PROPOSED STUDY PLAN

KETCHIKAN LAKES HYDROELECTRIC PROJECT

FERC NO. 420

Submitted by:
Ketchikan Public Utilities Electric Division
1065 Fair Street
Ketchikan, AK 99901

September 2025

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Table of Contents

LIST OF FIGURES

LIST OF TABLES

LIST OF ACRONYMS

ACHP	Advisory Council on Historic Preservation
ADFG	Alaska Department of Fish and Game
AHRS	Alaska Historic Resources Survey
APE	Area of Potential Effects
AWC	Anadromous Waters Catalog
C	Celsius
CFR	Code of Federal Regulations
cfs	cubic feet per second
FERC	Federal Energy Regulatory Commission
FPA	Federal Power Act
ft	feet
HPMP	Historic Properties Management Plan
ILP	Integrated Licensing Process
ISR	Initial Study Report
KPU	Ketchikan Public Utilities
kW	kilowatt
LP	Licensing Participants
MOA	Memorandum of Agreement
MW	megawatt
NEPA	National Environmental Policy Act
NGO	non-governmental organization
NMFS	National Marine Fisheries Service
NPS	National Park Service
NOAA	National Oceanic and Atmospheric and Administration
NOI	Notice of Intent
NRHP	National Register of Historic Places
NTU	nephelometric turbidity unit
PA	Programmatic Agreement
PAD	Pre-Application Document
RSP	Revised Study Plan
SD1	Scoping Document 1
SHPO	State Historic Preservation Office
SPD	Study Plan Determination
TCP	Traditional Cultural Property
USC	United States Code
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	United States Geological Survey
USR	Updated Study Report

1.0 Introduction

The City of Ketchikan, Alaska d/b/a Ketchikan Public Utilities (KPU or Licensee) owns and operates the Ketchikan Lakes Hydroelectric Project (FERC Project No. 420) (Project), located on Revillagigedo Island in Ketchikan Gateway Borough, Alaska, under a license administered by the Federal Energy Regulatory Commission (FERC). The current 30-year license expires on July 31, 2030, and the Federal Power Act (FPA) requires KPU to file its new license application with FERC no later than July 31, 2028.

KPU is using FERC's Integrated Licensing Process (ILP) as established in 18 CFR, Part 5. In accordance with the requirements of the ILP, KPU filed its Notice of Intent (NOI) and Pre Application Document (PAD) on March 31, 2025. The PAD provides a description of the Project, including its facilities and operations, and can be viewed on the Project's relicensing website using the following link: https://ketchikanlakesrelicensing.com/documents/.

KPU distributed the NOI and PAD to federal and state resource agencies, local governments, Tribes, and other parties (collectively referred to as Licensing Participants or LPs) potentially interested in this proceeding. On May 27, 2025, FERC issued Scoping Document 1 (SD1) and held two scoping meetings in Ketchikan on June 25, 2025. Concurrently, KPU held a site visit at the Project on June 26, 2025. As outlined in the PAD, and discussed at the public scoping meetings in June, the deadline to submit formal study requests, as well as provide comments on the PAD and SD1, was July 26, 2025. However, because this deadline falls on a weekend, comment deadline is shifted to the following business day, July 28, 2025.

Comments and/or study requests were received from Alaska State Historic Preservation Officer (SHPO), Alaska Department of Fish and Game (ADFG), and U.S. Fish and Wildlife Service (USFWS). KPU has evaluated all requests and comments with respect to 18 CFR § 5.9(b). Section 2.0 of this PSP provides a list of requested studies and KPU's rationale for inclusion, or exclusion, in the Project's study program. Studies deemed appropriate for inclusion in the study program are described in detail in Section 4.0 and include study goals and objectives, methodology, study schedules, proposed deliverables, cost, and level of effort.

1.1 Study Plan Meeting

In accordance with 18 CFR §5.11(e), KPU will conduct a virtual PSP meeting on Wednesday, October 8, 2025, from 1:00 – 3:00 PM, Alaska Time. The purpose of the study plan meeting is to clarify the intent and content of KPU's PSP and identify any

outstanding issues or information needs with respect to the studies being proposed. On September 9, 2025, stakeholders on the Project's distribution list were sent an email invitation to the PSP meeting. Stakeholders interested in participating in the PSP meeting should RSVP to Jeanette Ayala at ayala@mcmillen.com by Monday, September 29, 2025. Prior to the meeting, KPU will provide all interested parties with an agenda via email and a Teams link for those that cannot attend in person.

1.2 Comments on the Proposed Study Plan

No later than December 8, 2025, comments on this PSP, including any revised information or study requests, are due to FERC. Comments must include an explanation of any study plan concerns, and any agreements reached with KPU regarding those concerns per 18 CFR § 5.12. Proposed modifications to the PSP must address FERC's criteria described in 18 CFR §5.9(b).

1.3 Revised Study Plan

KPU must file a Revised Study Plan (RSP) with FERC within 30 days of the deadline for comments on this PSP (no later than January 7, 2026), in accordance with 18 CFR § 5.13(a). The RSP must specifically address all comments received on the PSP and include a description of the efforts made to resolve differences over study requests. As with the PSP, KPU will explain the rationale for any decision to not adopt a study in the RSP. LPs then have 15 days to file comments on the RSP (no later than January 22, 2026).

1.4 Study Plan Determination

Per 18 CFR § 5.13(c), FERC will issue its Study Plan Determination (SPD) within 30 days of KPU filing the RSP (no later than February 6, 2026). The SPD will identify all studies and information (1) required to meet FERC's NEPA obligations; and (2) deemed necessary under the FPA. In deciding which studies to require, FERC will apply the study criteria in 18 CFR § 5.6(b).

1.5 Study Implementation

KPU will conduct the first study season in 2026 in accordance with 18 CFR § 5.15(a). There is potential for one study season based on there being only minor proposed changes to Project facilities or operations, minimal resource concerns voiced during one-on-one LP meetings in December 2024, and minimal feedback provided during FERC's June 2025 public scoping meeting. However, this will ultimately be determined, along with any associated modifications to the schedule, collaboratively with LPs and FERC during study planning.

1.6 FERC Process Plan and Schedule

The remaining pre-filing ILP schedule for the Project, per SD1, is presented in Table 1-1 below. If the due date falls on a weekend or holiday, the due date is the following business day. Early filings or issuances will not result in changes to these deadlines. The schedule below assumes a formal Study Dispute Resolution Process will not be necessary. If study dispute resolution is required, the process will follow the schedule presented in 18 CFR § 5.14. KPU will keep an updated schedule on the Project's relicensing website (https://ketchikanlakesrelicensing.com/project-schedule/) for easy reference.

Table 1-1. Process Plan and Schedule

Pre-filing Major Milestone	Responsible Party	Due Date
File Proposed Study Plan (PSP)	KPU	September 9, 2025
Comments due on PSP	LPs	December 8, 2025
File Revised Study Plan (RSP)	KPU	January 7, 2026
File Comments on RSP	LPs	January 22, 2026
Issue Study Plan Determination	FERC	February 6, 2026
File Initial Study Report (ISR)	KPU	February 6, 2027
Initial Study Report Meeting	KPU	February 21, 2027
File Updated Study Report	KPU	February 6, 2028
Updated Study Report Meeting	KPU	February 21, 2028
File Draft License Application (DLA)	KPU	March 3, 2028
File comments on DLA	LPs	June 1, 2028
File Final License Application (FLA)	KPU	July 31, 2028

2.0 PAD Comments and Study Requests

2.1 Response to PAD Comments

Comments on the PAD and study requests were received from the Alaska SHPO, ADFG, and USFWS.

Comments on the PAD that provide additional details about the Project or provide corrections to information provided in the PAD have been used to inform this PSP and will be used in future licensing documents. Specific responses to comments received on the PAD are presented in Appendix A.

2.2 Response to Study Requests

Study requests were received from ADFG and USFWS and are included in Appendix B. These study requests, KPU's responses, and corresponding study plans, are presented in Table 2-1. KPU has noted if modifications to the study requests were made.

Table 2-1. Study Requests Received, KPU's Response, and Corresponding Study Plans

Licensing Participant	Proposed Study	KPU's Response	Corresponding PSP Section
ADFG	Fish Species Distribution and Fish Passage Evaluation	KPU has adopted this study request as part of its proposed Ketchikan Creek Fish Use and Instream Barrier Assessment	Section 4.2
ADFG	Streamflow Assessments	KPU has adopted this study request as part of its proposed Ketchikan Creek Hydrology Assessment	Section 4.3
USFWS	Stream Habitat Mapping and Characterization	KPU has adopted this study request as part of its proposed Ketchikan Creek Fish Use and Instream Barrier Assessment	Section 4.2
USFWS	Instream Flow Study	KPU has adopted this study request as part of its proposed Ketchikan Creek Hydrology Assessment	Section 4.3

3.0 Ongoing Study Efforts

A number of mitigation measures have been implemented since the last detailed fisheries assessment in Ketchikan Creek (Ketchikan Public Utilities 1998). Given this and based on dialogue with ADFG regarding the potential inaccuracy of their current Anadromous Waters Catalog (AWC) descriptions for Ketchikan Creek, KPU conducted an aerial survey with a small, unmanned aircraft system (sUAS) on Ketchikan Creek on August 20, 2025, and may conduct a second survey in 2026. One of the key mitigation measures completed on Ketchikan Creek was the removal of a large old growth timber located in the stream channel at the upstream extent of Reach K3, also referred to as the "Five-Foot Falls". The waterfall was identified as an anadromous barrier because of a unique hydraulic condition where a cascade hit a bedrock wall at a 90-degree angle and then dropped approximately five feet. Given the hydraulic conditions, KPU (1998) concluded that there was an inadequate takeoff pool necessary for anadromous

salmon to navigate the falls. In July of 2002, the old growth timber in the stream channel was removed. A subsequent assessment concluded that removal efforts were successful, and the falls were passable to Steelhead and Coho Salmon (Fleming 2004). In addition, anecdotal information suggests that prior to the barrier, both Steelhead and Coho Salmon were able to ascend the falls and migrate upstream to Rainbow Falls, a 35-foot barrier. The section of Ketchikan Creek between the Five-Foot Falls and Rainbow Falls (Reach K4) appears to contain habitat suitable for anadromous salmonid spawning and juvenile rearing. The Alaska Anadromous Waters Catalog (AWC) currently identifies the extent of upstream anadromy to nearly Ketchikan Lakes, but for this to occur, fish would need to ascend two 35-foot waterfalls.

The August 2025 sUAS drone survey was conducted at a time when Coho Salmon were anticipated to be present within Ketchikan Creek, and just prior to peak spawning. The timing of the survey was scheduled to document fish presence and redd development, with flexibility in timing to account for inclement weather and Coho run timing. The date of the survey was developed in coordination with ADFG. Due to dense overhead canopy cover, it was not possible to survey Ketchikan Creek from the mouth to Ketchikan Lakes. Instead, the survey focused on areas of primary interest, which was from the Five-Foot Falls upstream to the first 35-foot barrier (Rainbow Falls), and from Rainbow Falls to a point just downstream of the second 35-foot barrier (Twin Falls).

