

DRAFT AQUATIC RESOURCES STUDY PLAN

Takatz Lake Hydroelectric Project (FERC No. 13234)

City and Borough of Sitka, Alaska

March, 2010

BACKGROUND

The City and Borough of Sitka Electric Department (City) holds a Preliminary Permit (Permit) from the Federal Energy Regulatory Commission (FERC, Commission) for the proposed Takatz Lake hydroelectric project (Project), FERC No. 13234-000-AK. Licensing the Project will proceed under steps required under various FERC regulations,

During Initial Consultation and Scoping, Project Stakeholders including Alaska state and federal resource agencies indicated concern for Project effects on aquatic resources relative to Takatz Lake including its inflow tributaries (due to effects on increased and variable lake level); Takatz Creek (due to changes in streamflow regime); Baranof Lake (at affected outflow and inflow tributaries due to transmission corridor effects); and Medvejie Creek (also due to transmission corridor effects). Other concerns included changes in lake, stream, and tidewater water temperature regimes and effects of construction on water quality. This draft study plan intends to respond to study requests made during the Scoping Process and is the first step in developing a final study plan approved by all consulting parties.

Studies described in this draft plan are those to be conducted during 2010 only. Since there is very little existing information on many of the subject waterbodies, we feel it's best to complete one year's baseline surveys and to reconvene study planning for 2011 after the 2010 reports have been reviewed.

OBJECTIVES

This study plan is designed to address baseline and impact-evaluation data needs which will allow the City and Stakeholders to evaluate Project-related impacts. Objectives of the proposed 2010 studies are to provide information suitable to: 1) Establish baseline aquatic resources data in areas potentially-affected by the Project; and; 2) Evaluate the effects of Project construction and operation the Project in those areas.

STUDY SCOPE

GENERAL

The scope of fisheries studies will be influenced by final design and locations of Project features, including the proposed transmission line route. The proposed transmission routing as described in earlier licensing documents (City, 2008; FERC, 2009) depicted a submarine transmission route from the powerhouse proceeding underwater along Chatham Strait and then through the community of Baranof Warm Springs. This routing is referred to as the “Marine Alternative (Figure 1). The line then proceeded underwater through Baranof Lake and on overhead lines up the Baranof River valley, across the Baranof Mountains and down the Medveje River valley to its connection with the City’s existing transmission facilities.

