

City Light proposes a Golden Eagle Habitat Analysis as part of this PSP to assess the potential effects of continued O&M of the Project with respect to collision risk of golden eagles with transmission lines and inform BMP and elements of City Light's Avian Protection Plan. The goal of the study is to use existing information to map habitat for golden eagle nesting, foraging, and movement corridors in the study area and conduct a geospatial risk assessment (GRA) to identify potential risk associated with collision with Project transmission lines. The full study plan with further details on overall study and methodology is included in an appendix to this PSP.

No formal study requests related to this study were filed with FERC.

Tasks associated with the study include:

- (1) Compiling and reviewing of existing information;
- (2) Mapping observations and potential nesting and foraging habitat; and
- (3) Developing golden eagle geospatial risk assessment (Summer 2021).

Results from the TR-01 Vegetation Mapping Study and TR-02 Wetland Assessment, specifically landscape level cover types, will be used to characterize areas of potentially suitable golden eagle habitat for nesting, foraging, and movement corridors near the Project.

City Light will prepare a report that includes the following sections: (1) study goals and objectives; (2) methodology; (3) results, including GIS-based maps of potentially suitable eagle habitat; (4) discussion, including threats assessment; and (5) description of variances from the FERC-approved study plan, if any.

This study is intended to be a 1-year study. Final field results will be reported in the ISR.

5.25 TR-07 Northern Goshawk Habitat Analysis

City Light proposes a Northern Goshawk Habitat Analysis as part of this PSP to identify suitable goshawk habitat within and near areas potentially affected by ongoing Project activities. The goal of the study is to develop a map of suitable goshawk nesting habitat within the study area. The full study plan with further details on overall study and methodology is included in an appendix to this PSP.

No formal study requests related to this study were filed with FERC.

Tasks associated with the study include:

- (1) Reviewing scientific literature; and
- (2) Identifying and mapping potentially suitable habitat (Summer 2021).

Results from the TR-01 Vegetation Mapping Study will be used to define the extent of potential goshawk nesting habitat in the study area.

City Light will prepare a report that includes the following sections: (1) study goals and objectives; (2) methodology; (3) results, including GIS-based maps of potential suitable northern goshawk habitat; (4) discussion; and (5) description of variances from the FERC-approved study plan, if any.

This study is intended to be a 1-year study. Final field results will be reported in the ISR.

5.26 TR-08 Special-status Amphibian Study

City Light proposes a Special-status Amphibian Study as part of this PSP to collect information on special-status amphibians in areas potentially affected by ongoing Project activities. The goals of the study are to identify areas of potentially suitable breeding habitat for the special-status amphibians, Columbia spotted frog and Oregon spotted frog, within the study area; assess the likelihood that either species occurs in areas where there is activity related to Project O&M; document occurrences of a third special-status species, western toad, and the locations and types of habitats used around the Project reservoirs; and collect relevant information on populations where these species are found, including numbers, life stages, habitat, and locations. The full study plan with further details on overall study and methodology is included in an appendix to this PSP.

No formal study requests related to this study were filed with FERC.

Tasks associated with the study include:

- (1) Identifying and mapping potentially suitable habitat;
- (2) Conducting reconnaissance and incidental observations; and
- (3) Conducting amphibian surveys (March-July 2021).

Field activities will adhere to accepted field-gear cleaning and disinfection procedures to prevent the spread of amphibian pathogens.

Results from the TR-01 Vegetation Mapping Study and TR-02 Wetland Assessment will provide information to identify potential habitats and incidental observations of amphibians. The FA-03 Reservoir Fish Stranding and Trapping Risk Assessment will also identify potential habitats within drawdown zones on Ross, Diablo, and Gorge lakes that could be used by special-status amphibians.

City Light will prepare a report that includes the following sections: (1) study goals and objectives; (2) methodology; (3) results, including a narrative description of reconnaissance and survey habitat characteristics; and GIS-based maps of survey areas and amphibian observations; (4) discussion; and (5) description of variances from the FERC-approved study plan, if any.

This study is intended to be a 1-year study. Final field results will be reported in the ISR.

5.27 TR-09 Beaver Habitat Assessment

City Light proposes a Beaver Habitat Assessment as part of this PSP to characterize the ongoing beaver conflicts at the Project's Chum Salmon off-channel sites and characterize beaver habitat suitability in the study area. The goals of the study are to evaluate beaver conflicts at the City Light Chum off-channel habitat sites, identify where beaver occur, and map beaver habitat suitability of aquatic habitats in the study area to provide information useful for potential future beaver relocations. The full study plan with further details on overall study and methodology is included in an appendix to this PSP.

The Stillaguamish Tribe of Indians submitted a study request pertaining to beaver (STI-04 Beaver Project). The Beaver Habitat Assessment Study Plan addresses some of the elements identified in this study request, as explained in Section 6 of this PSP. Some elements of the study request involve management actions that will take place after the relicensing; information gathered in the study will be used to assess potential management actions at the Chum channels during the next Project license.

Tasks associated with the study include:

- (1) Evaluating existing conditions and management activities at off-channel habitat areas (April-September 2021);
- (2) Mapping beaver occurrence in Project Boundary (incidental observations gathered during fieldwork for all studies); and
- (3) Assessing beaver habitat.

Results from the TR-01 Vegetation Mapping Study and TR-02 Wetland Assessment, specifically on wetland/riparian vegetation mapping, plant species occurrence, and vegetation suitability, will be used to supplement Beaver Intrinsic Potential mapping classification.

City Light will prepare a report that includes the following sections: (1) study goals and objectives; (2) methodology; (3) results, including GIS-based maps of beaver occurrences and habitat suitability in the study area; (4) discussion; and (5) description of variances from the FERC-approved study plan, if any.

This study is intended to be a 1-year study. Final field results will be reported in the ISR.

5.28 TR-10 Northern Spotted Owl Habitat Analysis

City Light proposes a Northern Spotted Owl Habitat Analysis as part of this PSP to identify and map suitable northern spotted owl (NSO) nesting, roosting, and foraging (NRF) habitat within the Project Boundary and a 0.5-mile buffer. The goal of the study is to provide information to supplement existing NSO survey data in order to determine whether and the extent to which certain Project O&M activities may have potential to affect NSO. The full study plan with further details on overall study and methodology is included in an appendix to this PSP.

The NSO Habitat Analysis Study Plan is in response to a study request made by the USFWS (USFWS-19 Impact of the Operations of Skagit Hydroelectric Project (#553) on Northern Spotted Owl). In its study request, the USFWS requested more information on Project effects to NSO and whether NSO could successfully establish around Project reservoirs and mitigation lands. USFWS states if Project activities from operations are located near NSO NRF habitat, or tree clearing or other modifications to suitable habitat are planned, then there is potential for disturbing nesting NSO. While existing information does not a show a demonstrated effect of the Project on NSO populations, City Light has a mutual natural resource management interest in providing habitat information to inform potential NSO conservation measures and best management practices and has proposed this study in its PSP. The study plan addresses some of the elements identified in the study request, as explained in Section 6 of this PSP.

Tasks associated with the study include:

- (1) Review scientific literature; and
- (2) Identify and map potentially suitable habitat (Spring to Summer 2021).

Results from the TR-01 Vegetation Mapping Study will be used to inform the extent of potential NSO NRF habitat in the study area.

City Light will prepare a report that includes the following sections: (1) study goals and objectives; (2) methodology; (3) results, including GIS-based maps of potential suitable NSO habitat; (4) discussion; and (5) description of variances from study plan from the FERC-approved study plan, if any.

This study is intended to be a 1-year study. Final field results will be reported in the ISR.

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As noted above, City Light received at least 98 study requests submitted by federal and state agencies, Indian tribes, First Nations, NGOs, and other LPs. Some of these study requests did not provide all of the information required by FERC's ILP regulations (18 CFR § 5.9(b)), as set forth in Section 4.1 of this PSP. Regardless, in an effort to be complete, City Light has attempted to identify and evaluate all study requests submitted. Pursuant to 18 CFR § 5.11(b)(4), for any study request not adopted, an explanation that references the Study Criteria is to be provided. Table 6.0-1 summarizes City Light's review of the formal study requests and its determination. Where possible, City Light consolidated common themes and elements expressed in the study requests (Table 6.0-2). The correspondence from LPs requesting studies and providing comments is listed in an appendix to this PSP.

		Study Request			Proposed for		
	ID #	Title	Entity	Date	Study / Proposed for Study with Modifications	Not Proposed for Study	Correlation to City Light Study
1.	SDIDC-01	Flood Storage Timing	Skagit County Drainage and Irrigation District Consortium /	9/21/20	✓		OM-01 Operations Model Study See Section 6.2.18 of this PSP for response to the study request
			Skagit County Dike and Drainage District Flood Control Partnership			~	Climate change component is not proposed; see Section 6.3.9 of this PSP for response to the study request
			(Supported by Skagit County Board of Commissioners)				
2.	SDIDC-02	Irrigation Water Supply	Skagit County Drainage and Irrigation District Consortium	10/19/20	√		OM-01 Operations Model Study See Section 6.2.19 of this PSP for response to the study request
3.	NMFS-01	Water Quality	NMFS (Supported by Sauk-Suiattle Indian Tribe, Swinomish Indian Tribal Community)	10/22/20	✓		FA-01 WQ Monitoring Study See Section 6.2.9 of this PSP for response to the study request

Table 6.0-1.Summary of formal study requests and City Light's responses.9

⁹ Table 6.0-1 identifies the parties who provided explicit support for specific study requests in their filings with FERC.

	Study Request				Proposed for		
	ID #	Title	Entity	Date	Study / Proposed for Study with Modifications	Not Proposed for Study	Correlation to City Light Study
4.	NMFS-02	Geomorphology and Aquatic Habitat	NMFS (Supported by Sauk-Suiattle Indian Tribe, Swinomish Indian Tribal Community)	10/22/20	✓	✓	GE-04 Geomorphology Study FA-02 Instream Flow Model Development Study TR-02 Wetland Assessment See Sections 6.2.13, 6.2.14, 6.2.15, and 6.2.16 of this PSP for responses to the study request Sediment transport model component is not proposed; see Section 6.3.8 of this PSP for response to the study request
5.	NMFS-03	Quantifying Habitat and Production Potential of Chinook and Coho salmon and steelhead above Ross Dam	NMFS (Supported by Swinomish Indian Tribal Community)	10/22/20	V		FA-04 Fish Passage Study See Section 6.2.10 of this PSP for response to the study request
6.	NMFS-04	Feasibility Analysis of Fish Passage	NMFS (Supported by Sauk-Suiattle Indian Tribe, Swinomish Indian Tribal Community)	10/22/20	✓		FA-04 Fish Passage Study See Section 6.2.10 of this PSP for response to the study request
7.	Ecology-01	Water Quality Study	Ecology (Supported by Sauk-Suiattle Indian Tribe)	10/23/20	~		FA-01 WQ Monitoring Study See Section 6.2.9 of this PSP for response to the study request

	Study Request				Proposed for		
	ID #	Title	Entity	Date	Study / Proposed for Study with Modifications	Not Proposed for Study	Correlation to City Light Study
8.	Ecology-02	Instream/Recreation Flow Study	Ecology (Supported by Sauk-Suiattle Indian Tribe, Swinomish Indian Tribal Community)	10/23/20	~		FA-02 Instream Flow Model Development Study FA-05 Bypass Instream Flow Model Development Study RA-02 Gorge Bypass Reach Safety and Whitewater Boating Study See Sections 6.2.11 and 6.2.21 of this PSP for responses to the study request
9.	NPS-01	Feasibility Analysis of Anadromous and Resident Fish Passage	NPS	10/23/20	✓		FA-04 Fish Passage Study See Section 6.2.10 of this PSP for response to the study request
10.	NPS-02	Skagit Project Water Quality Assessment and Modeling	NPS	10/23/20	✓		FA-01 WQ Monitoring Study See Section 6.2.9 of this PSP for response to the study request
11.	NPS-03	Assessing the Impacts of Project Operations on Secondary Productivity	NPS	10/23/20		~	See Section 6.3.4 of this PSP for response to the study request
12.	NPS-04	Skagit Project Recreational Fishing (Creel) Survey	NPS	10/23/20		~	See Section 6.3.7 of this PSP for response to the study request
13.	NPS-05	Population Structure of Native Fish in the Project Area	NPS	10/23/20	~		See Section 6.2.17 of this PSP for response to the study request

	Study Request				Proposed for		
	ID #	Title	Entity	Date	Study / Proposed for Study with Modifications	Not Proposed for Study	Correlation to City Light Study
14.	NPS-06	Determine the Suitability and Productive Potential of Littoral and Riparian Habitat for Resident and Anadromous Fish in the Project Area	NPS	10/23/20		~	See Section 6.3.5 of this PSP for response to the study request
15.	NPS-07	Evaluating Existing Fish Passage and Entrainment	NPS	10/23/20		~	See Section 6.3.3 of this PSP for response to the study request
16.	NPS-08	Quantifying the Productivity Potential of Reservoir Tributary Habitat	NPS	10/23/20	~		FA-04 Fish Passage Study See Section 6.2.10 of this PSP for response to the study request
17.	NPS-09	Quantifying the Productivity Potential of Reservoir Fish	NPS	10/23/20		~	See Section 6.3.5 of this PSP for response to the study request
18.	NPS-10	Impact of Operations of Project Backwater on Major Streams and its Influence on Habitat Quality	NPS	10/23/20	~		GE-03 Sediment Deposition Study See Section 6.2.12 of this PSP for response to the study request
19.	NPS-11	Impact of the Operations of Project on Sediment Capture within Reservoirs and Sediment Recovery Below Gorge Dam and Its Influence on Endangered Species Habitat	NPS (Supported by Swinomish Indian Tribal Community)	10/23/20	Ý		GE-04 Geomorphology Study See Section 6.2.14 of this PSP for response to the study request
20.	NPS-12	Impact of Operations of Project on Sediment Storage, Stability and Transport on Skagit River and its Influence on Endangered Species Habitat	NPS	10/23/20	×	✓	GE-04 Geomorphology Study See Section 6.2.14 of this PSP for response to the study request Sediment transport model
							component is not proposed; see Section 6.3.8 of this PSP for response to the study request

	Study Request				Proposed for		
	ID #	Title	Entity	Date	Study / Proposed for Study with Modifications	Not Proposed for Study	Correlation to City Light Study
21.	NPS-13	Impact of Operations of Project on Process Flows of Water, Wood, and Sediment Below Gorge Dam	NPS (Supported by Sauk-Suiattle Indian Tribe, Swinomish Indian Tribal Community)	10/23/20	¥		GE-04 Geomorphology Study See Section 6.2.15 of this PSP for response to the study request
22.	NPS-14	Impact of Changing Hydrologic Regime on Operations of Project	NPS (Supported by Swinomish Indian Tribal Community)	10/23/20		V	See Section 6.3.9 of this PSP for response to the study request
23.	NPS-15	Recreation Facilities and Visitor Use Study	NPS (Supported by American Whitewater)	10/23/20	×		RA-01 Recreation Assessment See Section 6.2.20 of this PSP for response to the study request
24.	SC-01	Siren Warning Study	Skagit County	10/23/20		~	See Section 6.3.17 of this PSP for response to the study request
25.	SC-02	Mitigation Lands Study	Skagit County	10/23/20		~	See Section 6.3.12 of this PSP for response to the study request
26.	USFS-01	Recreation Facility and Use Study	United States Forest Service (USFS) (Supported by American Whitewater)	10/23/20	×		RA-01 Recreation Assessment See Section 6.2.20 of this PSP for response to the study request

		Study Request			Proposed for		
	ID #	Title	Entity	Date	Study / Proposed for Study with Modifications	Not Proposed for Study	Correlation to City Light Study
27.	AFWCC-01	Climbing Resources Study	Access Fund and Washington Climbers Coalition	10/26/20		√	See Section 6.3.11 of this PSP for response to the study request
28.	NNTC-01	Completion of the Traditional Cultural Properties Survey	Nlaka'pamux Nation Tribal Council (NNTC)	10/26/20	✓	✓	CR-01 Cultural Resources Data Synthesis CR-04 Properties with Traditional Cultural Significance Study See Section 6.2.1 of this PSP for response to the study request Chert analysis component is not proposed; see Section 6.3.1 of this PSP for response to the study
29.	NNTC-02	Evaluation of Identified Sites	NNTC	10/26/20	✓		CR-01 Cultural Resources Data Synthesis CR-04 Properties with Traditional Cultural Significance Study See Section 6.2.2 of this PSP for response to the study request
30.	NNTC-03	Chert Analysis	NNTC	10/26/20		√	See Section 6.3.1 of this PSP for response to the study request

	Study Request				Proposed for		
	ID #	Title	Entity	Date	Study / Proposed for Study with Modifications	Not Proposed for Study	Correlation to City Light Study
31.	NNTC-04	Traditional Cultural Properties Mitigation and Management Study	NNTC	10/26/20	~		CR-01 Cultural Resources Data Synthesis CR-04 Properties with Traditional Cultural Significance Study See Section 6.2.3 of this PSP for
32.	SITC-01	Reservoir Operation Impacts on Terrestrial Wildlife Study	Swinomish Indian Tribal Community (SITC) (Supported by Sauk-Suiattle Indian Tribe)	10/26/20		~	response to the study request See Section 6.3.14 of this PSP for response to the study request
33.	SITC-02	Fish and Wildlife Mitigation Land Access, Stewardship, and Habitat Assessment	SITC (Supported by BIA, NPCA, Sauk-Suiattle Indian Tribe)	10/26/20		~	See Section 6.3.13 of this PSP for response to the study request
34.	SITC-03	Cultural Resources Study	SITC	10/26/20	V		CR-01 Cultural Resources Data Synthesis CR-02 Cultural Resource Survey CR-04 Properties with Traditional Cultural Significance Study See Section 6.1.2 of this PSP for response to the study request

		Study Request			Proposed for		
	ID #	Title	Entity	Date	Study / Proposed for Study with Modifications	Not Proposed for Study	Correlation to City Light Study
35.	SSIT-01	Ethnographic Study	Sauk-Suiattle Indian Tribe (SSIT)	10/26/20		~	See Section 6.3.2 of this PSP for response to the study request
36.	SSIT-02	Impacts of Transmission Line Corridor Right-of-Way (ROW) on Terrestrial Wildlife/Habitat and Native Plant Species	SSIT	10/26/20		\checkmark	See Section 6.3.16 of this PSP for response to the study request
37.	SSIT-03	Impacts of Transmission Line Right of Way (ROW) on Aquatic Habitat and Riparian Zone for the Skagit River Hydroelectric Project	SSIT	10/26/20	~		GE-02 Erosion and Geologic Hazards Study TR-01 Vegetation Mapping Study TR-02 Wetland Assessment TR-04 Invasive Plants Study See Section 6.2.23 of this PSP for response to the study request
38.	SSIT-04	Cultural Resources Transmission Line Study	SSIT	10/26/20	V		CR-01 Cultural Resources Data Synthesis CR-02 Cultural Resource Survey CR-04 Properties with Traditional Cultural Significance Study See Section 6.2.4 of this PSP for response to the study request

		Study Request			Proposed for		
	ID #	Title	Entity	Date	Study / Proposed for Study with Modifications	Not Proposed for Study	Correlation to City Light Study
39.	SSIT-05	Cultural Resources Battle Site Study	SSIT	10/26/20	✓		CR-01 Cultural Resources Data Synthesis
							CR-04 Properties with Traditional Cultural Significance Study
							See Section 6.2.5 of this PSP for response to the study request
40.	USFWS-01	Feasibility Analysis of Fish Passage at the Skagit River Hydroelectric Project	USFWS	10/26/20	*		FA-04 Fish Passage Study See Section 6.2.10 of this PSP for
41.	USFWS-02	Quantifying the Habitat and Production Potential of ESA- Listed Salmon, Steelhead, and Bull Trout above Dams	USFWS	10/26/20	✓ ✓		FA-04 Fish Passage Study See Section 6.2.10 of this PSP for response to the study request
42.	USFWS-03	Skagit Project Water Quality Assessment and Modeling	USFWS	10/26/20	×		FA-01 WQ Monitoring Study See Section 6.2.9 of this PSP for response to the study request
43.	USFWS-04	Skagit Project Reservoir Secondary Productivity Study	USFWS	10/26/20		~	See Section 6.3.4 of this PSP for response to the study request
44.	USFWS-05	Skagit Project Recreational Fishing (Creel) Survey	USFWS	10/26/20		~	See Section 6.3.7 of this PSP for response to the study request
45.	USFWS-06	Population Structure of Native Fish in the Project Area	USFWS	10/26/20	~		See Section 6.2.17 of this PSP for response to the study request
46.	USFWS-07	Determine the Suitability and Productive Potential of Littoral and Riparian Habitat for Resident and Anadromous Fish in the Project Area	USFWS	10/26/20		V	See Section 6.3.5 of this PSP for response to the study request

		Study Request			Proposed for		
	ID #	Title	Entity	Date	Study / Proposed for Study with Modifications	Not Proposed for Study	Correlation to City Light Study
47.	USFWS-08	Evaluating Existing Fish Passage and Entrainment through the Skagit Hydroelectric Project Dams and Appurtenant Facilities	USFWS	10/26/20		√	See Section 6.3.3 of this PSP for response to the study request
48.	USFWS-09	Impact of the Operations of Skagit Hydroelectric Project (#553) Backwater on Major Tributaries to Reservoirs and its Influence on Habitat Quality	USFWS	10/26/20	×		GE-03 Sediment Deposition Study See Section 6.2.12 of this PSP for response to the study request
49.	USFWS-10	Habitat Use and Population Dynamics of Reservoir Fish	USFWS	10/26/20		~	See Section 6.3.5 of this PSP for response to the study request
50.	USFWS-11	Impact of the Operations of Skagit Hydroelectric Project (#553) on Sediment Capture within Reservoirs and Sediment Recovery below Gorge Dam and its Influence on Endangered Species Habitat	USFWS	10/26/20	×		GE-04 Geomorphology Study See Section 6.2.14 of this PSP for response to the study request
51.	USFWS-12	Impact of the Operations of Skagit Hydroelectric Project (#553) on Sediment Storage, Stability and Transport on Skagit River and its	USFWS	10/26/20	×		GE-04 Geomorphology Study See Section 6.2.14 of this PSP for response to the study request
		Influence on Endangered Species Habitat				~	Sediment transport model component is not proposed; see Section 6.3.8 of this PSP for response to the study request
52.	USFWS-13	Impact of the Operations of Skagit Hydroelectric Project (#553) on Process Flows of Water, Wood, and Sediment below Gorge Dam	USFWS	10/26/20	√		GE-04 Geomorphology Study See Sections 6.2.14 and 6.2.15 of this PSP for responses to the study request

	Study Request				Proposed for		
	ID#	Title	Entity	Date	Study / Proposed for Study with Modifications	Not Proposed for Study	Correlation to City Light Study
53.	USFWS-14	Impact of a Changing Hydrologic Regime on the Operations of the Skagit Hydroelectric Project (#553)	USFWS	10/26/20		✓	See Section 6.3.9 of this PSP for response to the study request
54.	USFWS-15	Geomorphology and Aquatic Habitat Complexity Study	USFWS	10/26/20	×		GE-04 Geomorphology Study FA-02 Instream Flow Model Development Study TR-02 Wetland Assessment See Sections 6.2.13, 6.2.14, 6.2.15, and 6.2.16 of this PSP for responses to the study request
55.	USFWS-16	The impacts of Project operations on aquatic & riparian biological productivity downstream of Gorge Dam	USFWS	10/26/20		~	See Section 6.3.4 of this PSP for response to the study request
56.	USFWS-17	Impact of Operations of the Skagit Hydroelectric Project on Terrestrial Wildlife connectivity	USFWS	10/26/20		~	See Sections 6.3.14 and 6.3.16 of this PSP for responses to the study request
57.	USFWS-18	Assessment of Fish and Wildlife Conservation Lands: Access, Stewardship, and Habitat Use	USFWS	10/26/20		~	See Section 6.3.13 of this PSP for response to the study request
58.	USFWS-19	Impact of the Operations of Skagit Hydroelectric Project (#553) on Northern Spotted Owl	USFWS	10/26/20	¥		TR-01 Vegetation Mapping Study TR-10 North Spotted Owl Habitat Analysis See Section 6.2.22 of this PSP for response to the study request

		Study Request			Proposed for		
	ID #	Title	Entity	Date	Study / Proposed for Study with Modifications	Not Proposed for Study	Correlation to City Light Study
59.	USIT-01	Feasibility Analysis of Fish Passage at the Skagit River Hydroelectric Project (Fish Passage Feasibility)	Upper Skagit Indian Tribe (USIT)	10/26/20	~		FA-04 Fish Passage Study See Section 6.2.10 of this PSP for response to the study request
60.	USIT-02	Quantifying Habitat and Production Potential of ESA-listed Chinook Salmon, Steelhead, Bull Trout, Coho Salmon, and Sockeye Salmon above Gorge Dam (Tributary Habitat Productivity)	USIT	10/26/20	×		FA-04 Fish Passage Study See Section 6.2.10 of this PSP for response to the study request
61.	USIT-03	Evaluating Existing Fish Passage: Spill and Entrainment Through Ross, Diablo, Gorge Dams and Appurtenant Facilities Through the Project Area at the Skagit River Hydroelectric Project (Spill and Entrainment)	USIT	10/26/20		~	See Section 6.3.3 of this PSP for response to the study request
62.	USIT-04	Assessment of Gorge Dam Removal	USIT (Supported by American Whitewater, WDFW)	10/26/20		✓	See Section 6.3.10 of this PSP for response to the study request
63.	USIT-05	Reservoir Littoral, Benthic, and Pelagic Invertebrate Productivity (Reservoir Secondary Productivity)	USIT	10/26/20		✓	See Section 6.3.4 of this PSP for response to the study request
64.	USIT-06	Littoral and Riparian Habitat Quality	USIT	10/26/20		✓	See Section 6.3.5 of this PSP for response to the study request