The survey included four primary objectives. First, to document fish and redd distribution within Ketchikan Creek, particularly in Reach K3 (between the Five-Foot Falls and Rainbow Falls). Second, to visually document passage conditions at the Five-Foot Falls and provide visual documentation of the two 35-foot falls including, if there are other side channels associated with the two falls. Third, capture video footage of instream and riparian habitat conditions of Ketchikan Creek. Lastly, this drone footage will inform the proposed Ketchikan Creek Fish Use and Instream Barrier Assessment (Section 4.2). Based on the results of that study, KPU will coordinate with ADFG to amend the Alaska AWC, if needed, to establish the extent of anadromous waters in Ketchikan Creek. In addition, the drone footage will be made available to all stakeholders to help inform the FERC relicensing process.

4.0 Proposed Studies

4.1 Cultural Resources Study

FERC's ILP, under the FPA (16 USC § 791-828c) and its implementing regulations (18 CFR § 5.6 (d)(3)(x)), requires an applicant to describe known cultural or historical

resources within the proposed project and surrounding area. Relicensing is also considered a federal undertaking (36 CFR § 800.16(y)) under Section 106 of the National Historic Preservation Act (NHPA; formerly 16 USC § 470, now 54 USC § 300101 et seq.) and its implementing regulations (36 CFR § 800). Section 106 requires that possible effects of a federal undertaking on historic properties be assessed.

Historic properties are defined as any district, site, building, structure, or object that is included in or eligible for inclusion in the National Register of Historic Places (National Register). Traditional Cultural Properties (TCPs) are another type of historic property eligible for the National Register because of their association with cultural practices or beliefs of a living community (Parker and King 1998).

4.1.1 Goals and Objectives

The goal of this study is to identify historic properties in the Area of Potential Effects (APE), defined below under Geographic Scope (Section 4.1.2) and evaluate any Project effects on those properties in order to support FERC's Section 106 consultation process. The consultation process could include the Alaska State Historic Preservation Officer (SHPO), Native American tribes (Tribes), and the Advisory Council on Historic Preservation (ACHP) and will provide FERC with data enabling informed management decisions.

KPU will acquire textual and digital Alaska Historic Resources Survey (AHRS) data for known sites in the general project area for inclusion in their GIS system. A literature review of ethnographic, historical, and oral history information will identify cultural sites not yet listed in the AHRS.

This Cultural Resources Study will focus primarily on an evaluation of the National Register eligibility of the historic Ketchikan Lakes Hydroelectric Project. It will also include efforts to identify TCPs that would be eligible for inclusion in the National Register "because of its association with cultural practices or beliefs of a living community" (Parker and King 1990, 1). TCPs are historic properties and, as such, are subject to the same Section 106 process as other archaeological and historical sites. A TCP is a tangible property that meets one or more of the four basic criteria set forth in the National Register regulations (54 USC 100101).

For a particular property—a district, site, building, structure, or object—to qualify for the National Register, it must meet one or more of the National Register Criteria for Evaluation and retain enough historic integrity necessary to convey its significance (NPS 1998). In addition to meeting one or more of the evaluation criteria, a property must retain integrity, defined as "the ability of a property to convey its significance"

(NPS 1998:44). The seven aspects of integrity are: location, design, setting, materials, workmanship, feeling, and association.

In addition to eligibility assessments, compliance with Section 106 of the NHPA includes evaluation of both direct and indirect effects of the Project on each historic property identified.

4.1.2 Geographic Scope

Based on the current knowledge of the project, the APE will include the lands enclosed by the existing FERC project boundary (Figure 3-1). Additional lands or properties outside the FERC project boundary may later be included in the APE, where continued project operation or other project-related activities may cause changes in the character or use of historic properties and/or TCPs, if any such properties exist. Consultation may also identify other areas that should be archaeologically surveyed.

The project APE will be refined in cooperation with all consulting parties, including FERC, the SHPO, and Tribes who have an interest in the project. Once a proposed APE is defined, the SHPO will concur, in writing, prior to any further analysis. FERC will be included in any correspondence with the SHPO regarding the APE. Final definition of the APE will facilitate and focus subsequent cultural resource planning.

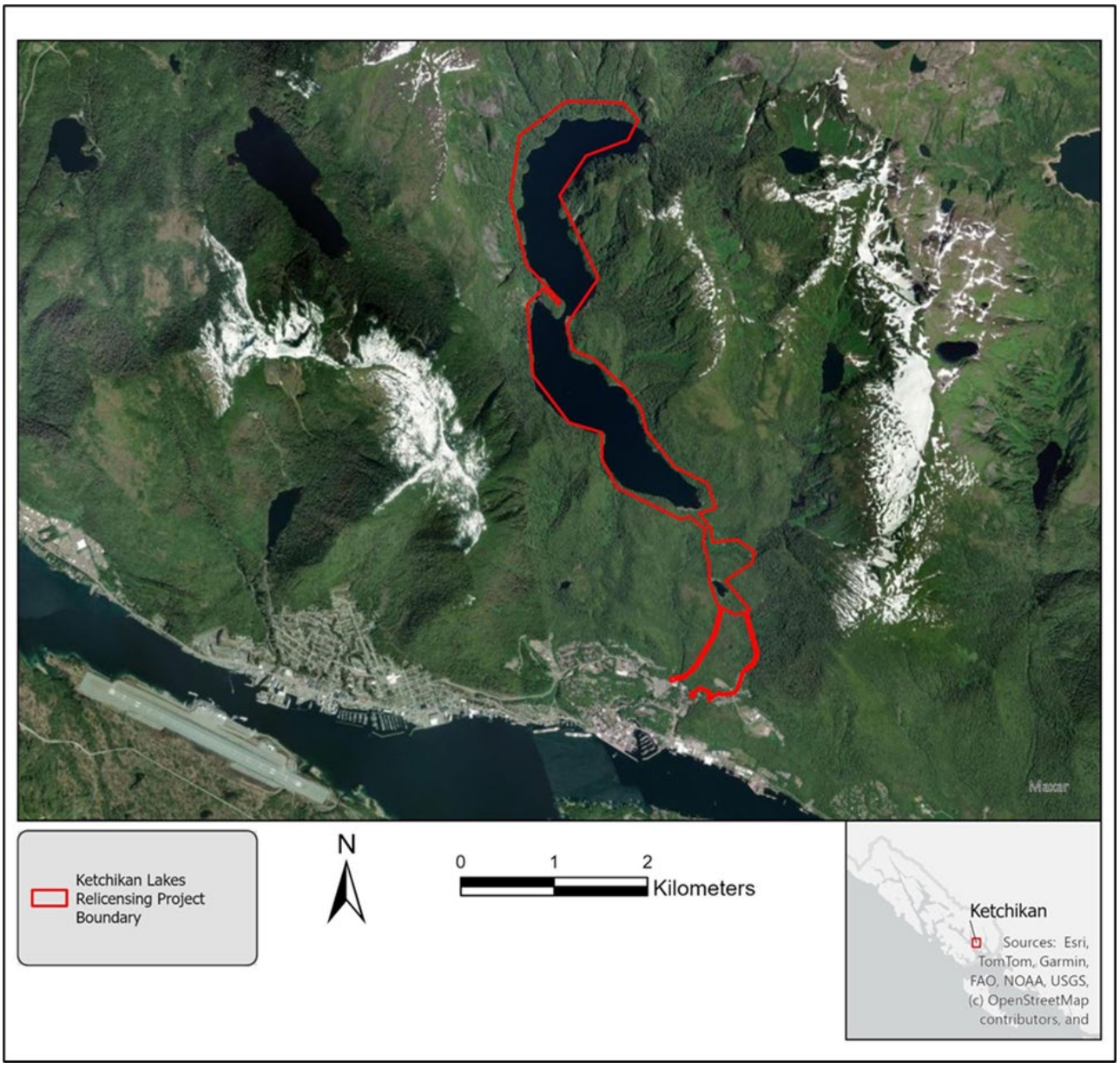

Figure 4-1. Ketchikan Lakes Relicensing Project Boundary

4.1.3 Relevant Resource Management Goals

For hydropower licensing actions, FERC typically complies with Section 106 by entering into a Programmatic Agreement (PA) or Memorandum of Agreement (MOA) with the license applicant, the ACHP, and SHPO. This agreement is then incorporated by reference into the project license when it is issued. Because it is not always possible for FERC to determine all the effects of various activities that may occur over the course of a license, the PA or MOA typically provides, and FERC may require as a license condition, that the licensee develop and implement a Historic Properties

Management Plan (HPMP) that includes consideration and appropriate management of effects on historic properties throughout the term of the license.

The key stipulation in either an MOA or PA is usually that adverse effects to historic properties would be avoided, minimized, or mitigated through the implementation of a treatment program. If the ACHP participates in the resolution of adverse effects, the ACHP will be one of the signatories to the agreement document. If the ACHP does not participate, other signatories would include the FERC and SHPO. Additionally, there may be invited signatories such as federal or state land-managing agencies, Tribes, project sponsors, and other FERC-approved consulting parties. Once executed, the agreement document would be sent by the FERC to the ACHP and then placed in the record for the project.

4.1.4 Existing Information and Need for Additional Information

The following information regarding cultural resources in the Ketchikan Lakes project area comes from the AHRS and the PAD. Since this is a public document, location information for cultural sites is intentionally vague in the following discussion.

4.1.4.1 Existing Discovery Measures

The most detailed histories of the Project are from Campbell (1997:6–9) and KPU (2024). A summarized history is provided below.

Permission to construct the water and power plant was granted in 1902, and it came to be owned by Citizen Light, Water and Power Company (CLW&P Co.) the following year. The project provided all of Ketchikan's drinking water and water used for power generation for decades afterward. In 1905 – 1907, the first dam was built at the outlet of Ketchikan Lake (Figure 3-2). The dam was of timber crib construction, 4 feet high and 110 feet long. A 3-foot by 3-foot by 3,300-foot flume and wood stave pipe 28 inches in diameter and 400 feet long conveyed water from the lake to a new wood powerhouse with 240 HP turbine and 120 kW generator. In 1909, the existing intake tunnel No. 1 was excavated 20 feet below the normal surface of the lake.

Figure 4-2. Dam at the Outlet of Ketchikan Lake, Constructed in 1905-1906.

Between 1911 and 1912, a new powerhouse, a dam at the Upper Ketchikan Lake outlet, and a tramway were constructed (Figure 3-3). In 1916, a 1,650-foot long and 30-inch diameter wood stave pipe was added in Granite Creek to allow additional flow from that creek to be utilized.

In the first half of the 1920s, CLW&P Co. expanded storage capacity and doubled power output by constructing three rock-filled cribbed dams and an additional tunnel and dam south of Ketchikan Lake. A dam was also constructed at Fawn Lake, raising the level of the lake by 6.5 feet. A steel bridge was built across Ketchikan Creek in 1924, and in 1925, the Ketchikan Powerhouse was expanded.

