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# Tributary Access Study

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*Swan Lake Hydroelectric Project  
(FERC Project No. 2911)*

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Ketchikan, Alaska

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## **ACRONYMS AND ABBREVIATIONS**

CFR	Code of Federal Regulations
ENRI	Environment and Natural Resources Institute
FERC	Federal Energy Regulatory Commission
ICD	Initial Consultation Document
NEPA	National Environmental Policy Act
SEAPA	Southeast Alaska Power Agency

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# 1. INTRODUCTION

## 1.1. Project Description

The Southeast Alaska Power Agency (SEAPA) owns the Swan Lake Hydroelectric Project (Project, FERC No. 2911) on the northeast side of Carroll Inlet in Southeast Alaska (Figure 1). SEAPA is currently evaluating the engineering feasibility and value of increasing the reservoir's storage capacity through an increase in dam height. SEAPA is planning a 20-foot raise in full pool reservoir elevation; the top of dam would increase from an elevation of 344 feet to 358 feet and the new normal maximum reservoir elevation would be 350 feet, subject to final design and environmental review.

The Project's Federal Energy Regulatory Commission (FERC) license sets the Project's boundaries at the 350-foot elevation contour. An increase in dam height may require revision of these boundaries to allow for operation and maintenance of the Project and to accommodate other Project purposes such as recreation, shoreline control, or protection of environmental resources. The proposed changes to the facilities, the operation of the reservoir, and potential changes to Project boundaries will require amending the Project's FERC license, a process that includes evaluating the potential impacts to environmental resources from the proposed action.

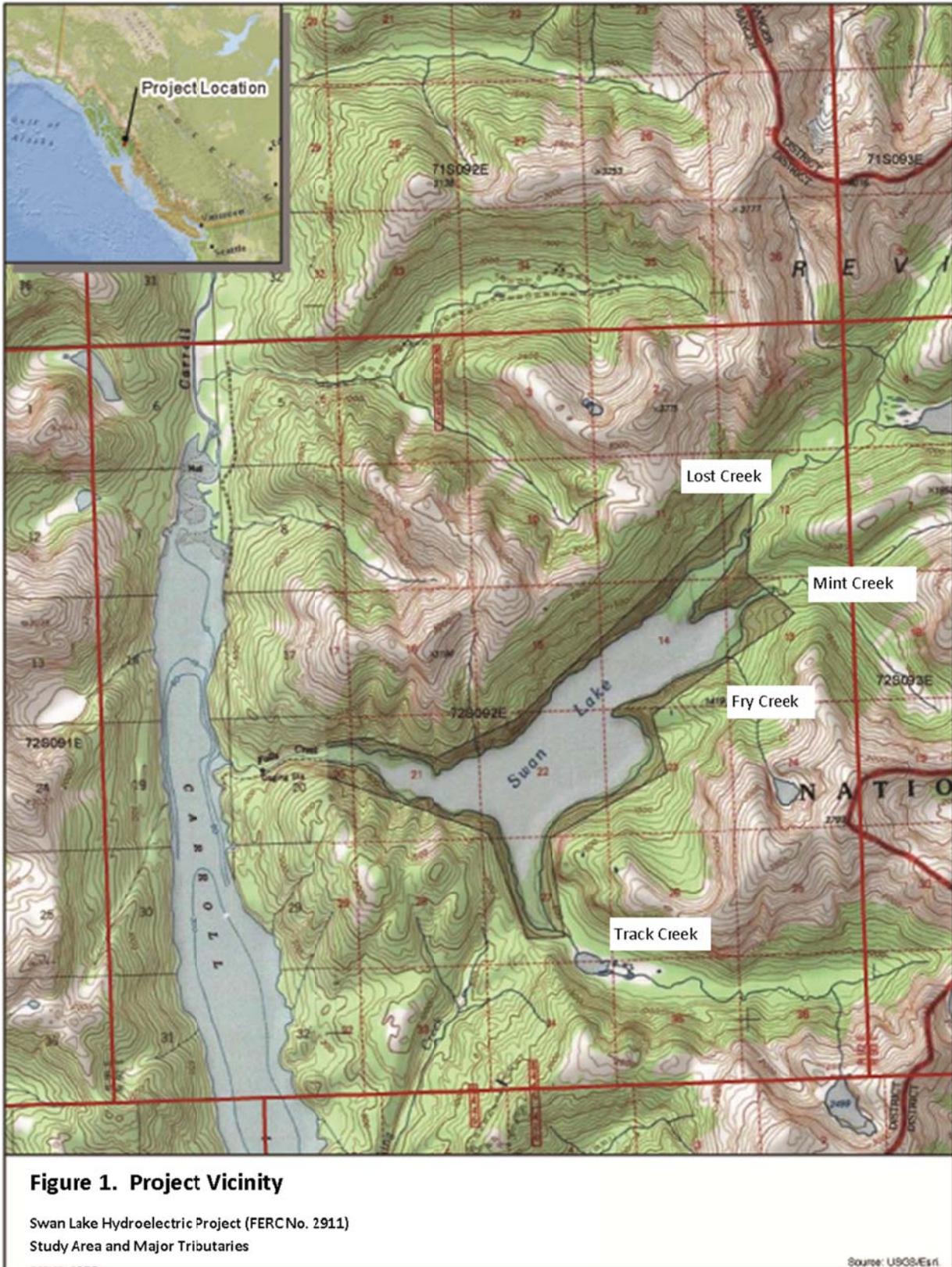
An amendment to modify the Project license, as described above, would be considered by FERC to be a non-capacity amendment since the nameplate capacity of the Project will not change. However, it involves a modification of an existing dam that will result in a significant change in the normal maximum surface area or elevation of an existing impoundment. Therefore, pursuant to 18 CFR §4.38(a)(4)(v), three stage consultation is required. Three stage consultation is generally defined as follows:

