PRELIMINARY DRAFT ENVIRONMENTAL ASSESSMENT

DRAFT APPLICATION for AMENDMENT

BLUE LAKE HYDROELECTRIC PROJECT (FERC No. 2230) EXPANSION

Prepared by:

City and Borough of Sitka Electric Department

Sitka, Alaska

March, 2010

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

PRELIMINARY DRAFT ENVIRONMENTAL ASSESSMENT

DRAFT APPLICATION for AMENDMENT

BLUE LAKE HYDROELECTRIC PROJECT (FERC No. 2230) EXPANSION

Prepared by:

City and Borough of Sitka Electric Department

Sitka, Alaska

March, 2010

EXECUTIVE SUMMARY

The City and Borough of Sitka, Alaska ("City", "CBS"), licensee for the Blue Lake hydroelectric project ("Project", FERC No. 2230-AK), applies for an amendment to the Project Federal Energy Regulatory Commission ("FERC", "Commission") license.

The action which is the subject of this amendment application would involve:

1. Raising the Project dam from spill elevation (El) 342 to El 425, a raise of 83 feet;
2. Construction of a new powerhouse housing three new generating units, increasing the Project's installed capacity from 6.7 to 15.9 megawatts (MW);
3. Installation of new intake works and a surge chamber; and
4. Modification of the power conduit to accommodate higher hydraulic pressure and to connect new or relocated project features.

Collectively, these actions are called the "Blue Lake Project Expansion" or simply "Expansion".

This Preliminary Draft Environmental Assessment (PDEA) is one component of the Draft Amendment Application (DAA) submitted by the City for Stakeholder and FERC review prior to submittal of the Final Amendment Application to the FERC. Preparation of the PDEA is authorized by the Commission's approval of the City's request to utilize the Alternative Licensing Procedures (ALP), as described in the following.

The City has conducted a three-stage consultation process to support this Draft Amendment Application. On 3/12/08, the City distributed an Initial Consultation Document (ICD) to a list of Stakeholders including state and federal resource agencies, Tribal entities and interested members of the public. On 4/16/08, after announcement in the local newspaper, the City conducted a resource agency meeting in Juneau and on

4/17/08 conducted a public meeting in Sitka. The City has prepared this Draft Amendment Application and distributed it to the mailing list in Attachment II.

The primary potential effects of the Expansion would be on:

Water Quality, including effects on Sawmill Creek and Blue Lake water quality, relative to sedimentation and other contamination during land clearing excavation, tunneling and blasting; and to potential changes in the temperature regime of Sawmill Creek resulting from a shallower water intake. Also, increased access to Blue Lake could result in more water borne recreation which might affect the Blue Lake water quality and its use as Sitka's drinking water supply.

Construction-related effects on water quality would be avoided or minimized through adherence to an Erosion and Sediment Control Plan (ESCP). This plan would be finalized after review and approval of responsible agencies.

Effects of the shallower intake would be primarily on salmon in Sawmill Creek. These effects were evaluated in a detailed study documented in the fisheries section of the PDEA. The report concluded that temperature effects would be small.

Effects of increased recreation would be addressed through modification of the City's Watershed Management Plan to limit boat access.

Fish, primarily rainbow trout in Blue Lake, which spawn in the lake's inflow tributaries, and salmon in lower Sawmill Creek, which might be affected by water temperature changes.

Effects of raised water level on Blue Lake trout population spawning would be minimal because access into the Lake's inflow tributaries would be increased in some cases and decreased in others. Blue Lake Creek, the lake's primary inflow tributary, would become accessible during the trout spawning season and offer currently-unavailable spawning habitat. Habitat in the stream, after inundation, would be of about the same quality as at present.

Concerns about water temperature effects from the proposed, shallower, intake location were addressed in a detailed report which concluded that effects on salmon spawning and emergence in Sawmill Creek resulting from this change would be minimal.

Wildlife/Vegetation effects would occur primarily in areas around Blue Lake's periphery which would be inundated after the dam raise, and through increased access to hunters resulting from higher water levels at the boat launch site. Inundation effects would result in the loss of approximately 430 acres which offer habitat of varying qualities for small mammals, birds, and large mammals including mountain goats and Sitka black-tailed deer. In this area, two plant species of special concern would be inundated. The City has proposed a survey and transplantation of these plants prior to reservoir filling.

The primary wildlife impact would be the effect of increased access (due to higher water levels and easier boat launching) on mountain goats. As discussed in the Water Quality Section, this effect could be addressed through changes in the City's Watershed Management Plan to restrict access and/or boat and motor specifications.

Recreation. The significant change in Blue Lake water elevation during the spring/summer recreation period might change use patterns and quality of experience. As discussed above relative to both Water Quality and Wildlife resources, recreation access to Blue Lake might be eased by raised water level. Again, changes in the Watershed Management Plan could restrict this access. Overall recreation effects in the Blue Lake area will await details of those changes.

Aesthetics, related to visual effects of the raised dam and reservoir surface, and to the various new Project features in the area of the powerhouse. Blue Lake currently offers very desirable views from the dam area overlook and from the lake surface. Raising the water level, however, would result in a very similar viewing experience. Annual drawdown, which produces a "bathtub ring" around the lake, would be reduced however, because drawdown levels would be decreased under Expansion-related annual operations.

Cultural resources, as potentially affected by construction in both the dam and powerhouse areas, and by inundation due to the dam raise. No historic properties which could be listed in the Register of Historic Places were found during detailed cultural resources surveys. Further site-specific surveys will be conducted after final design and determination of exact locations of land disturbance.

PRELIMINARY DRAFT ENVIRONMENTAL ASSESSMENT

DRAFT APPLICATION for AMENDMENT

**BLUE LAKE HYDROELECTRIC PROJECT (FERC No. 2230)
EXPANSION**

Prepared by:

**City and Borough of Sitka Electric Department
Sitka, AK**

March, 2010

1. APPLICATION

Project Name: Blue Lake Hydroelectric Project

FERC Project No. 2230

Application Type: Capacity-Related Amendment
Applicant: City and Borough of Sitka Electric Department
Water Body: Blue Lake, Sawmill Creek
Nearby City or Town: Sitka
State: Alaska

The City and borough of Sitka, Alaska ("City") applies to the Federal Energy Regulatory Commission (FERC, Commission) for a capacity-related amendment for the FERC-issued license of the Blue Lake Hydroelectric Project (Project, FERC No. 2230), as described in this document and accompanying Exhibits. The action which is subject of this amendment application would involve:

1. Raising the Project dam from spill elevation (El) 342 to El 425, a raise of 83 feet;
2. Construction of a new powerhouse housing three new generating units, increasing the Project's installed capacity from 6.7 to 15.9 megawatts (MW);
3. Installation of new intake works and a surge chamber; and
4. Modification of the power conduit to accommodate higher hydraulic pressure and to connect new or relocated project features.

Collectively, these actions are called the "Blue Lake Project Expansion" or simply the "Expansion".

2. PURPOSE AND NEED FOR ACTION

2.1 PURPOSE

This Preliminary Draft Environmental Assessment (PDEA) analyzes the environmental effects of construction and operation of the proposed Blue Lake Project Expansion. The analyses in this document will be used to make decisions on whether to issue an amendment to the existing FERC license.

2.2 NEED FOR ACTION

The City's recent electrical load forecasts show a marked increase in electrical demand in the near future (Figure 1). Two primary factors have driven this increase: 1) fuel costs in Sitka over the past four years have nearly tripled, making electric heating economically preferable to oil heating and driving up electrical demand in locations with a choice between oil-based and electrical heat; and 2) constructed high energy-need industries in Sitka have added to overall electrical demand. These factors, weighed against the City's existing electric generation capacity, predict an increase in expensive and polluting diesel generation within a few years unless hydroelectric generating capacity is increased. Key to the City's planning is continued preference for hydroelectric generation to assure lower electrical rates and increased environmental acceptability when compared to use of diesel fuel, the only other current generation alternative.

The City has explored various hydroelectric generation alternatives, including the Lake Diana Project (FERC No. 12716) and the Takatz Lake Project (FERC No. 13234). The Lake Diana Project, owing to its location in an existing wilderness area, has proven unfeasible. Engineering studies have shown that the Blue Lake Project Expansion could result in energy generation equal to or exceeding that expected from the Lake Diana Project. The City has begun feasibility studies for the Takatz Lake Project, but licensing and construction of that project are not certain at this time.

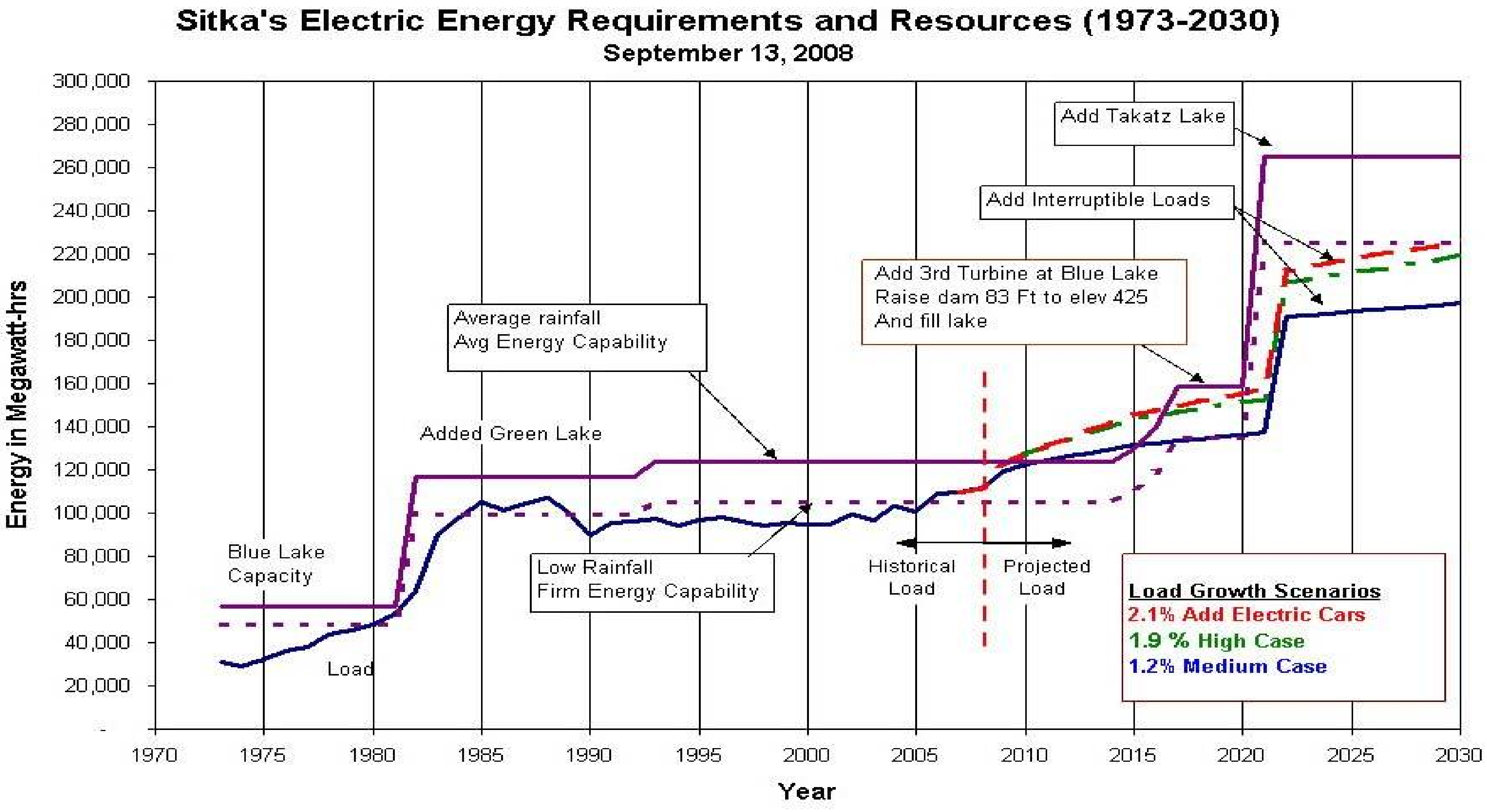


Figure 1. Sitka electrical load forecasts under various load growth scenario

3. PROPOSED ACTION AND ALTERNATIVES

In this section we first describe the existing Blue Lake Project as a basis for clarifying Expansion-related changes. We next describe the proposed changes and their associated construction.