Figure 4-3. 1912 Photograph of the Powerhouse Constructed in 1907 and the Tramway to Ketchikan Lakes.

At the time, these upgrades made the project the largest hydroelectric project in Alaska. The City of Ketchikan purchased the project in 1935 and became the first American city to own and operate their water, electric, and telephone utilities. The final purchase price was $954,970 (Kiffer 2007).

A major expansion phase of the Ketchikan Lakes project occurred in 1957, as electricity demands continued to rise with Ketchikan's growing population. During this time, an access road to Ketchikan Lake, Fawn Lake, and Granite Basin was built. A new 1,163-foot timber-core rockfill dam was constructed on top of the earlier timber crib dams at Ketchikan Lake (Dam #1 and Dam #3) (Figure 3-4). A channel was also excavated

between Upper and Lower Ketchikan Lakes. At Fawn Lake, new timber-core rockfill dams were built at both the north and south ends of the lake, a new intake structure that housed gauging and control equipment was built, and two tunnels between Fawn Lake and Granite Basin were renovated.

Figure 4-4. Newly Completed Ketchikan Lakes Dam and Penstocks 1 and 2, c. 1958.

The Ketchikan powerhouse was also renovated at this time. Units 1 and 2 were removed, and Unit 5 was added. A 36-inch steel penstock (Penstock 5) was installed to serve the new unit. Two years later, in 1959, the adjacent Penstocks 3 and 4 (formerly 44-inch diameter wood stave pipes) were both replaced with 36-inch steel pipe on new reinforced concrete supports.

The timber penstock crossing at Granite Basin Creek was replaced with a new concrete bridge structure constructed in early 1975.

From its construction in 1957, the Ketchikan Lakes spillway consisted of a gate-controlled weir structure containing 13 reinforced concrete piers and wooden slide

gates, with reinforced concrete sidewalls separating the spillway from the dam embankment. A wooden bridge spanned the spillway. However, in response to new FERC requirements, during March and April of 1978, the entire Ketchikan Lakes spillway structure was removed, and a new spillway was constructed in its place.

As constructed in 1912, the tailrace passed into three buried wooden flumes. In 1980, a portion of the Unit 4 tailrace flume caved in and was repaired. In the summer of 1983, a new buried tailrace was constructed.

In 1985, the wood stave pipe of Penstock No. 1 was demolished, and a new 54-inch concrete cylinder pipe was installed on new reinforced concrete supports along the same alignment. In 1997, the 54-inch wood stave Penstock 2 was replaced with a new 54-inch ductile iron pipe installed on new concrete supports along the same alignment.

In 1997, the 1920's-era wooden flume spanning the ravine between the two segments of Tunnel No. 6 was replaced with a grated concrete structure in fill. A steep road built to facilitate construction is maintained to provide maintenance access for KPU.

4.1.4.2 Previous Cultural Resource Surveys

Chris R. Campbell (1997) surveyed the Project area for FERC relicensing in the late 1990s. Survey included pedestrian survey and soil probing up to 1,000 feet away from the road and the trail/tramway following Ketchikan Creek. Campbell (1997:1) reported that she surveyed a total of four miles of the Project area.

4.1.4.3 Previously Reported AHRS Sites

There are five previously reported sites within the Project boundary listed in the AHRS. The AHRS is a restricted database, and information about site inventory may be restricted pursuant to AS 40.25.120(a)(4), Alaska State Parks Policy and Procedure No. 50200.

All the AHRS sites were reported by Campbell (1997), and all but two are associated with Project infrastructure:

- The tramway (KET-00519) was constructed in 1911 to facilitate construction of the Project and continued to be used during maintenance until the construction of the road in 1957 (Campbell 1997). Components included dimensional lumber, logs, trestles, and track over decking. The track was 25 gauge and spanned 6,930 feet.

- The transmission line (KET-00520) was constructed of cedar poles with brown ceramic insulators. Campbell noted that it was not maintained and that the line sagged near the ground.
- A penstock (KET-00521) of 12-inch wood stave water pipe was constructed by 1913. In 1997, the feature, that once spanned 7,100 feet, was in very poor condition.
- An adit (KET-00522) was excavated into a slope and was once blocked by a timber door. The Project used to store dynamite and tools inside.
- A stone fish trap (KET-00523) includes a deep pool and reroutes the creek at a 45-degree angle. Nearby are a bark-stripped cedar with adze marks.

Although Campbell (1997) did not discuss them, the modern Project powerhouse and substation were both constructed by 1965. Campbell (1997) also did not report on any of the Projects' many previous dams on Ketchikan Creek and the Ketchikan Lake outlet, the remains of which still exist.

4.1.4.4 Tribes That May Attach Cultural Significance to Historic Properties

Section 106 requires federal agencies to consult with interested Native American tribes that attach religious or cultural significance to historic or archaeological properties in the vicinity, including Tribes that may still have ancestral affiliations to a place. KPU, as the designated non-federal representative for day-to-day NHPA Section 106 consultation, will consult with potentially affected Native American Tribes and agencies during the Project relicensing.

At the time of EuroAmerican contact, the Ketchikan area was situated within the territory of the Tongass (Tan-ta kwan) Tlingit, which included the southern portion of Revillagigedo Island; Annette, Gravina, and Duke Islands; and the area around the mouth of Portland Canal (de Laguna 1990:204). Cape Fox Natives founded Saxman, a village two and one-half miles south of Ketchikan, in 1894 (Roppel 1998:10-11). Early in the historic period, the Saxman Tlingit claimed all of Revillagigedo Island.

By the 1880s, Tlingit society is recorded as being split into tribes, clans, and nobles, common people, and slaves (Emmons 1991). Tlingit occupied winter villages and seasonal subsistence camps. Usually, each Tribe had only one winter village. Summer houses were smaller than winter houses, built on the ground without any excavation,

and could double as a smokehouse. Temporary structures included lean-tos. Additional structures included steam baths (Grinev 2005:36).

Trade between coastal people was permitted for individuals, but trade rights with interior peoples were hereditary to chiefs (Emmons 1991:55). Potlaches were prominent prestige ceremonies where the opposite moiety would be presented with lavish gifts after a minimum four-day festival (Grinev 2005:45, 64). Warfare and conflict between clans and kwaans also occurred.

Tlingit traveled in canoes carved from tree trunks. Subsistence focused on salmon taken in dams, in traps, by spear, by hook, with harpoons, or with nets (Emmons 1991:55; Grinev 2005:35). Fur seal, halibut, eulachon, bear, wolf, fox, and other furbearers were taken primarily in spring (Emmons 1991:55). Hunting gear, for both marine and terrestrial game, included traps and snares, bows and arrows, spears, slings, daggers, clubs, and harpoons (Grinev 2005:35).

The Tlingit name for Ketchikan and Pennock Island is Kichxaan, meaning “near the eagle’s wing” (Thornton 2012:194, 173). Ketchikan Creek and the original winter village share the name. It refers to a founder’s name but also how the water at the mouth of Ketchikan Creek is calm from every direction.

A Tongass legend says that, a long time ago, Tongass people travelled over the sea and reached the coast where they came to populate (Goldschmidt and Haas 1998:9). The direction of travel was not specified. The Tongass Gasnax.adi clan is under the Raven moiety, and the Eagle/Wolf side was the Dakl’aweidi and Teikweidi clans (Thornton 2012:172). The Eagle/Wolf moiety originated from the Nass River area.

Although ethnographic accounts mention several localities used by the Tlingit in the Ketchikan area, few precontact period archaeological sites have been officially recorded in the AHRS. However, much of the area has not been intensively inventoried, and the possibility of locating additional sites should not be ruled out. The few known prehistoric sites in the Ketchikan area are along the coast.

Indigenous groups that may attach religious or cultural significance to historic properties in the Project vicinity include the Ketchikan Indian Corporation, Central Council of the Tlingit and Haida Indian Tribes of Alaska, and Sealaska Corporation. No traditional cultural properties have been identified in the Project vicinity. Traditional cultural properties are a type of historic property eligible for the NRHP because of their association with cultural practices or beliefs of a living community (Parker and King 1998).

4.1.5 Project Nexus

This Cultural Resource Study will establish a consultation process that ensures that the Project remains in compliance with Section 106 throughout the life of the license. This study is intended to provide sufficient information regarding the nature of historic properties located in the APE so that the potential effects of continued operation of the Project can be adequately assessed. Findings of Effect on historic properties in the APE will be included in the cultural resources study report and reviewed with consulting parties. Effect findings will aid in developing measures to be proposed in the draft and final relicensing applications to protect or minimize any adverse effects on historic properties.

4.1.6 Methodology

Much of the research and identification of cultural resources will follow the steps of the Section 106 process as outlined in 54 U.S.C.§ 36108. The cultural resources study will be accomplished or supervised by personnel who meet the Secretary of the Interior's *Professional Qualification Standards* (48 FR 4473 - 44739). The cultural resources subconsultant will comply with applicable laws and regulations and will follow the Secretary of the Interior's *Standards and Guidelines for Archaeology and Historic Preservation* (48 FR 44716-18) and the identification and testing procedures presented in Guidelines for Evaluating and Registering Archaeological Properties (National Park Service 2000). Reports will meet contemporary professional standards and follow OHA's *Standards and Guidelines for investigating and reporting archaeological and historic properties in Alaska (Historic Preservation Series Number 11) and the Secretary of Interior's Standards and Guidelines for Reports (FR Vol. 48, No. 190, pp. 44734-44737*). A completed OHA Cultural Resources Report Coversheet will be submitted with each report.

Study methods will include a review of existing information to identify and document known historic properties located within the defined APE. KPU will complete sufficient investigation and research on identified sites that could be potentially affected by continued operation of the Project to support any needed recommendations of National Register eligibility to be submitted to the SHPO for concurrence. The National Register eligibility of the Ketchikan Lakes Dam and the other historic Project facilities is one of the principal issues pertaining to cultural resources.

The need for any field activities will be determined after an evaluation of the relationship between known significant cultural resources in the APE and the needs of ongoing Project operation and maintenance. In addition to a pending review of existing information, the need for fieldwork will also be contingent on input from the Cultural

TWG. If a field-based investigation is required, the nature and extent of a survey would be contingent on the level of documentation necessary to support the project moving forward.

Survey methods that may be utilized include a combination of surface inspection and subsurface testing. The relative level of effort expended on each technique will depend upon the expected characteristics of sites in the area, with the most important variables being site size and distribution. Systematic pedestrian surveys, conducted in parallel transects, may be used to focus on discovering past land use through the identification of surface artifacts and/or features. No portion of the survey area will be excluded from examination without justification based on evidence that demonstrates that sites are unlikely to be present. Supplemental data may be gained through judgmental subsurface sampling including shovel tests and probes, terminated on sterile deposits. All excavated sediments are screened through screen mesh, with the size of the mesh largely dependent on field conditions. To the extent possible, shovel tests are excavated and recorded according to visible stratigraphy and backfilled once completed. A mapping-grade GPS unit will be used to collect geospatial data collected throughout the field investigation.