	Study Request				Proposed for		
	ID #	Title	Entity	Date	Study / Proposed for Study with Modifications	Not Proposed for Study	Correlation to City Light Study
65.	USIT-07	Water Quality Impacts Above and Below SCL Project Infrastructure (Water Quality)	USIT (Supported by Sauk-Suiattle Indian Tribe)	10/26/20	Ý		FA-01 WQ Monitoring Study See Section 6.2.9 of this PSP for response to the study request
66.	USIT-08	Geomorphology and Anadromous Salmonid Habitat	USIT (Supported by Sauk-Suiattle Indian Tribe, Swinomish Indian Tribal Community)	10/26/20	✓	✓	GE-04 Geomorphology Study FA-02 Instream Flow Model Development Study TR-02 Wetland Assessment See Sections 6.2.13, 6.2.14, 6.2.15, and 6.2.16 of this PSP for responses to the study request Sediment transport model component is not proposed; see Section 6.3.8 of this PSP for
67.	USIT-09	The Impacts of Project Operations on Aquatic & Riparian Biological Productivity Downstream of Gorge Dam (Littoral and Riparian Productivity)	USIT	10/26/20		√	See Section 6.3.4 of this PSP for response to the study request
68.	USIT-10	Efficiency of Engineered Spawning Channels as Mitigation to Loss of Off Channel Habitats Downstream of the Skagit Project (#553)	USIT (Supported by Sauk-Suiattle Indian Tribe, Swinomish Indian Tribal Community)	10/26/20		~	See Section 6.3.6 of this PSP for response to the study request

		Study Request Proj					
	ID #	Title	Entity	Date	Study / Proposed for Study with Modifications	Not Proposed for Study	Correlation to City Light Study
69.	USIT-11	Impact of a Changing Hydrologic Regime on the Operations of the Skagit Hydroelectric Project (#553)	USIT	10/26/20		√	See Section 6.3.9 of this PSP for response to the study request
70.	USIT-12	Fish and Wildlife Mitigation Land Access, Stewardship and Habitat Assessment	USIT (Supported by BIA, Sauk- Suiattle Indian Tribe)	10/26/20		~	See Section 6.3.13 of this PSP for response to the study request
71.	USIT-13	Impacts of Transmission Line Right-of-Way (ROW) on Terrestrial Wildlife/Habitat and Native Plant Species	USIT (Supported by BIA)	10/26/20		1	See Section 6.3.16 of this PSP for response to the study request
72.	USIT-14	Impact of the Operations of Skagit Hydroelectric Project (#553) on Terrestrial Wildlife (Wildlife Connectivity)	USIT (Supported by Sauk-Suiattle Indian Tribe)	10/26/20		V	See Section 6.3.14 of this PSP for response to the study request
73.	WDFW-01	Evaluation of Fish Barriers and Fish Species in the Bypass Reach	WDFW	10/26/20	×		FA-04 Fish Passage Study FA-05 Bypass Instream Flow Model Development Study See Sections 6.2.10 and 6.2.11 of this PSP for responses to the study request
74.	WDFW-02	Feasibility Analysis of Fish Passage at the Skagit River Hydroelectric Project (Fish Passage Feasibility)	WDFW	10/26/20			FA-04 Fish Passage Study See Section 6.2.10 of this PSP for response to the study request

		Study Request			Proposed for		
	ID #	Title	Entity	Date	Study / Proposed for Study with Modifications	Not Proposed for Study	Correlation to City Light Study
75.	WDFW-03	Quantifying Habitat and Production Potential of ESA-listed Chinook Salmon, Steelhead, Bull Trout, Coho Salmon, and Sockeye Salmon above Gorge Dam	WDFW	10/26/20	Ý		FA-04 Fish Passage Study See Section 6.2.10 of this PSP for response to the study request
76.	WDFW-04	Evaluating Existing Fish Passage: Spill and Entrainment Through Ross, Diablo, Gorge Dams and Appurtenant Facilities Through the Project Area at the Skagit River Hydroelectric Project (Spill and Entrainment)	WDFW	10/26/20		~	See Section 6.3.3 of this PSP for response to the study request
77.	WDFW-05	Geomorphology and Anadromous Salmonid Habitat	WDFW	10/26/20	✓	√	GE-04 Geomorphology Study FA-02 Instream Flow Model Development Study TR-02 Wetland Assessment See Sections 6.2.13, 6.2.14, 6.2.15, and 6.2.16 of this PSP for responses to the study request Sediment transport model
							component is not proposed; see Section 6.3.8 of this PSP for response to the study request
78.	WDFW-06	The Impacts of Project Operations on Aquatic & Riparian Biological Productivity Downstream of Gorge Dam (Littoral and Riparian Productivity)	WDFW	10/26/20		✓	See Section 6.3.4 of this PSP for response to the study request

		Study Request			Proposed for		
	ID #	Title	Entity	Date	Study / Proposed for Study with Modifications	Not Proposed for Study	Correlation to City Light Study
79.	WDFW-07	Efficiency of Engineered Spawning Channels as Mitigation to Loss of Off Channel Habitats Downstream of the Skagit Project (#553)	WDFW	10/26/20		Ý	See Section 6.3.6 of this PSP for response to the study request
80.	WDFW-08	Impact of the Operations of Skagit Hydroelectric Project (#553) on Process Flows of Water, Wood and Sediment Below Gorge Dam	WDFW	10/26/20	×		GE-04 Geomorphology Study See Sections 6.2.14 and 6.2.15 of this PSP for response to the study request
81.	WDFW-09	Wood Budget Inventory and Assessment	WDFW	10/26/20	1		GE-04 Geomorphology Study See Section 6.2.13 of this PSP for response to the study request
82.	WDFW-10	Impact of the Operations of Skagit Hydroelectric Project (#553) on Sediment Capture Within Reservoirs and Sediment Recovery Below Gorge Dam and Its Influence on Endangered Species Habitat	WDFW	10/26/20	×		GE-04 Geomorphology Study See Section 6.2.14 of this PSP for response to the study request
83.	WDFW-11	Impact of the Operations of Skagit Hydroelectric Project (#553) Backwater on Six Major Streams Tributary to Ross Lake and its Influence on Habitat Quality	WDFW	10/26/20	4		GE-03 Sediment Deposition Study See Section 6.2.12 of this PSP for response to the study request
84.	WDFW-12	Impact of a Changing Hydrologic Regime on the Operations of the Skagit Hydroelectric Project (#553)	WDFW	10/26/20			See Section 6.3.9 of this PSP for response to the study request

	Study Request				Proposed for					
	ID #	Title	Entity		Study / Proposed for Study with Modifications	Not Proposed for Study	Correlation to City Light Study			
85.	WDFW-13	Reservoir Littoral, Benthic, and Pelagic Invertebrate Productivity (Reservoir Secondary Productivity)	WDFW	10/26/20		1	See Section 6.3.4 of this PSP for response to the study request			
86.	WDFW-14	Littoral and Riparian Habitat Quality	WDFW	10/26/20		~	See Section 6.3.5 of this PSP for response to the study request			
87.	WDFW-15	Habitat Use and Population Dynamics of Reservoir Fish	WDFW	10/26/20	~		See Section 6.2.17 of this PSP for response to the study request			
						~	Habitat use and population dynamics component is not proposed; see Section 6.3.5 of this PSP for response to the study request			
88.	WDFW-16	Recreational Fishing (Creel) Survey	WDFW	10/26/20		~	See Section 6.3.7 of this PSP for response to the study request			
89.	WDFW-17	Water Quality impacts above and below SCL Project infrastructure (Water Quality)	WDFW	10/26/20	*		FA-01 WQ Monitoring Study See Section 6.2.9 of this PSP for response to the study request			
90.	WDFW-18	Impacts of Transmission Line Corridor Right-of-Way (ROW) on Terrestrial Wildlife/Habitat and Native Plant Species	WDFW	10/26/20		√	See Section 6.3.16 of this PSP for response to the study request			
91.	WDFW-19	Impact of the Operations of Skagit Hydroelectric Project (#553) on Terrestrial Wildlife (Wildlife Connectivity)	WDFW	10/26/20		√	See Section 6.3.14 of this PSP for response to the study request			

		Study Request			Proposed for						
	ID #	Title	Entity	Date	Study / Proposed for Study with Modifications	Not Proposed for Study	Correlation to City Light Study				
92.	STI-01	Comprehensive Ethnographic Study	Stillaguamish Tribe of Indians (STI)	10/26/20	*		CR-01 Cultural Resources Data Synthesis CR-04 Properties with Traditional Cultural Significance Study See Section 6.2.6 of this PSP for response to the study request				
93.	STI-02	Historic Properties Study	STI	10/26/20	✓		CR-02 Cultural Resources Survey See Section 6.2.7 of this PSP for response to the study request				
94.	STI-03	Study of Specific Sites as Archaeological District	STI	10/26/20	~		CR-02 Cultural Resources Survey See Section 6.2.8 of this PSP for response to the study request				
95.	STI-04	Beaver Project	STI	11/4/20 (dated 10/30)	×		TR-09 Beaver Habitat Assessment See Section 6.1.3 of this PSP for response to the study request				
96.	STI-05	Harlequin Duck Breeding Habitat Analysis	STI	11/4/20 (dated 10/30)		~	See Section 6.3.15 of this PSP for response to the study request				
97.	STI-06	Spotted Owl Habitat Map	STI	11/4/20 (dated 10/30)	¥		TR-01 Vegetation Mapping Study TR-10 North Spotted Owl Habitat Analysis See Section 6.2.22 of this PSP for response to the study request				

	Study Requested Category # = Submitted Study Request by ID#	AF / WCC	Ecology	NMFS	NNTC	SAN	SDIDC	SITC	Skagit County	SSIT	ITS	USFS	USIT	USFWS	WDFW
1	Completion of TCP Survey				01										
2	Evaluation of Sites				02										
3	TCP Mitigation and Management				04										
4	Cultural Resource Study							03							
5	Cultural Resources T-Line Study									04					
6	Cultural Resources Battle Site Study									05					
7	Comprehensive Ethnographic Study										01				
8	Historic Properties Study										02				
9	Study of Specific Sites as Archaeological District										03				
10	Chert Analysis				01 03										
11	Ethnographic Study									01					
12	Water Quality Monitoring		01	01		02							07	03	17
13	Fish Passage			03 04		01 08							01 02	01 02	01 02 03
14	Instream/Recreation Flow Study		02												01
15	Reservoir Turbidity Backwater Effect					10								09	11
16	Instream Large Wood			02									08	15	05 09
17	Sediment Budget			02		11 12							08	11 12 13 15	05 08 10
18	Channel Forming Flows			02		13							08	13	05 08
19	Potential Floodplain Connectivity of Off-Channel Aquatic Habitat			02									08	15	05
20	Native Fish Genetics Baseline					05								06	15

Table 6.0-2.Categories of formal study requests filed with FERC.

	Study Requested Category	AF / WCC	Ecology	NMFS	NNTC	SdN	SDIDC	SITC	kagit County	SSIT	ITS	USFS	USIT	USFWS	WDFW
	# = Submitted Study Request by ID#														
21	Reservoir Entrainment					07							03	08	04
22	Aquatic Productivity					03							05 09	04 16	06 13
23	Reservoir Habitat and Fish Populations					06 09							06	07 10	14 15
24	Engineered Spawning Channels												10		07
25	Creel Survey					04								05	16
26	Sediment Transport Modeling			02		12							08	12	05
27	Effects of Climate Change on Hydrology and Project Operations					14	01						11	14	12
28	Flood Storage Timing						01								
29	Modeling Irrigation Water Supply						02								
30	Gorge Dam Removal												04		
31	Recreation Facilities and Visitor Use Study					15						01			
32	Instream/Recreation Flow Study		02												
33	Climbing Study	01													
34	Wildlife Studies – Beaver										04				
35	Wildlife Studies – Northern Spotted Owl										06			19	
36	Transmission Line Right of Way (ROW) Aquatic Habitat									03					
37	Mitigation Lands – Cost-Benefit Analysis								02						
38	Mitigation Lands – Habitat							02					12	18	
39	Wildlife Studies – Connectivity							01					14	17	19
40	Wildlife Studies – Harlequin Duck										05				
41	Transmission Line									02			13	17	18
42	Siren Warning System								01						

6.1 Study Requests Included in City Light's PSP

6.1.1 Inventory of Historic Properties of Traditional Cultural Significance

During ethnographic outreach for the CR-01 Cultural Resources Data Synthesis and planning meetings, several Indian tribes and two First Nations identified geographic areas of interest within the APE or one-mile literature review buffer surrounding the APE and noted the need to further research and verify locations of traditional cultural places to determine which could potentially be affected by the Project activities. Some participants also identified particular areas where NRHP evaluations would likely need to be completed. Others identified broader geographic zones and suggested using a landscape/waterways and migratory pathways approach to conduct research through ethnographic and historic records, genealogical connections, language/place names, and the archaeological record to identify the specific areas within the Project where traditional cultural places may be at risk. These places would need to be verified through on-the-ground surveys and site visits. Additional concerns included protection of culturally-sensitive information from public view or disclosure and issues around potential storage and methods for protecting information.

Concerns identified by Indian tribes and First Nations about potential Project-related effects to cultural resources include ground disturbance, flooding, vegetation clearing, deforestation, visual, sound, and atmospheric impacts to these areas from vehicles, recreational users, and energy emissions as well as access limitations to reach properties for traditional gathering and cultural practices. They also had concerns about direct, indirect, and cumulative impacts due to increased recreational uses. While not all the potential effects they identified appear to be Project-dependent or Project related, they are viewed as interconnected issues which require a thoughtful, holistic, and multi-disciplinary approach.

These and other comments through CRWG meetings led City Light to develop CR-04 Inventory of Historic Properties with Traditional Cultural Significance Study (Properties with Traditional Cultural Significance Study), which is intended to build upon existing data compiled in the Cultural Resources Data Synthesis, and support the ethnographic study, survey and field visits specific to the APE. Several participants have already noted particular important places and ethnographic resources to refer to when evaluating nexus to the Project and potential Project effects. The Properties with Traditional Cultural Significance Study Plan is appended to this PSP and study goals are summarized in Section 5.4 of this PSP.

6.1.2 Cultural Resources Study

The Swinomish Indian Tribal Community submitted a study request regarding cultural resources (SITC-03 Cultural Resources Study). The study request proposes to outline, identify, evaluate, and assess potential adverse effects on and impacts to resources, places, and properties of traditional religious and cultural importance to the Swinomish Indian Tribal Community associated with the Project. This would include historic properties and natural-cultural resources considered under the NHPA, NEPA, and FERC Indian Policy. The results of the study would serve as the informational basis of government-to-government consultation and land/water management associated with the Project to ensure Swinomish Indian Tribal Community perspectives, values, beliefs, and ongoing cultural and religious practices properly inform and pragmatically guide historic property and cultural and treaty resource treatment, preservation, protection, avoidance, and/or mitigation measures and considerations.

City Light proposes to adopt this study request. City Light believes that its proposed studies, CR-04 Inventory of Historic Properties with Traditional Cultural Significance Study (Properties with Traditional Cultural Significance Study) and CR-02 Cultural Resources Survey, will collect the information requested in SITC-03 within the APE where Project effects are occurring or are reasonably foreseeable. The Properties with Traditional Cultural Significance Study includes an inventory of properties with traditional cultural significance that are within, intersect, or encompass the APE. The Properties with Traditional Cultural Significance Study is designed to identify and document historic properties pursuant to Section 106 of the NHPA. The proposed methodology in the Properties with Traditional Cultural Significance Study includes a step (Step 2) for City Light to work with individual Indian tribes and First Nations to develop research designs to outline the specific protocols that will work for each individual community during implementation of the study.

The Cultural Resources Survey includes an inventory of historic properties represented by archaeological and built environment resources. Management measures for historic properties will also be considered under the Historic Properties Management Plan (HPMP) that City Light anticipates being developed and implemented under a programmatic agreement (PA) to conclude the Section 106 of the NHPA process for the FERC relicensing. The HPMP will be the mechanism under the new FERC license for considering potential Project-related effects to historic properties.

6.1.3 Wildlife Studies – Beaver

Stillaguamish Tribe of Indians has requested a Beaver Project Study (STI-04) to identify current occupied sites, historically occupied sites and locations for beaver release or beaver dam analogue (BDA) construction and incorporate managing problem beavers in place using beaver deceivers or pond levelers when possible.

While the requester did not address the FERC Study Criteria, City Light will be conducting the TR-09 Beaver Habitat Assessment to address information requests from LPs. City Light proposes to identify beaver occurrences in the study area based on existing information and field observations. Additionally, the Beaver Habitat Assessment will map the suitability of aquatic habitats in the study area for beaver. City Light's goal is to gain an understanding of the current conditions at the Chum off-channel sites, to identify any issues caused by beaver activity that conflicts with salmon access to the channels, and to assess overall beaver habitat potential within a 2-mile buffer of the Project Boundary, which includes the 100-year floodplain and segments of adjacent tributaries of the Skagit watershed. This information will be used to assess potential management actions, including beaver relocation at the Chum channels, under the new Project license.

6.2 Study Requests Partially Included in City Light's PSP

6.2.1 Completion of TCP Survey

The Nlaka'pamux Nation Tribal Council submitted a study request for completion of a TCP survey in the drawdown of Ross Lake reservoir and higher elevation areas surrounding the reservoir (NNTC-01 Completion of TCP Survey). As part of the current license, the Nlaka'pamux Nation Tribal Council entered a MOA with City Light to conduct a TCP study which included ethnographic and archival research, interviews with elders, and on-the-ground survey in Ross Lake. The Nlaka' pamux Nation Tribal Council conducted this TCP study under the current license and prepared a confidential report documenting their findings (NNTC 2020). A result of that study was to recommend additional work to document and mitigate effects to the TCPs the Nlaka' pamux Nation Tribal Council had identified. A key concern of Nlaka' pamux Nation Tribal Council is that these important and culturally-sensitive resources could be affected by a number of activities – some of which are potentially Project-related, such as shoreline and reservoir erosion, while others are not clearly Project-related, like recreation and trail maintenance in higher elevations above the drawdown and outside of the APE on land managed by the NPS. A collaborative effort that crosses jurisdictional and agency boundaries is desired in order to protect the resources over the long term and mitigate effects resulting from City Light activities caused by power generation, recreation, and maintenance of recreation facilities.

NNTC-01 Completion of TCP Survey would build upon findings in their prior work and investigate new areas where data had not yet been collected. The methods in their proposal would include pedestrian survey of the Ross Reservoir drawdown and nearshore on both east and west banks and inside and outside of the APE, additional ethnographic interviews and archival research, examination of artifacts at the British Columbia Royal Museum which may link to toolstone sources in Ross Lake, development of a training video for environmental workers including City Light and NPS employees to facilitate awareness and proper respectful treatment for the protection of sensitive cultural resources, and discussions (i.e., travel/meetings) with other Indian tribes and First Nations.

The Nlaka'pamux Nation Tribal Council proposed to conduct the study themselves. However, in a subsequent meeting with City Light October 29, 2020, Nlaka'pamux Nation Tribal Council had reviewed City Light's draft study plan for the CR-04 Inventory of Historic Properties with Traditional Cultural Significance Study (Properties with Traditional Cultural Significance Study) and stated a willingness to work with City Light as participants in that study if it could be revised to include the following: (1) adjust study schedule to enable fieldwork in the Ross Lake drawdown in April of the first year; (2) add language to the methods to make the pedestrian survey component clear; and (3) meet and collaborate with the Nlaka'pamux Nation Tribal Council and NPS on planning for management strategies where the resources continue outside of the Project Boundary and APE.

NNTC-01 Completion of TCP Survey contains substantial detail suitable for a research design and meets most of the FERC Study Criteria. However, it does not demonstrate nexus between Project operations and effects on the resources to be studied (18 CFR § 5.9(b)(5)) outside of the APE; some identified areas in the study request are located outside of the Project Boundary and the request did not demonstrate a potential Project effect on those areas outside the APE. Accordingly, City Light proposes to adopt a portion of this study request where nexus with Project operations is demonstrated. Specifically, City Light incorporates the study request where it falls within the APE and will complete it as part of its Properties with Traditional Cultural Significance Study. City Light has provided work schedules in the Properties with Traditional Cultural Significance Study Plan which allow for survey during two drawdown periods and outlined report deadlines to fit within the overall ILP schedule. Additionally, City Light will work with the Nlaka'pamux Nation Tribal Council to confirm a research design considering the methods provided in NNTC-01 Completion of Step 2 of City Light's Properties with Traditional Cultural Significance

Study. Further, City Light agrees to work with the Nlaka'pamux Nation Tribal Council and NPS on cross-agency coordination for the purpose of reducing threats to resources through trainings and best management strategies and planning potential management plans or agreements, as needed.

Finally, City Light's APE does not include areas within Canada. Although Project operations potentially could affect cultural resources in Canada (e.g., fluctuation of Ross Lake water surface elevations), cultural sites in Canada are not eligible for listing in the NRHP (54 U.S.C. § 302102 [requiring the NRHP to include "districts, sites, buildings, structures, and objects significant in American history, architecture, archeology, engineering, and culture"]; id. § 306108 [requiring consultation for "a proposed Federal or federally assisted undertaking in any State"]). The undertaking, in this instance, is FERC's relicensing of the Project, which is located entirely in the United States, in the State of Washington. City Light will, however, be evaluating whether FERC's relicensing of the Project affects any properties in Canada that are formally listed on either the World Heritage List or the Canadian Register of Historic Places.

City Light supports the Nlaka'pamux Nation Tribal Council's concept of developing a training program by relying on the expertise of elders and creating videos. However, implementation of a training program is not appropriate as a relicensing study. Instead, City Light is already developing a cultural resource awareness training program and will work collaboratively with NNTC and other Indian tribes and First Nations to develop this training content.

6.2.2 Evaluation of Sites

The Nlaka'pamux Nation Tribal Council submitted a study request to evaluate all identified Nlaka'pamux Nation Tribal Council's cultural sites for eligibility for the NRHP based upon the information and experience of Nlaka'pamux Nation Tribal Council elders and shamans (NNTC-02 Evaluation of Sites). These members of the Nlaka'pamux Nation Tribal Council would provide their expertise to assess which of the traditional cultural places may be eligible for the National Register of Historic Places.

NNTC-02 Evaluation of Sites meets most of the FERC Study Criteria. However, it does not demonstrate nexus between Project operations and effects on the resources to be studied (18 CFR § 5.9(b)(5)) outside of the APE. Accordingly, City Light proposes to adopt a portion of this study request where nexus with Project operations is demonstrated. Specifically, City Light incorporates the study request where it falls within the APE and will complete it as part of CR-04 Inventory of Historic Properties with Traditional Cultural Significance, which states that should Project-related effects be identified outside the APE, the APE will be expanded to incorporate those areas. While City Light's APE does not extend into Canada (see Section 6.2.1), City Light will be evaluating whether FERC's relicensing of the Project affects any properties in Canada that are formally listed on either the World Heritage List or the Canadian Register of Historic Places.

6.2.3 TCP Mitigation and Management

The Nlaka'pamux Nation Tribal Council submitted a study request proposing a comprehensive examination of all management practices that may be damaging to traditional cultural properties, including activities associated with relicensing studies, ongoing hydroelectric operations, erosion related to the reservoir and its annual drawdown, recreation practices in the RLNRA, and NPS
management and maintenance (NNTC-04 TCP Mitigation and Management). This study requests that City Light complete a management plan identifying these effects cooperatively with NPS, and with full participation from the Nlaka'pamux Nation Tribal Council. The study request states that Nlaka'pamux Nation Tribal Council cultural sites are being damaged by trail clearing and maintenance, construction, disturbance of trees or rocks; human activities associated with recreation trails, boat docks, and other recreation amenities; environmental survey practices; and erosion associated with landscape modifications and the annual reservoir drawdown.

NNTC-04 TCP Mitigation and Management does not meet a majority of the FERC Study Criteria. It does not provide clear goals and objectives of the study, a study methodology, or level of effort and cost (18 CFR §§ 5.9(b)(1), (6), and (7)). Although NNTC-04 suggests nexus between Project operations and effects on the resources, it does not demonstrate nexus between Project operations and effects on the resources/locations to be studied (18 CFR § 5.9(b)(5)). Accordingly, City Light proposes to adopt a portion of this study request where nexus with Project operations is demonstrated as part of its CR-04 Inventory of Historic Properties with Traditional Cultural Significance Study (Properties with Traditional Cultural Significance Study will identify Project effects on cultural sites in the APE. These effects will be managed under a management plan for the new license. City Light agrees to work collaboratively with the Nlaka'pamux Nation Tribal Council and NPS on cross-agency coordination for the purpose of managing Project effects on Nlaka'pamux Nation Tribal Council and NPS managed lands and perceived threats to cultural resources outside the APE.