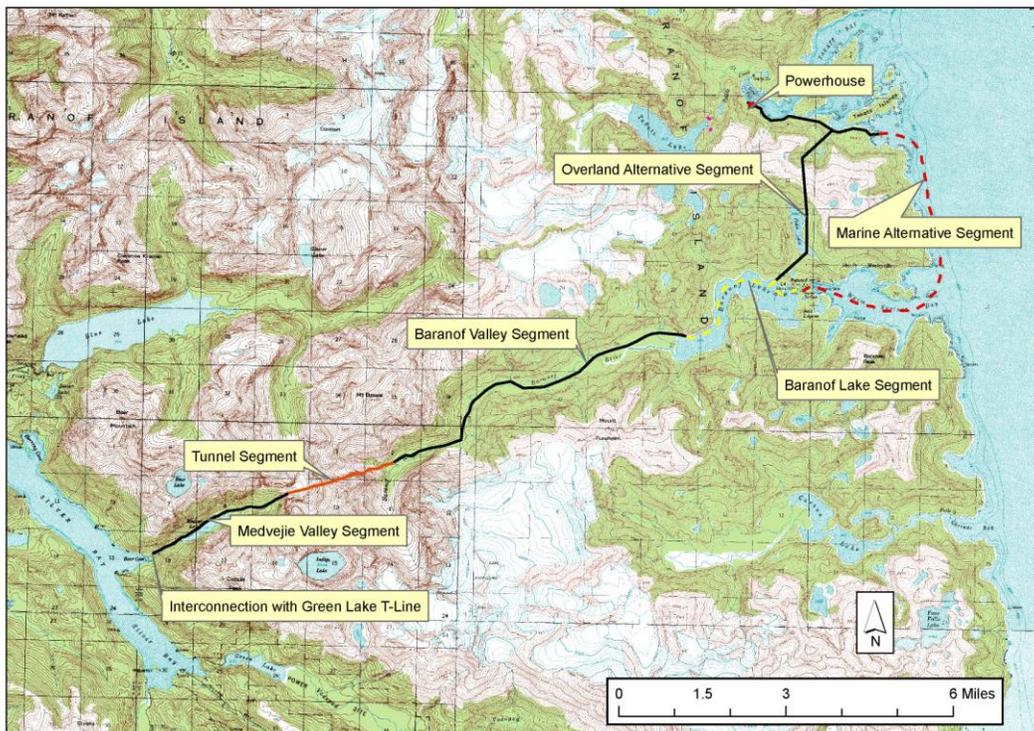


Figure 1. Takatz Lake Project Transmission Alternatives and Terminology. Note: Overland Alternative is City’s Preferred Alternative

NEW TRANSMISSION ROUTING

Based on comments received during SD1 review and after Scoping meetings, the City has developed a new transmission alternative which avoids potential effects on marine resources and on the community of Baranof Warm Springs. This routing, referred to as the “Overland Transmission Alternative”, or simply “Overland Alternative” is shown in Figure 2.

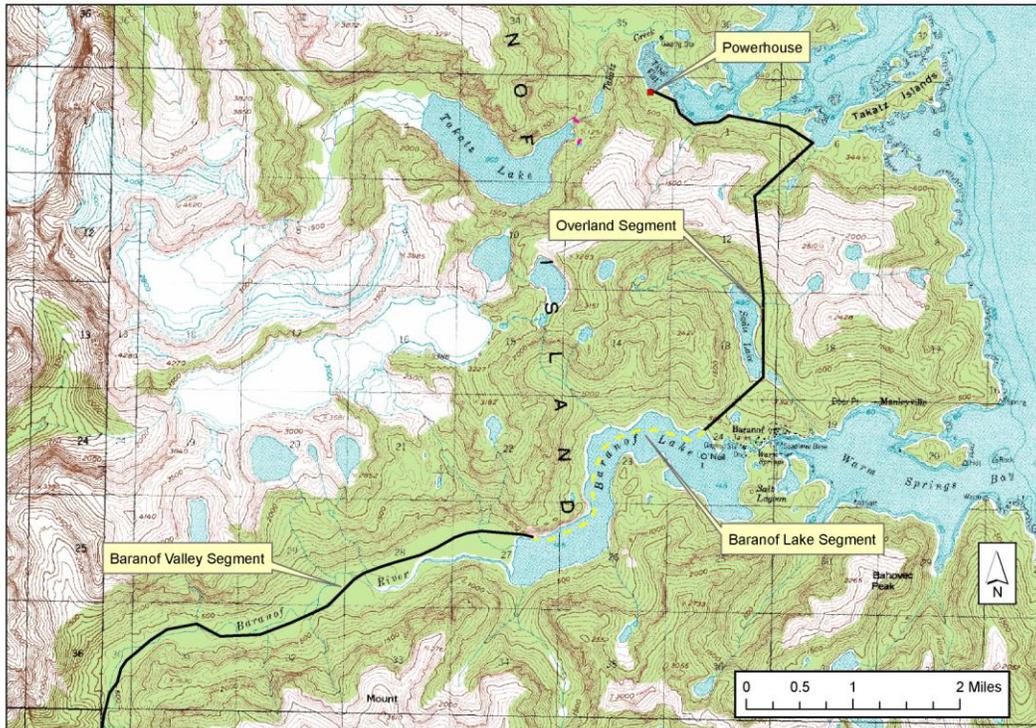


Figure 2. Detail of Overland Transmission Alternative

Note that the Overland Alternative does not change the routing of the transmission segments beyond the point at which the line emerges from upper Baranof Lake.

At this time, the Overland Alternative is the City’s preferred transmission alternative because it responds to concerns for impacts on both the community of Baranof Warm Springs and those on marine resources in Chatham Strait. Further, the Marine Alternative would necessitate extensive and difficult marine engineering feasibility analyses.