Stage 1 – Initiate consultation through the release of an Initial Consultation Document (ICD).

Stage 1 ends when agencies have provided the applicant with a list of study requests. SEAPA is planning to file the ICD with FERC in the late fall or winter of 2012/2013. Copies of the ICD will also be sent to all agencies, Native Villages, and Indian tribes, and made available to the public.

Stage 2 – Develop information (e.g., analysis of existing information, studies, etc.) to address the questions identified in Stage 1. Stage 2 ends when the applicant has filed the amendment request with FERC. SEAPA has elected to start collecting information prior to commencement of the formal amendment process in order to facilitate early discussion about the proposed action.

Stage 3 – FERC conducts post-filing consultation with agencies, pursuant to the National Environmental Policy Act (NEPA). This stage concludes with issuance of an amended license.



This process, from the filing of the ICD to the issuance of the amended license, could take 3 years. It may be possible to skip or truncate certain steps, which SEAPA would like to explore with the agencies, provided sufficient information can be developed in advance to allow all parties to knowledgeably discuss the action and its implications.

Accordingly, SEAPA engaged Long View Associates and Tetra Tech to collect information during the 2012 field season and conduct studies to help evaluate these potential resource impacts and to determine the optimal path forward for developing information for an eventual license amendment.

## **1.2. Purposes of the 2012 Environmental Field Program**

The purpose of the 2012 environmental field program is to collect baseline environmental information and to evaluate the potential for impacts to environmental resources resulting from the proposed 20-foot increase in pool elevation. Results of these studies will help inform discussions about the necessary range of environmental analysis to support the FERC amendment process. Broad areas of environmental question include potential impacts from the proposed action on (1) the fish and aquatic community and associated habitat, and (2) terrestrial vegetation and wildlife and features such as soils and cultural resources.

The 2012 fish and aquatic studies will provide (1) an understanding of the current fish assemblages in Swan Lake and its tributary streams, and (2) an analytical framework for discussing potential impacts of an expanded reservoir on these populations with state and federal agencies as part of the FERC amendment process. Specifically, the studies are intended to examine potential impacts to fish and aquatic habitat in Swan Lake and its tributaries, including the following:

- a. Tributary access for spawning kokanee and Dolly Varden (Lost, Track, Fry, and Mint creeks with particular interest in the falls barrier in Lost Creek)
- b. Loss of tributary spawning and rearing habitat for kokanee and Dolly Varden (Lost, Track, Fry, and Mint creeks)
- c. Loss of reservoir littoral habitat with a particular interest in shoreline spawning habitat for kokanee
- d. Impacts to the baseline reservoir fish community

This document describes the Tributary Access Study. Associated studies include a spawning assessment and a fish community and aquatic habitat evaluation.

## **1.3. Study Goals and Objectives**

The goal of the Tributary Access Study is to evaluate Project operations associated with the proposed action (through changing water surface elevations in the reservoir) and its potential impacts on kokanee and Dolly Varden access to tributaries during the fall spawning period (September to November).

## 2. BACKGROUND

Pre- and post-impoundment environmental assessments indicate that two game fish species, kokanee and Dolly Varden, are present within the Swan Lake system (Hoopes 1978; Pflug 1984; Kelly 1998). Both species spawn during the fall (September to November per Pflug 1984) and may complete this component of their life history in tributary streams. Four major tributaries flow into Swan Lake: Lost, Mint, Track, and Fry creeks.

**Lost Creek.** Lost Creek is the principal inlet stream to Swan Lake and flows in a southwesterly direction from Lost Lake (Hoopes 1978). This stream was believed to be the principal spawning and rearing stream for native salmonids within the Swan Lake system prior to construction of the Project. Much of the available habitat was located below a 13-foot barrier falls located at approximately Elevation 319 feet. With the Project's construction and inundation of Swan Lake to a maximum reservoir elevation of 330 feet, this barrier, including the available spawning and rearing habitat downstream, were inundated for periods of the year. In the FERC license order (1980), FERC stated that "the area above the barrier falls, which is currently inaccessible to spawning fish, is suitable spawning habitat."