6.2.4 Cultural Resources Transmission Line Study

The Sauk-Suiattle Indian Tribe submitted a study request for completing a cultural resources survey of the entirety of the Project transmission line ROWs, including a 250-foot buffer to either side of the Project transmission lines (SSIT-04 Cultural Resources Transmission Line Study). The study request states that the Sauk-Suiattle Indian Tribe's qualified staff members, in cooperation with other tribal entities, if they chose to participate, would conduct this survey. In a follow up meeting on October 28, 2020, City Light confirmed that this study would include survey of places of traditional cultural importance and archaeological resources.

SSIT-04 Cultural Resources Transmission Line Study does not meet a majority of the FERC Study Criteria. The study request does not provide clear goals and objectives of the study, a study methodology, or level of effort and cost, and does not demonstrate nexus between Project operations and effects on the resources/locations to be studied (18 CFR §§ 5.9(b)(1), (5), (6), and (7)). City Light is proposing to focus its study efforts where Project-related effects are occurring. Therefore, City Light proposes to adopt a portion of this study request under the CR-02 Cultural Resources Survey and CR-04 Inventory of Historic Properties with Traditional Cultural Significance Study (Properties with Traditional Cultural Significance Study).

The Cultural Resources Survey includes partial survey of Project transmission line ROWs. While the Project transmission lines are included in the APE (defined as a 250-foot buffer to either side of the Project transmission lines), City Light believes these ROWs cannot be field surveyed in two years and is proposing to prioritize survey areas. The Cultural Resources Survey will focus survey efforts on high and moderate probability areas (i.e., areas with a high sensitivity for cultural resources) where Project-related activities occur that could impact cultural resources. It does not intend to survey the entirety of the Project transmission line ROWs, as proposed in SSIT-04 Cultural Resources Transmission Line Study. However, City Light notes that additional survey of the Project transmission line ROWs, as related to considering Project effects to historic properties, could be included in the HPMP. City Light anticipates a HPMP being developed and implemented under a PA to conclude the Section 106 of the NHPA process for the FERC relicensing. The HPMP will be the mechanism under the new FERC license for considering potential Project-related effects to historic properties.

Implementation of the Cultural Resources Survey will include inviting Indian tribes and First Nation representatives to participate in field survey efforts, however, City Light intends to contract directly with a qualified cultural resources management consultant to coordinate and execute this work.

This study request is also partially adopted under the Properties with Traditional Cultural Significance Study. City Light's approach to this study is to consult and engage with Indian tribes and First Nations and work with each group that wants to participate to develop the detailed approaches, methods, and sensitivities required by each individual group in order to respect Indian tribal and First Nation knowledge sovereignty, honor the requirements of 36 CFR § 800.4(c)(1), and apply the guidance of NR Bulletin 38 as well as incorporate confidentiality protocols designed in coordination with the communities who participate. As such, while SSIT-04 Cultural Resources Transmission Line Study was focused on conducting research and field survey themselves and had concerns about confidentiality of sensitive information, City Light believes that the same opportunities and protections are afforded in the Cultural Resources Survey and Properties with Traditional Cultural Significance Study.

6.2.5 Cultural Resources Battle Site Study

The Sauk-Suiattle Indian Tribe submitted a study request to determine and commemorate the location of the currently submerged XIXc battle site (SSIT-05 Cultural Resources Battle Site Study). The site is reportedly at Diablo Lake and according to the historical account, marks the battlegrounds between the people of the Sauk-Suiattle Indian Tribe, Upper Skagit Indian Tribe, and Nlaka'pamux Nation Tribal Council.

SSIT-05 Cultural Resources Battle Site Study does not meet a majority of the FERC Study Criteria. It does not provide clear goals and objectives of the study, a study methodology, or level of effort and cost, and does not demonstrate nexus between Project operations and effects on the resources/locations to be studied (18 CFR §§ 5.9(b)(1), (5), (6), and (7)). Accordingly, City Light proposes to adopt a portion of this study request where nexus with Project operations is demonstrated. Specifically, City Light incorporates the study request where it falls within the APE and will complete it as part of the CR-04 Inventory of Historic Properties with Traditional Cultural Significance Study (Properties with Traditional Cultural Significance Study). The Properties with Traditional Cultural significance that are within, intersect, or encompass the APE. This study is designed to identify and document places like the battle site referenced in the study request. Though any physical remnants of the battle site may not be discoverable, the importance of the location and significance of it to the Sauk-Suiattle Indian Tribe can be documented during the Properties with Traditional Cultural Significance Study. Additional management measures for the history of this place can also be considered under the HPMP that City Light anticipates being developed and implemented

under a PA to conclude the Section 106 process of the NHPA for the FERC relicensing. The HPMP will be the mechanism under the new FERC license for considering potential Project-related effects to historic properties.

6.2.6 Comprehensive Ethnographic Study

The Stillaguamish Tribe of Indians submitted a study request for a comprehensive ethnographic study of the local mountains, including but not limited to Mt. Higgins, Mt. Whitehorse, and Round Mountain (STI-01 Comprehensive Ethnographic Study). This study is requested to fully evaluate the impact of the transmission lines on a traditional cultural landscape (TCL), which the Stillaguamish Tribe of Indians is in the process of documenting around Mt. Higgins and the town of Darrington.

STI-01 Comprehensive Ethnographic Study proposes the documentation and evaluation of resources with traditional cultural significance, which is already being conducted under the CR-04 Inventory of Historic Properties with Traditional Cultural Significance Study (Properties with Traditional Cultural Significance Study) for resources within the APE. The study request does not meet a majority of the FERC Study Criteria. It does not provide clear goals and objectives of the study, a study methodology, or level of effort and cost, and does not demonstrate nexus between Project operations and effects on the resources/locations to be studied (18 CFR §§ 5.9(b)(1), (5), (6), and (7)). Accordingly, City Light proposes to adopt a portion of this study request where nexus with Project operations is demonstrated. Specifically, City Light incorporates the study request where it falls within the APE and will complete it as part of the Properties with Traditional Cultural Significance Study. The Properties with Traditional Cultural Significance Study allows for collaborative development of a research design to identify areas and places important to the Stillaguamish Indian Tribe that are within the APE.

6.2.7 Historic Properties Study

The Stillaguamish Tribe of Indians submitted a study request for documentation of tribal-affiliated houses in the town of Oso while they are still standing (STI-02 Historic Properties Study). The town of Oso is located less than a mile to the north of the Project transmission line ROW and the APE. In the town, there are many small (1 room) houses that were initially constructed for logging workers but became tribal housing over time. Many of these houses are no longer in existence, but a few remain.

STI-02 Historic Properties Study proposes the documentation and evaluation of archaeological and historic built environment resources, which will be done in City Light's proposed CR-02 Cultural Resources Survey for resources within the APE. The study request does not meet a majority of the FERC Study Criteria. It does not provide clear goals and objectives of the study, a study methodology, or level of effort and cost, and does not demonstrate nexus between Project operations and effects on the resources/locations to be studied (18 CFR §§ 5.9(b)(1), (5), (6), and (7)). Accordingly, City Light proposes to adopt a portion of this study request where nexus with Project operations is demonstrated. Specifically, City Light incorporates the study request where it falls within the APE and will complete it as part of the Cultural Resources Survey. City Light is proposing to focus its study efforts where Project-related effects are occurring. If Project effects are known or anticipated at the location of the tribal houses, then they will be documented and evaluated in accordance with the Cultural Resources Survey.

6.2.8 Study of Specific Sites as Archaeological District

The Stillaguamish Tribe of Indians submitted a study request for recordation of an Archaeological District consisting of previously recorded sites within the portion of Jim Creek from where it is crossed by the Project transmission line to the confluence with the South Fork Stillaguamish River (STI-03 Study of Specific Sites as Archaeological District). As noted in the request, "SCL's transmission lines turn south at the precontact Stillaguamish village of Sk'balco, down the South Fork Stillaguamish in an area known as Achalitch." According to the study request, this stretch of Jim Creek contains a concentration of unique and important archaeological resources, several of which buffer or intersect the APE for the relicensing, where the APE follows City Light's transmission line.

STI-03 Study of Specific Sites as Archaeological District proposes the documentation and evaluation of archaeological resources, which is proposed in CR-02 Cultural Resources Survey for resources within the APE. The study request does not meet a majority of the FERC Study Criteria. It does not provide clear goals and objectives of the study, a study methodology, or level of effort and cost, and does not demonstrate nexus between Project operations and effects on the resources/locations to be studied (18 CFR §§ 5.9(b)(1), (5), (6), and (7)). City Light proposes to adopt a portion of this study request where nexus with Project operations is demonstrated. Specifically, City Light incorporates the study request where it falls within the APE and will complete it as part of the Cultural Resources Survey. City Light is proposing to focus its study efforts where Project-related effects are occurring. If Project effects are known or anticipated in the locations of the sites/district along Jim Creek in the APE, then these resources will be documented and evaluated in accordance with the Cultural Resources Survey methodology.

6.2.9 Water Quality Monitoring

Five LPs submitted study requests related to water quality: Ecology-01 Water Quality Study, NMFS-01 Water Quality, NPS-02 Skagit Project Water Quality Assessment and Modeling, USFWS-03 Skagit Project Water Quality Assessment and Modeling, USIT-07 Water Quality Impacts above and below SCL Project Infrastructure, WDFW-17 Water Quality Impacts above and below SCL Project Infrastructure. In response, City Light has adopted the LPs' study requests, with modifications, as part of its FA-01 Water Quality Monitoring Study (WQ Monitoring Study) Plan.

In the PAD, City Light proposed a one-year water quality monitoring study to fill identified data gaps and subsequently drafted a study plan that was reviewed with LPs. In their study requests, LPs asked that City Light increase the duration of water quality monitoring during the relicensing process. In response, City Light's WQ Monitoring Study Plan has been revised to meet LPs' requests for two years of turbidity and TSS sampling in Ross Lake. In addition, LPs requested, and City Light's PSP includes, continuous TDG monitoring for a full year in the Diablo Dam tailrace and the Gorge Lake forebay. For other water quality parameters, the combination of an extensive set of existing data (as summarized in Table 2.3-1 of City Light's WQ Monitoring Study Plan), which includes temperature, DO, and pH profiles at multiple locations in Ross Lake (which document the extent and effects of thermal stratification), along with monitoring summarized in Section 5.5 of this document and detailed in the WQ Monitoring Study Plan, are sufficient for assessing all water quality parameters in Project reservoirs. Existing water quality data will be

summarized in the ISR. Existing water quality data collected in the Project reservoirs by any party will be reviewed for quality and incorporated into the assessment appropriately.

Ecology requested that water quality monitoring in the Gorge bypass reach be conducted in autumn and spring (in addition to summer as originally proposed by City Light) and to conduct more extensive measurement of TDG. City Light has adopted this request in its WQ Monitoring Study Plan to include continuous monitoring of temperature, DO, turbidity, and TDG at two locations in the Gorge bypass reach for a full year to document ambient conditions during all four seasons. This will allow for the opportunistic measurement of TDG under spill conditions as they arise. Also, during the monitoring period City Light plans to implement controlled flow releases from Gorge Dam of about 50, 500, and 1,200 cfs (i.e., as part of fieldwork to develop the Skagit River Gorge Bypass Reach Hydraulic and Instream Flow Model; see Section 6.2.11 of this PSP).

Other modifications to City Light's WQ Monitoring Study Plan include the addition of continuous temperature monitoring for two years at the following locations in the Skagit River downstream of Gorge Powerhouse: (1) the proposed stage gage at RM 91.1; (2) the proposed stage and discharge gage at RM 85.6; and (3) the proposed stage gage at RM 75.1. Benthic macroinvertebrate sampling, requested by some LPs, has also been added to the study plan. Benthos will be collected in the vicinities of where the temperature sensors (as identified in the preceding sentence) are to be deployed.

The five LPs who filed water quality study requests asked for some form of water quality modeling, mostly with the use of the CE-QUAL-W2 model. The presumed need for modeling is predicated on the hypothesis that the temperature of water withdrawn through the deep intake in Ross Lake is adversely affecting fisheries resources downstream of the Project. None of the study requests included evidence of this adverse effect occurring, nor any data that show current water temperatures fall outside acceptable conditions. Flow releases stipulated by the FSA have been shown to have a beneficial effect on salmonids downstream of the Project. According to Connor and Pflug (2004), "Spawner abundance of all three species [Chinook, Coho, and Pink salmon] progressively increased in an upstream direction following implementation of flow measures; increases were greatest in the reach immediately below the hydroelectric project. These increases were substantially greater than those observed concurrently in other areas of the Skagit River basin and in other northern Puget Sound rivers." Any potential flow-release scenarios identified during relicensing for the river downstream of the Project are not anticipated to appreciably alter water temperatures from what they are under the current environmental baseline. Therefore, City Light sees no value in developing a costly model that will not be used for the formulation of license conditions. It is also worth noting that water temperatures below the Project comply with Ecology's relevant numeric criteria throughout the year. City Light is, as noted above, monitoring temperature at three locations downstream of Gorge Powerhouse; these stations will provide continuous data that can be used to evaluate temperature trends below the Project, and monitoring is likely to continue after license issuance to verify that temperatures are suitable during the next license term. If City Light decides to move forward with a Project operating proposal that would substantially alter existing conditions (e.g., pump back project), a draft study plan would be discussed with LPs prior to the ISR and a water quality model would be developed to assess potential effects on resources in the reservoirs and downstream of Gorge Dam.

The five LPs who filed water quality study requests identified concerns about the potential effects of toxic compounds, particularly heavy metals, on biota in the Project area. Existing information shows that there are no issues of concern associated with bioaccumulation of metals or other toxic substances in the Project reservoirs. (Ecology stated in its study request that it is open to "utilizing existing credible fish tissue studies."). Seiders and Deligeannis (2018) reported on contaminant concentrations in fish tissue collected in Ross Lake as part of Ecology's Freshwater Fish Contaminant Monitoring Program. The authors state that contaminant concentrations are low in fish from Ross Lake, with concentrations of metals in fish tissue similar to those found across Washington State. Seiders and Deligeannis (2018) state that previous analyses of Bull and Rainbow trout tissue collected from Ross Lake (in 2007 and 2012) showed that polychlorinated biphenyls (PCB), 4,4'- dichlorodiphenyldichloroethylene (DDE), polybrominated diphenyl ethers (PBDE), and polychlorinated dibenzodioxins/ dibenzofurans (PCDD/F) were present at low levels, and concentrations of chromium, copper, selenium, and zinc were detected at levels typically seen in fish fillet tissues across Washington (Seiders and Deligeannis, 2009; Seiders et al., 2014, as cited in Seiders and Deligeannis 2018). Seiders and Deligeannis (2018) reported that 2015 results show that contaminant concentrations in Ross Lake remained low. The 2015 results were derived from tissue taken from 70 Rainbow Trout and native char collected by the NPS, which were analyzed for chlorinated pesticides, PCBs, PBDEs, and metals. Concentrations of chlorinated pesticides and PCBs were low "and comparable to levels seen in waterbodies deemed to have little apparent human impact (Johnson et al, 2010, 2013, as cited in Seiders and Deligeannis 2018)." Also, the current Environmental Protection Agency (EPA) water quality assessment for Water Resource Inventory Area (WRIA) 4 (Upper Skagit) includes 2014 category listings for toxic substances (based on fish tissue data) in Ross Lake. Ecology assigned a Category 1 (i.e., "water quality criteria are being met") value to all evaluated toxins; Ecology's website states "Fish tissue data from the most recent year showed that the [fish tissue equivalent concentration] FTEC was met; therefore the Assessment Unit [i.e., Ross Lake] meets the requirements for a Category 1 determination."

Ecology, NPS, USFWS, Upper Skagit Indian Tribe, and WDFW requested assessment of productive potential in the Gorge bypass reach. City Light has included its response to information requests related to fish habitat suitability in the Gorge bypass reach with the proposed bypass reach modeling study (i.e., the FA-05 Skagit River Gorge Bypass Reach Hydraulic and Instream Flow Model Development Study Plan) described in Section 6.2.11 of this PSP.

Related to studies of productivity, all LPs that submitted water quality study requests asked that City Light assess nutrient dynamics in and downstream of Project reservoirs. Ross Lake and the downstream Project reservoirs constitute an oligotrophic system, and measurements reveal low concentrations of nutrients. These conditions are the result of nutrient-poor inflows, which are a characteristic of ambient conditions and do not constitute a Project effect. Nutrient dynamics and trends, i.e., the uptake, cycling, and fates of nutrients, constitute a complex issue, one that could not be reasonably addressed within the context and timeframe of the ILP. Moreover, no party has provided any evidence of adverse Project effect on nutrients or nutrient-related influences on reservoir fish, nor is City Light aware of such evidence.¹⁰ Nevertheless, the USGS, Washington

¹⁰ Potential limiting factors identified by the USFWS (2015a) for the Bull Trout core population upstream of Gorge Dam include forest management practices, mining, fish passage issues, and hybridization. Nutrient levels were not

Water Science Center, is periodically collecting nutrient data in the Skagit River Basin at the U.S.-Canada border, and it is City Light's intent to provide a summary of these data in its WQ Monitoring Study report. Also, the ongoing Food Web Study being conducted by USGS in the Project area (City Light 2019b) will address productivity-related topics, i.e., trophic relationships in reservoirs and bioenergetics, which are linked to nutrient availability.

Some LPs requested information on the effects of sediment retention by Project reservoirs. Sediment retention is addressed via other proposed studies (see Section 6.2.14 of this PSP).

LPs requested identification and evaluation of potential PMEs (e.g., selective water withdrawal in the Ross Lake forebay and "temperature conditioning"). Although City Light is open to assessing a range of potential PMEs as part of the ILP, i.e., when studies are complete and potential management actions are being explored, it is too early to identify such measures at this point in the process. Some proposed study objectives included the measurement of parameters, for example benthic macroinvertebrates, downstream to Puget Sound. Conditions in the lower Skagit River are influenced by an array of land and water management activities, with the overwhelming influence being due in many cases to localized effects. Attempting to isolate any Project influence on water quality at remote downstream locations with reasonable certainty of a cause-and-effect relationship is not an achievable objective and would not inform development of license conditions (18 CFR § 5.9(b)(5)). City Light notes that existing information indicates that waters within the Project Boundary and in the reach downstream of the Project comply with Ecology's applicable water temperature numeric criteria.

6.2.10 Fish Passage

LP study requests related to fish passage fall into three related categories: (1) assessment of potential upstream fish passage barriers in the Gorge bypass reach (WDFW-01 Evaluation of Fish Barriers and Fish Species in the Bypass Reach); (2) feasibility analysis of anadromous and resident fish passage facilities (NMFS-04 Feasibility Analysis of Fish Passage, NPS-01 Feasibility Analysis of Anadromous and Resident Fish Passage, USFWS-01 Feasibility Analysis of Fish Passage at the Skagit River Hydroelectric Project, USIT-01 Feasibility Analysis of Fish Passage at the Skagit River Hydroelectric Project, and WDFW-02 Feasibility Analysis of Fish Passage at the Skagit River Hydroelectric Project); and (3) evaluating fish habitat and potential fish productivity upstream of Gorge Dam, with emphasis on ESA-listed salmonids (NMFS-03 Quantifying Habitat and Production Potential of Chinook and Coho Salmon and Steelhead above Ross Dam, NPS-08 Quantifying the Productivity Potential of Reservoir Tributary Habitat, USFWS-02 Quantifying the Habitat and Production Potential of ESA-Listed Salmon, Steelhead, and Bull Trout above Dams, USIT-02 Quantifying Habitat and Production Potential of ESA-listed Chinook Salmon, Steelhead, Bull Trout, Coho Salmon, and Sockeye Salmon above Gorge Dam, and WDFW-03 Quantifying Habitat and Production Potential of ESA-listed Chinook Salmon, Steelhead, Bull Trout, Coho Salmon, and Sockeye Salmon above Gorge Dam).

identified as a limiting factor. Formal estimates of native char abundance have not been computed, but available data suggest that there are at least several thousand adult individuals of each species (Bull Trout and Dolly Varden) in Ross Lake and its tributaries (Triton 2017). Bull Trout in the Skagit River upstream of Gorge Dam (within the United States) form the Upper Skagit River Core Area. The USFWS (2015b) determined that this core area likely contains one of the most robust Bull Trout populations, with some of the most intact habitat, within the Bull Trout Coastal Recovery Unit.

City Light proposes to adopt the LPs' study requests, with modifications, by implementing the FA-04 Fish Passage Technical Studies Program. In addition, City Light has developed a FA-05 Skagit River Gorge Bypass Reach Hydraulic and Instream Flow Model Development Study Plan responding to related study requests, which are addressed in Section 6.2.11 of this PSP. The bypass modeling plan is linked to the fish passage plan as described below.

City Light is proposing a phased approach to assessing the feasibility of providing upstream and downstream fish passage at Gorge Dam. Phase 1 (which would take place during the first field season of the ILP) involves a field investigation to assess the degree to which channel features identified by Envirosphere (1989) in the Gorge bypass reach constitute barriers to upstream passage by steelhead and Chinook and Coho Salmon (the target species). If the field investigation concludes that the channel features identified by Envirosphere cannot be considered total passage barriers to one or more of the target species, hydraulic modeling (i.e., using the aforementioned bypass hydraulic and instream flow model) will be conducted to identify the flows under which the channel features are likely to be passable by each of the target species. Phase 2 (which would be conducted during the second field season of the ILP) would be contingent on the results of Phase 1. If it is determined that one or more of the target species may be capable of using the Gorge bypass reach as a migratory pathway (i.e., the bypass is suitable for the species' migration), City Light would initiate Phase 2 of the study, which would involve: (1) a feasibility assessment of potential upstream and downstream fish passage options that could be developed at Gorge Dam; and (2) an assessment of habitat availability and suitability necessary to support the target species in Stetattle Creek, Gorge Creek, and the reach of the mainstem Skagit River immediately below Diablo Dam.

Collection of fish habitat and productivity data in tributaries upstream of the Project Boundary (i.e., outside the influence of the Project's effects) do not meet the requirements of the FERC Study Criteria;¹¹ however, City Light plans to evaluate habitat in the locations identified above. This information will help City Light assess the appropriateness and potential feasibility of establishing passage at Gorge Dam. Although City Light's proposed assessment would include an evaluation of habitat availability and engineering feasibility, a variety of additional factors that describe the benefits, risks, and constraints would need to be considered (Anderson et al. 2014) before any decision is made to introduce or reintroduce anadromous salmonids above Gorge Dam. These factors include but are not limited to the risk of disease transmission from downstream stocks to those that exist upstream of Gorge Dam, the potential for competition among introduced and

¹¹ NMFS's primary support for its study requests, including habitat assessment and fishway feasibility studies, is the declining abundance of Puget Sound (PS) Chinook and PS steelhead populations. Specifically, NMFS asserts that the status of ESA-listed species "affected by the Project" remain depressed or have declined during the current license term. However, according to Connor and Pflug (2004), "Spawner abundance of all three species [which includes PS Chinook Salmon] progressively increased in an upstream direction following implementation of flow measures; increases were greatest in the reach immediately below the hydroelectric project. These increases were substantially greater than those observed concurrently in other areas of the Skagit River basin and in other northern Puget Sound rivers." NMFS's previous biological opinion on continued operation of the Project – issued 8 years ago in late 2012 – confirmed that abundance of Chinook "is actually enhanced" under current Project flow operations [NMFS 2012 biop at pp. 57-58]. Similarly, as NMFS acknowledges in its comments, the Skagit River PS steelhead populations are "the sole stronghold of the remaining PS steelhead populations." [NMFS comments at p.6]. Any assessment of appropriate studies should be based on actual potential impacts to populations affected by the Project.

resident fish, the possibility of resident species preying on juvenile anadromous fish in Gorge Lake and its tributaries, and the potential effects of genetic introgression on resident stocks.

City Light has defined the geographical scope of the study (i.e., to include only Gorge Dam, Gorge Lake tributaries, and the bypass reach) and the target species of interest based on existing genetic information and information that characterizes the historical upstream extent of anadromous fish distributions in the Skagit River in what is now the Project area. Existing information, discussed below, does not support the assertion found in some study requests that anadromous fish migrated upstream of the falls located just below the current location of Diablo Dam.

Historical distributions of salmonid species in the Skagit River, particularly in the reach now occupied by the Project, have been influenced by large-scale geological phenomena. Both local and regional drainage patterns in the Skagit River basin have been altered by glaciation (Riedel et al. 2007). The North Cascade Range and Puget Lowlands were inundated by the south-flowing Cordilleran Ice Sheet during the Fraser Glaciation 35 to 11.5 thousand years ago. The Cordilleran Ice Sheet that advanced into the area from the north was greater than 1 mile thick at Ross Lake and the Puget Lowland (Armstrong et al. 1965; Porter and Swanson 1998). Glacial ice dams blocked the northerly flowing Skagit River and created lakes that drained to the south, forming deep canyons. After the ice sheet retreated, the Skagit River and nearby creeks were redirected to flow south in their current configuration (Riedel et al. 2012). Prior to this redirection, the upper Skagit River is thought to have been a tributary to the Fraser River (Riedel et al. 2007).