The Overland Alternative would affect certain areas which would not have been affected by the Marine Alternative. These include, but would not be limited to an unnamed

drainage entering saltwater near the Takatz Islands (at approximately 57 07 39 N, 134 49 33 W, Sadie Lake, the Sadie Lake outlet stream, and potentially, other small tributaries to both Sadie and Baranof Lakes.

The focus of 2010 aquatic studies will be on fisheries in the potentially-affected freshwater environments including:

- Takatz Lake and its inflow tributaries;
- Takatz Creek (from Takatz Lake to tidewater);
- Unnamed drainage (Unnamed Drainage) entering saltwater near the Takatz Islands (at approximately 57 07 39 N, 134 49 33 W
- Lower Baranof River (from Baranof Lake to tidewater);
- Sadie Lake, its Outlet Stream and other Potentially-Affected Tributaries;
- Upper Baranof River (from its headwaters to Baranof Lake);
- Baranof Lake and its Potentially-Affected inflow tributaries; and the
- Medvejie Lake System.

The City intends to conduct a separate study planning process for fish and shellfish resources in Takatz Bay.

STUDY COMPONENTS

In the following sections, we define specific studies to be done in the various study areas. Generally, different study methods will be applied in lake and stream environments and temporal scale may vary by drainage as described below. These studies will include, but not be limited to, the Forest Service Management Indicator Species (MIS) which include coho and pink salmon, Dolly Varden char, and cutthroat trout. For convenience in grouping the studies, the Takatz and Baranof systems are initially grouped and will include both lakes their and inflow and outflow streams. In addition, fish surveys will be conducted in the Medvejie River, Sadie Lake, and Unnamed Drainage basins which are included in separate sections. Fish studies in the various systems may differ relative to proposed methods and levels of effort, as described in the following:

TAKATZ and BARANOF LAKE SYSTEMS

Stream Nomenclature

Many of the subject waterbodies are unnamed or not consistently named. For the purposes of this study plan, the following naming conventions will apply:

- In the Takatz Lake system, the main stream entering Takatz Lake will be known as “Upper Takatz Creek”;
- Unnamed streams entering Takatz Lake will be called “unnamed inflow tributaries” at this time, but will be named early during field studies to afford precise identification;

- Takatz Creek downstream of the lake outflow to tidewater will be called “Lower Takatz Creek”;
- An unnamed tributary which enters Takatz Creek just upstream of tidewater will be called “Lower Takatz Tributary”;
- The Baranof River upstream of Baranof Lake will be called “Upper Baranof River”; and
- The Baranof River downstream of the lake outlet, to tidewater, will be called “Lower Baranof River”.

Study Components

In these systems, three separate study components, and their respective areas will be studied:

1. Takatz and Baranof Lakes and Inflow Tributaries (including Upper Takatz Creek, Takatz Lake unnamed tributaries, Upper Baranof River and unnamed Baranof Lake inflow tributaries) Fisheries Baseline Surveys;
2. Lower Takatz Creek and Lower Baranof River Fish Distribution, Abundance and Timing Surveys;
3. Water Temperature Studies of the major streams in the Takatz and Baranof Lake systems; and
4. Aquatic invertebrate studies in selected waterbodies.

These studies are described in detail in the following:

Takatz Lake and Baranof Lake Fisheries Baseline Surveys

Studies described below refer only to the main bodies of Takatz Lake and Baranof Lakes. The objective of these surveys will be to determine, as quantitatively as possible, the relative proportion of fish which spawn along the Takatz and Baranof Lake shorelines and those which ascend or use tributaries to spawn. Also in these studies will be habitat evaluation of the areas used for spawning.

Shoreline Surveys

Takatz and Baranof Lake Shoreline Surveys will be conducted by qualified fisheries specialist(s) using both foot and boat access methods and direct observation or snorkeling to observe resident fish spawning in various lakeshore areas. Survey timing in both lakes will be broad in temporal range to include possible later spawning species, and may include focused fish trapping. Baranof Lake surveys will initially concentrate on known resident populations of cutthroat trout and suggested timing (Bangs 2008, Harding and

Jones 1993, Harding et. al. 2009) and will allow for possible inclusion of other species if needed.