Throughout this document, elevations are referenced as heights in feet above or below mean low sea level, denoted by the term "El". Reservoir and stream directions (left or right) are looking downstream. Project features on Sawmill Creek are described relative to their Stream Mile (SM), or the centerline distance on Sawmill Creek upstream from the Creek's mouth at tidewater, as determined from the project map.

3.1 DESCRIPTION OF THE EXISTING PROJECT

The Blue Lake Project is located approximately 5 miles east of the City of Sitka, Alaska, on Sawmill Creek, formerly the Medvetche River (Figure 2). The Project consists of: the dam, a submerged intake structure, a power conduit, three powerhouses, a switchyard and a primary and two secondary transmission lines (Figure 3).

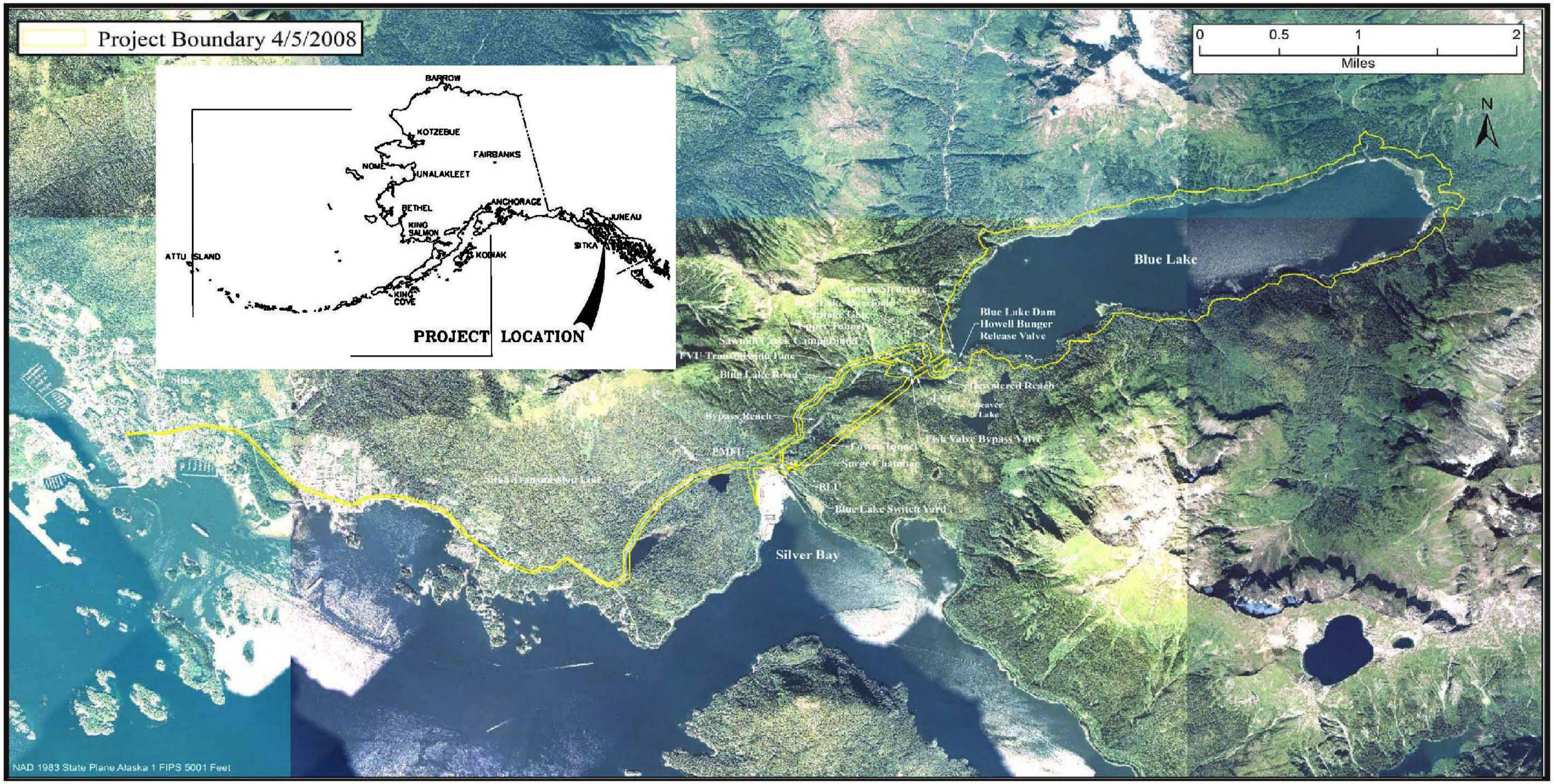


Figure 2. Blue Lake Project Area Map

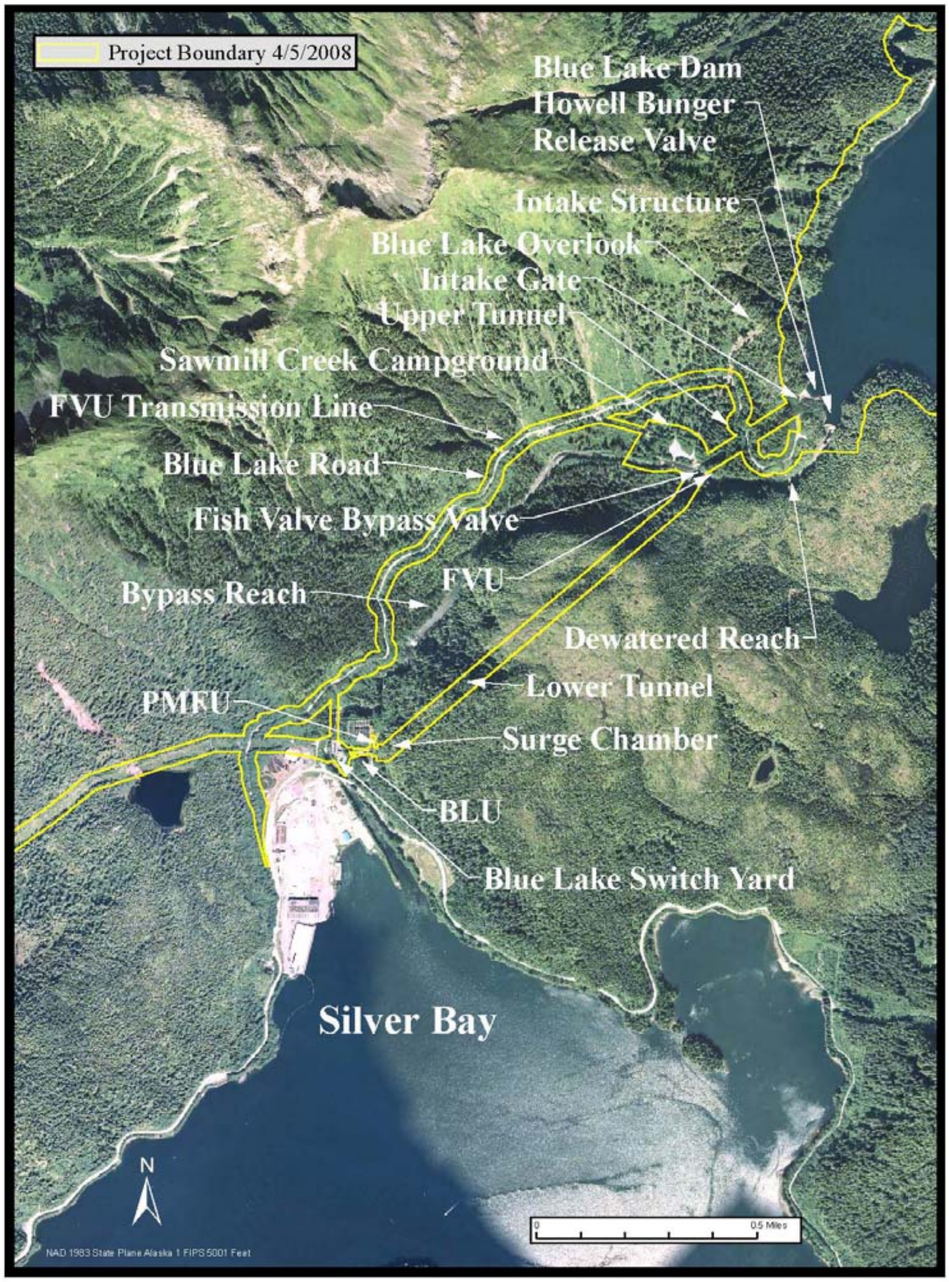


Figure 3. Blue Lake Project Map Showing Project Features and Waterways.

3.1.1 Dam

Located at SM 2.31 on Sawmill Creek, the existing concrete arch dam is 211 ft high with a base width of 25 ft and a crest width of 256 ft. The 140 ft wide spillway at El 342 is centrally located in the dam, and is sized to discharge 14,000 cubic feet per second (cfs). A release valve, installed at the base of the dam, is used to release water when the reservoir is below the spillway elevation. The valve capacity varies between 450 cfs and 650 cfs depending on lake level. A natural plunge pool is located downstream of the dam, to dissipate energy from the spillway discharge.

3.1.2 Reservoir

Blue Lake Reservoir was created when the dam raised the natural Blue Lake water surface from El 208 to El 342 and increased the lake surface area from 490 to 1,225 surface acres. Blue Lake is 3.25 mi long and 0.63 mi in average width. The deepest point is at El minus 126 at a depth of 468 feet below the lake surface at spill elevation. The reservoir has a gross storage capacity of 145,200 acre/feet (af) and a usable storage of 102,200 af at spill level. A submerged concrete intake structure is located approximately 400 feet north of the dam at invert El 204.

3.1.3 Power Conduit

A 7,110 ft. long power conduit extending from the intake structure to the Blue Lake powerhouse branches to provide water to the various powerhouses and other facilities described below. Figure 4 is a schematic representation of the Blue Lake Project power conduit system and associated taps and branches.

The power conduit consists of an upper tunnel with an unlined, 11.5 ft. diameter modified horseshoe cross-section extending 1,500 feet from the intake structure to the upper penstock on the right side of Sawmill Creek. The upper penstock, an 84 in. diameter, 460 ft. long, steel pipe crosses the stream supported on concrete piers and enters the lower tunnel on the left side of Sawmill Creek. The 4,650 ft. lower tunnel has an unlined, 10 ft. diameter modified horseshoe cross-section and extends to the lower penstock.

The lower penstock, an 84 in. diameter, 500 ft. long, steel pipe, has two taps immediately below the lower tunnel portal. A 36 in. tap supplies water to the Pulp Mill Feeder Unit and a 24 in. tap supplies water to the Sawmill Cove Industrial Park (SCIP), site of the former Alaska Pulp Company (APC) mill.