Smith (2019) indicated that Bull Trout populations in the Upper Skagit Core area are the result of a founding population from the Fraser River. Smith (2019) based this conclusion on an analysis of mitochondrial haplotypes of Bull Trout from the Fraser and Skagit rivers, and low allelic richness of upper Skagit Bull Trout indicating a founder effect. Smith (2019) suggests that the most likely mechanism for dispersal into the Skagit River above the current location of Gorge Dam is through the upper Skagit River from the Fraser River; the findings of Riedel et al. (2007) corroborate this conclusion regarding the origin of upper Skagit River salmonids. This is consistent with the fact that Bull Trout and Rainbow Trout below Gorge Dam are genetically distinct from those in the upstream reservoirs (Smith 2010; Small et al. 2016), and Dolly Varden only occur upstream of the Skagit River Gorge. Rainbow Trout in Stetattle Creek are also genetically distinct from steelhead in the Skagit River (Kassler and Warheit 2012, as cited in Pflug et al. 2013). These genetic differences coupled with the geologic history of the basin strongly suggest that salmonids in the upper Skagit River basin originated in the Fraser River.

Downen (2014) agrees that compelling evidence exists to support the hypothesis that the upper Skagit River once flowed into the Fraser River and states that native char (Dolly Varden and Bull Trout) and Rainbow Trout in the upper Skagit River basin may have originated in the Fraser River. As described in Downen (2014), a recent analysis conducted by the Washington Department of Fish and Wildlife (WDFW; Kassler and Warheit 2012, as cited in Pflug et al. 2013) found that Rainbow Trout in Ross, Diablo, and Gorge lakes are similar to each other, supporting the agency's management of these fish as a single population. However, they are genetically distinct (cluster separately) from steelhead in the lower Skagit River watershed and other headwater resident Rainbow Trout populations (Pflug et al. 2013). Prior to the construction of Ross Dam, gene flow from the upper Skagit into the lower Skagit was likely only one-way (upstream to downstream) following the redirection of the Skagit River's flow to the south approximately 15,000 years ago (Downen 2014).

Existing information indicates that prior to the Project's existence anadromous fish from the lower Skagit River rarely passed upstream of what is now the Gorge bypass reach. Smith and Anderson (1921) stated that "salmon have been seen [no more than] about one mile above the City of Seattle Camp (i.e., current Town of Newhalem at RM 94). Also, in 1921, the Washington State Fish Commission stated, "no salmon have been observed at any time more than one-half mile above City of Seattle Camp." Recently, the National Marine Fisheries Service (NMFS; 2012) also concluded that, "Natural barriers blocked the upstream passage of anadromous fish through [what is now] the Project area. These natural barriers include...a narrow bedrock constriction and falls located near Diablo Dam." NMFS (2012) further states "While some historical use of areas upstream from the Gorge by steelhead is suggested by anecdotal information gathered at the time of construction [around 1927], the preponderance of evidence indicates limited historical anadromous fish use of the Skagit River watershed upstream from the present location of the Gorge Powerhouse." During the previous Project relicensing, City Light conducted an assessment of historical records containing WDFW accounts in the Project vicinity (Envirosphere 1988). From review of the historical records, Envirosphere concluded that, "Some historical evidence suggests that small runs of steelhead trout migrated as far as Stetattle Creek ... "

During field reconnaissance on October 24, 2019, a team of City Light, WDFW, Upper Skagit Indian Tribe, and NPS biologists observed three schools of live Coho Salmon and one Chinook Salmon carcass below the lowermost potential passage barrier in the Gorge bypass reach. In contrast, several juvenile Rainbow Trout, Brook Trout, and native char were angled or electrofished upstream of the second potential barrier, located about 1.3 miles upstream of the powerhouse. Greater detail on information describing historical fish distribution in what is now the Project vicinity can be found in Section 2 of City Light's proposed Fish Passage Technical Studies Program Plan appended to this PSP.

6.2.11 Instream Flow Study

Ecology submitted a request for an Instream Flow Study (Ecology-02) and WDFW submitted a request for the Evaluation of Fish Barriers and Fish Species in the Bypass Reach Study (WDFW-01), which City Light is adopting with modifications.

City Light is proposing two study plans that together will provide for the development of instream flow models needed to assess relationships between flow and fish habitat downstream of Gorge Dam: (1) the FA-02 Instream Flow Model Development Study Plan, which addresses the reach of the Skagit River between the Gorge Powerhouse and the Sauk River confluence; and (2) the FA-05 Skagit River Gorge Bypass Reach Hydraulic and Instream Flow Model Development Study Plan, which addresses conditions between Gorge Dam and Gorge Powerhouse. To assess relationships between fish habitat and flow, City Light proposes to develop, in consultation with LPs, HSC for each of the fish species to be addressed by the models.

Together, these two modeling study plans address the objectives identified by Ecology in its study request, with two exceptions. City Light intends to model conditions, including the potential effects on habitat of alternative operating scenarios, downstream to the mouth of the Sauk River, whereas Ecology has requested that City Light model flow-habitat relationships downstream to

Puget Sound. Flow conditions in the lower river are influenced by the cumulative effects of an array of water management and land development activities in the watershed and tributary and accretion inflows. The Project's effects on flow, and therefore instream habitat, are attenuated with increasing distance downstream, and attempting to separate any signature of the Project's influence from the many other past and ongoing activities and effects of downstream influences is not an achievable objective and, therefore, would not inform the development of license requirements. Also, because this study would not be able to identify direct Project effects or any reasonably ascertainable indirect Project effects, there is no scientifically defensible method for determining a Project nexus (18 CFR § 5.9(b)(5)). The LPs also request the development of flow related PMEs, which are to be identified later in the relicensing process as a subsequent step to model development and application.

Ecology requests that City Light "Determine the extent of anadromy of various fish species in the basin 'identified by the Instream Flow Subcommittee.'" City Light believes that no additional information (18 CFR § 5.9(b)(4)) is needed because available information on the historical extent of anadromy (see Section 6.2.10 of this PSP) is adequate for determining which species' habitat should be modeled below and above partial fish passage barriers in the Gorge bypass reach. The ability of anadromous fish to ascend the Gorge bypass reach will be investigated during Phase 1 of City Light's assessment of the feasibility of fish passage at Gorge Dam (see Section 6.2.10 of this PSP). As part of the implementation of the instream flow studies in 2021, LP workshops are included in the study plan to allow City Light to work with LPs to develop the models. City Light believes coordination with LPs in preparation of the Instream Flow Model Development Study Plan regarding flow-habitat modeling has been productive. In addition to the workshops proposed, City Light is open to additional targeted technical engagements, as necessary.

Ecology requests that City Light "Conduct a hydrologic and stage analysis on process flows associated with natural (unmanaged) functioning of the Skagit River system for habitat maintenance, sediment transport, woody debris transport, side channel and riparian wetland connection, and groundwater recharge." In the context of FERC licensing, existing conditions constitute the baseline, not natural or "unmanaged" conditions. Attempting to recreate conditions that may have existed 75 to 100 years ago is not scientifically feasible or reliable, and speculation regarding factors that have affected the environment since that time would not allow for the discernment of valid cause-and-effect relationships. As a result, attempting to recreate historical conditions would not inform the development of license requirements, nor is City Light required to assess original Project effects at the time of relicensing. Ecology's request to investigate the future effects of operating the Project in a run-of-river mode constitutes an alternative PME measure which no party has proposed and would be inconsistent with Project purposes, including flood control. Nevertheless, if certain process flow releases are identified as a potential PME during the evaluation of alternative operational scenarios (which will take place following the completion of relevant studies), City Light will conduct the necessary modeling to assess potential resource benefits of the process flows and their influence on Project operations and other resourcebased flow demands. Ecology also states that City Light should "Determine the flows suitable for recreation..." Like process flows, information to inform review of recreation flows in the Skagit River downstream of the Project will be addressed as part of the assessment of flow related PMEs using outputs of the instream flow model and existing information on recreation uses in the lower River (see Section 6.2.21 of this PSP in response to recreation flows).

6.2.12 Reservoir Turbidity Backwater Effects

Three LPs submitted study requests related to potential backwater effects on tributaries to Project reservoirs: NPS-10 Impact of the Operation of Skagit Hydroelectric Project (#553) Backwater on Major Streams and its Influence on Habitat Quality, USFWS-09 Impact of the Operation of Skagit Hydroelectric Project (#553) Backwater on Major Streams and its Influence on Habitat Quality, and WDFW-11 Impact of the Operation of Skagit Hydroelectric Project (#553) Backwater on Six Major Streams Tributary to Ross Lake and its Influence on Habitat Quality.

In the study requests, LPs requested information on eight tributaries entering Project reservoirs: Big Beaver, Little Beaver, Skagit River, Lightning Creek, Devils Creek, and Ruby Creek that enter Ross Lake; Thunder Creek that enters Diablo Lake; and Stetattle Creek that enters Gorge Lake. The requests consist of data gathering to obtain baseline information on the streams, modeling to determine if there are reservoir backwater effects on the tributaries, and geomorphic and habitat surveys to identify possible blockages and opportunities for mitigation or enhancement, particularly for Bull Trout.

City Light currently performs surveys of all reservoir tributaries at least annually, with plans to expand these surveys to both spring and fall in the future, to look for and correct any wood or sediment accumulations that could be barriers to fish passage within the reservoir drawdown zones. City Light is also proposing to study sediment accumulations and backwater effects in three of the tributaries requested by the LPs (Skagit River where it enters Ross Lake, Thunder Creek on Diablo Lake, and Stetattle Creek on Gorge Lake) as part of the GE-03 Sediment Deposition in Reservoirs Affecting Resource Areas of Concern Study (Sediment Deposition Study) because these are locations where there are known and documented effects due to deposition on recreation and/or power generation resources within the reservoir delta deposits. The Sediment Deposition Study will include collecting information on deposition within the reservoir to determine if and how far sediment accumulations resulting from backwater effects extend.

City Light does not believe it is necessary to collect information on the remaining five tributaries (Big Beaver, Little Beaver, Lightning Creek, Devils Creek, and Ruby Creek) that enter Ross Lake because:

- City Light surveys and corrects any sediment/wood accumulations within the reservoir drawdown zone annually, with plans to expand these surveys to spring and fall;
- There have not been any known effects of deposition or wood accumulation upstream of the reservoir identified and LP study requests do not provide any information to support evidence of an effect in reservoir tributaries;
- The USFWS recovery plan (USFWS 2015b) states that the Upper Skagit and Lower Skagit Core Areas represent population strongholds for Bull Trout; and
- The timing of Ross Lake tributary peak flows that have the ability to transport large quantities of bedload and instream wood primarily coincides with times when Ross Lake is not at full pool elevation (see Figure 6.2-1 for a comparison of Ross Lake elevation with available tributary peak flow timing). Since the majority of tributary peak flows occur when the reservoir level is below full pool, there are only limited opportunities for backwater effects during peak

flows that could result in accumulations of wood or sediment in the tributaries upstream from Ross Lake as a result of Project operations.



Figure 6.2-1. Ross Lake water surface elevation in relation to peak flow timing in Ruby Creek and Big Beaver.

6.2.13 Instream Large Wood

Four LPs submitted five study requests related to instream large wood in the Skagit River and effects on geomorphology and aquatic habitat: NMFS-02 Geomorphology and Aquatic Habitat, USFWS-15 Geomorphology and Aquatic Habitat Complexity Study Request, USIT-08 Geomorphology and Anadromous Salmonid Habitat, WDFW-05 Geomorphology and Anadromous Salmonid Habitat, Inventory and Assessment.

The LPs requested that City Light collect and analyze large wood and its contribution to aquatic habitat in the Skagit River downstream of Gorge Dam. They requested the following information be collected/analyzed:

- (1) Estimate wood input to the three Project reservoirs.
- (2) Inventory wood stored in Project reservoirs.

- (3) Inventory and characterize wood currently transported by City Light from the reservoirs that is placed in the Skagit River downstream from the reservoirs; determine fate of wood removed from the reservoirs.
- (4) Inventory instream wood and log jams from Gorge Dam to the Skagit River delta in Puget Sound.
- (5) Estimate wood input from tributaries downstream from Gorge Dam.
- (6) Estimate wood input from bank erosion and landslides downstream from Gorge Dam.
- (7) Assess wood transport dynamics (with 2-D hydraulic wood transport model) and changes to instream wood downstream from Gorge Dam.
- (8) Compare existing wood loading to past conditions or reference reach to identify where wood augmentation would benefit fish habitat and aquatic resources.
- (9) Assess the feasibility and potential risks of wood augmentation downstream from Gorge Dam.

City Light proposes to adopt some aspects of the LP requests to determine the current amount and distribution of instream large wood and aquatic habitat in the Skagit River between Gorge Dam and the Sauk River as part of its GE-04 Skagit River Geomorphology between Gorge Dam and the Sauk River Study (Geomorphology Study). City Light also proposes to document current methods used to collect and transport large wood from Project reservoirs into the Skagit River downstream from the reservoirs to help determine if current methods are working or if alternative methods may be feasible and more appropriate as part of a Project wood management plan. City Light has collected information on woody debris annually in Ross Lake and Diablo Lake as part of the current wood management program and plans to include this information in the ISR.

The Geomorphology Study will collect information on instream large wood (single logs and log jams) using current and historical aerial photographs and a field inventory; and estimate wood input from tributaries, bank erosion, and landslides in the Skagit River between Gorge Dam and the Sauk River confluence. City Light proposed to use the large wood information, along with aquatic habitat data, sediment data, peak flow data, and fish use information to determine the best methods to enhance aquatic habitat in the Skagit River downstream from Gorge Dam in a forward-looking approach to developing PMEs for the Project. This forward-looking approach will consider current conditions of flow, large wood, and sediment input in the river, current aquatic habitat limitations, and potential ways to enhance limiting habitat. City Light does not believe that documenting levels of wood input into and storage in the reservoirs, or an analysis of past conditions, would be helpful to this forward-looking approach.

City Light does not propose to conduct field surveys of large wood in the Skagit River downstream of the Sauk River confluence, but will analyze conditions downstream of the Sauk River as part of the cumulative effects analysis in its Exhibit E Environmental Exhibit of the license application using existing data and information.

City Light does not believe that a 2-D hydraulic wood transport model is an appropriate technology to use since 2-D wood transport modeling is in the theoretical and experimental stage as shown from detailed reading of the study referenced by LPs (Ruiz-Villanueva et al. 2014). The referenced

study used experimental small-scale flume data to develop a theoretical 2-D hydraulic model of wood transport based on wooden dowels in the flume and does not meet FERC criterion for generally accepted practice in the scientific community (18 CFR § 5.9(b)(6)).

6.2.14 Sediment Budget

Five LPs submitted a total of 10 study requests related to sediment in the Skagit River and effects on geomorphology and aquatic habitat: NMFS-02 Geomorphology and Aquatic Habitat, NPS-11 Impact of Operations of Skagit Hydroelectric Project (#553) on Sediment Capture Within Reservoirs and Sediment Recovery Below Gorge Dam and Its Influence on Endangered Species Habitat, NPS-12 Impact of the Operations of Skagit Hydroelectric Project (#553) on Sediment Storage, Stability and Transport on Skagit River and its Influence on Endangered Species Habitat, USFWS-11 Impact of Operations of Skagit Hydroelectric Project (#553) on Sediment Capture Within Reservoirs and Sediment Recovery Below Gorge Dam and Its Influence on Endangered Species Habitat, USFWS-12 Impact of the Operations of Skagit Hydroelectric Project (#553) on Sediment Storage, Stability and Transport on Skagit River and its Influence on Endangered Species Habitat, USFWS-13 Impact of the Operations of Skagit Hydroelectric Project (#553) on Process Flows of Water, Wood, and Sediment below Gorge Dam, USFWS-15 Geomorphology and Aquatic Habitat Complexity Study Request; USIT-08 Geomorphology and Anadromous Salmonid Habitat, WDFW-05 Geomorphology and Anadromous Salmonid Habitat, WDFW-08 Impact of the Operations of Skagit Hydroelectric Project (#553) on Process Flows of Water, Wood and Sediment below Gorge Dam, and WDFW-10 Impact of Operations of Skagit Hydroelectric Project (#553) on Sediment Capture Within Reservoirs and Sediment Recovery Below Gorge Dam and Its Influence on Endangered Species Habitat. Note that several of these study requests are duplicates, submitted by multiple LPs.

The LPs requested that City Light collect and analyze information on sediment input and storage and instream substrate conditions and the influence on aquatic habitat in the Skagit River downstream of Gorge Dam. They requested the following information be collected/analyzed:

- (1) Measure volume, texture and location of sediment accumulations in each reservoir and average annual sediment load into the reservoirs.
- (2) Develop a sediment budget for tributaries from Gorge Dam to the estuary.
- (3) Develop a sediment budget for bank erosion inputs using a bank migration model from Gorge Dam to the estuary.
- (4) Determine if sediment deposits at tributary junctions with the Skagit River are impeding fish passage.
- (5) Monitor suspended sediment in the Skagit River to help understand how Project-related reductions in fine sediment may be affecting anadromous salmonid habitat in the Skagit River Delta.
- (6) Use the information to develop a sediment budget for the entire Skagit River watershed.
- (7) Assess the feasibility and potential risks of sediment augmentation downstream from Gorge Dam.
- (8) Develop a geomorphic/habitat monitoring plan.

City Light proposes to adopt some aspects of the LP requests to determine the current input of sediment and status of aquatic habitat in the Skagit River between Gorge Dam and the Sauk River as part of proposed study GE-04 Skagit River Geomorphology between Gorge Dam and the Sauk River Study (Geomorphology Study). In addition, current substrate data will be collected for the same reach of the Skagit River as part of City Light's FA-02 Instream Flow Model Development Study.

The proposed Instream Flow Model Development Study Plan will collect information on current substrate conditions in the Skagit River between Gorge Dam and the Sauk River confluence using current aerial photographs and a field inventory. The Geomorphology Study will estimate sediment input from tributaries and bank erosion in the Skagit River between Gorge Dam and the Sauk River confluence. City Light proposes to use the substrate and sediment budget information, along with aquatic habitat data, instream large wood data, peak flow data, and fish use information to determine the best methods to enhance aquatic habitat in the Skagit River downstream from Gorge Dam in a forward-looking approach to developing PMEs for the Project. This forward-looking approach will provide accurate and reliable information necessary to inform license conditions by considering current conditions of flow, large wood, and sediment input in the river, current aquatic habitat limitations, and potential ways to enhance limiting habitat. It is anticipated that part of the approach will include monitoring of geomorphic/habitat conditions to help guide enhancement measures over the course of the new license. City Light asserts that documenting sediment accumulation in the reservoirs, especially in Ross Lake, is unnecessary to inform the development of license conditions that deal with the adequacy of spawning habitat or gravel needs downstream of the Project. Using a forward-looking approach will be a more reliable and effective method for identifying potential actions that could improve aquatic habitat conditions in the Skagit River.

No study request provided any evidence of fish passage issues at tributary junctions in the Skagit River downstream of the Project due to sediment deposition (18 CFR § 5.9(b)(5)). Even if evidence of such issues existed, the barriers would likely be intermittent, transitory, and difficult to ascertain, and as such, City Light does not propose to conduct specific studies to search for a transitory condition. City Light will be evaluating tributary deltas between Gorge Dam and the Sauk River confluence as part of the sediment input budget analysis in the Geomorphology Study.

City Light does not propose to conduct field surveys of substrate in the Skagit River downstream of the Sauk River confluence, but will analyze conditions downstream of the Sauk River as part of the cumulative effects analysis in the Exhibit E Environmental Exhibit of the license application using existing substrate, sediment budget, and channel migration rate data and information discussed in the Geomorphology Study Plan. There is a wealth of information on sediment input, channel migration, and several sediment budgets already developed for the Skagit River watershed that is particularly detailed for the area downstream from the Sauk River confluence, as described in the Geomorphology Study Plan and the LPs' study requests (see study plan for list of available reports, data, and information). City Light does not propose to monitor suspended sediment in the Skagit River to determine potential Project effects in the Skagit River estuary because sediment contributions to the estuary will be analyzed using existing information as part of the cumulative effects analysis. As outlined in its proposed study plan, City Light will compile and analyze this existing information but does not believe additional data collection is needed to analyze cumulative effects.

6.2.15 Channel Forming Flows

Five LPs submitted study requests related to analyzing channel forming flows on the Skagit River: NMFS-02 Geomorphology and Aquatic Habitat, NPS-13 Impact of the Operations of Skagit Hydroelectric Project (#553) on Process Flows of Water, Wood and Sediment Below Gorge Dam, USFWS-13 Impact of the Operations of Skagit Hydroelectric Project (#553) on Process Flows of Water, Wood and Sediment Below Gorge Dam, USIT-08 Geomorphology and Anadromous Salmonid Habitat WDFW-05 Geomorphology and Anadromous Salmonid Habitat, and WDFW-08 Impact of the Operations of Skagit Hydroelectric Project (#553) on Process Flows of Water, Wood and Sediment Below Gorge Dam. Note that some of these study requests are similar.

The LPs requested that City Light determine the combination of flow releases, sediment entrainment, and large wood needed to protect, enhance, or mitigate aquatic habitat in the Skagit River during the next license period. Some of these objectives are included in other study requests and discussed in Sections 6.2.14 and 6.3.5 of this PSP. LPs requested the following related to process flows:

- (1) Define the frequency, duration, and magnitude of Project alteration to flows for three process flow types (flushing flows, channel maintenance flows, channel forming flows) at locations along the main channel from Gorge Dam to the estuary.
- (2) Examine the combination of flow and sediment transport to design process flows for mitigation efforts and determine how far downstream project flow alterations are effective based on experimental flow releases (initiate gravel transport, habitat and side channel effects).

City Light does not propose to determine the magnitude of Project alteration to flows by comparing the existing flow regime to the pre-Project flow regime since this does not reflect current conditions in the watershed or proposed or reasonable future levels of flow downstream of the Project due to concerns about flooding in downstream communities. Attempting to recreate conditions that existed 75 to 100 years ago is not feasible, and attempting to recreate historical conditions would not inform the development of license requirements (18 CFR § 5.9(b)(5)), nor is City Light required to assess original Project effects at the time of relicensing. However, as part of its GE-04 Skagit River Geomorphology between Gorge Dam and the Sauk River Study (Geomorphology Study), City Light will be examining the current status of peak flows (duration, magnitude, timing) in the Skagit River downstream from the Project.

City Light will be using information collected in the Geomorphology Study regarding initiation of gravel movement and depth of scour/fill in redds along with the 2-D hydraulic model (developed as part of the FA-02 Instream Flow Model Development Study) to examine the relationship between flow and substrate movement as part of analyses to develop appropriate PME measures to improve aquatic habitat which will consider potential flow, sediment, and large wood measures. The 2-D hydraulic model may also be used to analyze side channel connectivity and habitat.

6.2.16 Potential Floodplain Connectivity of Off-Channel Aquatic Habitat

Four LPs submitted study requests related to floodplain connectivity and off-channel aquatic habitat: NMFS-02 Geomorphology and Aquatic Habitat, USFWS-15 Geomorphology and Aquatic

Habitat Complexity Study Request, USIT-08 Geomorphology and Anadromous Salmonid Habitat, and WDFW-05 Geomorphology and Anadromous Salmonid Habitat.

The LPs requested that City Light collect and analyze information related to floodplain connectivity of off-channel habitat in the Skagit River downstream of Gorge Dam. They requested the following:

- (1) Deploy a network of piezometers in off-channel floodplain habitats and calibrate groundwater inundation associated with various flows below the dams
- (2) Model flows that develop and maintain aquatic floodplain habitat features (wetlands, side channels and delta marshes)
- (3) Improve side channel mapping proposed by City Light by conducting field reconnaissance in floodplains (including behind hydromodifications) or developing a digital elevation model in the floodplain and associating those habitats with flows to fully describe side channel habitat restoration opportunities.

City Light proposes to adopt some aspects of the LP requests to determine the current location and condition of off-channel habitat and wetlands in the Skagit River floodplain between Gorge Dam and the Sauk River as part of the GE-04 Skagit River Geomorphology between Gorge Dam and the Sauk River Study and TR-02 Wetland Assessment. In addition, the 2-D hydraulic model developed as part of proposed study FA-02 Instream Flow Model Development, will provide information on water levels and connectivity of off-channel habitat with flow levels in the Skagit River as requested by LPs (items 2 and 3 above).

City Light does not believe that deploying a large network of piezometers in off-channel floodplain habitats or an analysis of groundwater inundation across the entire Skagit River floodplain are necessary because groundwater levels are dependent upon a variety of non-Project factors that are beyond control of the Project and the level of effort required to try to determine Project vs. non-Project factors would be very high compared to the likely usefulness of the data (18 CFR § 5.9(b)(7)). City Light believes that alternatively, if particular side channel or off channel areas are proposed for specific mitigation measures that require groundwater information, more detail on groundwater at those locations could be collected as part of detailed planning efforts.

6.2.17 Native Fish Genetics Baseline

LPs submitted the following study requests aimed at collecting baseline genetics information in Project reservoirs: NPS-05 Population Structure of Native Fish in the Project Area, USFWS-06 Population Structure of Native Fish in the Project Area, and WDFW-15 Habitat Use and Population Dynamics of Reservoir Fish. City Light proposes to adopt these study requests, with modification, for the reasons discussed below.