Researchers will visit Takatz and Baranof Lake as early in 2010 as possible, given safety and ice considerations. Surveys will be conducted frequently during known and possible spawning periods and will continue to include possible incubation and emergence periods. Frequency of observations will coincide with probable spawning timing, be reduced as probable timing progresses, and will continue until it is assured that spawning is complete.

Inflow Tributaries Surveys

Observations of spawning relative abundance and timing will be conducted near the mouth of Upper Takatz and Baranof Creeks as well as at the mouths and in the lower reaches of all inflow tributary streams which might support spawning of the lake's possible fish population(s).

In these surveys, researchers will observe fish from streamside and by using foot surveys and snorkel surveys, as dictated by stream conditions which might limit visibility and safety. These surveys will coincide to the extent possible with the Takatz and Baranof Lake shoreline surveys, particularly in the study period when spawning timing is being observed.

In these studies, researchers will also seek to determine spawning processes (including timing) and locations of fish which support Takatz and Baranof Lake salmonid populations.

Lower Takatz Creek and Lower Baranof River Fish Distribution, Abundance and Timing Surveys

In these streams, researchers will use foot and snorkel surveys with methods similar to those described above. Boat and aerial surveys may also be utilized depending on conditions or difficulties encountered with the other methods. Survey objectives in these two water bodies will be to note overall abundance and distribution with emphasis at Takatz Creek on the upstream extent of anadromous fish passage. Pending results, researchers will coordinate with ADF&G habitat staff and will follow nomination guidelines for all possible inclusions or changes to the Anadromous Waters Catalog (ADF&G 2009a)

Lower Takatz Creek contains several potential barriers to upstream anadromous fish passage. The lowest potential barrier occurs directly above tidewater, and consists of a series of cascades leading upstream to a short falls and another series of cascades (Figure 3). The current Anadromous Fish Distribution Catalog and Atlas (ADF&G 2009b and c) lists coho, pink, and chum salmon present from tidewater to a point just upstream of the lowest potential barrier. The upper limit of distribution for these species is in a low gradient area characterized by beaver-influenced off channel habitat. The city proposes

to do fish passage analyses (Powers and Orsborne, 1985) to determine passage characteristics of selected potential barriers on lower Takatz Creek. In addition, the City will focus on juvenile trapping in the high quality rearing habitat afforded by the beaver ponds.