4.1.7 Schedule

This study will be completed following issuance of FERC's Study Plan Determination. The following schedule is proposed:

- February 6, 2026 – Study Plan Determination
- Spring 2026 – Additional research and review of background materials. Initiate consultation procedures.
- Summer 2026 – Data collection and analysis period
- February 6, 2027 – Initial Study Report.

4.1.8 Level of Effort and Cost Estimate

It is estimated that the Cultural Resources Study will cost approximately $85,000 to $120,000. A range of costs is provided because it is yet uncertain to what extent field surveys will be needed and to what extent the Project has the potential to impact significant cultural resources. FERC uses standardized programmatic agreement formats to implement HPMPs that require little negotiation or alteration prior to execution.

4.1.9 References

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4.2 Ketchikan Creek Fish Use and Instream Barrier Assessment

Ketchikan Creek, located on Revillagigedo Island in Ketchikan, Alaska, flows approximately 7 RM from its headwaters near John Mountain to its confluence with Tongass Narrows. Ketchikan Creek has a drainage area of approximately 14.1 square miles (United States Geological Survey (USGS) 2023). The creek drops approximately

2,000 feet along its course from its headwaters to sea level. From its headwaters, Ketchikan Creek flows in a generally southerly direction. It passes through Upper and Lower Ketchikan Lakes, which have a combined length of approximately 3.5 miles, which is approximately 50 percent of the total length of Ketchikan Creek. The portions of Ketchikan Creek above and below Ketchikan Lakes are characterized by steep terrain and contain numerous cascades and waterfalls. The creek then passes through the city limits of Ketchikan, where it is flanked by historic Creek Street as a piling-perched boardwalk.

Ketchikan Creek is used by a variety of native and non-native fish species which inhabit aquatic habitat that is compartmentalized by various barriers within the channel. Downstream of the tailrace, Pacific salmon species including Coho Salmon (*Oncorhynchus kisutch*), Sockeye Salmon (*O. nerka*), Pink Salmon (*O. gorbusha*), and Chum Salmon (*O. keta*) have been documented. Other salmonids including Steelhead (*O. mykiss*), Rainbow Trout (*O. mykiss*), and Coastal Cutthroat Trout (*O. clarkii*) and non-salmonids including Sticklebacks (*Gasterosteus aculeatus*) and Sculpin (*Cottus spp.*) have also been documented downstream of the tailrace. Non-native Chinook Salmon (*O. tshawytscha*) and Brook Trout (*Salmo fontinalis*) are also present downstream. In stream reaches between the tailrace and impassable 35’ barriers upstream, a more limited fish assemblage including Rainbow Trout, Coastal Cutthroat Trout, and Brook Trout has been reported.

Between the tailrace and the 35’ impassable barriers upstream (Rainbow Falls and 35’ Barrier #2), there is an additional instream feature approximately 5 feet in height called the “Five-Foot Falls”, identified by KPU (Ketchikan Public Utilities 1998), which may represent a temporary or partial barrier to fish access during some flow conditions or seasons. During aquatic habitat surveys in 1997-1998, KPU identified the Five-Foot Falls as an anadromous barrier because the cascade hits a bedrock wall, angles 90 degrees, and then drops about 5 feet. KPU also judged that there was inadequate depth in the pool downstream to allow Steelhead or other anadromous fish to jump over the falls. This barrier was modified by removal of a large log in July 2002 as a passage improvement measure identified in Article 410 of the FERC license and the Ketchikan Lakes Habitat Enhancement Plan (Ketchikan Public Utilities 2025). Following this modification, Fleming (2004) reported habitat use upstream of the modified Five-Foot Falls by Steelhead and Coho Salmon. As noted in the PAD (KPU 2025), additional natural passage barriers created by hillslope failures and large wood recruitment may exist in the confined reach downstream of the Five-Foot Falls which may also limit the extent of anadromous fish use in Ketchikan Creek.

4.2.1 Goals and Objectives

The goals of the study are to evaluate the status of existing (permanent or temporary) barriers to upstream anadromous fish passage in Ketchikan Creek that may affect both fish access to habitats between the Five-Foot Falls and Rainbow Falls and use of those habitats by resident and anadromous salmonid species.

Objectives of this study include the following.

1. Survey (measure elevation, pool depth, and horizontal and vertical distance) and capture aerial photographs of the Five-Foot Falls barrier during the migration period for steelhead (*Oncorhynchus mykiss*) in April/ May of 2026.

2. Compare surveyed barrier statistics to leaping and jumping criteria published for steelhead and other Pacific salmonids (Reiser et al. 2006) to determine if passage is theoretically possible.

3. Complete snorkel surveys in selected habitats where spawning or pre-spawning steelhead may be present to determine presence and habitat use. Use body length of observed adult fish (if any) to distinguish between resident and sea-fun fish which may spawn together.

4. If no spawning adult fish are observed during snorkel surveys, complete electrofishing transects at select sites identified as suitable for juvenile Steelhead and Coho Salmon rearing.

5. Coordinate with ADFG to submit a nomination to update the AWC for Ketchikan Creek based on results of this study.

4.2.2 Geographic Scope

During previous studies, Ketchikan Creek was divided into six reaches which are defined from the mouth of Ketchikan Creek (located at Thomas Basin within the Tongass Narrows) to the Ketchikan Lakes Dam. These reaches are delineated and described in the PAD (KPU 2025). The geographic scope of this study includes the entire length of Reach K4 from the Five-Foot Falls to Rainbow Falls, and the short section of the confined Reach K3 downstream of the Five-Foot Falls which will be included in the barrier assessment if temporary barriers (landslides, log jams, etc.) are present at the time of the survey. Figure 4-5 indicates the position of the study area including reaches K3 (downstream of 5-foot falls) and K4 (upstream of Five-Foot Falls).

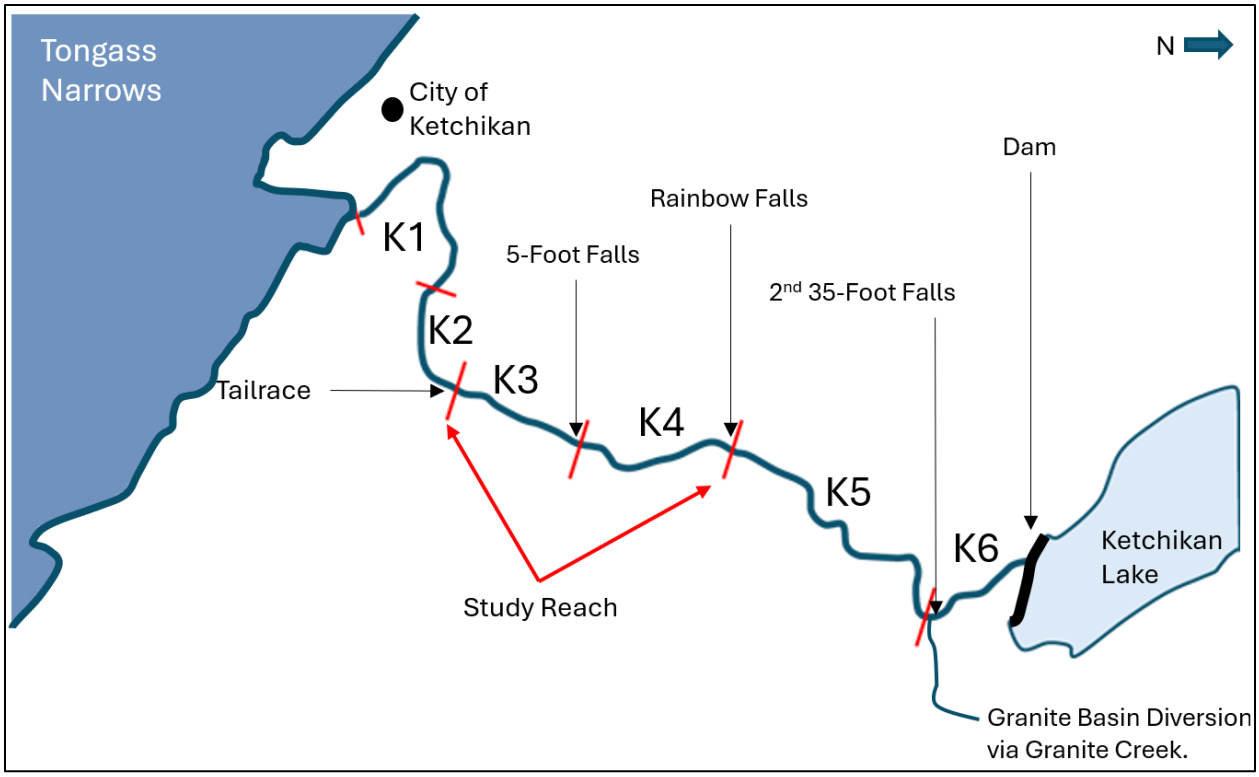

Figure 4-5. Study Reach for proposed Ketchikan Creek Fish Use and Instream Barrier Assessment

4.2.3 Relevant Resource Management Goal

The primary resource management goal associated with development of this study is to confirm understanding of the extent of anadromous fish use of waters within the Project Boundary, specifically, Ketchikan Creek. ADFG and USFWS have jointly requested a study to confirm and update the AWC with reference to the distribution of anadromous species. A byproduct of this study could include confirmation of the presence of resident species in study reaches of Ketchikan Creek.

4.2.4 Existing Information and Need for Additional Information

4.2.4.1 Habitat in Ketchikan Creek Reaches K3 and K4

Reach K3 of Ketchikan Creek is unregulated. That is, there are no minimum flow requirement or restrictions on ramping rates. Flows within this reach are dependent on localized accretion, infrequent spill events from Ketchikan Lakes and flows from Granite Basin and Scout Creeks. Flows from Granite Basin Creek are regulated at the Granite Basin Diversion, which can divert none, some, or all the water from the creek to Fawn Lake for use in hydroelectric generation and municipal water use. Non-diverted

water flows down the natural stream channel and enters Ketchikan Creek in Reach K6. Unregulated water from Scout Lake flows to Ketchikan Creek via Scout Creek, and enters Ketchikan Creek in Reach K4, upstream from the Five-Foot falls.

Reach K3 habitat differs from the other anadromous reaches in that it is confined within steep bedrock walls, and within a narrow channel averaging about 20 feet wide devoid of floodplain. The gradient is about 5% and the dominant substrate is bedrock, with extremely limited spawning habitat (KPU 1998).

Reach K4 extends upstream from the Five-Foot Falls to the 35-foot-tall Rainbow Falls and is 1,855 feet in length. Due to the presence of the Five-Foot Falls, KPU identified this reach as non-anadromous (KPU 1998) though access potential has likely changed since that designation with stream modifications. Within this reach, gradient is about two percent, and the dominant substrate is large cobble, providing much better spawning and rearing habitat relative to Reach K3 (KPU 1998).