The LPs' study requests did not meet a majority of the FERC Study Criteria established by FERC for the ILP. The study requests do not provide clear justification for why additional information is needed for relicensing the Project (18 CFR § 5.9(b)(4)), and there is no compelling statement of how the results would be used to inform the development of license conditions (18 CFR § 5.9(b)(5)). Although Project nexus is presumed by LPs (basically the fish species of

interest exist in the Project reservoirs), the study requests do not provide evidence of a site-specific Project effect (18 CFR § 5.9(b)(5)). These study requests propose gathering data with the intent of identifying a Project effect that has not been documented to exist (18 CFR § 5.9(b)(5)). Finally, the proposed study costs appear to be significantly underestimated (18 CFR § 5.9(b)(7)).

LPs request that City Light conduct a study to describe the genetic population structures of Bull Trout, Dolly Varden, and Rainbow Trout; develop a genetic baseline that can be used to document population responses to fish passage; and assess the health and viability of populations in each reservoir. These objectives are aimed at developing baseline information needed to inform management decisions. Although there is adequate existing information¹² (18 CFR § 5.9(b)(4)) for characterizing fish genetics for the purposes of relicensing the Project, City Light acknowledges a shared interest in developing a more in-depth genetics baseline for native fish species in Project reservoirs for the purpose of informing longer-term fish management objectives. As a result, City Light proposes to consult with LPs following the filing of the PSP to identify reasonable objectives for a study to be initiated by City Light during the ILP. The study plan, which would be included in the RSP, would be aimed at refining baseline genetic characterizations of native char and rainbow trout within the Project reservoirs, with the goal of refining the collective understanding of the genetic health and viability of the reservoir populations.

6.2.18 Flood Storage Timing

The Skagit County Drainage and Irrigation Special Purpose Districts represented by the Skagit County Drainage and Irrigation District Consortium LLC (SDIDC) submitted the proposed study request SDIDC-01 Flood Storage Timing: Study Plan Seattle City Light Skagit River Hydroelectric Project FERC No. 553.

The goals of this study request are to ensure City Light's proposed OM-01 Operations Model Study Plan includes: (1) a trend analysis of recent hydrologic inputs to the hydropower project; (2) an evaluation of potential impacts to flood storage availability and imminent pre-event drawdown protocols based on that trend analysis; (3) that operation scenarios evaluated as part of the Operations Model Study Plan evaluate potential changes in the timing, frequency, and magnitude of hydrologic inputs to the Project over the lifespan of the Project; and (4) that changes to storage timing and drawdown protocols that optimize flood storage are considered.

Specific objectives of this study request are to:

- (1) Evaluate scenarios to optimize flood storage and draw-down protocols to reduce flood risks and impacts for downstream communities;
- (2) Evaluate potential changes in hydrologic inputs to the Project based on recent data and trends in seasonal precipitation and runoff patterns, snow-pack and snow-moisture content, changes in glacial ice mass, and changes in the timing of snow melt and how these changes affect operations and flood storage availability; and
- (3) Evaluate potential benefits or impacts to competing resource and recreational needs.

¹² Anthony and Glesne. 2014, Downen 2004, Kassler and Warheit 2012, McPhail and Taylor 1995, Myers et al. 1998, Plug et al. 2013, Ruckelshaus et. 2006, Small et al. 2016, Small et. 2020a, Small et al. 2020b, Smith 2010, Smith 2019.

SDIDC-01 requests the simulation of alternative operating scenarios under varying hydrologic conditions. City Light recognizes the need to model a range of alternative operating scenarios for the Project as part of relicensing, many of which will be identified by LPs. However, the Operations Model Study Plan is aimed at describing how the model will be developed and applied. Identifying and evaluating specific alternative operating scenarios, such as those identified by SDIDC, will take place later in the relicensing process.

As previously outlined, the Operations Model to be developed under City Light's Operations Model Study Plan will document and define current Project operations including the Base Case, Current Operations Baseline. As part of City Light's Operations Model Study, a contiguous long-term hydrologic period based on historical hydrology will be selected to ensure the evaluation of wet, dry, and normal conditions; including extended multi-year conditions, such as multi-year droughts. The influence of glaciers and groundwater is embedded within this historical streamflow data.

City Light's Operations Model will be capable of projecting the effects of alternative operating scenarios on available water storage, flow releases and release rates, lake levels and fluctuations, and relevant issues associated with or dependent upon water availability under different water year types and hydrologic regimes. Once City Light's Operations Model study is complete (i.e., development, calibration, and validation of an Operations Model), City Light plans to develop a framework to work with LPs to identify and evaluate individual scenario requests, such as those included in SDIDC-01. Typically, scenario requests from different LPs overlap and, in some cases, may be outside the physical capability of the system. Each scenario request will require a detailed review and will be discussed with LPs for the most efficient assessment of requested scenarios. Additionally, scenarios can be simulated with alternate hydrologic conditions to represent potential climate change conditions. City Light has developed a Distributed Hydrology Soil Vegetation Model (DHSVM) model (see Section 6.3.9) using recent regional climate projections to inform the model, and updates the model periodically as needed to inform hydroelectric operations. This is outlined in the Operations Model Study Plan, which summarizes the study, Hydrology, Stream Temperature, and Sediment Impacts of Climate Change in the Sauk River Basin (Bandaragoda et al. 2020); and has been identified as a source of alternative future hydrology under various potential climatic conditions that could be applied to simulate Skagit Operations Model scenarios with potential climate change conditions. Development and implementation of the framework to identify and evaluate scenarios is a separate future step of the relicensing that will occur following model development.

6.2.19 Modeling Irrigation Water Supply

The Skagit County Drainage and Irrigation Special Purpose Districts represented by the Skagit County Drainage and Irrigation District Consortium LLC. (SDIDC), submitted the proposed study plan SDIDC-02; Irrigation Water Supply: Study Plan Seattle City Light Skagit River Hydroelectric Project FERC N0. 553.

SDIDC-02 requests an alternative operations scenario(s) to evaluate storage and release of water for supplemental irrigation water supply. The Operations Model to be developed under City Light's Operations Model study plan (OM-01) will document and define current Project operations including the Base Case, Current Operations Baseline. This Operations Model will be capable of projecting the effects of alternative operating scenarios on available water storage, flow releases and release rates, lake levels and fluctuations, and relevant issues associated with or dependent upon water availability under different water year types and hydrologic regimes. Separate from City Light's Operations Model study, the Operations Model will be utilized to simulate alternative operations scenarios identified by City Light and LPs through the relicensing process. Once the Operations Model study is complete (i.e., development, calibration, and validation of an Operations Model), City Light plans to develop a framework to work with LPs to identify and evaluate individual scenario requests, such as SDIDC-02. Typically, scenario requests from different LPs may overlap with one another or be outside the physical capability of the system. Each scenario request requires a detailed review and will be discussed with LPs on the most efficient application of requested scenarios. Implementation of the framework to identify scenarios is a separate future step of the relicensing that will occur subsequent to the study program.

6.2.20 Recreation Facilities and Visitor Use Study

The NPS and USFS collaborated on and filed substantially identical study requests (NPS-15 and USFS-01) for City Light to evaluate recreation sites managed by City Light, NPS, and USFS that are within the Project Boundary or in the vicinity of the Project Boundary. In its PAD and subsequent draft study plan reviewed with LPs, City Light proposed RA-01 Recreation Use and Facility Assessment (Recreation Assessment) Study Plan, which is included in this PSP with some modifications. NPS and USFS requested several modifications and expansions upon the scope proposed by City Light in this PSP:

- Expanding the number of recreation sites where data are collected to include NPS and USFS projects in the Project vicinity.
- Expanding the use count, survey methodology, and use impact assessment at each Recreation Area including utilizing trail counters to measure use at representative trails within or partially within the Project Boundary.
- Modifying some specific questions in the survey instrument to address the recreation facilities and use in the Project vicinity (Attachment 3 to the NPS and USFS study request letters).
- Characterizing future use by considering the changing demographics of visitors and communities, and analyzing opportunities within the Project vicinity to address Project related recreation use and known facility needs identified in previous plans.

City Light proposes to adopt the study request proposed by NPS and USFS, with modifications, in its Recreation Assessment Study Plan. Each of the four requested modifications are addressed by City Light individually below.

6.2.20.1 Expansion of Recreation Study Sites

The NPS and USFS requested City Light expand the recreation sites addressed in City Light's original Recreation Assessment Study Plan to include data collection (i.e., facility inventory, observations, and visitor surveys) and analysis at additional recreation sites. The NPS and USFS requested City Light include an additional 39 study sites associated with the NPS' RLNRA or the USFS' Mt. Baker-Snoqualmie and Okanogan-Wenatchee National Forests. City Light's Recreation Assessment Study Plan is focused on the FERC-approved/jurisdictional and City Light-managed recreation facilities, plus non-Project recreation facilities on Ross and Diablo lakes that provide direct access to Project reservoirs (i.e., Hozomeen Boat Launch, Winnebago Flats

Boat Launch, and Ross Lake Resort dock at Ross Lake; and Colonial Creek Boat Launch and Fishing Pier at Diablo Lake). Other than non-Project recreation facilities that provide direct access to Project reservoirs, City Light did not adopt the NPS and USFS request to include non-Project recreation sites.

The NPS and USFS requested non-Project recreation facility study sites both within and outside of the Project Boundary. The study requests do not provide sufficient evidence of Project-related effects to recreation resources for those sites located outside of the Project Boundary. In addition, the study requests do not identify methods in which a study could reasonably ascertain Projectrelated effects from non-Project related effects. Therefore, there is no technically defensible method of determining Project effects for the identified sites outside of the Project Boundary (18 CFR § 5.9(b)(5)). With regard to those located within the Project Boundary, these sites are not City Light facilities, nor are they FERC-approved facilities. City Light does not operate, maintain, or promote the use of these facilities. Most of the facilities at issue, whether within or outside the Project Boundary, are associated with the NPS's RLNRA and/or North Cascades National Park that were created by Congress nearly 50 years after the Project was established. Moreover, the NPS, not City Light, is responsible for the management, maintenance, and operation of these recreation facilities as part of the larger and broader RLNRA/North Cascades National Park. The USFS also requested an additional study site within the Project Boundary (the Marblemount Boat Launch), but this facility is associated with the USFS' Mt. Baker-Snoqualmie National Forest, is not a FERC-approved recreation facility, and the USFS, not City Light, is responsible for the management, maintenance, and operation of the facility.

Further, City Light is not proposing to study these non-Project recreation sites because they are not FERC jurisdictional. NPS and USFS have not demonstrated how the inventory and evaluation of recreation facilities (i.e., accessibility compliance, facility capacity, and use impacts) is necessary to inform license conditions as these sites are entirely within the control of NPS and USFS, i.e., there is no nexus between the Project and the requested resource study.

City Light acknowledges that both the Project and the surrounding RLNRA/North Cascades National Park attract visitors to the area and that both FERC and the NPS have responsibilities for managing this use. The purpose of City Light's Recreation Assessment is to determine the condition and use of recreation facilities that are most closely tied to the FERC-licensed Project.

6.2.20.2 Visitor Survey, Use Count, and Impact Assessment Methodology Expansion

Sample Size

In its study requests, the NPS and USFS requested a recreation visitor survey sample size target of 2,304 completed surveys based on a study area divided into six sub-sections or resource areas.

City Light did not adopt this sample size methodology. Rather, in City Light's Recreation Assessment Study Plan, City Light proposes a single sample population for the Project, which equates to a target of 384 completed surveys using a 95-percent confidence interval with a sampling error no more than +/-5 percent, which is consistent with professional practice for planning, implementing, and analyzing visitor surveys (Salant and Dillman 1994) and has been successfully applied in other FERC relicense proceedings (e.g., FERC Project Nos. 2106, 2149, 2299 and 2997). A key objective of the visitor survey element of City Light's Recreation

Assessment is to identify the recreation use, preferences, attitudes, and characteristics of the Project facilities' recreation users. While City Light may summarize these attributes by type of facility or area and develop Project recreation use summaries, the overall purpose is to characterize these attributes for the Project as a whole. Information from the visitor surveys and observation counts will provide insight into individual areas and facilities, but is not intended to have a statistically valid sample size for each facility or resource area. The NPS and USFS request to divide the Project into six resource areas and to study each area individually includes areas without a Project nexus (refer to Section 6.2.20.1 of this PSP) and is not necessary to inform license conditions. Rather, City Light's Recreation Assessment sample population is focused on a single sample population (i.e., the recreation users who visited the Project). City Light selected a single sample population since the primary FERC Project recreation resources are associated with the three Project reservoirs (Ross Lake, Diablo Lake and Gorge Lake) that are all in close proximity to one another and provide similar recreation opportunities and settings in a contiguous reach of the upper Skagit River.

In addition to the sample size request, the NPS and USFS also requested that City Light assign three survey teams to implement the visitor and observation surveys on two consecutive days to cover all of the NPS and USFS requested sites in six study site areas for each required sampling day (i.e., weekday, weekend day, and holiday day). City Light did not adopt this request since it assumes City Light is surveying NPS/USFS-requested sites outside the Project Boundary and sites as part of the RLNRA/North Cascades National Park, while also using NPS/USFS requested additional sampling frequencies and methods that City Light is not adopting (refer to the "Observational Data Collection" response below). Based on the study sites City Light is proposing in this PSP, City Light anticipates utilizing three survey teams on a single day. City Light's proposed Recreation Assessment Study Plan includes this detail, but also states that the final survey team staffing and sampling approach may be modified based on field logistics and testing prior to implementing the study.

Sampling Frequency

The peak and off-peak season sampling frequencies included in City Light's Recreation Assessment are consistent with the frequencies requested by the NPS and USFS, as follows.

Peak Season Sampling Frequency

- Two randomly selected weekday days per month (separated by at least one week)
- Three randomly selected weekend days (Saturday or Sunday) per month (non-consecutive)
- Two holiday days (Saturday and Sunday) for each three-day holiday weekend (Independence Day and Labor Day holiday weekends) (four survey days total)

Off-Peak Season Sampling Frequency

- Two randomly selected weekday days per month (separated by at least one week)
- Two randomly selected weekend days (Saturday or Sunday) per month (non-consecutive)
- One pre-selected holiday day (Saturday or Sunday) for the three-day Memorial Day holiday weekend

Observational Data Collection

The NPS and USFS requested that City Light record observational use data at 15-minute intervals for an 8-hour period at each study site during each scheduled sampling day. The NPS and USFS stated that "this will provide enough resolution to report hourly results, and a long enough duration at each site, and will provide a robust set of data for subsequent tasks that rely on these data (i.e., estimates of visitor use)." City Light did not adopt this observation survey methodology as it is extremely effort-intensive and is not necessary to characterize recreation use levels and recreation activities of visitors to the Project. Further, the requested methodology is not consistent with observation survey/spot count methods utilized for other recreation visitor use FERC relicensing studies. Rather, City Light proposes to conduct one-time spot counts during each visit to the study site before administering visitor surveys at each study site. This method will provide an observation/spot count for each sampling day, which will be stratified across an 8-hour period over the course of the study season by visiting each study site on a shifting visitation pattern (i.e., spot counts will occur at a variety of times during the typical 8- to 10-hour sampling day over the survey season).

In addition, the NPS and USFS also requested specific data/use parameters be collected during each observation survey. City Light's Recreation Assessment Study Plan is consistent with the NPS and USFS request.

Trail Use Counts

The NPS and USFS requested that City Light estimate trail use at 13 non-Project trails and two (2) FERC-approved Project trails using automated pedestrian trail counters by installing and then maintaining, downloading, and calibrating trail counting equipment during each sampling period.

In the Recreation Assessment Study Plan, City Light did not adopt the NPS and USFS request to include a survey and assessment of the non-Project recreation trails. These non-Project trails do not directly access the reservoirs and do not connect FERC-approved Project recreation facilities. In fact, nearly all of these non-Project recreation trails connect to non-Project recreation facilities. Some of these trails are within or partially within the Project Boundary (i.e., recreation sites managed by NPS as part of the RLNRA and North Cascades National Park), but some also extend well beyond the Project Boundary to non-Project campgrounds, trailheads, and lakes in the Project vicinity.

City Light has included the two Project trails (i.e., 0.4-mile-long Ladder Creek Falls Trail and Garden and 0.3-mile-long Trail of the Cedars) as study sites in its Recreation Assessment Study Plan as they are FERC-approved, located entirely within the Project Boundary, and provide Project-related interpretation. For these Project trails, City Light proposes to study the recreation use through direct visitor surveys administered to trail users and observation surveys/spot counts at the trailhead parking areas rather than through indirect trail counters (as proposed by the NPS and USFS). This methodology meets the needs of the study request to identify and characterize Project recreation use, preferences, attitudes, and characteristics of the Project facilities' recreation users.

Recreation Use Impact Assessment Methodology Expansion

The NPS and USFS requested City Light conduct a secondary or second stage recreation use impact assessment beyond what City Light proposes in its Recreation Assessment Study Plan. Specifically, the agencies requested that for sites that were found in the initial form/assessment to have higher level impacts, that the assessment be refined to allow for the development of site-specific measures to address the issues identified. It is not clear from the NPS and USFS request what information would be collected in this second stage. City Light did not adopt the NPS and USFS' expanded methods. In its Recreation Assessment Study Plan, City Light proposes to conduct a qualitative assessment of recreation use impacts following the methods (Whittaker and Shelby 2001) used on many other relicensing projects, which are adequate for City Light to identify potential recreation use impacts (e.g., areas of bare ground beyond the developed sites/areas or vegetation cutting) for the development of City Light's license application.

Level of Effort and Cost

One general comment in response to the NPS and USFS study requests is related to considerations of level of effort and cost (18 CFR § 5.9(b)(7)). The NPS and USFS estimate the study cost of NPS-15/USFS-01 to be approximately \$550,000; this is \$180,000 over City Light's estimate for the Recreation Assessment. City Light has determined the study site and sampling expansions requested by NPS and USFS would result in additional costs far in excess of \$180,000 in the form of additional survey techniques (automated pedestrian trail counters, 15-minute observation intervals), increased number of recreation sites to be studied (additional facility inventories, logistics of accessing study sites by boat), increased number of visitors to be surveyed, and additional data analysis (six times more user surveys, trail counts, increased number of observational data points). Such study cost increases are not warranted given the sufficiency of City Light's proposed study methods.

6.2.20.3 Visitor Survey Instrument Modifications

The NPS and USFS study request includes a proposed visitor survey instrument (Attachment 3 to the NPS and USFS study requests). City Light's survey instrument in its Recreation Assessment Study Plan includes much of the same or similar questions as proposed by the NPS and USFS. However, City Light did not include several requested questions as they were not specific to or applicable to the Project and were more applicable to the larger RLNRA/North Cascades National Park. City Light's proposed survey instrument addresses the objectives related to Project recreation use and not the geographically broader and more recreationally diverse RLNRA and North Cascades National Park.

6.2.20.4 Future Use Assessment Methodology Modifications

In their study requests, the NPS and USFS recommend three changes to the methodology related to future use and demand assessment:

- (1) Expand the study to include facilities and use in the Project vicinity as defined in Table 1 of their study requests.
- (2) Evaluate the changing demographics in the communities that the Project is drawing from and what changes to the facilities may be needed due to cultural changes and consider other potential barriers to visitor use that could be addressed in license implementation.

- (3) Recreation Needs Assessment: Synthesize adequacy of existing recreational access and the adequacy and capacity of existing recreational facilities to meet the future demand, including the following site-specific analyses per the RLNRA General Management Plan:
 - a. Conduct a site analysis and alternative locations for the Colonial Creek campground, boat launch, and day-use area. Conduct a site analysis to explore alternative locations to provide similar amenities to the public.
 - b. Conduct site design analysis to explore conceptual design alternatives for re- designing the Ross Dam Trailhead parking lot and Hozomeen Campground to better meet visitor needs.
 - c. Investigate feasible locations for new camping and trails near Diablo Lake, Gorge Lake, Newhalem, and the Skagit River area.

First, regarding the NPS and USFS request to expand the recreation sites to be included in the future use and demand assessment, no Project nexus is established (see Section 6.2.20.1 of this PSP). Regarding non-Project recreation facilities within the Project Boundary, City Light does not propose to project the facility utilization and overall recreation use of non-Project recreation facilities within the Project Boundary as this data is provided by the NPS, USFS, and other entities, and data collection methods and supporting data needed for the projections (i.e., where visitors to non-Project facilities reside) will not be collected as part City Light's Recreation Assessment Study Plan. Further, the projections for non-Project recreation facilities are not necessary for decisions to be made in relicensing. City Light does not propose to expand the facility utilization and use projection methods to include non-Project recreation facilities outside the Project Boundary because of the lack of a Project nexus (see Section 6.2.20.1 of this PSP).

Second, regarding evaluating the changing demographics in the communities the Project is drawing from, City Light believes the methods for estimating future use and demand in City Light's Recreation Assessment adequately address the NPS and USFS recommendations. As noted in City Light's Recreation Assessment Study Plan, City Light will estimate Project recreation use and Project recreation facility utilization over the term of the new license based on historical trends, future growth projections, and likely foreseeable events in the watershed. City Light will utilize readily available, existing information on current and future population rates from the State of Washington Office of Financial Management Department of Finance website (https://www.ofm.wa.gov/washington-data-research) for the counties where the majority of the Project visitors originate from (based on completed visitor surveys) to project the overall Project recreation use estimate over the term of a new license period (i.e., 30 to 50 years). These population projections incorporate age and race demographics and, thus, City Light's methods will incorporate the changing demographics in the communities that the Project is drawing from, as requested by the NPS and USFS. The population growth rates are the best method of capturing what future population growth and Project recreation use may look like over the term of the new license. This type of future use and demand assessment is considered very speculative due to the uncertainties of projecting preferences and behaviors far into the future, but it will provide a general indication of how recreation use is expected to change over the license period. Further, assessing future recreation demand through an evaluation of existing use, demographic data, and participation trends and projections in the region (as proposed by City Light) is common practice (Kelly and Warnick 1999) and has been successfully applied in other FERC relicense proceedings.

Third, regarding the request for a recreation needs analysis, this request is beyond the scope of a recreation study in FERC's relicensing process. City Light will synthesize existing data and data collected as part of City Light's Recreation Assessment and other relicensing studies to inform a recreation needs analysis in City Light's license application. Further, it is premature to conduct recreation facility site and feasibility analyses until City Light completes its proposed relicensing studies and all data are available as a basis for consultation with the NPS and USFS to develop PMEs related to recreation resources.

6.2.21 Recreation Flow Study

Ecology filed a study request (Ecology-02 Instream/Recreation Flow Study) focused on instream flows in the Skagit River downstream of the Project; elements not related to recreation are addressed in Section 6.2.11 of this PSP. Study objective A(6) in Ecology's request stated the need to "Determine the flows suitable for recreation and other beneficial uses and if necessary, develop a flow regime(s) for those beneficial uses." Ecology's study request does not specifically identify an information gap to be addressed (18 CFR § 5.9(b)(4)) or propose methods to collect the information (18 CFR § 5.9(b)(6)).

City Light acknowledges that Ecology will evaluate recreation flows as a beneficial use in its consideration of instream flows. Ecology's request did not propose study methods for identifying recreation flows in the mainstem Skagit but instead suggests a subcommittee with direct input from the recreation community develop the study plan. To date in discussions in the RARWG meetings, LPs did not identify a Project effect on or the need for a recreation flow study in the mainstem Skagit River.

City Light believes existing information is available, but also proposes to partially include this study request as part of City Light's FA-02 Instream Flow Model Development Study, FA-05 Skagit River Gorge Bypass Reach Hydraulic and Instream Flow Model Development Study (Bypass Instream Flow Model Development Study), and RA-02 Gorge Bypass Reach Safety and Whitewater Boating Study (Bypass Safety and Whitewater Boating Study).

City Light's Instream Flow Model Development Study and Bypass Instream Flow Modeling Development Study will provide tools for LPs to evaluate the water surface elevations and flows for all resources, including the effects of any modified flow proposals on recreation, if necessary. City Light's Bypass Safety and Whitewater Boating Study will further provide information on recreation flows in the Gorge bypass reach as requested by Ecology in its study request. In addition, City Light believes existing information is available to demonstrate recreation uses in the mainstem Skagit downstream from the Project under existing flows and will provide analysis of this information for Ecology's review during development of City Light's license application. A summary of the existing information is provided below.

The mainstem Skagit River directly downstream of Newhalem provides a scenic Class II – III boating opportunity. The Guide to Whitewater Rivers of Washington (Bennett and Bennett, n.d.) lists the 9-mile river segment from Goodell Creek to Copper Creek as runnable year-round with flows ranging from 1,500 to 5,000 cfs. At flows greater than 5,000 cfs the difficulty increases to Class IV (Bennett and Bennett, n.d.). Much of the Goodell to Copper Creek river segment is described as scenic Class I – II difficulty with two rapids along the 9-mile length. S bend is a Class III rapid located 6-miles from the Goodell Creek put-in and a Class II wave train is located at mile

7 (Bennett and Bennett, n.d.). Otherwise, the shallow gradient of 15 ft per mile keeps much of this river segment a peaceful scenic float. American Whitewater describes this river segment as a great location available throughout the year for advanced beginners to practice skills (American Whitewater 2020). The Skagit River from Marblemount to Rockport is rated Class I-II (Bennett and Bennett, n.d). American Whitewater does not list the segment from Marblemount to Rockport as a whitewater boating opportunity on their webpage. For the period 1991 through 2018, monthly minimum discharge (Table 4.4.3 in the PAD [City Light 2020a]) has never dropped below the 1,500 cfs recommended minimum whitewater flow listed by Bennett and Bennett as well as American Whitewater.