Approximately 90 feet below these two pipes is a 20 in. tap (the “water supply tap”) leading into the adjacent water treatment plant for municipal water supply. Approximately 50 ft below this tap is an 84 in. butterfly valve which allows shutdown of the main powerhouse and dewatering of the turbines while maintaining water to the

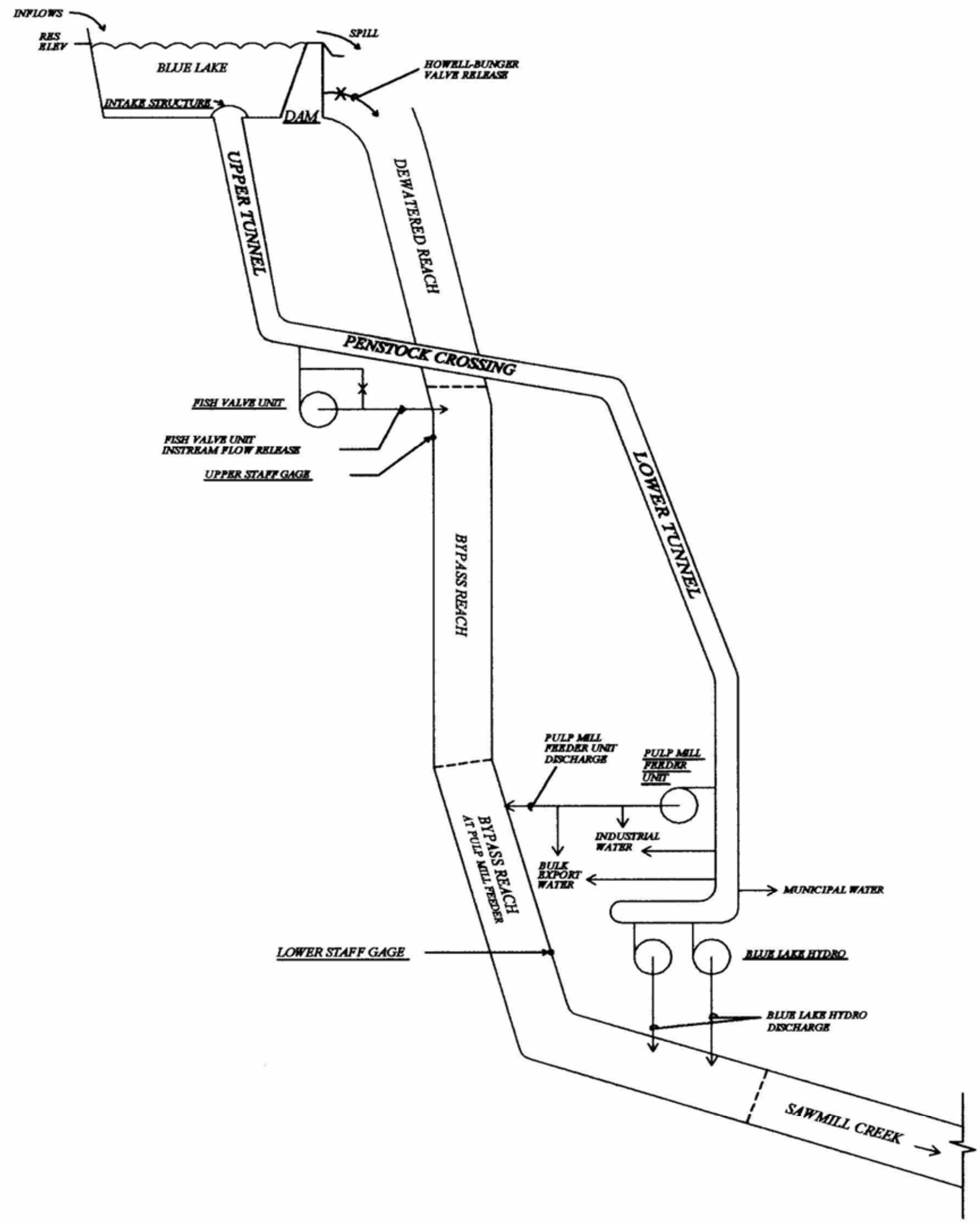


Figure 4. Blue Lake Project Power Conduit Schematic

Sawmill Creek Industrial Park and the Water Treatment Plant.

At the end of the lower penstock is a manually operated 24 in. conduit drain valve which discharges into Sawmill Creek.

3.1.4 Project Powerhouses

The existing project generates power using the Blue Lake Unit (BLU), Fish Valve Unit (FVU) and Pulp Mill Feeder Unit (PMFU) powerhouses. The BLU is the primary generating facility. The other two powerhouses provide additional generation capacity, as described in detail below.

BLU

The BLU houses the primary Project generating units. It is located on the left bank of Sawmill Creek at SM 0.32 and is a 35 ft. X 70 ft. building with steel superstructure, precast walls and concrete foundation structure. The powerhouse contains two horizontal shaft Francis turbines each rated at 3000 kilowatts (kW) with provision for future installation of a third unit (Figure 5). The turbines discharge water into the approximately 150 ft long tailrace which carries water from the turbines to Sawmill Creek.

The Blue Lake Switchyard, located adjacent to the powerhouse, receives generation energy from the Blue Lake powerhouse, and the two small hydro components described below. The switchyard includes two 12.47/4.16 kilovolt (kV) transformer banks comprised of a total of seven 2500 kilovolt amp (kVA) single phase, 4.16/69 kV transformers, with associated bus-work and disconnect switches. This provides for redundant installed transformers and a total capacity of 15,000 kVA. Power from the Green Lake Project, FERC No. 2818, another hydroelectric facility owned by the City of Sitka, is also transmitted to the Blue Lake switchyard at 69 kV.

Small Hydro Components

By License Amendment dated September 6, 1991, the Project was modified to include two additional generating units, the Fish Valve Unit (FVU) and the Pulp Mill Feeder Unit (PMFU), as described in the following:

FVU

The FVU, located at SM 1.62, generates power from flows released for instream purposes through a valve located about 1900 ft. downstream of the dam. It is housed in a concrete powerhouse located approximately 175 feet below the upstream end of the upper penstock on the right side of the stream. A 36 in. diameter wye branch on the upper penstock supplies water to the FVU. An automatic bypass valve opens when the Fish

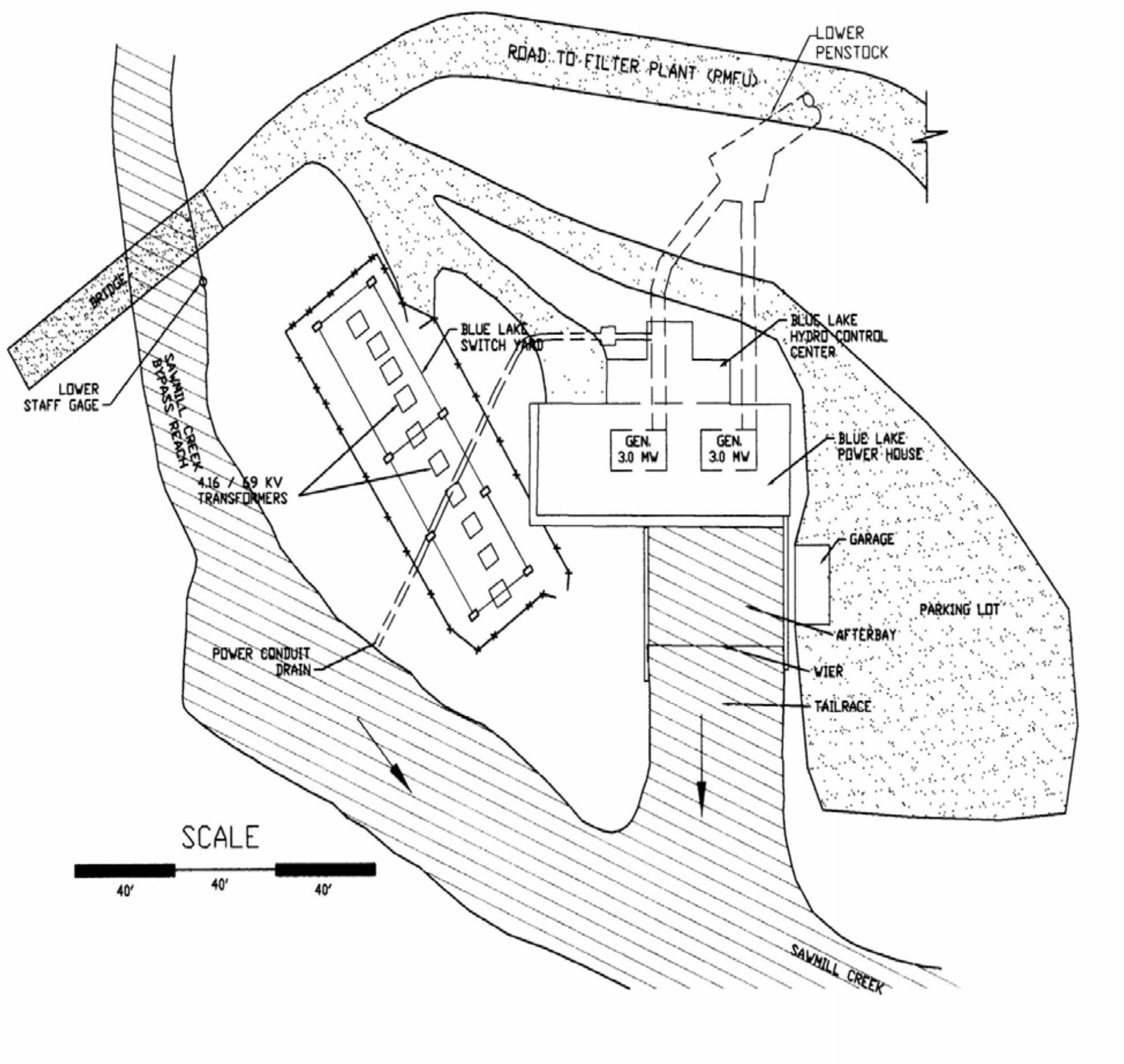


Figure 5. Blue Lake Generating Unit

Valve Unit is tripped off-line to maintain the required flow of 50 cfs in the stream at all times. A single Francis turbine spins a generator rated at 670 kW.

PMFU

The 870 kW PMFU generates power from the water supply to the former Alaska Pulp Corporation (APC) filter plant. Regular PMFU operation was discontinued in 1993 because of shutdown of the APC mill. The unit was returned to intermittent service in August, 2003.

3.1.5 Transmission Facilities

Existing transmission facilities are comprised of three separate lines. The primary transmission line connects the Blue Lake switchyard to distribution system in Sitka and two secondary lines connect the FVU and PMFU to the primary facilities at the BLU, as described in more detail below.

Blue Lake (Sitka) Transmission Line.

A 69 kV Blue Lake (Sitka) transmission line extends 5 mi. from the Blue Lake Switchyard to the Jarvis Street and Marine Street substations in Sitka. The line is carried on both H-frame and single pole wood structures. The transmission line right of way occupies 67.7 acres of land, 12.8 acres of lands administered by the U.S. Department of Agriculture Forest Service (USFS). The remainder of land within the primary transmission corridor is owned by the State of Alaska, the City of Sitka, and various private land owners.

Pulp Mill Feeder Unit Transmission Line.

Power from the PMFU is transmitted at 4.16 kV over a 470 ft. long, underground transmission line to the Blue Lake Powerhouse and connected to the main generation bus.

Fish Valve Unit Transmission Line.

Power from the FVU is transmitted over a 12.47 kV transmission line 7,700 ft. long to the Blue Lake switchyard where it is transformed to 4.16 kV and connected to the main generation bus. The first 1,400 feet of the transmission line through the U.S. Forest Service Sawmill Creek recreation area is underground. The remaining portion is overhead.

3.1.6 Access Roads

The dam access road is USFS road No. 5755 (Blue Lake Road) and extends 2.18 miles to the dam from Sawmill Creek Road. Just downstream of the FVU, a footbridge bridge crosses Sawmill Creek at SM 1.57. Access to the Blue Lake powerhouse and the PMFU is along a licensee-owned road connected to Sawmill Creek Road at mile 5.5; access to the FVU is via USFS road No. 5755. At SM 0.38, the Blue Lake Powerhouse Bridge crosses Sawmill Creek just upstream of the Blue Lake powerhouse.

3.1.7 Project Lands

The existing facilities of the Blue Lake Project occupy a total of 1784.3 acres, consisting of 1670.3 acres of U.S. lands administered by USFS and 114.0 acres of non- federal lands.

The project lies within the U.S. Geological Survey (USGS) Sitka A-4 and A-5 Quadrangle maps, within the land descriptions presented in Table 1.

Table 1. Land Descriptions of Blue Lake Project Features.

Project Features	Map Locations
Dam, Spillway and Intake Structure	Section 35 of T55S, R64E, Copper River Meridian.
Power Conduit	Sections 34 and 35 of T55S, R64E, Copper River Meridian.
Fish Valve Unit	Section 34 of T55S, R64E, Copper River Meridian.
Pulp Mill Feeder Unit	Section 34 of T55S, R64E, Copper River Meridian.
Blue Lake Powerhouse	Section 34 of T55S, R64E, Copper River Meridian.
Primary Transmission Line	Section 33 & 34 of T55S, R64E, Copper River Meridian; Section 4, 5 and 6 of T56S, R64E, Copper River Meridian; Section 1 of T56S, R63E, Copper River Meridian; Section 35 & 36 of T55S, R63E, Copper River Meridian.

3.2 FEATURES EXPECTED TO CHANGE OR TO BE ADDED UNDER BLUE LAKE PROJECT EXPANSION

In the following design graphics, green is an existing feature, red is a proposed feature. Exact plans for decommissioning the existing powerhouse and generators have not been developed at this time.

3.2.1 Powerhouse Area Changes

3.2.1.1 New Powerhouse and Generators

The current proposal is to replace the existing BLU powerhouse and two generators with a new powerhouse and three new generators. The new powerhouse, approximately 65 by 140 feet in area and 40 feet tall, would be located on Sawmill Creek's left bank about 20 yards downstream from the existing BLU powerhouse (Figures 6 and 7).