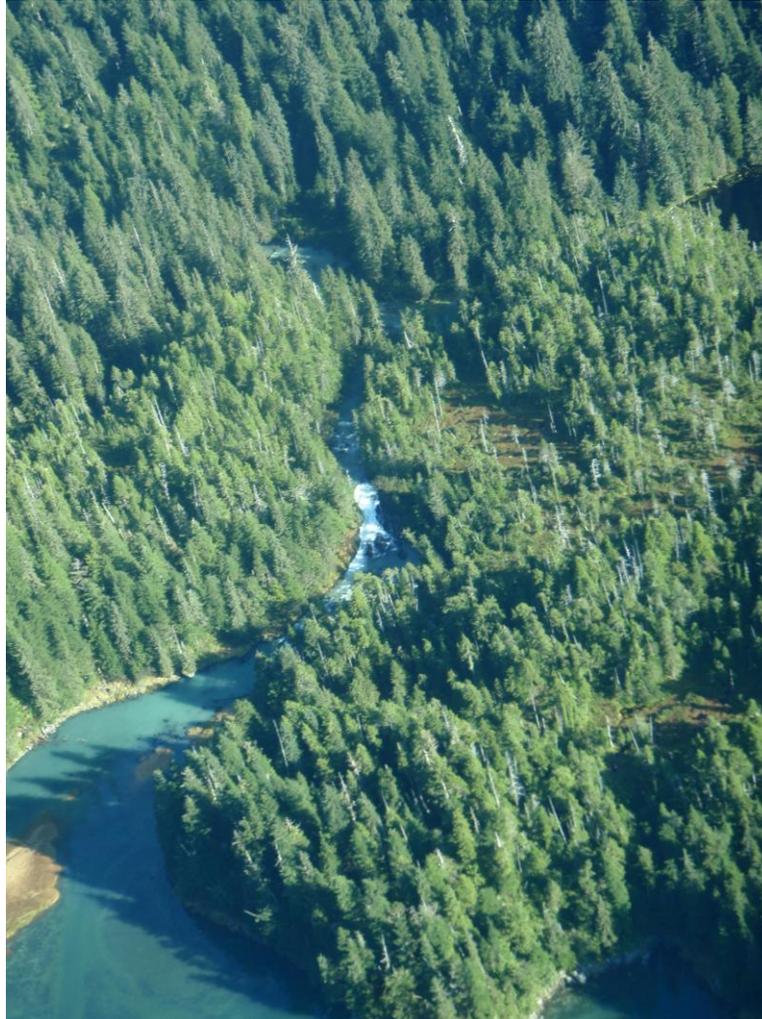


Figure 3. Lowest Potential Barrier on Lower Takatz Creek at Tidewater.

On Baranof River, Baranof Falls are currently recognized as a barrier to anadromous fish passage (ADF&G 2009b, 2009c) and studies there will focus on distribution, abundance and timing both above Baranof Falls (to the lake outlet) for resident species and below Baranof Falls for anadromous species.

Water Temperature Studies

To better described factors involved timing of various fish life history stages, researchers will measure water temperatures in various potentially-affected water bodies. Beginning well before the expected onset of salmonid fish spawning (probably in March or April, 2010), researchers will emplace continuous temperature monitoring data loggers in the

upper ends of Takatz and Baranof Lake near the inflows from the major inflow tributaries. Loggers will also be emplaced in the inflow tributaries at locations to be determined after field reconnaissance. In addition logger(s) will also be placed in Lower Takatz Creek at or near tidewater to measure potential changes there.

Exact placement of these loggers will be determined based on physical characteristics of the nearby lakeshore, but at least one of the measurement locations at Takatz Lake will allow emplacement of a thermograph array to measure water temperatures at various water depths. Vertical spacing of these loggers will be determined by the physical attributes of the site. Individual loggers may also be emplaced on floats to measure surface or near-surface water temperature at various lake locations. Loggers will be set to measure at least 10 time periods per day.

Aquatic macroinvertebrate studies

Researchers will collect, using methods approved by consulting agencies, stream macroinvertebrates and other food items in the potentially-affected water bodies. Detailed field collection methods, sampling frequency and lab identification methods will be the subjects of a further draft study plan sent for review by consulting agencies.

UNNAMED DRAINAGE ENTERING SALT WATER NEAR THE TAKATZ ISLANDS

In 2010, researchers will conduct shoreline and tributary surveys of this unnamed drainage to generally determine which aquatic resources exist in these water bodies. Exact methods for these studies will be determined after an initial reconnaissance visit in spring or summer, 2010, which will provide insights into access and sampling conditions.

SADIE LAKE, its OUTLET STREAM and other POTENTIALLY-AFFECTED TRIBUTARIES

As with the Unnamed Drainage, in 2010 researchers will conduct shoreline and tributary surveys of Sadie Lake and its primary inlet and outlet streams. These surveys will generally determine which aquatic resources exist in these water bodies beyond the current anadromous reach cataloging of chum, pink and coho salmon as well as cutthroat trout (ADF&G 2009b, 2009c). Exact methods for these studies will be determined after an initial reconnaissance visit in spring or summer, 2010, which will provide insights into access and sampling conditions.

MEDVEJIE LAKE SYSTEM

Shoreline Surveys

Medvejie Lake Shoreline Surveys will be conducted by qualified fisheries specialist(s) using both foot and boat access methods and direct observation or snorkeling to observe possible fish activity in various lakeshore areas. As with the other drainages the visual

observation surveys may be augmented by focused fish trapping. Survey timing of the unknown species composition of Medvejie Lake will be broad in temporal range to include possible later spawning or overwintering by Dolly Varden char (Armstrong 1984)(also see anadromous distribution discussion below).