The NPS manages the Goodell Creek Boat Launch on the mainstem Skagit downstream of the Project. Commercial and non-commercial boaters utilize this put-in location for the 9-mile float to Copper Creek. Rafting companies with clients must have a permit with the NPS for commercial use of the river and data are available to show annual usage. Non-commercial boaters also launch at Goodell Creek, though a permit is not required. This segment of the river is popular for rafts and beginner to intermediate boaters in kayaks and open boats (American Whitewater 2020).

6.2.22 Wildlife Studies – Northern Spotted Owl

Two LPs submitted study requests related to NSO: USFWS-19 Impact of the Operations of Skagit Hydroelectric Project (#553) on Northern Spotted Owl, and STI-06 Spotted Owl Habitat Map. USFWS has requested a study to assess impacts of Project operations on NSO and if NSO could successfully establish around Project reservoirs and mitigation lands.

USFWS's study request does not meet FERC Study Criteria. While USFWS states that continued Project operations may impact NSO, USFWS does not demonstrate effects, the need for additional information or explain why the continued implementation of requirements of the current license are not adequate for the new license term (18 CFR §§ 5.9(b)(4) and (5)). The Stillaguamish Tribe of Indians' request did not address FERC Study Criteria.

USFWS identified concerns regarding habitat loss and fragmentation associated with ongoing Project operations and increased human activity associated with visitation and recreation potentially causing wildlife stress/mortality and habitat degradation that may encourage barred owl, an invasive competitor to NSO. As currently proposed, the relicensing of the Project will not increase habitat fragmentation relative to current conditions and City Light is not proposing changes in Project operations or activities which would create new edge or early-seral habitats.

USFWS has confirmed multiple times, as recently as 2011, that continued operation of the Project is "not likely to adversely affect" the NSO (letter from D. Frederick, State Supervisor, USFWS, Olympia, WA, to J. Clement, Acting Director, FERC, Washington D.C., August 10, 1994; and letter from K. Berg, Manager, Washington Fish and Wildlife Office, Lacey, WA to K. Bose, Secretary FERC, Washington D.C., December 30, 2011). Nevertheless, in its study request, USFWS requested intensive inventory surveys (protocol-level) for NSO within RLNRA, areas with Project-related activities (including helicopter flights), and mitigation lands. Existing information indicates that NSO has not been recently observed near the Project. As noted in the PAD, City Light has no recent records of documented pairs of NSOs near the Project Boundary. Siegel et al. (2012) conducted extensive NSO surveys in North Cascades National Park, in particular, near reservoirs. Surveys at five historical NSO activity centers (all 1 mi or further from Project reservoirs) and along 74 survey transects in 2009 and 2010 by Siegel et al. (2012) yielded a NSO response only at Newhalem Creek in 2009 (but not in 2010); the Newhalem Creek drainage subsequently burned extensively (more than 5,000 acres) in the 2015 Goodell Creek Fire.

City Light does not believe it is necessary to conduct costly surveys for NSO in advance of assessing the presence and distribution of potentially suitable NSO habitat in the Project and evaluating where potential effects (direct habitat modification or increases in Project-related sound) of existing or proposed Project O&M or capital improvements overlap with potentially suitable habitat. Consistent with current practices, City Light consults with USFWS on unique capital projects and conducts surveys for NSOs in affected areas, as necessary.

During early discussions regarding City Light's proposed study program with LPs in 2019–2020, LPs identified questions regarding potential impacts of sound and light from Project operations on NSO and other species. As noted in the PAD, City Light consults with the NPS and USFWS to determine potential noise impacts on ESA-listed species and/or wildlife species of special significance if helicopter use, heavy equipment use, or blasting is needed for maintenance or major projects outside the winter season. There is no evidence that current operations result in noise or light levels that affect NSOs. City Light's RA-03 Project Facility Lighting Inventory and RA-04 Project Sound Assessment studies will inventory and map outdoor Project lighting and identify Project-related noise. These studies will provide information on the locations where certain types of future Project activities could warrant pre-construction assessment or BMPs to minimize effects on NSOs based on proximity to suitable nesting habitat and disturbance thresholds in the literature.

Nonetheless, City Light is proposing TR-10 Northern Spotted Owl Habitat Analysis (NSO Habitat Analysis) to compile and refine existing information on the distribution of potentially suitable NSO habitat. The existing NSO habitat suitability model (originally created in 2005 [Davis and Lint 2005] as part of the Northwest Forest Plan, and updated in 2016 [Davis et al. 2016]), has not been accurately applied at the local scale in the Skagit River watershed due to the lack of locally available NSO habitat and detection data. A more detailed and refined map of suitable NSO habitat will be used to characterize baseline conditions, assess potential ongoing Project effects, and inform conservation measures, if warranted, under a new license. This study will map potential NRF habitat of the NSO within the FERC Boundary and a 0.5-mile buffer. The study will use data from the TR-01 Vegetation Mapping Study and data from agencies including USFS, NPS, USFWS, Washington Department of Natural Resources (DNR), and others and will provide information needed to identify the presence and distribution of potentially suitable habitat for NSO in the study area.

USFWS requested information on NSO habitat indicators on mitigation lands including: "trees/acre, density of snags with requisite height and diameter, understory coverage, down woody debris, etc." The mitigation lands are managed for habitat conservation and City Light is not proposing any activities that would impact habitat. The proposed information to be collected in the NSO Habitat Analysis will adequately inform management plan development for the license. City Light will consider the USFWS additional information requests as a part of management plan implementation for the new license if consistent with the parcel-specific management plan goals developed with LPs. Study results (from the Vegetation Mapping Study and NSO Habitat Analysis) may be used to identify locations warranting more detailed habitat assessment to inform management goals related to NSO habitat in the development of mitigation lands management.

City Light currently implements an Avian Protection Plan (City Light 2014a) that follows USFWS (2005) guidelines. City Light will continue to implement its Avian Protection Plan under the new license. Information from the NSO Habitat Analysis could be used to inform updates to the plan by providing additional site-specific information for the Project Boundary.

6.2.23 Transmission Line Right of Way Aquatic Habitat

The Sauk-Suiattle Indian Tribe submitted a study request related to aquatic habitat (SSIT-03 Impacts of Transmission Line Right of Way (ROW) on Aquatic Habitat and Riparian Zone for the Skagit River Hydroelectric Project). The request is for a study to assess restoration needs within the transmission line ROW including locations where the transmission line crosses or is adjacent to streams, road network stream crossings, and transmission towers in the channel migration zone (CMZ).

In response, City Light proposes to adopt the study request, with modifications, as part of its GE-02 Erosion and Geologic Hazards at Project Facilities and Transmission Line Right-of-Way Study (Erosion and Geologic Hazards Study), TR-01 Vegetation Mapping Study, TR-02 Wetland Assessment, and TR-04 Invasive Plants Study. These proposed studies will identify and map locations of all stream riparian zones in the transmission line ROW within the Project Boundary; document occurrences of invasive species; identify and map locations where roads cross streams (including fish-bearing streams); and assess culverts, fords, and bridges at fish-bearing stream crossings. The study will not include development of "restoration plans" as the requester did not demonstrate a need for restoration plans (18 CFR § 5.9(b)(4)) and it is premature to identify PMEs at this time in the ILP. Resource management plans to be developed by City Light in support of the new license and informed by the proposed studies may inform identification of needs for specific actions recommended by requesters, such as restoration, revegetation, potential supplementation of LWD in streams, culvert or bridge replacement actions, riparian buffer protection and/or enhancement measures, and erosion control.

The LP requested assessment of fish passage at all road stream crossings within the ROW and assessment of fish assemblage at crossings where infrastructure additions are being considered. As part of the proposed Erosion and Geologic Hazards Study, City Light will assess fish passage suitability at fish-bearing stream crossings where passage has not been assessed by other entities or where existing data is outdated. The study request does not demonstrate a need for passage assessments at non-fish-bearing stream crossings nor assessment of fish assemblages as part of the relicensing process as there is no evidence that Project-related culverts, fords, and bridges on non-fish-bearing streams have affected fish passage (18 CFR § 5.9(b)(5)) or that existing classification of fish-bearing streams (Washington DNR and SalmonScape) is not accurate within the Project Boundary.

The LP requested identification of transmission tower locations in the CMZ and exploration of tower relocation options, including development of alternative tower locations as bank armoring at towers in the CMZ reduces habitat complexity for salmonids. City Light will identify, map, and characterize areas of erosion, runoff, mass wasting, and culvert conditions that are affected by transmission towers as part of the Erosion and Geologic Hazards Study. City Light does not believe the request to explore relocation options and develop alternative tower locations is timely or warrants a study in relicensing. City Light is currently reviewing and reprioritizing actions required under the existing tower maintenance program including evaluation of potential relocation

(assessments, studies required, etc.) on a routine basis. The current Settlement Agreement on Visual Quality requires a number of actions yet to be completed under the current license, a schedule for which is forthcoming in early 2021. The proposed Erosion and Geologic Hazards Study will provide information that will be used in the assessment of management of towers and bank armoring; these and alternatives can also be part of the development of City Light's long-term asset management plan. City Light will add identification of transmission towers that may be affected by erosion or geologic hazards and any bank armoring associated with the Project to the Erosion and Geologic Hazards Study to inform the tower maintenance program. City Light does not currently know future tower locations; these locations would be developed as part of planning efforts at the time that any tower relocation is needed.

6.3 Study Requests not Included in City Light's PSP

6.3.1 Chert Analysis

The Nlaka'pamux Nation Tribal Council submitted a study request that proposes technological sourcing of Hozomeen chert in the Skagit area (NNTC-03 Chert Analysis). Hozomeen chert is a toolstone of particular importance in the RLNRA due to presence of raw source material within the RLNRA as well as archaeological evidence of this toolstone use within and outside of the RLNRA. The purpose of the study is to get a geochemical fingerprint to compare chert samples from the Project area with artifacts/manuports passed down by Nlaka'pamux Nation Tribal Council families and artifacts that are now curated at the Royal British Columbia Museum and the American Museum of Natural History believed to be Nlaka'pamux Nation Tribal Council artifacts. The Nlaka'pamux Nation Tribal Council identify this research as important to the evaluation of the TCP mid-montane (mountain slope) trail resources because it would provide information regarding the travels and resource collection strategies of Nlaka'pamux Nation Tribal Council people and could provide important background information for the development of a TCP nomination.

Examination of chert artifacts at the British Columbia Royal Museum was also included in study request NNTC-01 Completion of Traditional Cultural Property Survey. The chert analyses proposed in NNTC-01 and NNTC-03 do not meet the FERC Study Criteria. They do not provide clear goals and objectives of the study, a study methodology, or level of effort and cost, and do not demonstrate nexus between Project operations and effects on the resources/locations to be studied (18 CFR §§ 5.9(b)(1), (5), (6), and (7)). Therefore, City Light has not adopted these chert analyses in NNTC-01 and NNTC-03 as a study.

6.3.2 Ethnographic Study

The Sauk-Suiattle Indian Tribe submitted a study request for a social science study on how the agencies, consultants, Indian tribes, and First Nations are communicating for the relicensing process (SSIT-01 Ethnographic Study). In a follow up meeting with the Sauk-Suiattle Indian Tribe on October 28, 2020, City Light confirmed that the intent of the study would be to investigate biases, ways of communicating that are more effective and inclusive of different views and are more collaborative and open minded.

SSIT-01 Ethnographic Study does not meet the FERC Study Criteria. It does not provide clear goals and objectives of the study, a study methodology, or level of effort and cost, and does not

demonstrate nexus between Project operations and effects on the resources/locations to be studied (18 CFR §§ 5.9(b)(1), (5), (6), and (7)). Therefore, City Light has not adopted the request as a study. However, City Light will endeavor to continue open, honest, and transparent communications with all parties participating in the relicensing process and will look for new ways to engage participants in a fair and consistent manner that allows for all views to be heard.

6.3.3 Reservoir Entrainment

Four LPs submitted study requests related to turbine and spillway fish entrainment: NPS-07 Evaluating Existing Fish Passage and Entrainment, USFWS-08 Evaluating Existing Fish Passage and Entrainment through the Skagit Hydroelectric Project Dams and Appurtenant Facilities, USIT-03 Evaluating Existing Fish Passage: Spill and Entrainment through Ross, Diablo, Gorge Dams and Appurtenant Facilities through the Project Area at the Skagit River Hydroelectric Project, and WDFW-04 Evaluating Existing Fish Passage: Spill and Entrainment through Ross, Diablo, Gorge Dams and Appurtenant Facilities through the Project Area at the Skagit River Hydroelectric Project, and WDFW-04 Evaluating Existing Fish Passage: Spill and Entrainment through Ross, Diablo, Gorge Dams and Appurtenant Facilities through the Project Area at the Skagit River Hydroelectric Project. City Light has not adopted these study requests for the reasons discussed below.¹³

The LPs' study requests do not meet a majority of the FERC Study Criteria. City Light believes: (1) existing information is sufficient for the purposes of relicensing the Project so there is no need for additional information (18 CFR § 5.9(b)(4)); (2) the proposed methods result in an extensive scope of work that could not meaningfully be completed within the timeframe allowed by the ILP and therefore would not inform the development of license conditions (18 CFR § 5.9(b)(5)); and (3) cost and level of effort to complete the study are underestimated (18 CFR § 5.9(b)(7)).

Existing information shows that turbine and spillway entrainment rates are low and unlikely to result in population-level effects on reservoir fish species. The turbine intake depth at Ross, Diablo, and Gorge dams is approximately 110, 88, and 52 ft, respectively, and entrainment of smaller species and early life-stages of salmonids is unlikely because they do not occupy these depths and because they are resident species which do not sound in an attempt to exit the reservoirs. Larger species and life-stages are strong enough to avoid being entrained into the turbines.

As a component of its Biological Opinion associated with the addition of the second power tunnel at the Gorge Development, USFWS (2013) analyzed the potential effects of entrainment on Bull Trout in the Project reservoirs. Annual entrainment is summarized in City Light's incidental take reports (City Light 2014b–2018 and 2019a). Between 2013 and 2018, two tagged Bull Trout were entrained at the Diablo Dam intakes, but both fish (each of which was greater than 500 mm long) survived turbine passage, as evidenced by their continued downstream movements detected via their acoustic tags).

Spillway passage at Ross Dam is relatively rare given the low frequency of spill events at this facility. Spill is more common at Diablo and Gorge dams, although only one acoustic-tagged Bull

¹³ Although City Light has concluded that these studies do not meet the FERC Study Criteria under section 5.9(b) of its regulations, 18 CFR § 5.9(b), and are unneeded to analyze any Project-related effects, City Light believes that there is shared interest with the LPs in understanding and properly managing reservoir fish populations over the next license term. These matters can be properly addressed in a reservoir fisheries management plan to be developed during relicensing and implemented over the next license term.

Trout passed over the Gorge Dam spillway during the six-year study period, 2013–2018. No tagged Bull Trout passed over the Diablo Dam spillway.

City Light also calculated Bull Trout spillway mortality from 2013–2018 based on (1) annual spill duration at each dam, (2) time acoustically-tagged Bull Trout spent near the spillways at each dam, (3) assumed adult Bull Trout population abundance in each reservoir, and (4) assumed spillway mortality rates of 100 percent at Ross Dam, 55 percent at Diablo Dam, and 10 percent at Gorge Dam, as stipulated in USFWS (2013). Based on this formula, estimated average annual Bull Trout spillway mortality rates for the three Project developments (averaged over the 2013–2018 period) are as follows: Ross Dam, 0.8/yr; Diablo Dam, 24.2/yr; Gorge Dam 4.3/yr.

City Light also conducted a desktop risk assessment (City Light 2011) as part of its license amendment to add the second power tunnel at the Gorge Development. The desktop risk assessment was not fish species specific and modeled entrainment related mortality risk based upon fish size. The assessment indicated probable entrainment related injury rates are well below what would result in population-level effects for fish in the reservoirs.

Although entrainment rates for other species are unknown, Rainbow Trout have survived entrainment and downstream passage at the Project in the past (City Light 2011). Also, under its current license, City Light has received approval¹⁴ to tag Bull Trout, Rainbow Trout, Dolly Varden, and Brook Trout in Project reservoirs. Tracking of these tagged fish may provide additional information on entrainment of these species.

It would not be possible to conduct a mark-recapture study of the magnitude identified by the LPs, and produce meaningful results, within the relicensing timeline. The fish species of interest vary among the LP's study requests, with the most expansive request being provided by the NPS, i.e., "...assess the amount of passage and survival through entrainment and spill for all size classes of native and nonnative fish at each of the dams and powerhouses..." Marking and recapturing sufficient numbers of fish of all size classes and species, including non-native fishes, would not only require more time than is available but would also be unjustified when comparing the cost of such a study to the relatively low risk of population-level effects due to entrainment (as noted above, fish occupying the reservoirs are residents and not actively attempting to migrate downstream). City Light considers the level of effort and study costs developed by the LPs to be underestimated (total cost of \$400,000 estimated by NPS, Upper Skagit Indian Tribe, and WDFW and \$500,000/year estimated by USFWS).

6.3.4 Aquatic Productivity

LPs submitted study requests aimed at assessing productivity within and downstream of the Project area. NPS-03 Assessing the Impacts of Project Operations on Secondary Productivity, included objectives aimed at assessing productivity both above and below Gorge Dam. Three LPs requested assessments of secondary productivity upstream of Gorge Dam: USFWS-04 Skagit Project Reservoir Secondary Productivity Study, USIT-05 Reservoir Littoral, Benthic, and Pelagic Invertebrate Productivity, and WDFW-13 Reservoir Littoral, Benthic, and Pelagic Invertebrate Productivity. Study requests focused solely on productivity in the Skagit River downstream of

¹⁴ USDI NPS Animal Research Protocol Approval Long-term, Ongoing Research Project WA_NOCA_Fisher_BullTrout_2020.A3.

Gorge Dam include USFWS-16 The Impacts of Project Operations on Aquatic and Riparian Biological Productivity Downstream of Gorge Dam, USIT-09 The Impacts of Project Operations on Aquatic & Riparian Biological Productivity Downstream of Gorge Dam, and WDFW-06 The Impacts of Project Operations on Aquatic & Riparian Biological Productivity Downstream of Gorge Dam. City Light has not adopted these study requests for the reasons discussed below.

The LPs' study requests do not meet a majority of the FERC Study Criteria. City Light believes: (1) although goals and objectives are identified, they are not well linked to the proposed methodologies (18 CFR § 5.9(b)(6)); (2) there is no clear justification for why additional information is needed (18 CFR § 5.9(b)(4)), and there is no explicit statement of how the results would be used to inform the development of license conditions (18 CFR § 5.9(b)(5)); (3) although Project nexus is presumed by LPs, no evidence is provided by any party of a site-specific Project effect (18 CFR § 5.9(b)(5)); and (4) proposed study costs appear to be underestimated (18 CFR § 5.9(b)(7)).

The study requests do not provide evidence of an adverse Project effect on nutrients and productivity. Ross Lake and the downstream Project reservoirs constitute an oligotrophic system, and previous measurements reveal very low concentrations of nutrients in Ross Lake. Moreover, tributary inflows are nutrient-poor, which is a characteristic of ambient conditions and not a Project effect. The USGS, Washington Water Science Center, is periodically collecting nutrient data in the Skagit River Basin at the U.S.-Canada border, and it is City Light's intent to provide a summary of these data in its FA-01 Water Quality Monitoring Study report (see Section 6.2.9 of this PSP).

All the study requests identified above constitute extensive baseline data gathering efforts that could not be meaningfully addressed within the confines of the ILP study timeframe. City Light believes, however, that several of the proposed study objectives are being addressed by the ongoing Food Web Study being conducted by USGS in the Project area (City Light 2019b). The Food Web Study, which was developed in coordination with and approved by the NCC (of which the LPs are members), can be used to address elements of the study requests (e.g., trophic relationships, bioenergetics) at an appropriate scale and according to a phased approach. Also, although not a productivity study, per se, City Light is proposing to collect benthic macroinvertebrates (an objective of the riverine study proposals) at three locations downstream of Gorge Powerhouse (see Section 6.2.9 of this PSP). City Light also has zooplankton abundance and taxonomic composition data for Ross Lake, which City Light believes adequately characterize existing conditions.

The proposed methods in the study requests are not clearly linked to the stated objectives, and the study requests do not provide explanation of how the information gathered would enable an assessment of the potential effects of Project operations or inform potential license conditions. Further, it appears the scope of the studies may preclude them from being completed within the two allotted study seasons. An example of this is contained in the NPS's Assessing the Impacts of Project Operations on Secondary Productivity study proposal, which includes an objective (Objective 5) that states, "Identify monitoring locations and develop quantitative performance metrics to evaluate..." This study request does not provide clear consideration of how information requested would be derived and applied. The open-ended nature of the request, the lack of methodological specificity, including how the information would be used to assess effects due to Project operations, and the expansiveness of the scope make the proposed undertaking more

suitable as an effort for which City Light and the LPs might be able to develop a management plan to be implemented after license issuance, once specific management objectives and appropriate metrics can be identified. Finally, the basis for cost estimates is unclear as the extent of sampling is not specified and without such basic structure, it is not possible to accurately estimate costs.

6.3.5 Reservoir Habitat and Fish Populations

LPs requested assessments of habitat in Project reservoirs, which fall into two categories: those focused on fish habitat use and population dynamics and those aimed at assessing littoral and riparian habitat along the reservoirs' shorelines.

The following study requests pertaining to habitat use and population dynamics were submitted: NPS-09 Quantifying the Productivity Potential of Reservoir Fish, USFWS-10 Habitat Use and Population Dynamics of Reservoir Fish, and WDFW-15 Habitat Use and Population Dynamics of Reservoir Fish. City Light has not adopted these study requests for the reasons discussed below.¹⁵

The studies requested to address habitat use and fish population dynamics constitute significant baseline information requests that could not be completed within the study program timeframe associated with the ILP. These study requests involve gathering data with the intent of identifying a Project effect that has not been documented to exist (18 CFR § 5.9(b)(5)).

Overall, it appears that the objectives of the study requests constitute an unnecessary expansion of activities being conducted or proposed by City Light. City Light believes that existing knowledge, data from ongoing efforts conducted in coordination with members of the NCC, along with data from its proposed studies, will provide information sufficient to address the LPs' concerns as reflected in the fish habitat use and population dynamics study requests. Baseline genetics data exist to make discernments regarding the three native salmonid species in Project reservoirs and no additional information is needed (18 CFR § 5.9(b)(4)). The Food Web Study being conducted by USGS in the Project area (City Light 2019b) is structured to address a range of fish populationlevel phenomena (see also City Light's response in Section 6.3.4 of this PSP). City Light has provided LPs with a detailed account (City Light 2020b) of how the Food Web Study will provide the information being sought by the LPs. City Light is exploring, in collaboration with the NCC, methods for estimating the size of the Redside Shiner population in Ross Lake. The objectives of City Light's proposed FA-03 Reservoir Fish Stranding and Trapping Risk Assessment include desktop mapping of stranding and trapping risk locations for native fish species and a field-based step to ground-truth the mapping. City Light already has a tributary barrier removal program in place to ensure that reservoir fish are not precluded from accessing tributaries at critical times during their life-histories. City Light has studied entrainment risk (see Section 6.3.3 of this PSP) using acoustic telemetry and a desktop analysis, the NPS conducts ongoing spawning surveys, and an extensive water quality dataset, which will be augmented by City Light's proposed FA-01 Water Quality Monitoring Study (see Section 6.2.9 of this PSP) will provide information that can be used to assess the influence of ambient conditions on reservoir fish populations.

¹⁵ Although City Light has concluded that these studies do not meet the FERC Study Criteria under section 5.9(b) of its regulations, 18 CFR § 5.9(b), and are not needed to analyze any Project-related effects, City Light believes that there is shared interest with the LPs in the long-term management of fish populations in Project reservoirs. Such matters can be properly addressed in a reservoir fisheries management plan to be developed during relicensing and implemented over the next license term.

LPs submitted four study requests related to assessing shoreline habitat: NPS-06 Determine the Suitability and Productive Potential of Littoral and Riparian Habitat for Resident and Anadromous Fish in the Project Area, USFWS-07 Determine the Suitability and Productive Potential of Littoral and Riparian Habitat for Resident and Anadromous Fish in the Project Area, USIT-06 Littoral and Riparian Habitat Quality, and WDFW-14 Littoral and Riparian Habitat Quality. City Light has not adopted these study requests for the reasons discussed below.

The studies requested to address near-shore habitat quality are requests for baseline data gathering that could not be adequately completed within the ILP study timeframe. City Light believes that the LPs' proposals represent extensive data gathering exercises aimed at detecting a Project effect where none is indicated by existing information (18 CFR § 5.9(b)(5)). Reservoir water surface elevations fluctuate as the result of Project and non-Project (e.g., flood-control related operations stipulated by the U.S. Army Corps of Engineers [USACE]) actions, and this variation affects the shoreline. However, LPs point to no specific adverse effects demonstrated by the wealth of data already collected within the Project area (18 CFR § 5.9(b)(4)).