The new powerhouse would house three new Francis turbine-generators with installed capacities of approximately 5.3 MW each. The turbines would release water into an afterbay and then into Sawmill Creek via a tailrace similar to that at the existing powerhouse.

Power Conduit

Due to the increased pressure associated with the dam raise the steel liners at the portals of the power conduit must be lengthened. These modifications will only be noticeable inside the tunnel.

The existing lower penstock is 7 feet diameter, in order to decrease the pressure drop in this penstock a replacement 9 foot diameter penstock will be constructed between the lower portal and the new power house.

3.2.1.2 Surge Chamber

An underground 25 foot diameter surge chamber would be constructed near the lower portal (Figure 8). The surge chamber would be vented to the surface at about El 465. The surge chamber would be necessary to decrease water pressure in the power conduit resulting from load rejection and a consequent pressure spike which might damage the power conduit and generating equipment. The surge chamber would allow system operation at a higher average pressure and would improve the electrical frequency response of the Blue Lake Project. The surge chamber will be constructed from an adit located near the PMFU.

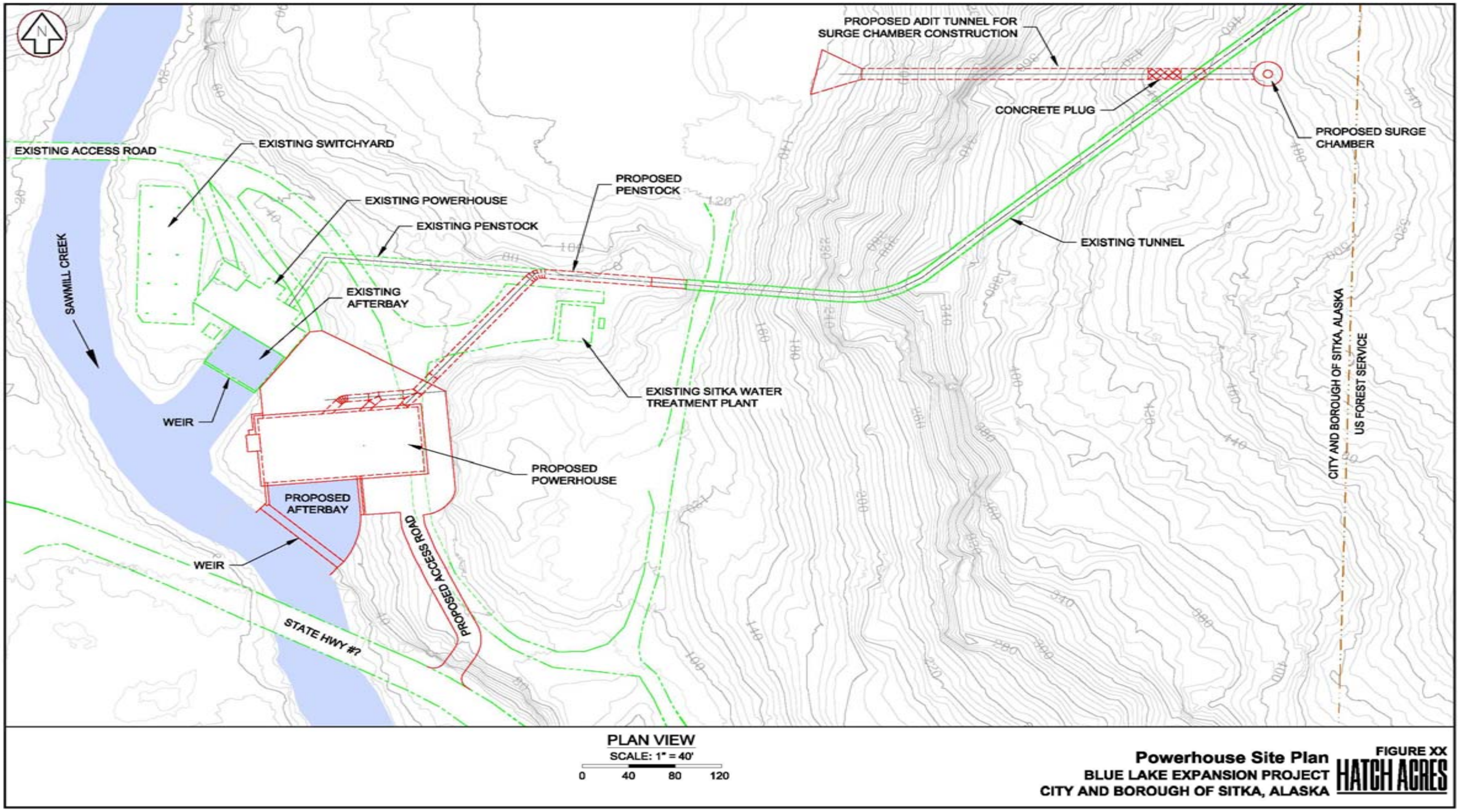


Figure 6. Powerhouse Area Site Plan

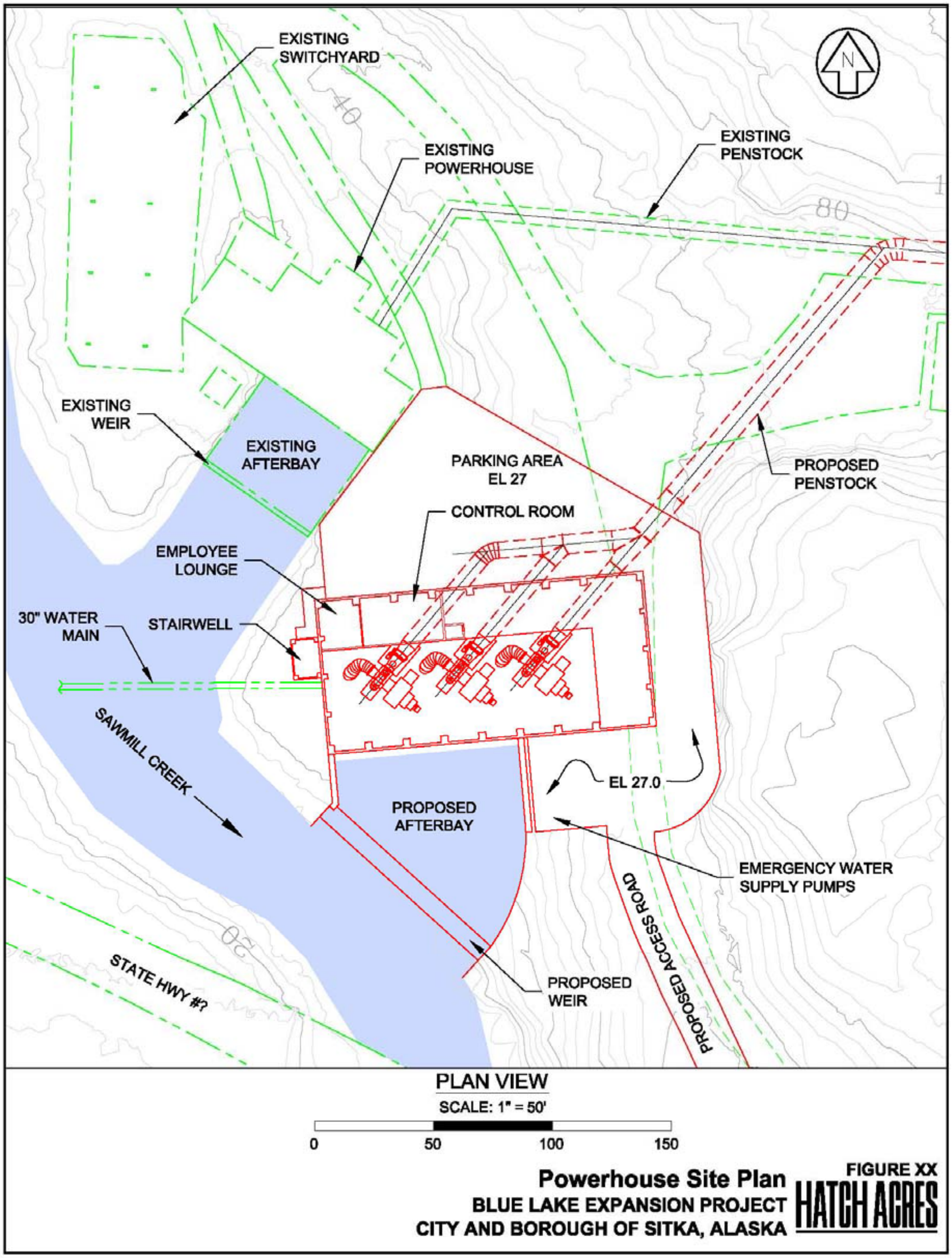


Figure 7. Detail of Powerhouse and Afterbay Arrangement.

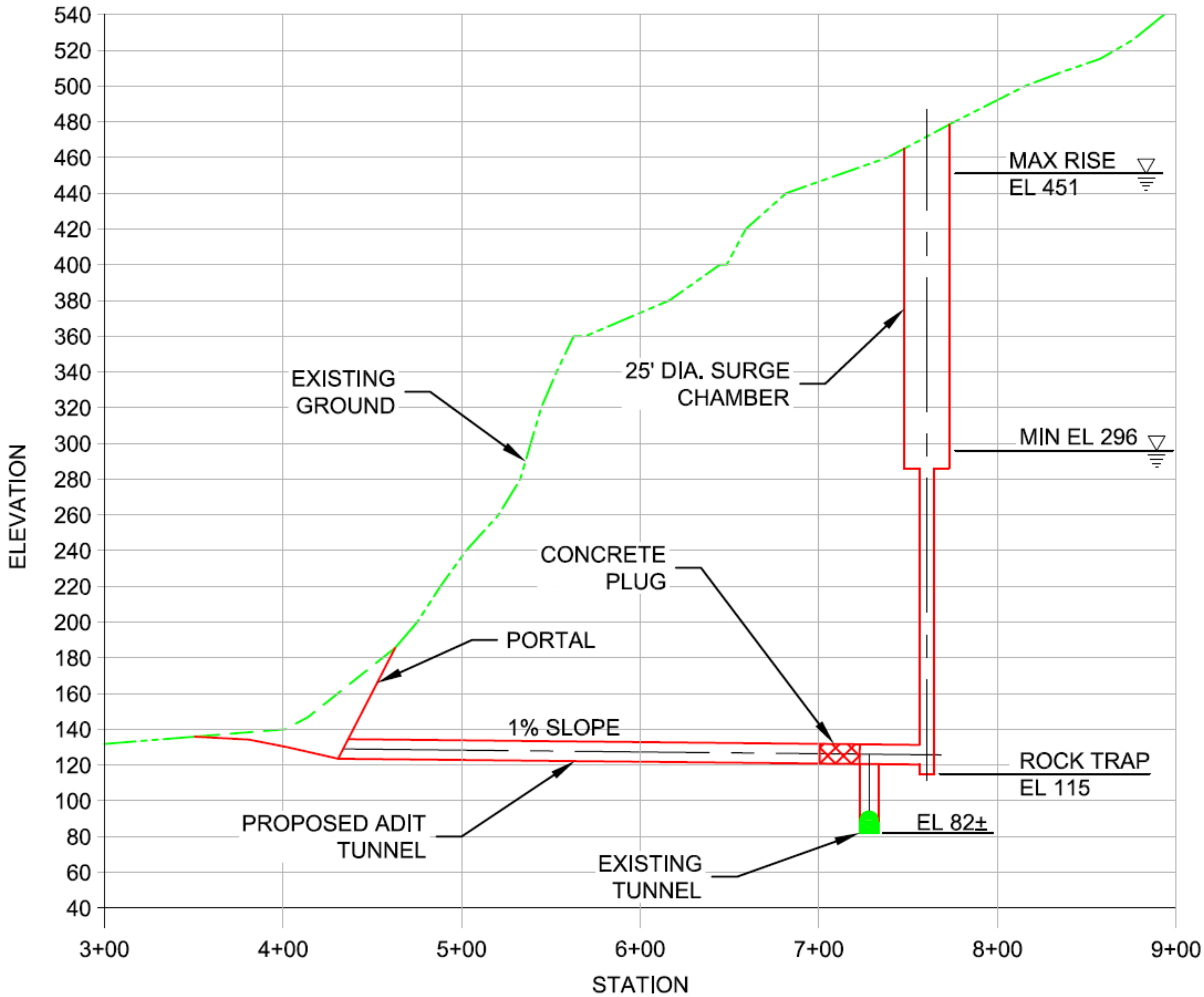


Figure 8. Surge Chamber Profile

3.2.1.3 Switchyard

A new switchyard would be constructed in the location of the existing switchyard next to the existing powerhouse (See Figure 6). The switchyard would transform the generation voltage (12.47 kV) to transmission voltage (69kV) and would connect to the existing transmission line from the Green Lake powerhouse.