Flows within the lower 334 feet of Reach 4 (the location of Scout Creek confluence) are dependent on infrequent spill events from Ketchikan Lake, flows from Granite Basin and Scout Creeks, and accretion from rainfall within the watershed. As such, flows are similar to observations at the gaging station upstream from the powerhouse tailrace. During the period of 2006 to 2009, stream discharge measured upstream from the powerhouse tailrace varied from 0.8 cfs (February 27, 2006) to 1,464 cfs (August 13, 2008). Physical habitat in Ketchikan Reaches K3 and K4 was surveyed during the summer of 1997 (KPU 1998) and is presented in Table 4-2.

Table 4-1. Summary of aquatic habitat characteristics in Ketchikan Creek reaches K3 and K4 in August and September 1997 (KPU 1998).

Reach	Channel Type	Length (m)	Gradient	Proportion Riffle/ Glide	Substrate	Structure (LWD/mi.)
K3	Main	1,284	5%	50%	Bedrock	350
K4	Main	1,855	2%	50%	Cobble	413

New surveys of both the presence and passability of potential instream barriers upstream of the tailrace are needed to assess how much of Ketchikan Creek in Reach K4 is currently accessible to anadromous species. Additionally, sampling of Reach K4 for juvenile and/or spawning anadromous species will provide current information on anadromous fish use in this reach which is needed to update the AWC with accurate current fish use data for consideration during the relicensing process for the Ketchikan Lakes Project.

4.2.4.2 Fish Use of Ketchikan Creek Reaches K3 and K4

Fish species present in Reach K3 include all five anadromous species (Chinook, Coho, Sockeye, Pink, and Chum Salmon), as well as resident Dolly Varden, Steelhead/Rainbow, Cutthroat Trout, and Brook Trout. At the time of the KPU surveys, adult Pink, Sockeye, Chum, and Coho salmon were observed in Reach K3, with Pink Salmon being the most abundant fish species. During a reconnaissance survey in April 1997, an adult steelhead was observed attempting to ascend the Five-Foot Falls unsuccessfully.

During the surveys conducted by KPU in 1997, only resident fish species were observed and included Rainbow, Cutthroat, and Brook Trout. KPU noted that while not abundant, these species were reproducing successfully. They also noted that fish were very small and attributed that observation to reduced food availability due to unproductive oligotrophic water, fishing pressure targeting larger fish, or a combination of the two. They also observed that most Rainbow and Cutthroat Trout in this reach showed evidence of hybridization, which is not uncommon for these species. Additional snorkel surveys in lower Scout Creek also showed signs of Rainbow/Cutthroat Trout hybridization but noted that upper portions of Scout Creek and the lake contained pure strains of Cutthroat, suggesting Scout Lake is the primary recruitment source for Cutthroat Trout remaining in Ketchikan Creek.

The Alaska AWC currently includes anadromous fish use of Ketchikan Creek from the mouth to a point near the forest boundary downstream of the Granite Basin Diversion but apparently upstream of Rainbow Falls (Figure 4-6). The AWC information for Ketchikan Creek lists Chum, Coho, Chinook, Pink, and Sockeye salmon as well as Steelhead and Cutthroat Trout in upper reaches of Ketchikan Creek (Figure 4-6) (AWC 2025).

New surveys of fish presence in Ketchikan Creek Reach K4 are needed to provide current and accurate information about anadromous fish use in this portion of the creek. In combination with the assessment of instream passage barriers to anadromy between reach K3 and K4, this study will provide relevant information on the status of

anadromy in Ketchikan Creek to inform estimates of Project effects on aquatic resources and aquatic habitat under the current relicensing processes.

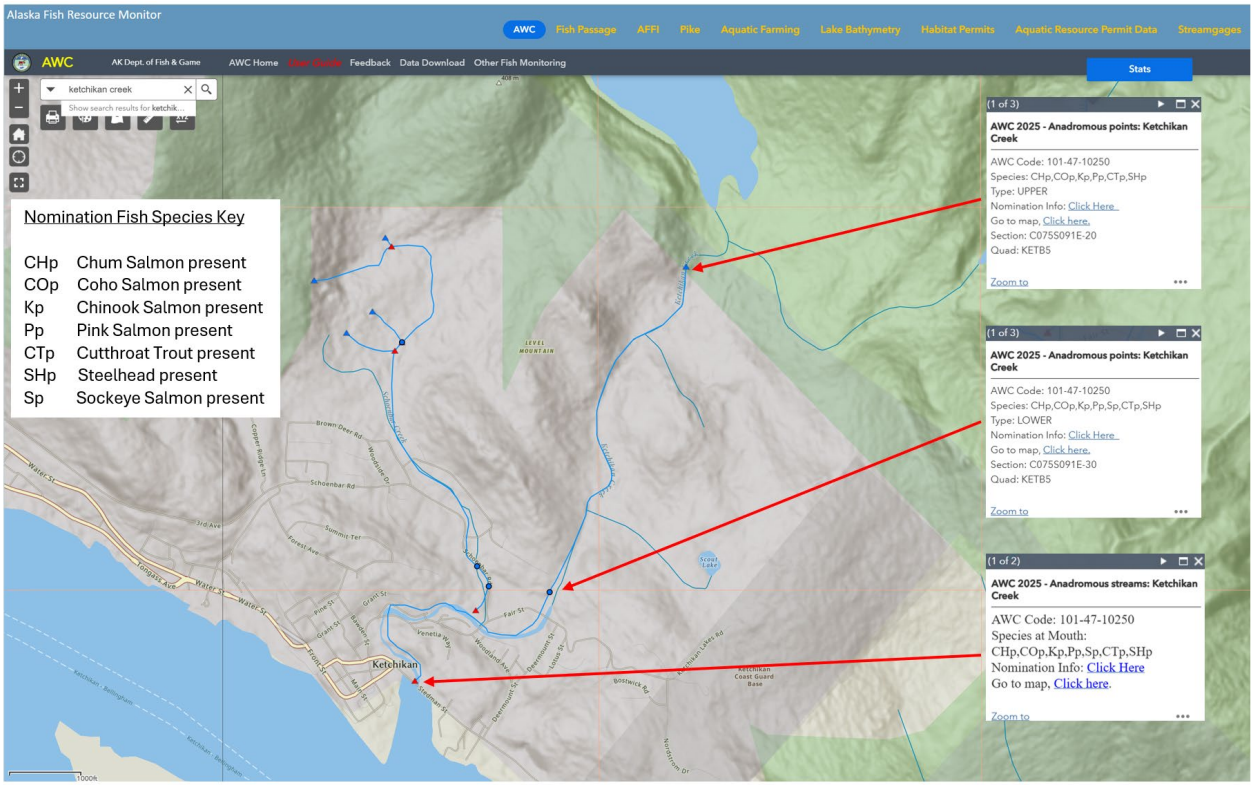

Figure 4-6. Alaska AWC nomination data for Ketchikan Creek.

4.2.5 Project Nexus

The Ketchikan Creek Fish Use and Instream Barrier Assessment has nexus to the Ketchikan Lakes Project relicensing because there are currently inconsistencies related to current anadromous use of waters within the project boundary. Understanding anadromous fish use of Ketchikan Reach 3 may also be relevant to evaluating the potential effect on anadromous species of installing a low-level outlet in Ketchikan Lakes to limit uncontrolled spill into the portion of Ketchikan Creek upstream of the tailrace, which is addressed in the proposed Ketchikan Creek Hydrology Assessment, described in Section 4.3.

4.2.6 Methodology

The Ketchikan Creek Fish Use and Instream Barrier Assessment will include a physical assessment of any instream barriers present in Ketchikan Creek Reach K3 or K4 at the time of the survey, and an assessment of fish presence during a single survey period in late spring. The methods for each assessment are described below.

4.2.6.1 Instream Barrier Assessment

While it is undisputed that instream barriers to fish passage can limit habitat connectivity and fish access to habitat that may be beneficial to the completion of their life histories, in some cases, definitely quantifying whether an instream structure constitutes a complete barrier, a partial barrier, a temporary barrier, or a species-specific barrier is not straightforward (Reiser et al 2006; Kemp and O'Hanley 2010). Common methods include measuring or modeling the physical characteristics of an instream structure and comparing it against published leaping, jumping, and swimming capabilities of study fish (i.e., Bjornn and Reiser, 1991; USFS 2003 [culverts]; Bjorn and Peery 1993), using mark recapture methods to assess passage success (Bjorn and Perry 1993; Cahoon et al. 2007), or comparing fish stock genetics between water bodies (Kemp and O'Hanley 2010).

Even with quantitative methods, the physical characteristics and associated challenges for a given fish species can change seasonally with variations in stream discharge, or individually with size-specific limitations for some individuals (Bourne et al 2011; Rolls 2011). Fish motivation, temperature, life-stage, and the presence of predators may also affect the degree to which a barrier is passable or non-passable to a given individual of a given species (Reiser et al 2006).

For purposes of evaluating the passability of the Five-Foot Falls for anadromous adults, KPU proposes to approach the concept of passability as suggested by O'Hanley and Tomberlin (2005) and Reiser et al. (2006) in which passability equals the proportion of fish that are able to pass through a barrier while migrating upstream. Passability will be determined by first surveying the physical characteristics of the Five-Foot Falls, and then comparing measured parameters with published leaping, jumping, and swim speed data for the anadromous fish species that have been documented upstream of the tailrace on Ketchikan Creek. A similar study was completed by Reiser et al. (2006) to assess complex instream barriers on regulated Ward Creek, Alaska, also located on the West Coast of Revillagigedo Island.

The physical assessment of the Five-Foot Falls will be completed during a low-water period when access to the feature is feasible and safe. If the survey team identifies other potential barriers downstream (as expected based on PAD Section 4.4.1) (KPU 2025), those will be surveyed as well. The measurements to be made at the Five-Foot Falls, which has been identified as a true pour-over falls (KPU 1998) and not a chute-type obstacle, are depicted in Figure 4-7 and defined in Table 4-3. A temporary staff gage will be installed to record stage at low water. If installation of a temporary gage is infeasible, water surface elevation will be estimated via an alternative method such as a reference point. The falls was also photographed both from ground level and from

a small, unmanned aircraft (drone) from both downstream and upstream perspectives during the elective drone surveys conducted on August 20, 2025, and will further inform feasibility of implementing the barrier assessment proposed methods, access points and challenges, and current position of large wood or other hazards within the reach.