The proposed studies comprise a variety of shoreline surveys, such as woody debris inventories and shoreline erosion assessment. Much of the information sought by LPs is available as existing information or will be available as the result of studies proposed by City Light, and some will be derived, if appropriate, in the context of management plans that arise out of the relicensing. City Light's proposed GE-01 Reservoir Shoreline Erosion Study includes objectives to: (1) identify ongoing areas of erosion along the reservoirs' shorelines; (2) assess the contribution of Project and non-Project related factors to areas of erosion; (3) estimate shoreline erosion rates at representative unmonitored sites; (4) correlate existing erosion rates with erosion site characteristics (e.g., underlying geology, slope, aspect, shoreline height) to help estimate ongoing erosion rates; and (5) evaluate the condition and effectiveness of existing shoreline erosion control measures. City Light estimates the volume of woody debris entering Ross Lake and transports large wood downstream for release into the Skagit River below Gorge Powerhouse to benefit downstream aquatic habitat. The future monitoring and management of large wood, including its transport to the lower river and its use to enhance shoreline habitat in the Project reservoirs, will be a topic of discussion during the collaborative identification of PMEs for the next license term.

The study requests also contain management objectives or PME requests and as such do not constitute appropriate actions for this stage of the ILP. Examples of these include: (1) "Facilitate management objectives, including fish passage around the Skagit Dams, that would preserve the reproductive potential for genetically unique Bull Trout and other fish populations in Skagit Basin above the Cascade River;" (2) "Identify restoration opportunities to enhance habitat for native fish, amphibians, and wildlife and ameliorate turbidity;" (3) "Provide a means to assess the health and viability of populations in each reservoir and predict long-term persistence in the face of changing flow and temperature regimes and project operations."

Overall, the LPs' requests do not meet a majority of the FERC Study Criteria. City Light believes: (1) although goals and objectives are identified, they are not well linked to the proposed methodologies (18 CFR § 5.9(b)(6)); (2) there is no clear justification for why additional information is needed (18 CFR § 5.9(b)(4)); (3) although Project nexus is presumed by LPs, no evidence is provided of a site-specific Project effect, and there is little explanation of how the results would be used to inform the development of license conditions (18 CFR § 5.9(b)(5)); and
(4) proposed study costs appear to be underestimates; in some cases it is unclear if one or two years of effort is being proposed (18 CFR § 5.9(b)(7)).

6.3.6 Engineered Spawning Channels

The Upper Skagit Indian Tribe (USIT-10) and WDFW (WDFW-07) each submitted a study request titled, Efficiency of Engineered Spawning Channels as Mitigation to Loss of Off Channel Habitats Downstream of the Skagit Project. As stated in the Upper Skagit Indian Tribe's study request, "The goals of this study are to understand the engineered channels efficacy to salmonids, assess function and longevity of enhancement structures, identify the rate and root causes of their degradation, to inform the basis for long term enhancement, maintenance or alternative strategies." Given the uncertainty regarding the eventual suite of PMEs for the Project (as discussed below), it is not prudent to allocate effort during the study period to the assessment of these channels, and as a result City Light has not adopted this study request.

Chum Salmon in the reach downstream of the Project are limited by the availability of spawning habitat. As a result, the FSA established the Off-Channel Chum Habitat Development and Improvement Program, i.e., the engineered spawning channels.¹⁶ Although the channels functioned as intended to provide spawning habitat for Chum Salmon, they are nearing the end of their functional design life, and it is unclear whether their restoration and future use would constitute a potential PME during the next license term. As stated by the Upper Skagit Indian Tribe in its request, "…it will be important to assess whether improved channel forming processes offer a new management approach that is more inclusive and beneficial to other salmonids that use floodplain and off channel habitats."

City Light is proposing to conduct studies to better understand fluvial geomorphologic conditions, riparian and aquatic habitat in the Skagit River reach downstream of Gorge Dam to the Sauk River. Some desired data identified in these study requests will be collected as part of GE-04 Skagit River Geomorphology between Gorge Dam and the Sauk River Study (Geomorphology Study) and FA-02 Instream Flow Model Development Study. Hydraulic modeling (see Section 6.2.11 of this PSP), conducted to assess conditions between Gorge Powerhouse and the Sauk River confluence, will map substrate and cover and can evaluate the connectivity between mainstem flows and side channels considered to have significant habitat value. In its Geomorphology Study (see Section 6.2.15 of this PSP), City Light proposes to conduct scour monitoring and examine current peak flows (i.e., duration, magnitude, and timing) in the Skagit River downstream of the Project. Information from the proposed study will also be used to evaluate the relationship between flow and substrate movement. Other potentially relevant information will be derived from the TR-01 Vegetation Mapping Study, which will involve systematic vegetation mapping that may be useful in describing existing riparian conditions and assessing potential Project-related habitat effects, and TR-02 Wetland Assessment. Potential PME measures arising out of these analyses could include management of flow releases in combination with augmentation of coarse sediment and large wood to improve downstream habitat conditions.

City Light acknowledges that engineered channels may continue as part of the overall suite of PMEs for the Project, but before investing time and effort in assessing existing channels near the

¹⁶ Engineered spawning channels for Chum Salmon include Park Slough, Newhalem Ponds, County Line Ponds, Taylor Channel, Powerline Channel, and Illabot Channels.

end of their functional design life it would be beneficial to first understand the potential role of these features in the context of other potential measures and actions in creating and maintaining functional mitigation habitat where it is most needed and effective. If engineered side channels are identified as a PME for the next license term, City Light will work with LPs to develop appropriate designs that provide multi-species benefits and identify implementation and performance monitoring metrics that will allow for the ongoing appraisal of the channels' effectiveness and any need for their maintenance or modification.

6.3.7 Creel Survey

LPs submitted the following study requests for a creel survey in the Project reservoirs: NPS-04 Skagit Project Recreational Fishing (Creel) Survey, USFWS-05 Skagit Project Recreational Fishing (Creel) Survey, and WDFW-16 Recreational Fishing (Creel) Survey. City Light has not adopted these study requests for the reasons discussed below.

LPs request that City Light estimate fishing pressure and angling related morality, characterize the species, size, age, and parasite load of fishes caught, conduct an economic analysis of the fishery, assess angler knowledge of regulations, identify impacts to Bull Trout related to angling, and assess the effectiveness of fishing regulations. There is no reasonable Project nexus (18 CFR § 5.9(b)(5)) associated with these requests, as the objectives of these study requests are the responsibility of resource management agencies to inform resource management decisions and are not appropriate to study as part of relicensing. City Light recognizes its responsibility to operate the Project in a manner that supports reservoir fisheries and acknowledges its shared interest in the resource. However, the management of those fisheries, and financing the extensive baseline data gathering necessary to make management decisions, is the agencies' responsibility.

6.3.8 Sediment Transport Modeling

LPs submitted study requests related to developing a two-dimensional (2-D) sediment transport model of the Skagit River: NMFS-02 Geomorphology and Aquatic Habitat, NPS-12 Impact of the Operations of Skagit Hydroelectric Project (#553) on Sediment Storage, Stability and Transport on Skagit River and its Influence on Endangered Species Habitat, USFWS-12 Impact of the Operations of Skagit Hydroelectric Project (#553) on Sediment Storage, Stability and Transport on Skagit River and its Influence on Endangered Species Habitat, USFWS-12 Impact of the Operations of Skagit Hydroelectric Project (#553) on Sediment Storage, Stability and Transport on Skagit River and its Influence on Endangered Species Habitat, USIT-08 Geomorphology and Anadromous Salmonid Habitat, and WDFW-05 Geomorphology and Anadromous Salmonid Habitat. City Light has not adopted these study requests for the reasons discussed below.

The LPs requested that City Light collect and analyze information on sediment transport and develop a 2-D sediment transport model in the Skagit River downstream of Gorge Dam. They requested the following:

- (1) Monitor bedload transport (volume and grain size) and sediment mobilized as a function of discharge, depth, and velocity to develop bedload rating curves at key locations including tributary junctions
- (2) Develop and calibrate a 2-D sediment transport model of the Skagit River downstream from Gorge Dam

- (3) Monitor changes in bed elevation and bank erosion at key cross sections to develop a bank erosion model to supplement the 2-D sediment transport model
- (4) Use the model to analyze the fate of any sediment added as part of PME measures

City Light does not propose to develop a 2-D sediment transport model for the Skagit River as part of relicensing studies for several reasons. Two-dimensional sediment transport models may be appropriate to use to analyze sediment transport and bed changes for short reaches of river (up to one mile in length) but are not appropriate given current models and technology for long reaches of river as proposed by LPs. The Skagit River from Gorge Dam to the Sauk River confluence is over 29 miles long and would result in infeasible run times for a 2-D sediment transport model. LPs cite 2-D models developed for the Barnaby Reach on the Skagit River, but the Barnaby Reach analysis used a 2-D hydraulic model (no sediment transport component) and instead used analysis of historic aerial photographs and flow records to assess sediment transport and channel changes (Skagit River System Cooperative and Natural Systems Design 2019), similar to the approach proposed by City Light.

LPs suggest that a 2-D sediment transport model is needed to determine the discharge necessary for gravel mobilization from tributary inputs and streambanks and identify where sediment may be transported and sorted and to design and monitor process flows that form and maintain new aquatic habitat. City Light proposed to analyze flows needed to mobilize tributary inputs and streambanks and using an analysis of historical aerial photographs and flow records as part of GE-04 Skagit River Geomorphology between Gorge Dam and the Sauk River Study (Geomorphology Study).

City Light does propose to develop a 2-D HEC-RAS hydraulic model of the Skagit River as part of FA-02 Instream Flow Model Development Study. In addition, City Light proposes to collect information on initiation of bedload movement and depth of scour/fill at redd spawning locations in the Skagit River using scour monitors and accelerometers as part of the Geomorphology Study. The scour data, along with the 2-D hydraulic model and associated substrate conditions, will be useful to extrapolate the results to other areas of the river with similar hydraulic/substrate conditions to determine flows that may cause scour of salmonid redds and other habitat areas.

City Light proposes to use the substrate and sediment budget information, along with aquatic habitat data, instream large wood data, peak flow data, and fish use information to determine the best methods to enhance aquatic habitat in the Skagit River downstream from Gorge Dam in a forward-looking approach to developing PMEs for the Project. This forward-looking approach will consider current conditions of flow, large wood, and sediment input in the river, current aquatic habitat limitations, and potential ways to enhance limiting habitat and would likely include monitoring and adaptive management based on the monitoring results. City Light does not believe that the considerable level of effort required to develop and calibrate a 2-D sediment transport model of the entire reach of the Skagit River downstream from Gorge Dam would be helpful to this forward-looking approach considering the inherent scale limitations and uncertainty in 2-D sediment transport modeling would require a monitoring and adaptive management approach to any gravel augmentation or high flow modifications to provide site-specific information on the effectiveness of the modifications.

In their study requests, LPs met some but not all of the FERC Study Criteria. City Light observes that: (1) the approach proposed by the LPs is not appropriate for modeling the proposed length of river, and as such, it is unclear how the results from this model could effectively inform license conditions (18 CFR § 5.9(b)(5)); and (2) proposed study costs appear to be underestimates (18 CFR § 5.9(b)(7)).

6.3.9 Effects of Climate Change on Hydrology and Project Operations

LPs submitted study requests related to analyzing the effects of climate change on Project operations: NPS-14 Impact of a Changing Hydrologic Regime on the Operations of the Skagit Hydroelectric Project (#553), USFWS-14 Impact of a Changing Hydrologic Regime on the Operations of the Skagit Hydroelectric Project (#553), USIT-11 Impact of a Changing Hydrologic Regime on the Operations of the Skagit Hydroelectric Project (#553), WDFW-12 Impact of a Changing Hydrologic Regime on the Operations of the Skagit Hydroelectric Project (#553), WDFW-12 Impact of a Changing Hydrologic Regime on the Operations of the Skagit Hydroelectric Project (#553), and SDIDC-01 Flood Storage Timing. City Light has not adopted these study requests for the reasons discussed below.

The LPs requested that City Light analyze the effects of climate change on streamflows input to the Project and resulting effects on Project operations. They requested the following:

- (1) Seek updated regional projections on change in the region's hydrology.
- (2) Improve the existing DHSVM model by including new regional projects, reducing grid size, developing a snow transport and deposition capability at the landscape scale, and improving the groundwater component.

City Light has already developed a DHSVM model using recent regional climate projects to inform the model and updates the model periodically as needed to inform hydroelectric operations. City Light does not believe a study plan is appropriate to inform its ongoing climate modeling efforts since a relicensing study implies a limited (2-year) time frame as part of the ILP process. City Light plans to continue updating its model to inform Project operations during the new license; this will provide sufficient information to address LP concerns.

City Light is also developing an Operations Model (OM-01 Operations Model Study). The Operations Model will be capable of projecting the effects of alternative operating scenarios on available water storage, flow releases and release rates, lake levels and fluctuations, and relevant issues associated with or dependent upon water availability under different water year types and hydrologic regimes. Scenarios could be simulated in the Operations Model with alternate hydrologic conditions, such as the simulated stream flows from the DHSVM model, however, this is a separate and subsequent step to City Light's Operations Model Study, which focuses on the development of the Operations Model. Once the model is developed, City Light plans to develop a framework to work with LPs to identify and evaluate individual scenario requests. The model will be utilized to simulate alternative operations scenarios identified through the framework. Typically, scenario requests from different LPs may overlap with one another or be outside the physical capability of the system. Each scenario request requires a detailed review and will be discussed with LPs on the most efficient application of requested scenarios. However, as stated above, identification of scenarios will occur through a framework process following model development.

6.3.10 Gorge Dam Removal

The Upper Skagit Indian Tribe submitted a request to study the removal of Gorge Dam (USIT-04 Gorge Dam Removal). The goal of the requested study is "to examine the ongoing impacts of Gorge Dam on anadromous salmonid habitat productivity, and viable salmonid populations while exploring the possible ecological and social economic effects of Gorge Dam removal." Individual components of the study request include investigating the degree to which Gorge Dam blocks anadromous fish passage, impairs habitat in the Gorge bypass reach and tributary habitat above the impoundment, and alters anadromous salmonid productivity below the impoundment. To the degree to which the study request of Gorge Dam removal includes these stated components, City Light has adopted this study request, in part, as City Light is proposing to undertake a number of fish and aquatics, and geomorphology studies to investigate these potential effects of the Skagit Project on the resources identified in the study request. However, to the extent the study request includes an exploration of the "possible ecological and social economic effects of Gorge Dam removal," City Light has not adopted the study request for the reasons discussed below.

First, the request constitutes a study of a specific mitigation measure, dam removal, which has not been shown to be necessary or warranted. Under the ILP, the development of proposals for mitigation measures necessarily must occur after appropriate studies of potential Project effects have undergone rigorous scientific investigation, a step which has yet to occur in the relicensing process for the Skagit Project. In SD1, FERC determined that decommissioning was not an alternative to be considered in the Skagit River Project relicensing and reiterated the Commission's long-held policy that "decommissioning is not a reasonable alternative to relicensing in most cases." SD1 went further to explain that for a variety of reasons:

".. the Commission does not speculate about possible decommissioning measures at the time of relicensing, but rather waits until an applicant actually proposes to decommission a project, or a participant in a relicensing proceeding demonstrates that there are serious resource concerns that cannot be addressed with appropriate license measures and that make decommissioning a reasonable alternative. City Light does not propose decommissioning, nor does the record to date demonstrate there are serious resource concerns that cannot be mitigated if the project is relicensed; as such, there is no reason, at this time, to include decommissioning as a reasonable alternative to be evaluated and studied as part of staff's NEPA analysis."

Therefore, for FERC to consider a proposal to decommission the Gorge Dam or even a proposal to study such a measure, the request to conduct such a study needs to demonstrate that a resource concern exists that cannot be addressed through other measures. While the Upper Skagit Indian Tribe's study request identifies possible resource concerns, concerns which City Light has already proposed to study, the requested study does not demonstrate that there are significant resource impacts which cannot be addressed by other measures, nor does it demonstrate that these impacts are occurring. Indeed, the study request itself asks for "exploring the possible ecological and social economic effects of Gorge Dam removal."

City Light acknowledges that the extent to which a serious resource impact should be clearly demonstrated may be proportional to the overall benefits and importance of a project. For example, a 500-kW project that impairs the migration of an ESA-listed fish may require less of a showing of impacts than a much larger project. At 200-MW, the Gorge Development must be considered a large generating facility. However, size alone is not its only significance, as this goes well beyond

its generating capability. The Gorge Development is an essential energy resource for City Light customers and the region as a whole.

The Gorge Development operates as part of the Ross-Diablo-Gorge integrated system of operations. Removing any part of the system and the system as a whole is materially reduced in operational value beyond the loss of the single component. The Gorge Development, working in conjunction with Ross and Diablo, is vital for delivery of ancillary services to the electrical grid, including voltage and frequency control, operating reserves, and overall control area functions. These services bring stability, reliability, and resiliency to City Light's system and the electrical grid as a whole, all of this with a renewable energy source. The Gorge Development produces needed clean, renewable energy and capacity, and this renewable energy is essential to combatting climate change. The Gorge Development system benefits of reliability will become even more valuable as non-renewable, carbon dioxide emitting base load resources are decommissioned. Gorge operations allow greater ability for City Light to incorporate intermittent renewable energy for City Light customers and the region at large, and its loss would restrict City Light's further integration of solar and wind energy.

Beyond its role and benefits to the electrical system, Gorge operations bring considerable value to the Skagit River resources and environment. In its role as an afterbay for Diablo and Ross, Gorge operations allow precise control of downstream flows and associated river stage to benefit and enhance fish life stages of spawning and egg incubation. The Gorge Development also plays a role in the flood control operations of the Skagit River Project for protection of Skagit Valley infrastructure and lands, a role the Gorge Development played just recently by enabling regulation of river stage by controlling potential flow fluctuations in downstream reaches due to tributary inflows below Diablo Dam. With four turbine-generators, the Gorge Development has a high degree of flexibility to optimize downstream flows for fishery resources, to limit scour, while allowing response to rapid changes in system disturbances and downstream resource needs.

Given its size and overall significance to the electrical system and Skagit River resources, the need for an actual demonstration—that is, proof—of the existence of a serious resource impact is required to demonstrate the requested study, but is absent in the study request.

Moreover, the study request does not meet the FERC Study Criteria. The study request to simply "explore" the possible effects of such a mitigation measure is insufficient rationale to undertake such a costly study given no specific need for the study is explained. There would be no limit to studies that a licensee would have to undertake if requests to simply "explore possible effects" of different actions were sufficient justification to conduct a study. A reasonable connection between Project operations and effects on anadromous fish has not been shown in the study request, as the effects are all alleged to occur, which is an insufficient basis for the dam removal portion of the study request. Moreover, the great majority of the study request consists of study components already requested in other study requests, studies which City Light is proposing to undertake. The dam removal portion of the study request is a request for FERC to consider a specific PME measure that lacks any evidentiary foundation.

For these reasons, City Light has not adopted the dam removal portion of this study request.

6.3.11 Climbing Study

The Access Fund (AF) and Washington Climbers Coalition (WCC) filed a study request (AFWCC-01 Climbing Resources Study) designed to investigate rock climbing opportunities and conduct the requisite botanical, cultural and wildlife studies needed to establish new climbing management areas (CMA). The four proposed CMAs include three CMAs on lands managed by NPS (the Space Wall, Canoehalem, and Gorge Bypass Reach CMAs) and one CMA (comprised of Maintenance Wall, After Hours Crag, and Wu Tang Wall) on City Light-owned lands adjacent to the existing Town Crags CMA on lands managed by NPS located near Newhalem. All of these proposed CMAs are located outside the Project Boundary. The AF/WCC request states the natural resource data collected from the field studies could be used by the NPS to complete their NEPA review of the proposed CMAs on lands managed by NPS. City Light has not adopted the AFWCC-01 Climbing Resources Study request for the reasons described below.

First, the study request does not demonstrate any nexus between Project operations and effects on climbing resources (18 CFR § 5.9(b)(5)). City Light, as the licensee, must provide adequate access for recreation on Project lands and waters, however, the proposed CMA locations are not within the Project Boundary. The proposed Space Wall CMA is located 1.2 miles east of Newhalem above Highway 20 to the north of the Project Boundary. Canoehalem is located on the southern side of Gorge Lake and while access to the CMA is via Gorge Lake from State Route (SR) 20 on the north side, the actual climbing area is located outside the Project Boundary to the south of the Project. The Project does not restrict access to the area of Gorge Lake where the proposed new CMA would be located. The proposed Gorge Bypass Reach CMA would utilize boulders for climbing within the Gorge bypass reach, which is also outside the Project Boundary. The fourth proposed CMA is abutting the existing Town Crags CMA outside of and to the north of the Project Boundary at Newhalem on City Light-owned lands.

Second, the NPS, not City Light, is responsible for designating and managing CMAs on land within the RLNRA managed by NPS. The NPS only allows rock climbing in designated CMAs within the RLNRA, per the 2012 RLNRA General Management Plan. The NPS process for establishing new climbing areas in the RLNRA includes a NEPA process supported by the requisite botanical, cultural and wildlife studies to assess potential impacts. There are currently four approved CMAs in RLNRA, including Town Crags, Newhalem East, Newhalem West, and Diablo. Three of the four new CMAs proposed by AF and WCC are located on lands managed by NPS, and therefore fall under the NPS's jurisdiction. For these reasons, City Light does not propose to include the AF and WCC study request in City Light's PSP.

6.3.12 Mitigation Lands – Cost-Benefit Analysis

One LP submitted study requests related to its characterization of a tax shift burden arising from City Light's acquisition of mitigation lands (SC-02 Mitigation Lands). City Light has not adopted this study request for the reasons discussed below.

In its study request, Skagit County requested a cost-benefit assessment of City Light's mitigation lands program to assess merits of future mitigation land acquisition, including an assessment of the shifted tax burden to Skagit County taxpayers. This proposed study plan is not included in this PSP because such an investigation will not inform the development of license requirements (18 CFR § 5.9(b)(5)). It is well settled that FERC has no authority to award damages, including the assessment of payments in lieu of taxes, or to fund local governmental functions.¹⁷

The LP's identified concerns include limitations of the acquired mitigation lands to improve salmonid populations (including a request for smolt production and outmigrant survival count), and ongoing management and stewardship actions related to mitigation lands. The LP also specifically cites a concern about proliferation of illegal activities and impacts on local law enforcement. This is a statement on proper or desired methods for selection and management of mitigation lands rather than a study request. City Light is aware of very few instances when Skagit County has had to respond to City Light mitigation lands for law enforcement issues. Skagit County has assisted with eviction at a few non-license conservation lands, but City Light directly paid the Sheriff in those events. More than 10,300 acres of the City Light mitigation lands in Skagit County were acquired pursuant to the Wildlife Settlement Agreement. These lands primarily address wildlife mitigation purposes/services, although many have a secondary direct or indirect benefit for salmonids. It would not be possible to quantify the number of salmon produced associated with each acquisition. The Skagit Mitigation Land Management Plan (City Light 2006) summarizes habitat acreages for key wildlife species in parcels owned at that time. The new management plan will update this information for current priority species and all of the lands owned. At least seven proposed studies (GE-02, TR-01, TR-02, TR-04, TR-05, TR-07, and TR-09) include information gathering on mitigation lands which will serve as the information base for management plans in the new license.

City Light notes that Skagit County states that the mitigation lands "…provides additional hunting land for tribal members". It is policy that City Light mitigation lands be open to all tribal members and the non-tribal public for hunting, fishing, and non-motorized daytime recreation if the activities are consistent with wildlife resource management objectives and abide by state and tribal laws. This is stated in the 2006 Management Plan and on the City Light website with the public use policy.¹⁸

6.3.13 Mitigation Lands – Habitat

Three LPs submitted study requests related to mitigation lands habitat: SITC-02 Fish and Wildlife Mitigation Land Access, Stewardship and Habitat Assessment; USIT-12 Fish and Wildlife Mitigation Land Access, Stewardship and Habitat Assessment (Mitigation Lands); and USFWS-18 Assessment of Fish and Wildlife Conservation Lands: Access, Stewardship, and Habitat Use. City Light has not adopted these study requests for the reasons discussed below.¹⁹

¹⁷ E.g., S. Carolina Pub. Serv. Co. v. FERC, 850 F.2d 788 (D.C. Cir. 1988); County of Butte v. Cal. Dep't of Water Resources, 128 FERC ¶ 61,068, reh'g denied, 129 FERC ¶ 61,133 (2009); Confederated Salish and Kootenai Tribes, 153 FERC ¶ 61,217, at P 21 (2015); N.Y. Power Auth., 120 FERC ¶ 61,266, at PP 31-33 (2007).

¹⁸ http://www.seattle.gov/light/skagit/docs/SCL_Conservation_Lands_Public_Use_Policy_20180619.pdf

¹⁹ Although City Light has concluded that these studies do not meet the FERC Study Criteria under section 5.9(b) of its regulations, 18 CFR § 5.9(b), and are unneeded to analyze any Project-related effects, City Light believes that there is shared interest with the LPs in managing mitigation lands for habitats and species. Such matters can be properly addressed in management plans developed during relicensing and implemented over the next license term.

In their study requests, Swinomish Indian Tribal Community, Upper Skagit Indian Tribe, and USFWS requested that City Light assess access to mitigation lands and evaluate the potential for these lands to support culturally significant and special-status species.

The LPs' study requests do not meet a majority of the FERC Study Criteria. Primarily, the study requests do not demonstrate nexus between Project operations and effects on mitigation land habitat (18 CFR §§ 5.9(b)(5)).