3.2.2 Changes at Blue Lake

Expansion-related work in the Blue lake area would include 1) development of equipment access and staging facilities; 2) dam raising; 3) construction of new intake facilities; and 4) timber clearing around the reservoir and in the Blue Lake Creek valley. These actions are described in detail in the following.

3.2.2.1 Development of New Access and Equipment Staging Facilities for Dam Raising

Dam raise construction would generally be done using cranes positioned on the right abutment and at the downstream base of the existing dam (Figure 9). Access would be primarily via existing roads with some upgraded road construction leading to the right abutment and staging areas. An approximately 1.5 acre construction staging area would be developed by leveling a hill just south and west of the current Blue Lake overlook to EL 460. This area would be leveled and supplied with an appropriately-sized gravel base to support dam raising equipment. Reusable spoils will be used on site. Organic material will be disposed of offsite.

3.2.2.2 Proposed Dam Raising

It is the city's goal to raise the dam to the highest structurally feasible level because each foot of increased dam height would generate an additional 241 megawatt/hours per year (MWh/yr) of electricity. A dam height of El 425 would increase the Blue Lake Project average annual generation by 50 percent.

Geologic and engineering evaluations have suggested that the existing dam could be raised to El 425, (a raise of 83 feet above the existing spillway elevation) and that the existing dam would be competent to serve as the base of any dam structure rising to that height.

Figure 10 shows an elevation view of the existing dam with spillway at El 342 and the proposed dam with spillway at El 425. At that height, the raised dam top width would be about 215 feet.

3.2.2.3 Intake Structure Modifications

If the existing intake location and structure were retained, water temperature at the intake, and hence in Sawmill Creek below the FVU and BLU would be significantly colder than at present. In addition, the City wishes to replace the current intake because of difficulty in maintaining it

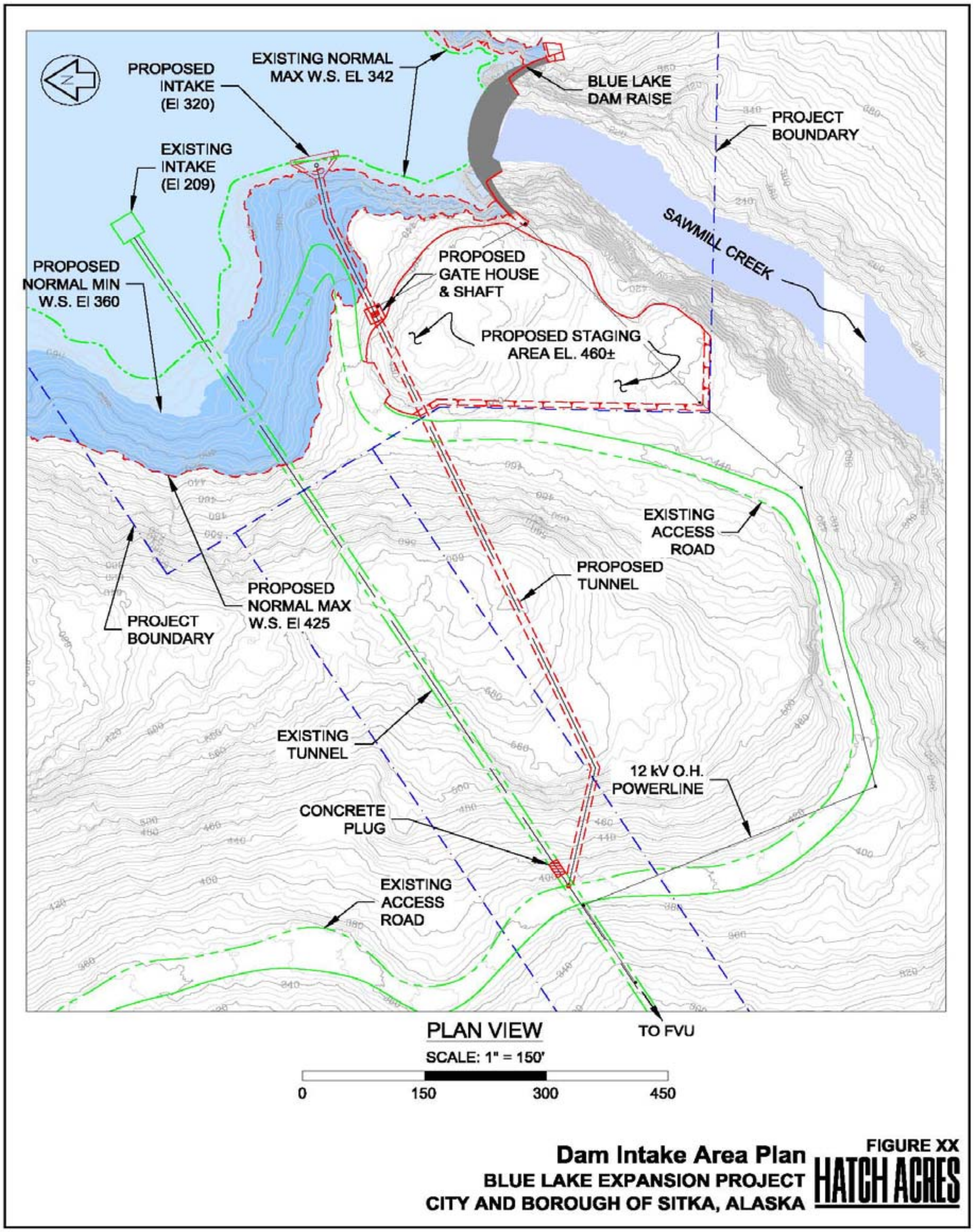


Figure 9. Dam Intake Area Plan

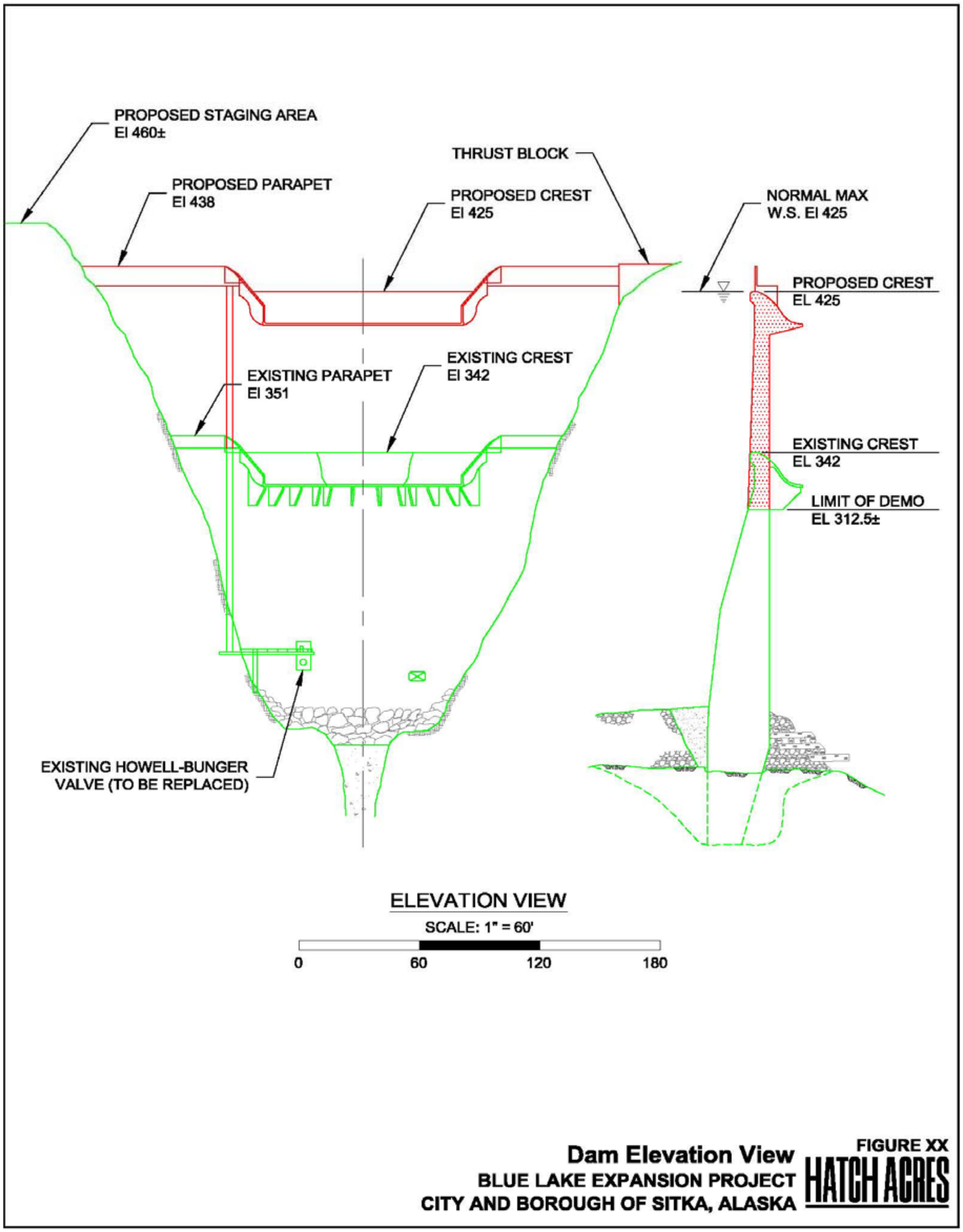


Figure 10. Elevation View of Existing and Expansion-Related Dam at El 425.

(possible only by divers) and to decrease the likelihood that construction-related contaminants and other inputs would compromise drinking water quality. The existing intake structure is located in an area that receives considerable overland runoff during rainstorms and snowpack melt. Because the intake is located at a juncture with the flat lake bottom, sediment and organic material tend to accumulate and impede the intake. Under the new design and location, the intake would be located on a steep slope, past which overland runoff material would continue without settling out.

The existing intake gate would be replaced with a new fixed wheel intake gate located within a gate shaft and a bulkhead gate at the intake location (Figure 11). The new intake arrangement and gates would offer a more reliable seal than the existing gate. The existing intake gates and winch house would be removed from service.

3.2.2.4 Electrical Distribution Facilities

To operate the new gate winch, a 1400 ft-long 12.4 kV electrical distribution line would run from the FVU along the tunnel alignment to the Blue Lake Road, and would follow the Blue Lake road to the dam site. This line would be carried on overhead wood poles along its entire length.

3.2.2.5 Timber Clearing Around The Reservoir and in Blue Lake Creek Valley

Prior to reservoir filling, timber and other large vegetation in the potentially-inundated area will be removed. Large merchantable timber will be felled, yarded and stored in the inundation area at the east end of the lake. The timber will be floated to a retrieval area near the access road after the lake has been filled to El 425. Timber volume in the Blue Lake Creek valley has been cruised under USFS guidelines. The volume of timber is approximately 5000 MBF. Slash, utility, and understory material will be burned at the east end of the lake.

3.2.3 Affected Reservoir Area and Energy Production

Inundated area of Blue Lake reservoir would increase by approximately 35 percent with a dam height of El 425 (Table 2, Figure 12). Energy would increase by 32,000 MWh per year or 50 percent.