Researchers will visit Medvejie Lake as early in 2010 as possible, given safety and ice considerations. Surveys will be conducted frequently during likely life history periods (including spawning) and will continue to include possible incubation and emergence periods. Frequency of observations will coincide with probable life history timing, be reduced as probable timing progresses, and will continue until it is assured that the life history timing for that season is complete.

Observations of spawning relative abundance and timing will be conducted near the mouth of Upper Medvejie Creek as well as at the mouths and in the lower reaches of all inflow tributary streams which might support spawning of the lake's possible fish population(s).

Inflow Tributaries Surveys

In these surveys, researchers will observe fish from streamside and by using foot surveys and snorkel surveys, as dictated by stream conditions which might limit visibility and safety. These surveys will coincide to the extent possible with the shoreline surveys and lower creek surveys (see below), particularly in the study period when spawning timing is being observed.

In these studies, researchers will also seek to determine spawning and other life history processes (including timing) and the locations of fish during these processes. The objective of these surveys will be to determine, as quantitatively as possible, the presence or absence of any fish, and the relative proportion of fish at various life stages compared to other areas of the drainage. Also in these studies will be habitat evaluation of the areas used for spawning and rearing.

Medvejie Creek Fish Distribution, Abundance and Timing Surveys and Anadromous Fish Limits

In Lower Medvejie Creek, researchers will use foot and snorkel surveys with methods similar to those described above. Survey objectives in the Lower Creek as well as any anadromous species found upstream of the current cataloged distribution will be noted as to overall abundance and distribution with emphasis on the upstream extent of anadromous fish passage.

The current Anadromous Fish Distribution Catalog and Atlas (ADF&G 2009a, 2009b) lists coho, pink, and chum salmon and Dolly Varden char from tidewater to point located just below the outlet of Medvejie Lake. Since Medvejie Creek salmon abundance and timing is controlled by weirs operated by The Northern Southeast Aquaculture

Association’s (NSRAA) Medvejie Central Incubation Facility (MCIF) hatchery, city researchers will coordinate closely with hatchery staff during these runs.

Data Referencing and Cataloguing

Stream and Lake Mapping

For surveys of all study areas, researchers will develop detailed maps, referenced to existing aerial photography and maps and Global Positioning System (GPS) coordinates of the various waterbodies. All streams potentially affected by proposed project activities, including those along access roads, transmission line corridors, and construction sites will be mapped with stream class and channel type according to the Tongass Stream Survey Protocol as outlined in the Aquatic Management Handbook (USFS 2001). As studies progress, these maps will be further annotated with observations and locations of both fish and habitat features.

Data Recording

Fish researchers will note:

- Location, tied to Global Positioning System (GPS) coordinates;
- Fish size and condition, estimated for visual observations and fork length for capture techniques if utilized;
- Activity (nesting, spawning, feeding, etc.);
- Habitat type in area.

SCHEDULE

Studies described in this report will be conducted according to the schedule proposed in Table 1. Specific schedule items are subject to comment by reviewing agencies and are further subject to change based on 2010 weather, snow and ice conditions as well as any additional species or life stages encountered.

Table 1. Proposed Schedule, 2010 Takatz Lake Project Aquatic Resources Studies.

Study Component, Location	Proposed 2010 Time Period
Takatz, Baranof , and Medvejie Lake Distribution and Relative Abundance Surveys	April-September 2010, or when ice conditions allow to conclusion of life stage activities
Takatz Creek, Baranof River and Medvejie Creek	April 2010-early July, 2010, or when ice

Spawning, Life History and Habitat Utilization Studies	conditions allow to conclusion of life stage activities
Water Temperature Studies	Spring 2010, continuously until license application
Takatz, Baranof and Baranof Lakes inflow Tributary studies	April 2010 to conclusion of life stage activities
Aquatic macroinvertebrate studies	July, August, 2010

REPORTING

A draft Aquatic Resources Report documenting current 2010 data collection and analysis will be submitted for agency review as early in the winter of 2010 as possible, given the need to continue various field observations. The object is to provide sufficient review time for this subject prior to submission of the Project Draft License Application in early 2011.

Review of the report should assist in determining the need and details of further studies which might be conducted in 2011.

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