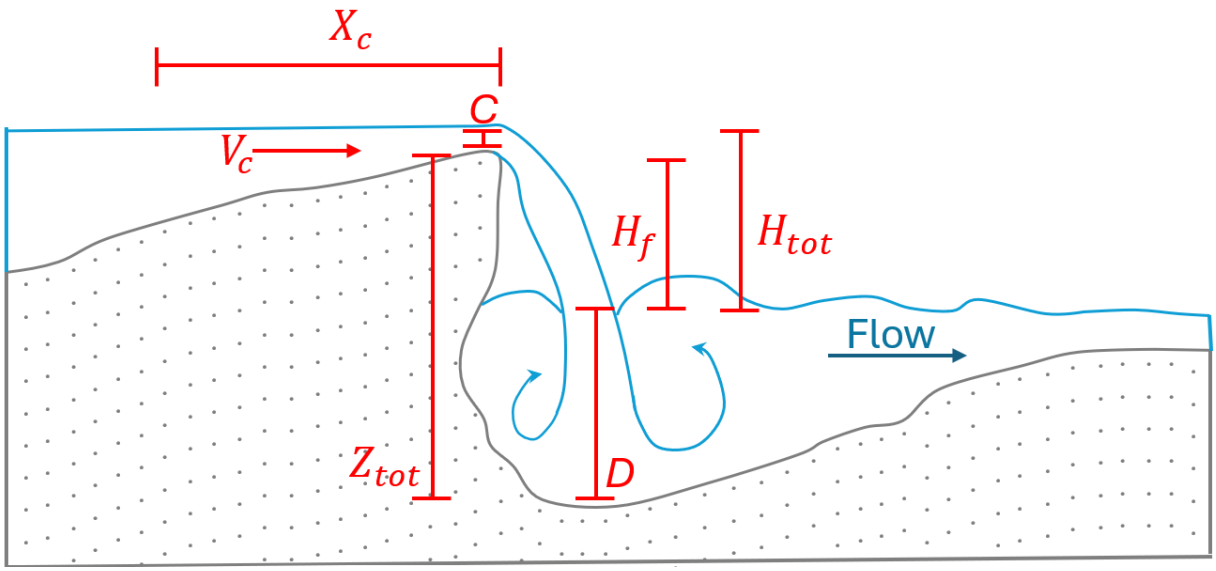

Figure 4-7. Schematic showing measurements for barrier assessment survey.

Table 4-2. Variables to be measured during Five-Foot Falls barrier assessment.

Variable	Definition
V_c	Velocity (m/s) at falls crest
X_c	Horizontal Distance of Crest Velocity (m)
C	Water depth at crest (m)
Z_{tot}	Total height from streambed to crest bottom (m)
D	Water depth in plunge pool (m)
H_f	Vertical distance, bottom of crest to water surface plunge pool (m)
H_{tot}	Vertical distance, water surface crest to water surface plunge pool (m)

The physical habitat characteristics of the Five-Foot Falls will be compiled to develop a threshold of minimum swimming and leaping criteria necessary for fish to ascend the feature at the velocity conditions recorded during the survey. A second velocity measurement will be taken (if feasible and safe) during field work to sample the fish community (proposed to occur during Steelhead spawning period April/ May) to provide a range of velocities at the falls crest for inclusion in the minimum threshold calculations. These minimum thresholds for passage will be compared to typical leaping and swimming capabilities of anadromous fish at may be present and may encounter the Five-Foot Falls in Reach K3 of Ketchikan Creek to determine theoretical passability. Typical leaping and swimming capabilities were compiled from Powers and Orsborn (1985); Bell (1990); Reiser and Peacock (1985); and NOAA (2006) as reported in Table 3 of Reiser et al. (2006).

Table 4-3. Typical leaping and swimming abilities of Pacific Salmon and steelhead from Alaskan rivers (after Table 3, Reiser et al. 2006).

Variable	Definition					
	Steelhead	**Coho salmon**	**Chinook salmon**	**Sockeye salmon**	**Pink salmon**	**Chum salmon**
Sustained Velocity (m/s)	0.0-1.40	0.0-1.04	0.0-1.04	0.0-0.97	0.0-0.79	0.0-0.79
Prolonged Velocity (m/s)	1.4-4.17	1.04-3.23	1.04-3.29	0.97-3.11	0.79-2.34	0.79-2.34
Burst Velocity (m/s)	4.17-8.07	3.23-6.55	3.29-6.82	3.11-6.27	2.37-4.57	2.34-4.57
Min. Swim Depth (m)	0.17	0.17	0.17	0.17	0.17	0.17
Fish Body Length (m)	0.7	0.7	0.91	0.55	0.58	0.20
Max Jump Height (m)	3.35	2.9	2.38	2.10	1.21	1.21

4.2.6.2 Fish Use Assessment

The fish use assessment of Ketchikan Reach K4 may include several methodologies including electrofishing, snorkeling, videography for visual observation, and/or dip-netting. Aerial drone surveys that were conducted in 2025 will help with preliminary reach characteristics reconnaissance, determination of the feasibility of using each proposed method for fish use assessment and help KPU select target sample sites

within Reach K4 where methods could be implemented. Each method is described below.

Sampling of juvenile salmonids in cold clearwater streams can be highly effective with the use of electrofishing. Electrofishing as a fish capture technique is regulated by ADFG. Consistent with recommendations, electrofishing would not be conducted in Ketchikan Creek if adult anadromous salmon were present, so field teams will first conduct pedestrian surveys of sample reaches to ensure adult fish are not present prior to initiating electrofishing efforts. Electrofishing surveys will also not be attempted if it is either infeasible or unsafe to access all Ketchikan Reach K4 target sites with the equipment.

If electrofishing is deemed feasible, the following protocols and standards will be observed. ADFG-recommended target voltage settings for juvenile salmonid sampling in cold water will be used as a reference at the onset of sampling (Bales and Geifer 2015), as well and the Quick-Setup feature of the LR-24 Smith-Root Backpack Electrofishing unit, which calculates recommended voltage settings based on ambient conductivity and water temperature. All backpack electrofishing activities will follow NMFS (2000) Guidelines for Electrofishing Waters Containing Salmonids Listed Under the Endangered Species Act and be conducted and supervised by a trained crew leader with approved USFWS certification for electrofishing operations in Alaska.

A Smith-Root LR-24 backpack electrofishing unit will be operated by a trained field crew leader assisted by two people with dipnets. Each backpack unit will be fitted with a standard Smith-Root cathode and a single anode pole with a steel ring. Single-pass electrofishing surveys will be conducted through the selected study reach moving in an upstream direction. All stunned fish will be captured with dipnets away from the electric field and held in buckets for later processing.

Backpack electrofisher settings will be determined in the field based on water quality conditions, professional judgment, and the overall goal of minimizing impacts to fish health (Temple and Pearsons 2007). Prior to electrofishing, ambient water chemistry will be recorded including conductivity (µS), turbidity (nephelometric turbidity unit [NTU]), and surface water temperature (°C) with a digital meter at the downstream end of the sampling site to help determine initial backpack electrofishing unit settings. In all cases, the electrofishing unit will be operated and configured with settings consistent with guidelines established by the manufacturer (Smith-Root 2009), ADFG (Bales and Geifer 2015), and NMFS (2000).

The location of each habitat unit electrofished will be mapped using handheld Global Positioning System (GPS) units and marked on high-resolution aerial photographs. Start and stop times and total effort (in seconds) will be recorded to quantify and standardize effort between surveys, though no estimates of abundance or relative density will be estimated.

Site selection will occur following review of aerial drone imagery collected on August 20, 2025, as noted above. Three to five sites will be selected for sampling where there are areas of habitat complexity and cover (such as backwaters, alcoves, large woody debris jams, and overhanging vegetation) as well as shallow riffle and glide shorelines with small gravel and gentle currents. At each site, a transect approximately 100m in length will be sampled. All captured fish will be held in dark-colored buckets during fishing efforts and refreshed with ambient river water prior to processing.

A dip net will be used when selecting fish to be measured. Hands, dip nets, and measuring boards will be wetted before touching fish. Length measurements will be taken on a clean, smooth, wet PVC cradle with easy-to-read gradations in millimeters. Ancillary data including fish condition, sex (if determined), presence of spawning colors, and any injuries or mortalities will be recorded on field forms.

Fish will be identified to species, measured for fork length (mm), and released alive near the point of capture. Field study leads are expert biologists with long experience identifying juvenile salmonids in Alaksa. Nonetheless, the resources “Fish Identification of Coastal Juvenile Salmonids” by Pollard et al. (1997) and “Juvenile Salmonid and Small Fish Identification Guide” by Weiss (2003) will used for field verification of juvenile salmonid species in addition to the ADFG guide if necessary. At least five individuals of each species observed will be photographed in a photarium for development of a field reference library, and labeled with location, date, GPS position, and species. An example reference photograph is provided in Figure 4-8.

If electrofishing is infeasible or unsafe in the study area, information on juvenile fish presence will be completed using snorkel surveys and concurrent dip netting to capture reference photographs and lengths of species and life stages present. If snorkel surveys are implemented, the same habitat features that would be targeted for electrofishing would be surveyed via snorkeling including any log jams, other elements of habitat complexity, shallow shorelines, and pools. Snorkel surveys would be completed by two field staff, with one person observing fish and the second recording data and serving as a safety watch. Fish species, approximate size category, and number of individuals would be noted. Underwater photography using a GoPro or similar submersible camera would be used to document fish presence. Field staff have

extensive experience identifying and sizing juvenile salmonids using snorkeling methods. Field staff will also attempt to capture representative individuals of observed species for reference-photograph documentation. Previous experience indicates that both snorkel-based-netting with a small aquarium net, and shore-based dip netting with a .25" soft-mesh long-handled dip net with 1.5' x 1.5' opening is effective for capturing juvenile salmonids and other species for presence-absence documentation in Alaskan streams where electrofishing, seining, trapping, and other methods are infeasible.

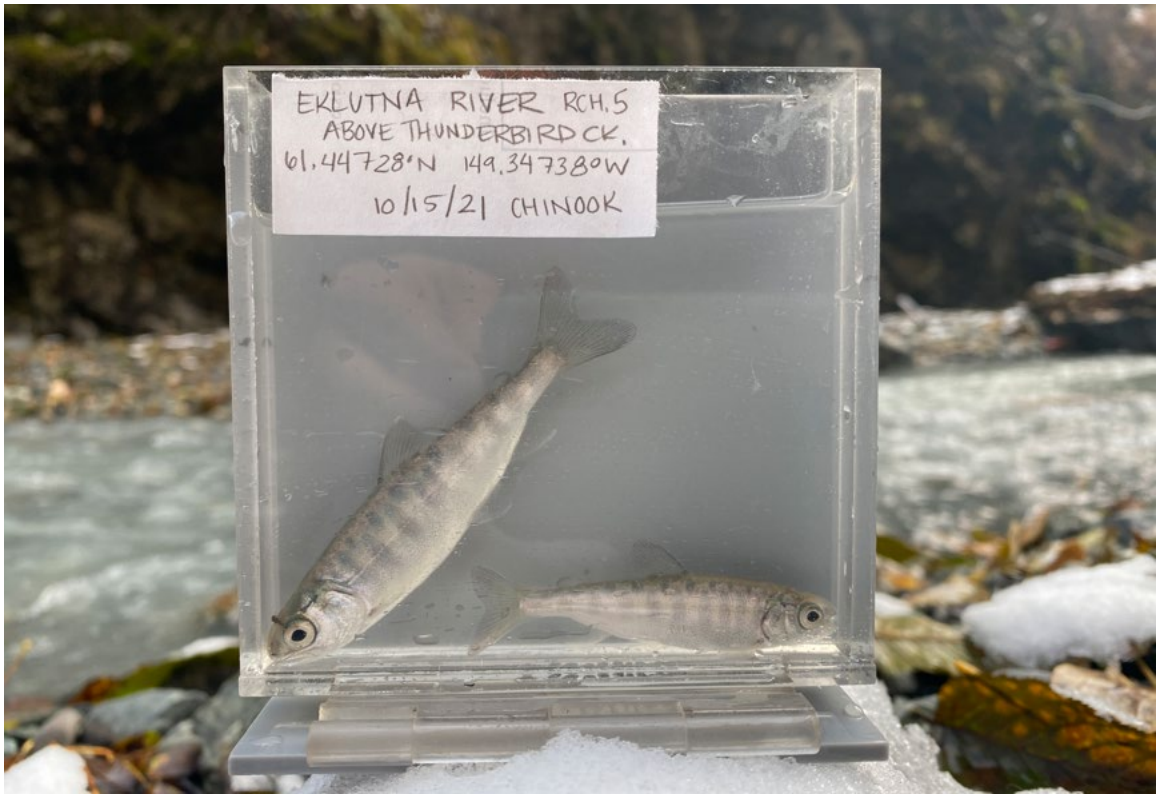

Figure 4-8. Example fish identification reference photograph.