Table 2. Potential Energy and Inundated Area for Dam Height of El 425

Dam Height	Existing Reservoir Surface Area (acres)	Additional Inundated Area (acres)	Additional Inundated Area (percent)	Existing Energy Generation (MWh)	Energy Increase (MWh)	Energy Increase (Percent)
425	1,655	430	35	62,500	32,000	50

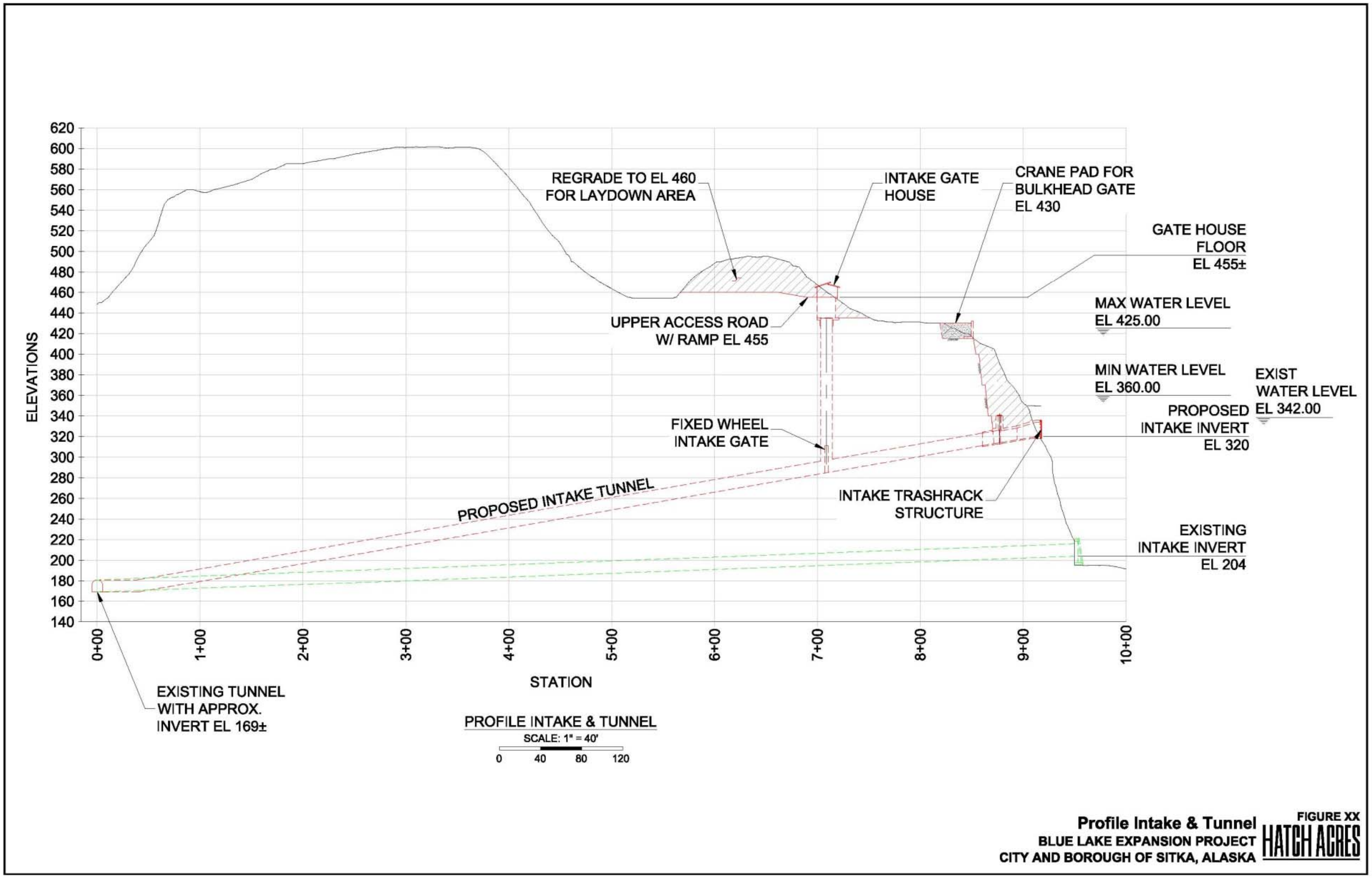


Figure 11. Profile of Existing and Proposed Intake Structures

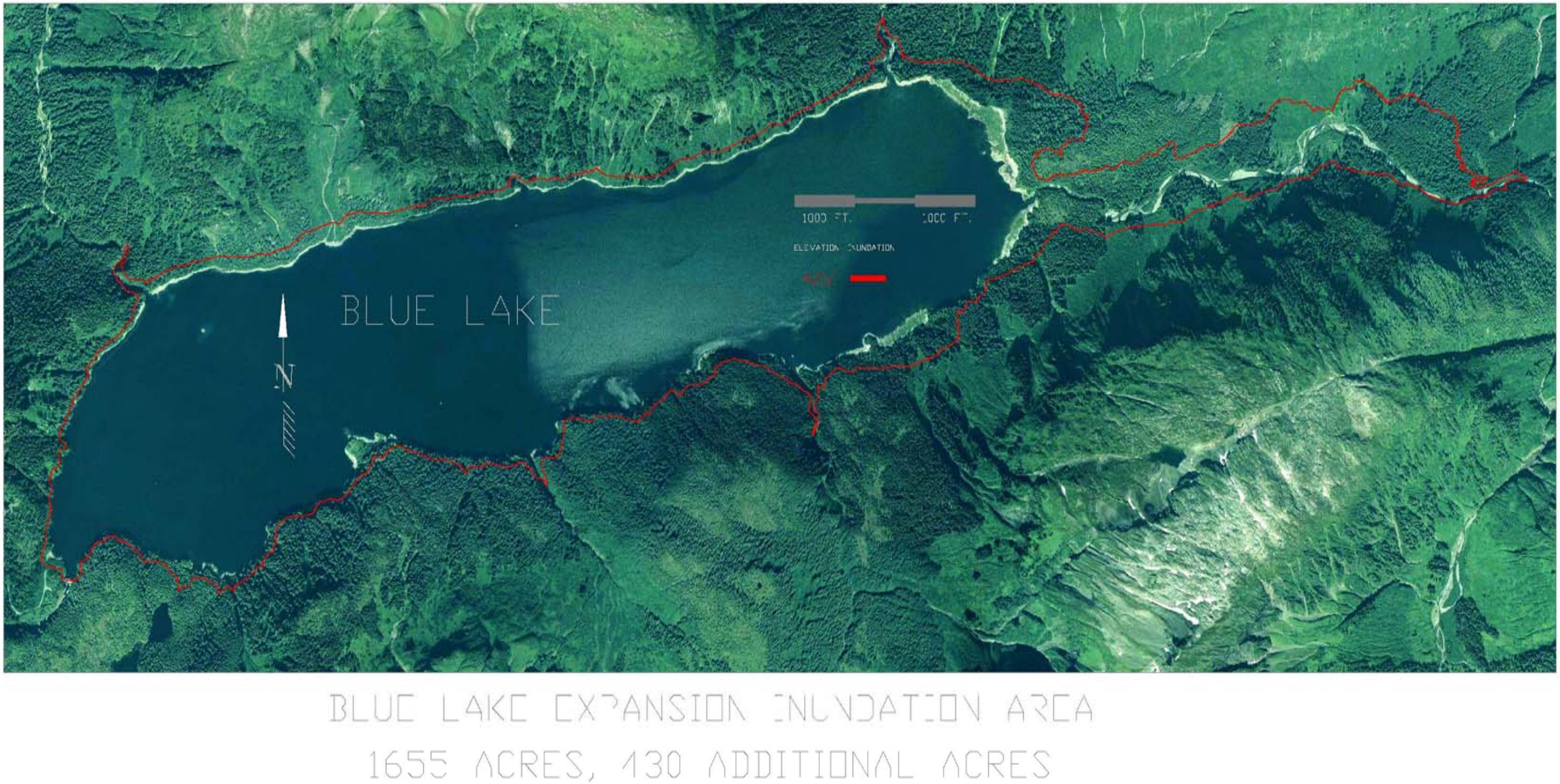


Figure 12. Orthophoto of Blue Lake showing Existing (spill at El 342) and Post-Expansion (spill at El 425) Water Surface Elevations and Inundated Areas

3.2.3.1 Expansion-Related Project Lands

Lands within the proposed Expansion Project Boundary would consist of the acreages shown in Table 3. Federal lands would all be on USFS lands of the Tongass National Forest. Non-Federal lands are largely owned by the City and Borough of Sitka.

Table 3. Land Ownership of Areas Within Proposed Expansion Project Boundary.

Area Description	Area in Acres
Total Within Project Boundary	1912
Federal Land	1797
Transmission Lines on Federal Land	25
Non-Federal Land	115

The proposed features of the Blue Lake Project Expansion will all be constructed on City property except for 1400 ft. of the 12kV distribution line that will supply power to the dam site. This distribution line will follow the tunnel alignment and Blue Lake Road.

3.3 PROJECT OPERATION CHANGES

The City proposes no change in the existing instream flow release or ramping rate patterns at both the FVU and the BLU. Under the typical Expansion operation, the seasonal drawdown will be 55 to 65 feet, which is significantly less than the 70 to 80-ft drawdown typical of operations with the existing dam height.

After expansion, the Blue Lake project would more effectively serve to balance system electrical load between the Blue Lake and Green Lake projects. Generating units would be operated as the load following generator and all other generators would be base loaded. The load following generator continuously adjusts its output to match the load while the base loaded generators have a fixed output. With the addition of the new turbines operated as a load following generator, the city would have multiple base loaded generators providing a wider range of efficient operation.

As explained previously, a goal of the Expansion is to improve the electrical system frequency with the installation of the surge chamber. The city will also investigate the addition of other frequency improving features such as improved governors on existing generators, a synchronous motor and flywheel, and interruptible resistance loads.

3.4 PROPOSED CONTRUCTION SCHEDULE

Following are major milestones in several areas, including FERC amendment application and various engineering and construction activities.

Amendment Application

- Submit Draft Amendment Application March 1, 2010;
- Submit Final Amendment Application November 1, 2010;
- FERC review November, 2010- October 2011; and
- Amendment issued November 1, 2011.

Engineering

- Final Design March 2010 – September 2011;
- Issue Turbine Generator and Penstock contracts April 2010; and
- Order other owner supplied equipment November 1, 2011.

Construction

- City relocates utilities in powerhouse area: July, 2011;
- City runs 12.4kV distribution to dam site: October, 2011;
- Issue Notice to Proceed to General and Underground Contractors: January, 2012;
- General contractor begins work at Powerhouse site: February, 2012;
- Underground contractor begins work at intake area: February, 2012;
- Underground contractor completes underground work: July, 2012;
- General contractor begins work at dam site: October, 2012;
- General Contractor begins structural work at intake site and installs gates: March, 2013; and
- Intake structure and gates operational: July, 2013.

Generation Outage (September–October, 2013)

- Install steel tunnel linings;
- Remove existing lower penstock;
- Install new lower penstock;
- Connect surge chamber to lower tunnel;
- Connect new intake tunnel to upper tunnel; and
- Commission Blue Lake Unit 5.

Reservoir work

- Reservoir clearing: December, 2012 – February, 2013;
- Reservoir filling: October 2013- December, 2014;
- Manage floating debris: October, 2013- December, 2016; and

- Remove Timber: January, 2015.

The above schedule is illustrated on the Gantt chart shown in Figure 13. It should be noted that due to the long lead times on certain equipment, the City plans to order some equipment (such as the turbine generator package and penstock manifold) and to relocate the project utilities with Sitka crews and local contractors prior to receiving the license amendment. This is necessary to conduct the generation outage prior to filling the reservoir as mentioned above.

3.5 ALTERNATIVE(S) EVALUATED BUT ELIMINATED FROM FURTHER CONSIDERATION

Beginning in 2007, the City began feasibility studies to determine how to meet electrical load increases. These studies evaluated hydro, diesel, wind, tidal and geothermal energy. Generally, hydroelectric generation was considered the best alternative. It has a relatively low and predictable incremental cost and a predictable and well-developed regulatory environment. Hydroelectric generation uses very reliable equipment supplied and supported by well-established large scale industry.

Diesel power, as already demonstrated, results in dramatically higher rate-payer costs and has negative air quality and other environmental effects. Wind, tidal and geothermal generation are attractive alternatives from an environmental standpoint, but, as untested technologies in Alaska could not be installed soon enough or at a competitive cost to hydro.