**Mint Creek.** Mint Creek flows into Swan Lake at the northeast corner of the lake. Prior to Project construction, good spawning gravel was located in the first 400 to 800 meters (1,312 to 2,625 feet) upstream from the outlet (Hoopes 1978). A low falls, approximately 1 meter (3.28 feet) high, occurs at the upstream end of this spawning area. According to Hoopes (1978), the stream has very limited potential for spawning beyond this point. This segment of stream was inundated when the maximum water surface elevation of Swan Lake was raised to 330 feet.

**Fry Creek.** Fry Creek enters the east end of the lake just below a series of falls. Very little information exists on this stream except that Dolly Varden fry were taken from the stream mouth where a small amount of fair spawning gravel exists (Hoopes 1978). Similar to Lost and Mint creeks, this potential spawning area is currently inundated under the existing Project baseline.

**Track Creek.** Track Creek originates beyond a small pond above the south arm of Swan Lake. This stream flows over a falls about 800 meters (2,625 feet) upstream from the lake. According to Hoopes (1978), no fish were observed during surveys last conducted in 1961, and the stream is believed to be of little value as a spawning area.

Since Project construction, evaluations have focused on monitoring of the fisheries community with an emphasis on kokanee and Dolly Varden (Pflug 1987; Kelly 1998); however, little information has been collected with regard to the availability of spawning habitat within tributary streams post-inundation, and whether these areas are accessible to adult kokanee and Dolly Varden that may make spawning migrations into streams during the fall. An evaluation of whether Swan Lake kokanee and Dolly Varden populations have access to available spawning habitat, if any, in tributary streams is critical to evaluating the potential impacts of the proposed action on the existing fisheries resources within the Project area.

### 3. METHODS

This study is primarily a desktop evaluation utilizing the following information, which may be obtained from various sources and studies:

- Acquire reservoir water surface elevation information for proposed Project operations during the fall period (September to October) when kokanee and Dolly Varden would migrate into Swan Lake tributary streams.
- From the Fish and Aquatic Habitat Study, acquire information on any potential upstream fish passage barriers in Swan Lake tributaries (i.e., elevation information, barrier characteristics/size) within the fall reservoir operating range.
- From the Spawning Study, confirm existing information on spawning periodicity of kokanee and Dolly Varden into Swan Lake tributary streams; current studies indicate a September to November time frame.

#### **Project Operations/Elevation Information**

Reservoir elevation information (a function of Project operations) will be acquired from SEAPA operations staff for the period September 1 to November 30. This time period may be adjusted based on the information collected on spawning periodicity. Information will be presented as an average daily water surface elevation.

To address annual variability, average daily water surface elevations will be made available for wet, dry, and average years where average years will be based on the average annual precipitation over a 30-year period (up to 2011), wet years will include water surface elevation information for years in which precipitation was 5 percent above the average, and dry years will include water surface elevation information for years in which precipitation was 5 percent below the average.

In total, average daily water surface elevation information from September 1 to November 30 will be available for three sets of water years (wet, dry, and average).

#### **Fish Barrier Information**

As part of the Fish and Aquatic Habitat Study, fish barrier information will be collected on tributary streams across the range of operational elevations typical of the fall period. For each tributary stream, information on barriers present, if any, will consist of elevation information and physical characteristics (e.g., height, width, surface flow present, composition, partial/full barrier, etc.). In addition, information on the amount of available spawning habitat above the fish passage barrier will be collected.

**Spawning Periodicity**

As part of the Spawning Study, spawning periodicity information for tributary streams will be collected for kokanee and Dolly Varden. For each tributary stream, information will consist of species utilizing the stream for fall spawning, as well as the timing of onset, peak, and end of spawning activities. Note that the periodicity information will inform the time period of operational information to be collected as part of activities identified in the Project Operations/Elevation Information section above.

**Data Analysis and Evaluation**

The information collected as described in the sections above will be combined to evaluate the potential impacts to tributary accessibility for kokanee and Dolly Varden during the fall spawning period. Average daily elevations for wet, dry, and average years for the fall period will be plotted against barrier elevation information in each stream (i.e., wet, dry, and average years; 3 X 4 streams = 12 total plots of average daily elevations). These plots, coupled with aquatic habitat characterizations above/between barriers and species periodicity information, will allow the characterization of tributary access risks to kokanee and Dolly Varden posed by specific barriers and the potential loss of habitat from barrier inaccessibility, if any. Note that 12 plots are the maximum number that may be developed. If associated studies conclude that no spawning habitat exists in a stream and no spawning activity is observed in these streams, curves may not be developed.

**4. SCHEDULE**

The proposed schedule is as follows and will be refined, as needed, by the contractor in consultation with SEAPA.

August–November 2012	Collect data
December 2012	Conduct data analysis and develop report
January 2013	Submit final report to SEAPA

**5. REPORTING**

SEAPA will produce a draft report containing appendices with summary data by December 17, 2012, for review by agencies. A final report that addresses agency comments will be issued by January 21, 2013. The report will include SEAPA's recommendations for follow-up activities in 2013, if any, to address outstanding questions, or new questions that arise as a result of the study.

## 6. REFERENCES

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