Surveys for the presence of adult Steelhead will be approached as a typical spawning survey during clear, calm weather in April or May of 2026, consistent with known periodicity data for Steelhead in this basin. Field staff will walk the entirety of Ketchikan Creek Reach K4 upstream of the Five-Foot Falls after spending 30 minutes watching the falls for evidence of adult Steelhead attempting to ascend. A pair of field staff will work together, each covering one bank, looking for adult Steelhead. Polarized sunglasses will be always worn during the survey. Field staff will carry a portable underwater camera with video capability mounted on a long pole. If any adult fish, or any evidence of spawning fish regardless of size, are observed, staff will attempt to collect underwater video footage to confirm identification. One staff member will wear

a dry suit for the survey, and may enter the water if deep pools, undercut banks, or other obstructions prevent a clear view of all riverine habitat, or if large anadromous fish are observed to confirm species identification and take underwater photographs. Snorkel-based observations will only occur if conditions are safe to conduct them and if definitive identification of any adult salmonids cannot be made from the surface.

Data from fish presence electrofishing and Steelhead spawning surveys will be compiled into an initial study report. Data will also be used to submit a nomination to the AWC to update the extent of anadromy for Ketchikan Creek, commensurate with study results and review by agency stakeholders. While the presence of adult Steelhead in April and May or the presence of any Pacific Salmon juvenile would constitute evidence of anadromous use of Reach K4, the presence of juvenile *O. mykiss* captured during electrofishing would not. As Rainbow Trout and Steelhead are the same species, they are indistinguishable in juvenile life stages and may express either resident or marine life history (Quinn 2018).

4.2.7 Schedule

This study is expected to require one field season, and two site visits which may overlap with sites visits for the proposed Ketchikan Creek Hydrology Assessment.

The following is the proposed schedule for implementation of this study:

- February 6, 2026 – Study Plan Determination
- March 2026 – Low water barrier measurement, drone surveys, and juvenile sampling. If there is not an appropriate low water window at this time, measurements may be taken during late summer.
- May 2026 – Steelhead spawning surveys
- Summer 2026 – Data analysis
- February 6, 2027 – Initial Study Report

4.2.8 Level of Effort and Cost Estimate

This study is expected to cost approximately $125,000 and be completed in one study season if low flow conditions can be captured.

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4.3 Ketchikan Creek Hydrology Assessment

Ketchikan Creek, located on Revillagigedo Island in Ketchikan, Alaska, flows approximately 7 RM from its headwaters near John Mountain to its confluence with Tongass Narrows. Ketchikan Creek has a drainage area of approximately 14.1 square miles (United States Geological Survey (USGS) 2023). The creek drops approximately 2,000 feet along its course from its headwaters to sea level. From its headwaters, Ketchikan Creek flows in a generally southerly direction. It passes through Upper and Lower Ketchikan Lakes, which have a combined length of approximately 3.5 miles, which is approximately 50 percent of the total length of Ketchikan Creek. The portions of Ketchikan Creek above and below Ketchikan Lakes are characterized by steep terrain and contain numerous cascades and waterfalls. The creek then passes through the city limits of Ketchikan, where it is flanked by historic Creek Street as a piling-perched boardwalk.

Ketchikan Creek is used by a variety of native and non-native fish species which use aquatic habitat that is compartmentalized by various barriers within the channel. Downstream of the tailrace, Pacific salmon species including Coho Salmon (*Oncorhynchus kisutch*), Sockeye Salmon (*O. nerka*), Pink Salmon (*O. gorbusha*), and Chum Salmon (*O. keta*) have been documented. Other salmonids including Steelhead (*O. mykiss*), Rainbow Trout (*O. mykiss*), and Coastal Cutthroat Trout (*O. clarkii*) and non-salmonids including Sticklebacks (*Gasterosteus aculeatus*) and Sculpin (*Cottus spp.*) have also been documented downstream of the tailrace. Non-native Chinook Salmon (*O. tshawytscha*) and Brook Trout (*Salmo fontinalis*) are also present downstream. In stream reaches between the tailrace and impassable 35’ barriers upstream, a more limited fish assemblage including Rainbow Trout, Coastal Cutthroat Trout, and Brook Trout have been reported. The effect of Ketchikan Creek hydrology on aquatic habitat for these fish species is the focus of the proposed Ketchikan Creek hydrology assessment described here.

4.3.1 Goals and Objectives

The goal of this study is to summarize the current range of flows into Ketchikan Creek (i.e., bypass, spill, etc.), estimate future flows with the proposed modifications to ramping rates and the proposed low-level outlet for safety reasons, and assess the effect of these changes on fish habitat in Ketchikan Creek between the Five-Foot Falls and Rainbow Falls upstream of the tailrace, and between the tailrace and Thomas Basin downstream.

Specific objectives associated with the Streamflow Assessment include:

1. Catalog the number, magnitude, timing, duration, and cause for deviations from current upramping requirements since the 2009 license amendment.

2. Summarize the available streamflow monitoring data collected by KPU since the 2009 license amendment including a summary of spill events from Ketchikan Lakes for the period of record.

3. Identify whether the volume (cfs) of spill events and timing constitute deviation from baseline hydraulic conditions and could cause deleterious flow conditions for aquatic resources including rearing or spawning fish.

4.3.2 Geographic Scope

During previous studies, Ketchikan Creek was divided into six reaches (K1-K6) which are defined from the mouth of Ketchikan Creek (located at Thomas Basin within the Tongass Narrows) to the Ketchikan Lakes Dam. These reaches are delineated and described in the PAD (Ketchikan Public Utilities 2025).

The geographic scope of the proposed stream hydrology assessment includes specific reaches in Ketchikan Creek. The portion of Ketchikan Creek known or expected to contain accessible fish habitat, reaches K3 and K4, will be the focus of aspects of the proposed study related to the effect of spill events on instream fish habitat, while reaches K1 and K2 will be the focus of aspects of the proposed study related to effects of changes to ramping rates (Figure 4-9).

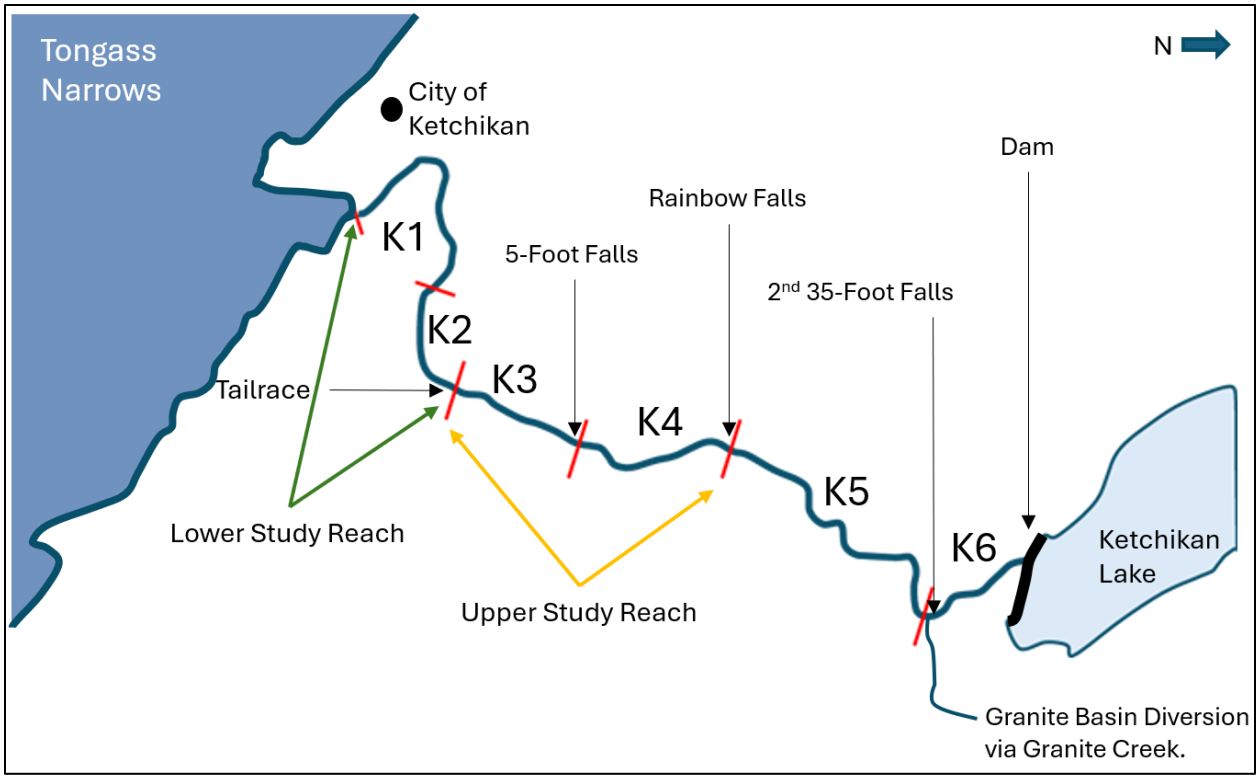

Figure 4-9. Ketchikan Creek Study Reach for proposed Ketchikan Creek Hydrology Study

4.3.3 Relevant Resource Management Goals

Studies with similar goals and objectives to the proposed study were requested by both USFWS and ADFG. The resource management goal of both agencies is to understand effects of current Ketchikan Creek hydrology on fish habitat in those reaches of the Creek which contain fish habitat and evaluate the potential effects that changing ramping rate requirements and installing a low-level outlet may have on fish habitat and aquatic resources. This information is cited as important by both agencies for their management of resident and anadromous salmonid species in the area.