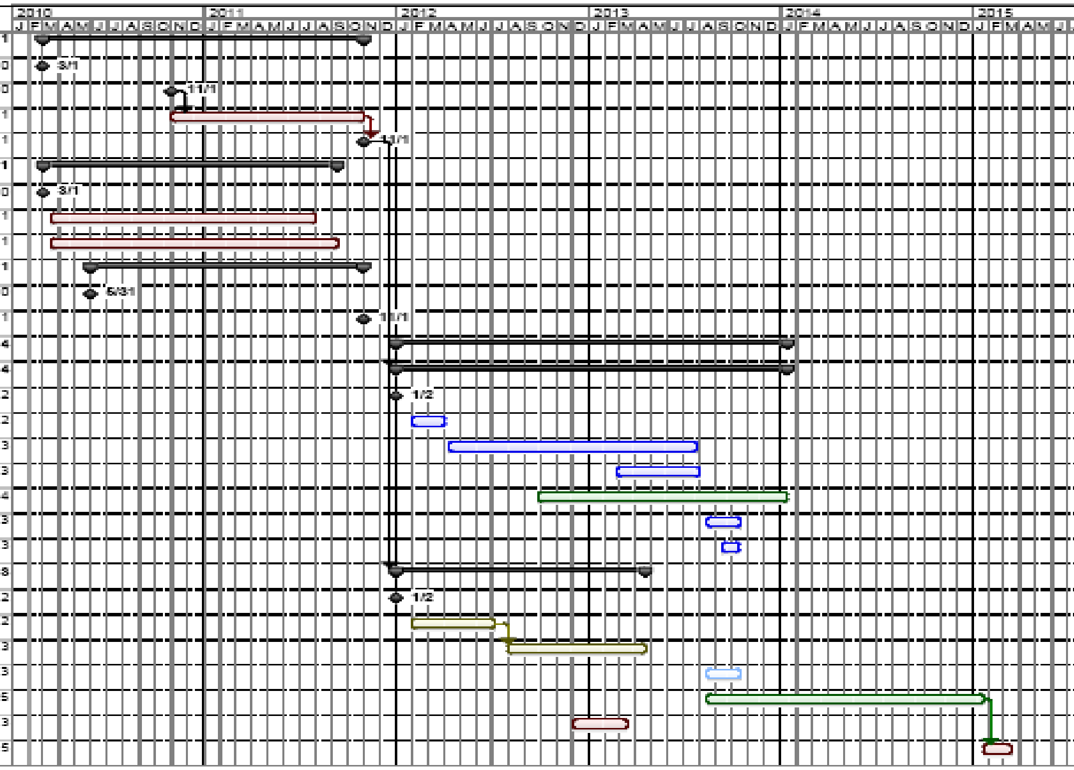
To increase Sitka's hydroelectric generating capacity, the Blue Lake Project Expansion is preferable to either expansion of the Green Lake Project or development of an entirely new hydro project. The Blue Lake Project is to some extent "under installed" relative to Green Lake and has more water inflow than the existing turbines can use. The Blue Lake dam is in a canyon which could geotechnically support a significantly higher dam. The Green Lake project, while having more installed capacity, has a much smaller water inflow located at a site which does not favor adding additional reservoir capacity by dam raising.

The City initially considered the Lake Diana hydroelectric project and obtained a Preliminary Permit (FERC No. 12716-001) to study the Project in 2006. The Preliminary Permit was ultimately surrendered because of Project cost and regulatory/environmental challenges related to developing a project in a designated wilderness area.

The City holds a Preliminary Permit for the Takatz Lake Project (FERC No. 13234) on the east coast of Baranof Island. This Project, with a proposed 27 MW installed capacity, has been under evaluation by the City for some time. While the City views the Takatz Lake project as a valuable future generation component, its construction schedule would be several years beyond that of the Blue Lake Expansion.

Schedule-Blue Lake Expansion Project Mon 2/1/10

ID	Task Name	Start	Duration	Finish
1	**FERC Licensing**	**Mon 3/1/10**	**68.33 wks**	**Tue 11/1/11**
2	Draft License Application	Mon 3/1/10	0 wks	Mon 3/1/10
3	Final License Application	Mon 11/1/10	0 wks	Mon 11/1/10
4	FERC Review	Mon 11/1/10	35 wks	Tue 11/1/11
5	Amendment Issuance	Tue 11/1/11	0 wks	Tue 11/1/11
6	**Engineering**	**Mon 3/1/10**	**63.47 wks**	**Mon 9/12/11**
7	Design Development Study	Mon 3/1/10	0 wks	Mon 3/1/10
8	Procurement Specification	Wed 3/17/10	48 wks	Mon 8/1/11
9	Final Design	Wed 3/17/10	52 wks	Mon 9/12/11
10	**Procurement**	**Mon 5/31/10**	**49.6 wks**	**Tue 11/1/11**
11	Turbine Generator Procurement	Mon 5/31/10	0 wks	Mon 5/31/10
12	General Equipment Procurement	Tue 11/1/11	0 wks	Tue 11/1/11
13	**Construction**	**Mon 1/2/12**	**70.87 wks**	**Tue 1/14/14**
14	**General Const**	**Mon 1/2/12**	**70.87 wks**	**Tue 1/14/14**
15	Gen. Const NTP	Mon 1/2/12	0 wks	Mon 1/2/12
16	Power House Site Prep	Wed 2/1/12	6 wks	Tue 4/3/12
17	Power House Construction	Wed 4/11/12	45 wks	Fri 7/26/13
18	Intake Construction	Mon 2/25/13	15 wks	Wed 7/31/13
19	Dam Construction	Fri 9/28/12	45 wks	Tue 1/14/14
20	Power Conduit Tie-ins	Thu 8/15/13	6 wks	Wed 10/16/13
21	Turbine Commissioning	Fri 9/13/13	3 wks	Tue 10/15/13
22	**Underground Const.**	**Mon 1/2/12**	**46.27 wks**	**Fri 4/19/13**
23	Underground Const NTP	Mon 1/2/12	0 wks	Mon 1/2/12
24	Intake Tunnel and Shaft Const	Wed 2/1/12	15 wks	Fri 7/6/12
25	Surge Chamber Const	Wed 8/1/12	25 wks	Fri 4/19/13
26	Generation Outage	Thu 8/15/13	6 wks	Wed 10/16/13
27	Fill Reservoir	Thu 8/15/13	50 wks	Wed 1/21/15
28	Reservoir Clearing	Mon 12/3/12	10 wks	Fri 3/15/13
29	Remove Timber	Thu 1/22/15	5 wks	Mon 3/16/15



Common Components -- Maroon
Dam Raise Components -- Green
Power House Components -- Blue
Underground Components- Olive
Generation Outage -- Aqua

Task	Rolled Up Task	External Tasks
Progress	Rolled Up Milestone	Project Summary
Milestone	Rolled Up Progress	Group By Summary
Summary	Split	Deadline

Figure 13. Proposed Blue Lake Expansion Regulatory and Construction Schedule.

The licensing and permitting process for the Takatz Lake project is expected to be more extensive than amending the existing Blue Lake project license. The Blue Lake Expansion, in terms of cost, timing, and regulatory feasibility, betters both Lake Diana and Takatz Lake among competing hydro sites.

In sum, the City considers the Blue Lake expansion to be the most feasible alternative to meet Sitka's critical energy needs quickly and at the least cost.

4. CONSULTATION AND COMPLIANCE

4.1 CONSULTATION

4.1.1 Alternative Licensing Procedure

The City submitted a Draft Communications Protocol (CP) for Stakeholder review on 3/11/2008, etc. responded with approvals of the draft requests, or comments which were all addressed by the City. The Request to Use ALP was sent to FERC on 4/28/2008, and the FERC sent an approval dated 9/2/2008.

4.1.2 Initial Consultation and Study Planning

The City distributed an Initial Consultation Document (ICD) to the Stakeholder list in March, 2008. On April 16th and 17th, 2008, the City conducted an initial consultation meetings in Juneau and Sitka, respectively, and on April 17th also conducted a site visit in Sitka. Comments on the ICD were received from USFS.

Based on comments received during scoping, draft study plans were prepared for fisheries [City and Borough of Sitka Electric Department (CBS) 2008a, 2008b], wildlife and vegetation(CBS 2008c), sedimentation (Dube 2009), minerals claims (Streveler and Mann 2008.), scenery (CBS 2009a), and timber volume (Cascade 2009a). All study plans were finalized with no remaining disputes from reviewers.

4.1.3 Scoping

The City distributed Scoping Document I (SD1) on November 11, 2008. A Scoping meeting was held in Sitka on December 11, 2008, along with a site visit. Comments on SDI were received from US Forest Service (USFS), and Sitka Conservation Society (SCS), and Scoping Document 2 (SD2) was distributed to the Stakeholder list on June 29th, 2009.

4.1.4 Study Plans and Reports

During the pre-amendment filing period, the City completed study planning for a number of studies to address environmental effects of construction and operation of the Expansion. In all cases, draft study plans were distributed by the City to applicable resource agencies and other entities. Any comments on these draft plans were incorporated and final plans in all cases were prepared without unresolved disputes on study proposals.

A number of reports have been prepared documenting studies done according to the plans described above. In all cases, draft reports were distributed by the City with requests for comments. We believe that all comments were addressed in the final reports.

4.2 COMPLIANCE

4.2.1 Water Quality Certification

In Alaska, Water Quality Certification leading to Clean Water Act (CWA) Section 401 Certification is routinely waived for hydroelectric project proposals in the initial licensing and permitting phases. Instead, after the Commission has accepted the final application for amendment, CBS will initiate Coastal Zone Management Act Consistency review. Under this review, conducted by Alaska Department of Natural Resources (ADNR), all CWA requirements, including the possible need for 401 Certification, will be addressed among all potentially-responsible agencies, including US Army Corps of Engineers, (USCOE), Alaska Department of Environmental Conservation (ADEC) and ADNR.

4.2.2 Section 18 Prescriptions

Based on comments and issue deification throughout initial consultation and Scoping, agencies responsible for Section 18 (fish passage) Prescriptions (US Fish and Wildlife Service and National Marine Fisheries Service) have not indicated that they will make such prescriptions.

4.2.3 Section 4(e) Conditions

At the time of this draft EA, USFS, the only agency with Section 4(e) authority on this action, has not discussed terms and conditions or 4(e) status. We expect to begin more intensive consultation with USFS after submittal of the Draft Amendment Application.

4.2.4 Section 30(c) Conditions

We expect no Section 30 (c) conditions.

4.2.5 Endangered Species Act

Endangered species will be studied as part of the fish, wildlife and botanical field and literature reviews. During the study phase of these studies, our researchers will contact US Fish and Wildlife Service (USFWS), National Marine Fisheries Service (NMFS) and US Forest Service (USFS) to determine list of threatened, endangered or candidate plant or animal species, as well as species noted in the Alaska Natural Heritage Program (AKNHP) and other species of special concern. Draft resource reports will contain sections on these species. Prior to license application, CBS will determine, in consultation with USFWS, NMFS and USFS, the potential need for one or more Biological Evaluations and decide on whether CBS or the respective agencies will prepare these documents.

4.2.6 Section 10(j) Recommendations

As with Section 4(e) conditions, above, we have not begun the process of negotiating terms and conditions with applicable agencies.

4.2.7 Coastal Zone Management Act (CZMA)

In Alaska, CZMA consistency review is done by the Alaska Department of Natural Resources (ADNR), and serves as "one stop shopping" for all state and federal permits necessary for construction. Recent experience has shown that, after a hydro project license or amendment application has been noticed for filing by FERC (after all additional information requests from final application are fulfilled) the applicant or owner will submit to ADNR a "Coastal Project Questionnaire" including detailed project descriptions and referencing all licensing documents at that time. Based on the described action, ADNR will at that time involve other agencies which may need to issue permits, including US Army Corps of Engineers (USACOE) for such permits as CWA Section 404, Alaska Department of Environmental Conservation (ADEC) water quality permits, ADF&G Habitat

5. ENVIRONMENTAL ANALYSIS

5.1 DESCRIPTION OF THE LOCALE

5.1.1 Physiography

The Blue Lake Project area is on the west side of Baranof Island, a major component of the Alexander archipelago in southeast Alaska. Baranof Island, with an area of 1569 square miles, is generally characterized in its northern half by rugged mountainous terrain and by gentler, but still mountainous topography in its southern half.

In the immediate Project area, the Baranof Mountains rise to heights of over 4300 feet in the Blue Lake basin, and to over 5390 maximum on the island. The Blue Lake basin's topography is the product of both glacial and riverine erosion.

5.1.2 Climate

The climate in the Project area is characterized as marine, with heavy precipitation and mild temperatures. The Blue Lake Project area's temperature and precipitation differ significantly from data for those factors gathered at the Sitka airport. The airport NOAA weather station shows that Sitka receives 86 inches of precipitation per year. Temporary rainfall monitoring done in the mountains near the Project powerhouse shows over 105 inches of precipitation per year.