Every parcel acquired for wildlife mitigation was approved by all members of the Wildlife Management Review Committee (WMRC) comprised of representatives from Settlement Agreement signatories, including the Swinomish Indian Tribal Community, Upper Skagit Indian Tribe, and Sauk-Suiattle Indian Tribe. The primary purpose of the mitigation land is to protect and enhance habitat for wildlife. For this reason, the WMRC focused on acquisition of properties that are adjacent to federal, WDFW, and conservation organization lands to maximize habitat connectivity and protection. However, there are some parcels that are adjacent to private properties. In these areas City Light works to form partnerships with willing neighbors to steward the area but also occasionally needs to install signage and gates and, in a few cases, pursue law enforcement actions to address issues of illegal activity. Public usage (hunting, fishing, gathering, recreation, etc.) is secondary to habitat protection and sometimes limited, which is beneficial for many wildlife species. Access to mitigation lands is allowed for anyone.

LPs also identify concerns regarding impacts of illegal activities and the need to evaluate the potential for mitigation lands to support species of concern. City Light has successfully reduced impacts at the limited locations where trespass has impacted habitat (City Light notes that this is one reason more isolated properties afford greater protection of habitat). Each parcel has unique set of habitat conditions, adjoining land uses, and issues, and thus unique opportunities and constraints for habitat management for target species. City Light's current management funds have been mostly used to remove culverts, bridges, roads and riprap, prevent illegal activities, and improve elk forage habitat at sites selected in coordination with the Indian tribes. As identified in the current Settlement Agreement and directed by the WMRC, the funding for wildlife habitat was to be focused on land acquisition. Management was to be relatively passive, with the intent of allowing forests to mature.

City Light recognizes that additional habitat enhancement actions can be implemented in some areas and looks forward to working with LPs to develop updated management plans. City Light has proposed to develop a new management plan for mitigation lands in consultation with LPs after proposed TR-01 Vegetation Mapping Study, TR-02 Wetland Assessment, TR-04 Invasive Plants Study, GE-02 Erosion and Geologic Hazards at Project Facilities and Transmission Line Right-of-Way Study, TR-05 Marbled Murrelet Study, TR-09 Beaver Habitat Assessment, and TR-10 NSO Habitat Analysis are completed during relicensing. Information on benefits to fish and wildlife, habitat conditions of the mitigation lands, instances of illegal activity, access issues and land use changes near mitigation lands would be included in the assessment of each parcel. This assessment will provide a basis for developing parcel-specific management objectives and actions and would be compiled into an updated management plan for mitigation lands. The plan could also include identification of additional data collection needed to determine or refine management actions (e.g., access, where to focus elk forage enhancement; habitat for murrelets, spotted owls, and forest carnivores; wetland-dependent species; stream/riparian habitat, etc.).

6.3.14 Wildlife Studies – Connectivity

Four LPs submitted study requests related to wildlife connectivity: SITC-01 Reservoir Operation Impacts on Terrestrial Wildlife, USIT-14 Impact of the Operations of Skagit Hydroelectric Project (#553) on Terrestrial Wildlife (Wildlife Connectivity), USFWS-17 Impact of Operations of the Skagit Hydroelectric Project on Terrestrial Wildlife Connectivity; and WDFW-19 Impact of the Operations of Skagit Hydroelectric Project (#553) on Terrestrial Wildlife (Wildlife Connectivity). The Upper Skagit Indian Tribe, Swinomish Indian Tribal Community, USFWS, and WDFW have requested a study to assess the impacts of the reservoirs, Project infrastructure, SR 20, and recreation on the ability of wildlife to move around the region and maintain healthy populations, or for ESA-listed species to recover. Species of concern are identified as follows: mountain goat, pine marten, Pacific fisher, gray wolf, Grizzly bear, Canada lynx and wolverine. Additionally, the request includes generating a population estimate for mountain goats in North Cascades National Park, RLNRA, and the surrounding area.

The study requests do not provide information to demonstrate the need for a study based on the FERC Study Criteria as outlined below.

All the study requests identified above requested a study examining the impacts of the Project on wildlife connectivity; the presumed need is adverse effect. There is no evidence for such an adverse effect. There is no evidence provided in the request (18 CFR § 5.9(b)(5)) that the Project isolates wildlife populations or hinders movement, to any significant degree, of mountain goat or other wildlife populations, including the species of concern. Mountain goat population suppression is an issue throughout the North Cascades and is not limited to the Project. Welch et al. (1997) surveyed large portions of RLNRA and surrounding North Cascades National Park and found very few goats. They hypothesized that this could be due to lower habitat quality (large patches of open subalpine meadows [the preferred foraging habitat] situated near escape terrain seems to be lacking compared to the terrain to the east and west), lack of natural salt licks, or lack of satisfactory winter habitat nearby. While Parks et al. (2015) found that freeways, highways, water, agriculture, and urban landcover limit gene flow in mountain goat populations in Washington and British Columbia, the study does not provide evidence that the Project affects goat movement, and other studies suggest that patterns are poorly understood. The Washington Wildlife Habitat Connectivity Working Group found low- and moderate-cost linkages between mountain goat habitat concentration areas, but I-90 and Fraser River Valley are the most substantial restrictions. In a study that encompassed the North Cascades, Shirk et al. (2010) found that I-90 has a major effect on north-south movement and suggested "...water bodies like those found within the study area are not major impediments to gene flow. Indeed, mountain goats are capable swimmers and have been observed crossing major lakes and rivers."

The study requests do not demonstrate nexus between Project operations and wildlife movement in the Project vicinity (18 CFR § 5.9(b)(5)).

There have been some recent research projects on forest carnivores relevant to this connectivity. Aubry et al. (2012) documented extensive wolverine movement east and north of Ross Lake and into British Columbia where core populations occur. Long et al. (2013) found north and south black bear genetic population segments with a steep gradient near Highway 2, but no evidence of structuring within the vicinity of the Project. They also found no evidence of genetic structuring for marten populations (but sample sizes were small). Previous concurrence letters from USFWS

determined that continued routine operation of the Project was "likely to affect, not likely to adversely affect" the grizzly bear and gray wolf (letter from D. Frederick, State Supervisor, USFWS, Olympia, WA, to J. Clement, Acting Director, FERC, Washington D.C., August 10, 1994).

City Light is not responsible for potential impacts of SR 20 on wildlife movement in the region as it is not a Project facility. Additionally, SR 20 is not comparable to I-90, which research has identified as a barrier to wildlife movement. SR 20 is a much narrower road with far less traffic and is closed for five months out of the year. A regional study focusing on connectivity would require a multi-year regional effort and would have severe limitations in its ability to isolate the effects of the Project from other factors influencing wildlife movement and connectivity. City Light does not believe a study is warranted as the study requests did not provide evidence that the Project has an adverse effect on wildlife movement in the region (18 CFR § 5.9(b)(5)).

6.3.15 Wildlife Studies – Harlequin Duck

The Stillaguamish Tribe of Indians submitted a study request related to harlequin duck (STI-05 Harlequin Duck Breeding Habitat Analysis). City Light has not adopted this study request for the reasons discussed below.

The study request does not address the FERC Study Criteria. The study request does not provide evidence of a Project effect on harlequin duck populations. City Light does not believe a Harlequin Duck Breeding Habitat Analysis is warranted as the request does not attempt to demonstrate nexus between the Project and harlequin duck populations (18 CFR § 5.9(b)(5)). Harlequin ducks nest near fast-flowing water with loafing sites nearby; typically nesting on the ground but also in tree cavities. WDFW data indicate the presence of harlequin duck in tributaries to the Skagit River outside of the North Cascades National Park Complex, and surveys in the park have documented its presence (Hoffman et al. 2015), however, there are fewer than 10 observations of harlequin duck posted on eBird in the park (Hoffman et al. 2015) and all are associated with creeks and rivers that are not near the Project. Harlequin duck population numbers in the Project vicinity are unknown and occurrence within the Project Boundary has not been documented.

6.3.16 Transmission Line

Four LPs submitted study requests related to the transmission line and impacts on wildlife and plant species: SSIT-02 Impacts of Transmission Line Corridor Right-of-Way (ROW) on Terrestrial Wildlife/Habitat and Native Plant Species, USIT-13 Impacts of Transmission Line Right-of-Way (ROW) on Terrestrial Wildlife/Habitat and Native Plant Species, USFWS-17 Impact of Operations of the Skagit Hydroelectric Project on Terrestrial Wildlife connectivity, and WDFW-18 Impacts of Transmission Line Corridor Right-of-Way (ROW) on Terrestrial Wildlife/Habitat and Native Plant Species. The Sauk-Suiattle Indian Tribe, Upper Skagit Indian Tribe, USFWS, and WDFW have requested a study to assess the impact of the transmission line ROW on plant and wildlife species and inform the development of updated management plans and site-specific management activities to enhance terrestrial wildlife habitat. The study requests include surveys for deer and elk, avian species, and vegetation surveys to provide a quantitative analysis of species presence and abundance, availability, and inform how the Project may be affecting habitat and resource quality and availability. The study request also includes forage species energy assessment and visual screening quality assessment along roads.

City Light has not adopted these study requests for the reasons discussed below.²⁰

The study requests do not provide information to demonstrate how the information would be used to inform license conditions or evidence of a Project effect (18 CFR § 5.9(b)(5)).

City Light believes its proposed studies including GE-02 Erosion and Geologic Hazards at Project Facilities and Transmission Line Right-of-Way Study (Erosion and Geologic Hazards Study), TR-01 Vegetation Mapping Study, TR-02 Wetland Assessment, and TR-04 Invasive Plants Study are adequate to assess the Project effects related to the transmission line ROW for relicensing in the ILP.

City Light recognizes that the ROW provides habitat benefits for some wildlife species as an early successional habitat corridor through agricultural and second-growth forested areas and that vegetation management plays a major role in habitat quality. During 2020, City Light has been collecting data on plant communities, species, and general structure as part of its Vegetation Mapping Study and Wetland Assessment, and will be collecting data on invasive plant species (Invasive Plants Study) in 2021. The results of these studies along with data from the Erosion and Geologic Hazards Study will be used to inform the development of a vegetation management plan for the transmission line ROW. City Light's proposed approach is to use the data collected during relicensing studies to identify sections of ROW that have different types and general qualities of habitat and identify locations where City Light can improve habitat.

City Light is committed to considering more focused data collection in areas where it is feasible to impact management by expanding upon the vegetation mapping study once management objectives in the transmission line ROW are further developed. City Light is considering the following data needs to inform management actions: dominant plant species composition, vegetation height, percent cover; and qualitative assessment of plant species diversity, patchiness, and vegetation structure. City Light will consider information including (but not limited to) the following to determine where to focus habitat improvement efforts: results of proposed relicensing studies on wildlife, vegetation mapping, and invasive species; land ownership; adjacent vegetation communities; topographic and landscape position; proximity to roads; habitat connectivity; cover measurements of screening vegetation along roads; and soil types (to inform drainage patterns). City Light will assess and determine appropriate management methods once locations have been determined.

These data will be used during collaborative development of the management plan with LPs to select specific areas of the ROW that should be prioritized for habitat improvements. The management plan may include additional studies or surveys to further refine habitat improvement activities, locations, site-specific objectives, and methods; as well as implementation and effectiveness monitoring, and adaptation management as needed. This could include data on forage species abundance and nutritional value in treatment areas to document baseline conditions. Management plans will include BMPs to protect natural and cultural resources from direct and

²⁰ Although City Light has concluded that these studies do not meet FERC Study Criteria under section 5.9(b) of its regulations, 18 CFR § 5.9(b), and are unneeded to analyze any Project-related effects, City Light believes that there is shared interest with the LPs in understanding appropriate management actions and their effectiveness over time in the transmission line ROW. These matters can be properly addressed in a transmission line vegetation management plan to be developed during relicensing and implemented over the next license term.

indirect effects from ROW operations and maintenance activities as well as indirect effects due to recreational use of City Light roads and trails.

In their study requests, LPs requested that City Light conduct deer, elk, and bird surveys to quantify species presence and abundance in the ROW. City Light agrees that vegetation management can affect deer and elk habitat and bird use of the ROW, however, spotlight surveys for ungulates and bird surveys are not likely to add significant relevant information that will be used for the formulation of license conditions. These surveys would also be very difficult to implement except in a few segments of the line. There are additional limiting factors are not related to the Project that impact deer, elk and avian use of the area; therefore City Light believes its proposed relicensing studies that focus on vegetation should be used to develop actions in the ROW management plan that would improve habitat at select sites for these species. City Light does not believe a study is warranted as its proposed studies will capture necessary habitat data to inform development of management plans.

6.3.17 Siren Warning System

Skagit County submitted the proposed study request, SC-01 Skagit County Siren Warning Study.

The goals of this study request are to identify and memorialize effective emergency communication strategies between Seattle City Light and Eastern Skagit County. Specific objectives of this study request are:

- (1) For Seattle City Light to define and implement the necessary attributes of a safe and effective dam failure early warning system in Eastern Skagit County; and
- (2) For Seattle City Light to define emergency communication protocols for Eastern Skagit County for events outside a dam failure, including imminent flooding and wildfire response.

Skagit County's request states that the system relies largely on a continuous ringing of the local fire district's sirens, which ring numerous times a day on most days for other reasons, inuring citizens to an actual alert of potential dam failure. The study request proposes a literature review on BMPs for siren notifications, developing a project to implement those practices, and identifying upgrades to be distributed to Eastern Skagit County emergency responders for additional input.

City Light does not propose to study the siren warning system for several reasons. The Project's siren warning system was updated in 2010. The system reliably functions as intended and reaches all of the populations in close proximity to the Project. The next area of population downstream from the siren's audibility has approximately 1 hour and 5 minutes before the front edge of a worst-case scenario dam failure flood wave would reach that population. According to FERC guidelines, this is enough time to be alerted by Skagit County's alert and warning procedures, and the Wireless Emergency Alert, for a dam failure flash flood that would be sent out by the National Weather Service. City Light proposes to continue to work with Skagit County on identifying improvements in the siren warning system and communications with local populations. City Light believes this topic is appropriate to be addressed outside of relicensing and does not require a relicensing study.

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PROPOSED STUDY PLAN

APPENDICES

PROPOSED STUDY PLAN

APPENDIX A

CONVERSION TABLE OF CITY OF SEATTLE DATUM TO NAVD 88 DATUM

Skagit River Project Elevation Transformation Table

City Light As-Built to NAVD 88 Datum Last Revised 10/8/2020

SPU was tasked to densify the elevations on the Skagit River Hydroelectric Project from the established NAVD 88 benchmarks that was done in 2015 for the Height Modernization. These benchmarks were published by the NGS (National Geodic Survey). SPU used these published benchmarks to establish NAVD 88 elevations on a number of existing City Light benchmarks, staff gages, and elevations of powerhouses and top of dam elevations to obtain a comparison between the existing City of Seattle datum (CoSD) elevations from as-built drawings and the NAVD 88 datum. Below is the comparison of elevations of these items at each site on the Skagit River Hydroelectric Project.

Notes:

- (1) All elevations are in US Survey Feet.
- (2) Refer to Geodetic Control Tables for each of the below networks.
- (3) No guarantees are made for adjustment of feature elevations not listed in this table and additional survey may be required to determine current elevation of the feature in question.
- (4) Above features are not to be used for survey control. All surveys shall use NGS benchmarks shown on Drawings D-44743 through D-44746.

PtNo / Station	Control Network and Feature	Reference	As-Built CoSD El. (feet)	Surveyed El. in NAVD-88 (feet)	Delta (feet)	Notes
Newhalen	1					
910	Gorge Powerhouse Finish Floor	D-44944	515.75	521.97	+6.22	
911	Gorge Powerhouse Tailrace Staff Gage (Physical)	Physical Gage	501.00	507.34	+6.34	Survey is to physical gage.
912	Gorge Powerhouse Tailrace Staff Gage (Electronic)	Electronic Reading	492.02	498.50	+6.48	SPU Survey indicates Water El. 498.5 ft NAVD-88 at 1:19 PM on 9/30/2019. Lake water surface elevation electronically recorded at 492.02 ft City Light per PI data from Don Tinker.

PtNo /	Control Network		As-Built CoSD El.	Surveyed El. in NAVD-88		
Station	and Feature	Reference	(feet)	(feet)	Delta (feet)	Notes
905	Newhalem Skagit River Gage USGS Gage 12178000	Physical Gage USGS 12178000	488.00	494.20	+6.20	Datum of Gage is 407.7 ft above NAVD-88. 3 measurements made at 488.0 ft, 484.0 ft on gage, and benchmark on river gage building resulting in deltas of 6.20, 6.21, and 6.20 ft, respectively. 6.20 ft selected.
Gorge Da	m			[1	l
1002	Top of Gorge Dam	D-49941	880.67	886.97	+6.30	SCL brass disc in concrete 2.5 ft east of D/S parapet wall
GWTR	Gorge Lake Staff Gage	Electronic Reading USGS 12177700	871.26	877.77	+6.51	Datum of Gage is 6.51 feet above NAVD-88. 871.26 is electronic reading from powerhouse. Physical gage matched reading as of 5/21/2018.
Diablo (Powerhouse/Hollywood Townsite)						
2030	Diablo Powerhouse	RR Map El., FB 49A, PG10	892.39	898.77	+6.38	Finish floor elevation surveyed 897.42 (+6.42 ft). 6.38 feet selected based on brass cap.
WTR	Diablo Tailrace Elevation	Electronic Reading	876.22	882.48	+6.26	El. 876.22 is electronic reading from powerhouse. Physical gage matched (+6.30).
2027	Stetattle Creek Bridge	RR Map	890.78	897.16	+6.38	Based off of SCL Survey Field Book 49A, Page 9 using the Railroad (RR) Map Elevation.
Diablo Dam						
3008	Top of Dam (0+00 level pegging station)	D-44947	1218.00	1224.72	+6.72	Use +6.65 for Diablo Dam
3009	Top of Dam (2+00 level pegging station)	D-44947	1218.00	1224.59	+6.59	Use +6.65 for Diablo Dam

PtNo / Station	Control Network and Feature	Reference	As-Built CoSD El. (feet)	Surveyed El. in NAVD-88 (feet)	Delta (feet)	Notes
3007	SCL Benchmark NE end of bathrooms	Benchmark	1219.69	1226.01	+6.32	
3011	Diablo Lake Staff Gage (physical)	Physical Gage	1209.00	1215.37	+6.37	Upper panel replaced September 2020 and surveyed again by SPU 9/29/20.
3012	Diablo Lake Staff Gage (electronic)	Electronic Reading	1201.20	1207.56	+6.36	SPU Survey indicates Water El. 1207.56 ft NAVD-88 at 12:20 PM on 10/01/2019. Lake water surface elevation electronically recorded at 1201.20 ft SCL per PI data from Don Tinker.
	Diablo Intake	D-16717	1208.00			As surveyed on 9/29/20 by SPU, matched with staff gage (within a couple hundreths, actual value forthcoming in SPU report).
	Diablo Surge Tank					Placeholder - estimate of conversion values forthcoming in following SPU report.
Ross Dam	(and Powerhouse)					
4009	Top of Dam at toe of D/S parapet wall	D-44952	1615.25	1621.45	+6.20	Upstream wall also had delta of +6.20 ft.
4017	Ross Powerhouse Finish Floor	D-44954	1236.50	1242.65	+6.15	
4011	Ross Lake Staff Gage	Physical Gage	1615.10	1621.36	+6.26	Survey is to physical gage. Electronic gage not verified and reportedly fluctuates.
4015	Ross Powerhouse Tailrace Staff Gage	Physical Gage	1205.00	1210.96	+5.96	Survey is to physical staff gage.

PtNo / Station	Control Network and Feature	Reference	As-Built CoSD El. (feet)	Surveyed El. in NAVD-88 (feet)	Delta (feet)	Notes
4016	Ross Powerhouse Tailrace Staff Gage	Electronic Reading	1203.71	1209.67	+5.96	SPU Survey indicates Water El. El.1209.67 ft NAVD88 at 11:06 AM on 10/03/2019. Tailrace water surface elevation electronically recorded to be 1203.67 ft City Light per PI data from D. Tinker. B. Vavrek verified that powerhouse reading matched with Operator Bob See and PI data per D. Tinker 9/28/20 @ 2:08 PM (1200.38 visual, 1200.38 powerhouse, ~1200.36 PI). Value matched to physical gage based on powerhouse reading and visual water level matching within 0.01 ft.

PLEASE NOTE:

1. All elevations are in US Survey Feet.

2. Refer to Geodetic Control Tables for each network.

3. Please contact SCL Technical Resources or SPU Surver for a densification in an area not referenced in this map.

4. All surveys shall use NGS benchmarks shown on Drawings D-44743 through D-44746.

5. Refer to 'Skagit Project Elevation Transformation Table' Rev. 10/08/2020 for Datum Conversion details. The following equation is used to convert between the City of Seattle (COS) Datum and NAVD-88 Datum:

COS Datum Elevation + Delta = NAVD-88.

6. No guarantees are made for adjustment of feature elevations not listed in above table and additional survey may be required to determine current elevation of the feature in question. 7. The survey reading for physical gage(s) was taken at a mark on the physical gage(s) and should NOT be used for the actual water surface elevation. As of 10/08/2020, SCL has not surveyed any water surface elevations.

Point No. 902 AVD-88 Elev = 490.855' o Convravailable Point No. 903 AVD-88 Elev = 507.378 No Convr a vailable Goodell Cree Point No. 901 NAVD-88 Elev = 504.609' No Convr a vailable whalem NAVD-88 Survey Elevations Seattle City Light Newhalem and vicinity 1:5,500 500 1,000

All elevations in this map are current as of October 8, 2020.

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All elevations in this map are current as of October 8, 2020.

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PROPOSED STUDY PLAN

APPENDIX B

LIST OF ORGANIZATIONS PARTICIPATING IN THE RESOURCE WORK GROUPS AND STEERING COMMITTEE

List of organizations participating in the RWG and SC meetings through November 2020.

Organization
Access Fund
American Rivers
American Whitewater
Lummi Nation
National Marine Fisheries Service (NMFS)
Nlaka'pamux Nation
Nooksack Indian Tribe
North Cascades Conservation Council (NCCC)
North Cascades Institute (NCI)
Samish Tribe
Sauk-Suiattle Indian Tribe
Skagit County
Skagit County Dike District Partnership (SCDDP)
Skagit Drainage and Irrigation District Consortium (SDIDC)
Skagit Fisheries Enhancement Group
Skagit River System Cooperative (SRSC)
Snohomish County
Snoqualmie Indian Tribe
Stillaguamish Tribe of Indians
Stó:lō Nation
Suquamish Tribe
Swinomish Indian Tribal Community
Trout Unlimited
Ts'elxwéyeqw Tribe (Stó:lō Nation)
U.S. Army Corps of Engineers (USACE)
U.S. Bureau of Indian Affairs (BIA)
U.S. Department of the Interior
U.S. Fish and Wildlife Service (USFWS)
U.S. Forest Service (USFS)
U.S. Geological Survey (USGS)
U.S. National Park Service (NPS)
Upper Skagit Indian Tribe
Washington Climbers Coalition
Washington Department of Archaeology and Historic Preservation (DAHP)
Washington Department of Ecology (Ecology)
Washington Department of Fish and Wildlife (WDFW)

PROPOSED STUDY PLAN

APPENDIX C

LIST OF COMMENT LETTERS AND STUDY REQUESTS AS FILED WITH FERC

List of comment letters and study requests regarding the Skagit River Project relicensing as filed with FERC or transmitted to City Light from September 11 to November 4.

Date Letter Filed/Transmitted	Filing Party	Description of Letter		
9/15/2020	Skagit County Board of Commissioners	General comments; SD1 comments		
9/21/2020	Skagit County Drainage and Irrigation District Consortium / Skagit County Dike and Drainage District Flood Control Partnership	Study request		
10/19/2020	Skagit County Drainage and Irrigation District Consortium	Study request		
10/22/2020	NMFS	General comments; PAD comments; SD1 comments; study requests		
10/23/2020	American Rivers and Trout Unlimited (jointly)	General comments; PAD comments; SD1 comments		
10/23/2020	Ecology	Study requests		
10/23/2020	National Parks Conservation Association	SD1 comments		
10/23/2020	North Cascades Conservation Council	SD1 comments		
10/23/2020	NPS	General comments; PAD comments; SD1 comments		
10/23/2020	Skagit County	Study requests		
10/23/2020	USFS	PAD comments; SD1 comments; study request		
10/26/2020	Access Fund and Washington Climbers Coalition (jointly)	PAD comments; study request		
10/26/2020	American Whitewater	General comments; PAD comments		
10/26/2020	BIA	Letter of support		
10/26/2020	Nlaka'pamux Nation Tribal Council	SD1 comments; study requests		
10/26/2020	Sauk-Suiattle Indian Tribe	General comments; PAD comments; SD1 comments; study requests		
10/26/2020	Stillaguamish Tribe of Indians – Cultural Resources Dept	General comments; study requests		
10/26/2020	Swinomish Indian Tribal Community	General comments; PAD comments; SD1 comments; study requests		
10/26/2020	Upper Skagit Indian Tribe	PAD comments; SD1 comments; study requests		
10/26/2020	USACE	PAD comments; SD1 comments		
10/26/2020	USFWS	General comments; PAD comments; SD1 comments; study requests		
10/26/2020	WDFW	General comments; PAD comments; study requests		
11/4/2020 (dated 10/30)	Stillaguamish Tribe of Indians – Natural Resources Dept	General comments; study requests		
PROPOSED STUDY PLAN

APPENDIX D

CITY LIGHT'S STUDY PLANS