4.3.4 Existing Information and Need for Additional Information

The Ketchikan Lakes reservoir is operated for hydroelectric generation at El 325 feet and higher. When the reservoir falls below El. 325, generation is curtailed to facilitate water transfer from Ketchikan Lakes to Fawn Lake to ensure adequate quantity and quality of municipal water and to provide for instream flow releases into Ketchikan Creek. KPU operates the Ketchikan Lakes project in compliance with the minimum flow and ramping rate requires of the FERC “Order granting amendment of License for Articles 405, 407, 409, and 413” on May 11, 2009. These are discharge-based flow as

measured by the ultrasonic flow meters installed on the powerhouse penstocks. There are no spillway gates or reservoir control valves at the Ketchikan Lakes project that prevent spill water from entering Ketchikan Creek when the lake elevation exceeds the spill-elevation of the dam (El. > 347 ft) or the top of the core wall (El >351 ft). While KPU maintains autonomous records of lake elevation, there is no comprehensive summary of annual spill event frequency and estimated discharge into Ketchikan Creek upstream of the Tailrace.

Flows entering Ketchikan Creek upstream of the powerhouse and tailrace, which contribute to instream hydrology and habitat forming and maintenance processes originate from four sources including a) seepage from Ketchikan Lakes dam; b) spill events which overtop the dam; c) diversion dam seepage or non-diversion periods from Granite Creek; and Scout Creek, an undeveloped watershed (Ketchikan Public Utilities 2025). Spill and non-diversion events occur intermittently, while Scout Creek (confluence in lower reach K4) and seepage from the dams at Ketchikan Lakes and Granite Creek serve as the primary source of baseflows to Ketchikan Creek upstream of the powerhouse. If KPU elects to include the addition of a low-level outlet in Ketchikan Lake in their new license application, the new outlet would represent a fifth source of flow into Ketchikan Creek.

FERC Article 403 of the current operating license required KPU to conduct flow monitoring upstream of the tailrace to measure seasonal variability of flow in Ketchikan Creek. Results of this monitoring over the time period from 2005 – 2009 show mean monthly bypass flows ranging from 11 cfs (May) to 50 cfs (November) with a mean annual discharge of 27 cfs. Monthly minimum bypass flows were 0.5 cfs in May 2005, while maximum monthly bypass flows peaked at 162 cfs in November of 2005. Table 4-4 includes a summary of the monitoring results from 2005 -2009 on Ketchikan Creek. It is unknown how past spill events contributed to variation observed in stream discharge during the required 5-year stream flow monitoring period.

Table 4-4. Monthly Mean Bypass Flows for the Ketchikan Creek Bypass Reach 2005-2009.

Month	Mean Ketchikan Creek Bypass Flows (cfs)	Minimum / Maximum Ketchikan Creek Bypass Flows (cfs)
January	26	13 / 41
February	19	9.1 / 39
March	18	3.6 / 36
April	28	10 / 21

Month	Mean Ketchikan Creek Bypass Flows (cfs)	Minimum / Maximum Ketchikan Creek Bypass Flows (cfs)
May	11	0.5 / 27
June	13	1.1 / 41
July	40	5.7 / 121
August	34	3.7 / 121
September	34	18 / 61
October	36	21 / 62
November	50	14 / 162
December	26	6.2 / 45
Annual	**27**	**0.5 / 162**

Additional analysis is needed to determine how intermittent spill events from the Ketchikan Lakes reservoir since the last relicensing may have affected hydraulic conditions in Ketchikan Creek upstream of the tailrace in reaches K3 and K4. These 2 stream reaches contain rearing and possibly spawning habitat for resident salmonids. The K3 and K4 stream reaches may also be accessible to anadromous salmonids that can overcome the partial barrier at the Five-foot falls, located at the downstream boundary of reach K3. In addition, with the proposed low-level outlet in Ketchikan Lake being added to the Project's infrastructure, supplemental information is needed to determine what portion of uncontrolled spill events the low-level outlet could prevent, and the resultant effect on the hydrology of Ketchikan Creek in the future.

Downstream of the tailrace, flows in Ketchikan Creek are augmented by discharge from the powerhouse. Article 405 of the current license requires KPU to release a minimum of 47 cfs into the tailrace, except in the event of a plant power trip or for the purpose of protecting the municipal water supply. Under Article 407, KPU must limit ramping rates to obtain specific maximum stage changes in Ketchikan Creek downstream of the tailrace as specified in Table 4-5. Per the 2009 License Amendment, these ramping rates are defined in terms of plant discharge.

Table 4-5. Ramping Rate Schedule and Rule Curves under Article 407.

Ramping Rate Schedule			Rule Curve A	
Month	Daylight	Night	Powerhouse Discharge	Max. Change Flow Rate (cfs/hr)

Ramping Rate Schedule			Rule Curve A	
January	B	B	47-65	15
February 1-27	B	B	65-85	20
February 28 – March 31	15 max*	B	85-110	25
April	15 max*	B	110-140	30
May	15 max*	B	140-172	32
June	A	A	172-205	34
July	A	A	205-242	36
August	A	A	242-280	38
September 1-15	A	A	280-320	40
September 16-30	B	B	Rule Curve B	
October	B	B	47-85	35
November	B	B	85-140	55
December	B	B	140-205	65
*15 cfs/ hr maximum flow change, except for 30 cfs/ hr for water quality/ quantity releases			205-280	75
			>280	80

As written, Article 407 does not distinguish between downramping and upramping. Since downstream environmental impacts are most commonly associated with downramping rates, KPU would like to refine Article 407 accordingly so that it only applies to downramping. This potential operational change would provide greater operational flexibility for KPU without detrimentally impacting the aquatic environment and will be discussed with the appropriate stakeholders and regulatory agencies during relicensing. Further analysis is needed on how removal of upramping rate requirements as proposed would affect instream aquatic habitat downstream of the Tailrace for resident and anadromous fish species with specific reference to the potential scouring of spawning gravels, redds, or other important instream habitat structure.

4.3.5 Project Nexus

The proposed addition of a low-level outlet in Ketchikan Lakes has the potential to result in periodic flow increases within the Ketchikan Creek bypass reach and may impact aquatic habitat and fish resources within Ketchikan Creek upstream of the tailrace.

The proposed change to eliminate upramping restrictions has the potential to impact aquatic habitat and fish resources within Ketchikan Creek downstream of the tailrace.

The proposed study would provide updated analysis on how these two proposed changes to Ketchikan Lakes Project infrastructure and operations could affect important aquatic habitat in Ketchikan Creek that has implications for maintenance of aquatic resources in the Project Area.

4.3.6 Methodology

As recommended by ADFG and USFWS, the methods for the implementation of the Ketchikan Creek Hydrology Assessment are described below.

4.3.6.1 Hydrology Assessment Upstream of the Tailrace

The analysis of existing data coupled with engineering specifications will be assessed to evaluate potential effects on Ketchikan Creek aquatic habitats:

1. A summary of available spill data (spill volume and duration) from Ketchikan Lakes will be analyzed for the time period since the last relicensing, completed in 2000. Spill events from 2005-2009 will be further assessed to determine their effect on bypass reach discharges during the Ketchikan Creek stream monitoring study.

2. Current conceptual engineering design and published specifications for low-level lake outlets of a size commensurate with the one proposed for Ketchikan Lake will be considered in the analysis of how theoretical outlet release options would have mitigated uncontrolled spill events.

3. The results of study steps 1 and 2 (above) will be used to complete an analysis of how future periodic flow events associated with spill or low-level outlet flows may affect aquatic habitat upstream of the tailrace. Metrics that will be considered in this assessment may include (depending on available data):

    a. Stream discharge (cfs)

    b. Change in stream discharge (Δcfs)

    c. Rate of change in stream discharge (Δcfs/ hour)

4.3.6.2 Hydrology Assessment Downstream of the Tailrace

The following steps will be implemented for the hydrologic assessment of removing upramping rate restrictions on Ketchikan Creek downstream of the tailrace.

4. All upramping exceedances since the 2009 license amendment will be summarized. This will include the date and time of each exceedance event, magnitude, duration, and root cause for the exceedance. The 2009-2025 upramping excursions will be compared to KPU's stream monitoring study (2005-2009) to determine how many upramping events would have occurred from 2005-2009 without the license restriction.

5. The results of study step 4 will be used to complete an analysis of how these periodic flow events associated with upramping may affect aquatic habitat downstream of the tailrace in Ketchikan Creek reaches K1 and K2. Metrics that will be considered in this assessment may include (depending on available data):

    a. Stream discharge (cfs)

    b. Change in stream discharge (Δcfs)

    c. Rate of change in stream discharge (Δcfs/ hour)

4.3.7 Schedule

This study will be completed in one year beginning following approval of the RSP. The following schedule is proposed:

- February 6, 2026 – Study Plan Determination
- Spring 2026 – Data collection
- Summer 2026 – Desktop analysis
- February 6, 2027 – Initial Study Report.

4.3.8 Level of Effort and Cost Estimate

This desktop study is expected to cost approximately $80,000 and take one year.

4.3.9 References

Ketchikan Public Utilities Electrical Division. 2025. Pre-Application Document Volume 1-Public. Ketchikan Lakes Hydroelectric Project FERC No 420. Filed 3/31/2025. https://elibrary.ferc.gov/eLibrary/filelist?accession_number=20250331-5352

United States Geological Survey (USGS). 2023. National Geospatial Program, 20231220, USGS National Hydrography Dataset Best Resolution (NHD) for Hydrological Unit (HU) 8 – 19010102. (published 20231220) FileGDB: U.S. Geological Survey.

5.0 Study Schedule and Process

KPU intends to conduct the studies outlined in Section 4.0 during the 2026 field season. The estimated start and completion dates for the field effort associated with the proposed studies are provided in Table 5-1.

No later than February 6, 2027, KPU will file an Initial Study Report (ISR) with FERC in accordance with 18 CFR § 5.15(c) and 18 CFR § 5.15(f). The ISR will describe the progress regarding studies carried out to date and identify (1) any variances from the SPD; and (2) any additional data that needs to be collected based on first year study results. KPU will hold a meeting with LPs and FERC staff to discuss the ISR after which, the LPs may request modifications to the study plan(s). Based on these requested modifications, KPU will file an Updated Study Report (USR) no later than February 6, 2028. KPU will also hold a meeting with LPs and FERC staff to discuss the USR. KPU notes, given the limited impacts associated with the continued operation of this Project, the potential exists for a single study season. Given this, the revisions and/or need for major updates in the USR may not be necessary.

Table 5-1. Estimated Start and Completion Field Dates for Proposed Studies.

Proposed Study	Estimated Start Date	Estimated Completion Date
Cultural Resources Study	June 2026	August 2026
Ketchikan Creek Fish Use and Instream Barrier Assessment	March 2026	May 2026
Ketchikan Creek Hydrology Assessment	N/A	N/A

APPENDIX A: PAD Comment Responses

APPENDIX B: Study Requests Filed with FERC