Average monthly temperature at the airport is 43F, and is expected to be lower than at the Project location. As with precipitation, temperature changes dramatically with elevation and is significantly lower in the mountains than at the elevations of both Blue Lake and Sawmill Creek. No long-term measured data are available for these areas.

5.2 CUMULATIVELY AFFECTED RESOURCES

According to the CEQ regulations for implementing the National Environmental Policy Act (NEPA) (§1508.7), an action may cause cumulative impacts on the environment if its impacts overlap in space and/or time with the impacts of other past, present and reasonably foreseeable future actions, regardless of what agency or person undertakes such other actions. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time to include hydropower and other land and water development activities.

The primary development activity in the project area is a fish hatchery constructed by the Northern Southeast Regional Aquaculture Association (NSRAA). Details of the hatchery's operation are not available at the time of this document, but will be available prior to submission of the final license application. The hatchery has been constructed but has not commenced operation at this time.

Based on information gained from public and agency involvement and consultation, and from our own studies, we have identified three resources that have the potential to be cumulatively affected by amendment of the Project license and other foreseeable activities. These resources are: 1) fisheries, 2) recreation (including aesthetics), and 3) wildlife.

5.2.1 Geographic Scope

The geographic scope of analysis for the resources that could be cumulatively affected is defined by the physical limits or boundaries of: 1) the proposed action's effect on the resource; and 2) contributing effects from other hydropower and non-hydropower activities. Since the actions affect the resources differently, the geographic scope for each resource may vary.

For fisheries resources, the geographic scope of cumulative analysis is an area encompassing the Blue Lake and Sawmill Creek watersheds. Based on recommendations from the Alaska Department of Fish and Game (ADF&G), the geographic scope of cumulative analysis for fisheries resources is the area associated with Game Management Unit 4 as defined by ADF&G. The boundaries of this Unit are defined and discussed in the Fisheries section of this document.

The geographic scope of cumulative analysis for wildlife species is Game Management Unit 4(GMU4), as defined by ADF&G. Geographic scope for recreation is the Project Boundary.

5.2.2 Temporal Scope

Cumulative analyses will include past, present, and future actions and their effects on aesthetic, recreational, fisheries and wildlife resources. Based on the potential 30-year term for the Project's new license, issued in 2008, the temporal scope will look 30 years into the future, concentrating on environmental effects from reasonably foreseeable future actions.

5.3 GEOLOGY AND SOILS

5.3.1. Affected Environment

Geology in the Project area was documented in detail prior to construction of the original dam, tunnel and powerhouse (Athearn 1954). In that report, the authors presented results of both surface investigations and numerous drill holes in the Project area and evaluated subsurface conditions and rock competency. During summer, 2009, an expanded geotechnical survey was conducted at the damsite and at certain areas along the lower power conduit (Hatch 2010). Also in 2009, a study of the stability of the Expansion-related reservoir shoreline was commissioned by the City (R and M consultants 2009). Descriptions below were drawn primarily from Athearn, 1954.

The lowermost rocks in the Blue Lake area are a series of intricately folded, fractured, and recemented phyllite, graywacke, and argillite beds and lenses. These beds strike approximately North 60 degrees West and either dip very steeply to the southwest or stand vertically. They extend from approximately one mile below the lake outlet to some distance north and east from the inlet to the lake.

Exposed by roadcuts along the highway leading east from Sitka is a layer of volcanic ash that rests on the glaciated bedrock surface. It is dark, chocolate brown in color and varies in thickness from a few inches to about 2.5 ft.

Several light gray dioritic appearing dikes were mapped along the stream channel. Those observed ranged from 1 to 3 feet in width with exposures of limited later extent.

Recent alluvium covers the valley floors, both above the lake and below the outlet to the shore of Silver Bay. The mountain slopes are very steep and overlain by very little overburden of alluvium except where small talus slides will lesser drainage channels.

Considerable major and minor faulting has occurred in the Blue Lake–Sitka area. Two apparently major groups of faults trend northwesterly and easterly. One group of minor faults, no doubt associated with the major faulting, trending approximately east-west.

Geology in the Blue Lake powerhouse area was said to be underlain by the same general sedimentary series.

5.3.2 Environmental Effects and Recommendations

Construction-Related Effects

Construction of Expansion-related features would cause considerable ground disturbance in both the powerhouse and dam/intake areas. Destabilization and erosion could cause both land and water effects which, if not avoided or controlled, could lead to significant impacts to the terrestrial environment. These impacts in turn might affect water quality and fisheries in both Blue Lake and Sawmill Creek, as well as downstream in marine areas.

The City, to avoid or minimize such effects, will develop an Erosion and Sediment Control Plan (ESCP). The ESCP will address such construction-related factors as surface and subsurface material stability, local drainage patterns and vegetation. The ESCP will describe site-specific conditions, construction and operation-related risks, and proposed measures to avoid slope failure, sedimentation of water bodies, spoils disposal and stockpile and revegetation and rehabilitation.

Effects due to Long-term Operation

Geotechnical feasibility of Project works

The City completed geotechnical investigation and prepared a Geotechnical Findings Report (Hatch 2010). The basis for geotechnical conclusions was a drilling program to determine competency of rock in all the areas of proposed construction. Fifteen bore holes, multiple test pits and a seismic survey were included in the investigation. Underlying rock was considered competent at all test sites.

Existence of mineral claims

The minerals claims report (Streveler and Mann 2009) concluded that there were no existing mineral claims within the area of potential effect, including the Blue Lake basin and along the transmission route into Sitka.

Stability of Shoreline Areas

The City contracted with a geotechnical specialty firm in 2009 to study shoreline stability. Their report (R and M Consultants 2009) concluded that potentially-affected areas of the reservoir were unlikely to be subject to catastrophic slope failures because the underlying soil structure in all areas was relatively coarse-grained.

5.4 WATER QUANTITY

5.4.1 Affected Environment

5.4.1.1 Blue Lake

Blue Lake is a 1225 acre water body impounded by the Project dam. Maximum depth of Blue Lake is currently about 468 feet, placing the lake bottom about 126 feet below sea level. (The Blue Lake basin was carved by glacial activity, resulting in this very deep lakebed point). Blue Lake is generally deeper in the middle and lower (toward the Project dam) areas. Maximum depth at the dam face is 134 feet, but average depth in the upstream end of the lake is only about 20 feet. At maximum pool elevation of El 342, the capacity of Blue Lake is approximately 145,200 acre feet (af).

5.4.1.2 Sawmill Creek

Sawmill Creek is a moderately sized stream relative to others in Southeast Alaska. Average annual flow in Sawmill Creek is 441 cfs, ranging from a monthly average low of 11 cfs in March to a monthly average high of 1690 cfs which may occur from June to October each year depending on rainfall and snowmelt (Table 4, Figures 14 and 15). Recorded maximum flow in Sawmill Creek was 12,000 cfs in 1992.

During relicensing, the City negotiated a new instream flow release requirement. The original license specified that 50 cfs be released from the FVU year-around and that these releases be monitored weekly by reading gage height on a staff gage just downstream of the FVU.

The 2007 license, under Condition 8, Instream Flow, specified a release of 70 cfs from April 15 through June 30 each year and 50 cfs for the remainder of the year. The City and resource agencies negotiated this flow amount to increase spawning for target species of anadromous fish in lower Sawmill Creek.

Table 4. Maximum and Minimum Average Daily Flows in Sawmill Creek, by Month, for 29-year Period of Record. Original USGS Gage 15088000.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Max	2,270	2,410	1,250	1,050	1,640	1,780	2,170	4,940	4,980	5,500	4,430	3,770
Min	24	16	11	14	57	308	311	200	71	84	46	34

5.4.1.3 Blue Lake and Sawmill Creek Water Rights

Following is a summary of the City & Borough of Sitka's water rights and allocations for the Blue Lake watershed (Table 5).

The City recently submitted a request to ADNR to amend the language of the various water rights in terms and units consistent with current ADNR practice (acre-feet per year with a maximum diversion rate in cubic feet per second) and to better reflect the City's current use of Blue Lake water. At the time of this application, these requests are still pending for action at ADNR.

5.4.2 Environmental Effects and Recommendations

Construction-Related Effects

No water quantity effects are expected during the construction period. It may be necessary to control the level of Blue Lake reservoir at certain construction stages to permit working in the dry, but these controls will be temporary and will last no longer than a few months, at most. No changes are expected to occur in Sawmill Creek except for those which might affect spill quantities due to possible need to lower reservoir level for construction purposes. None of the

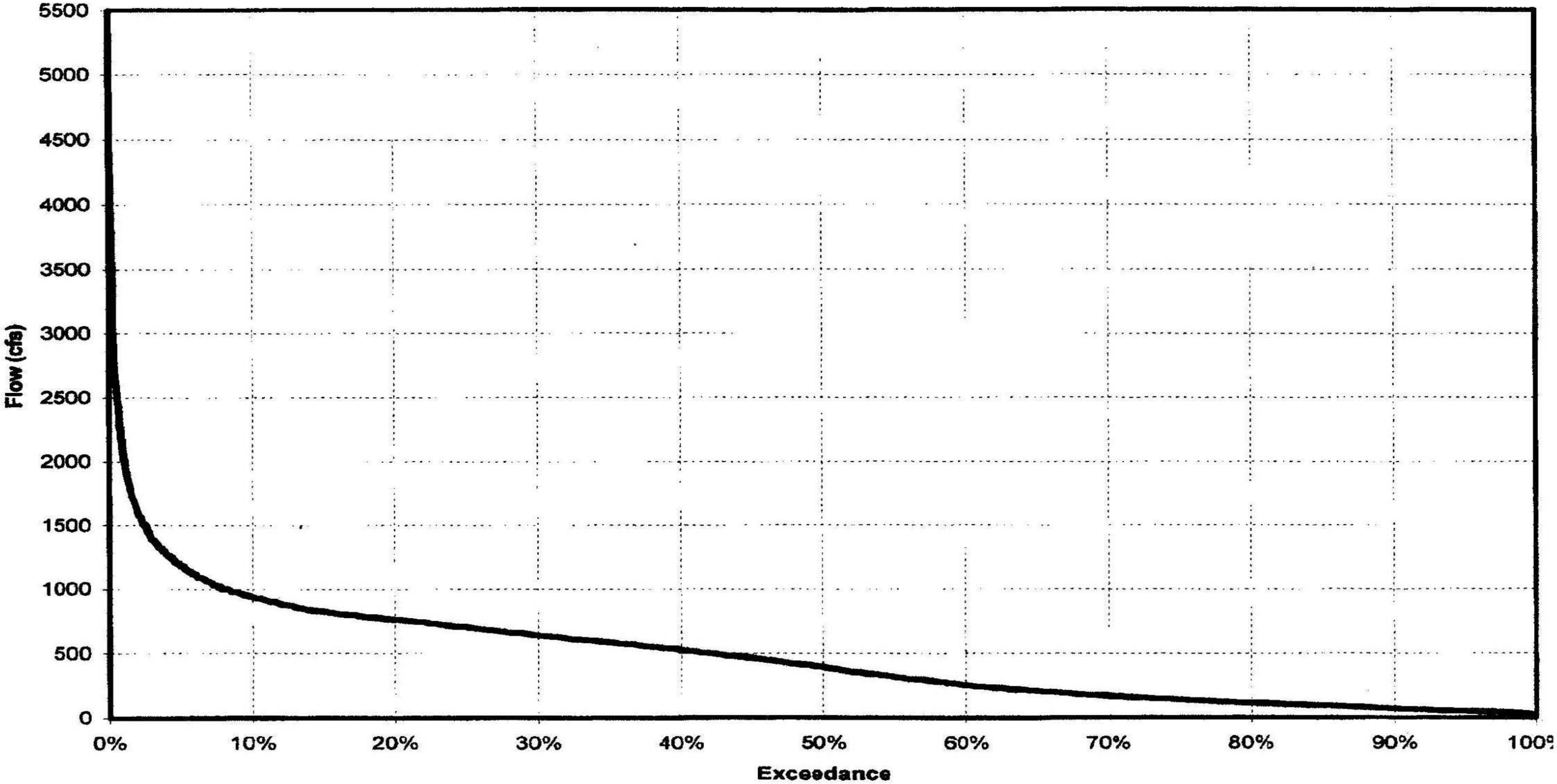


Figure 14. Sawmill Creek Flow Duration Curve.

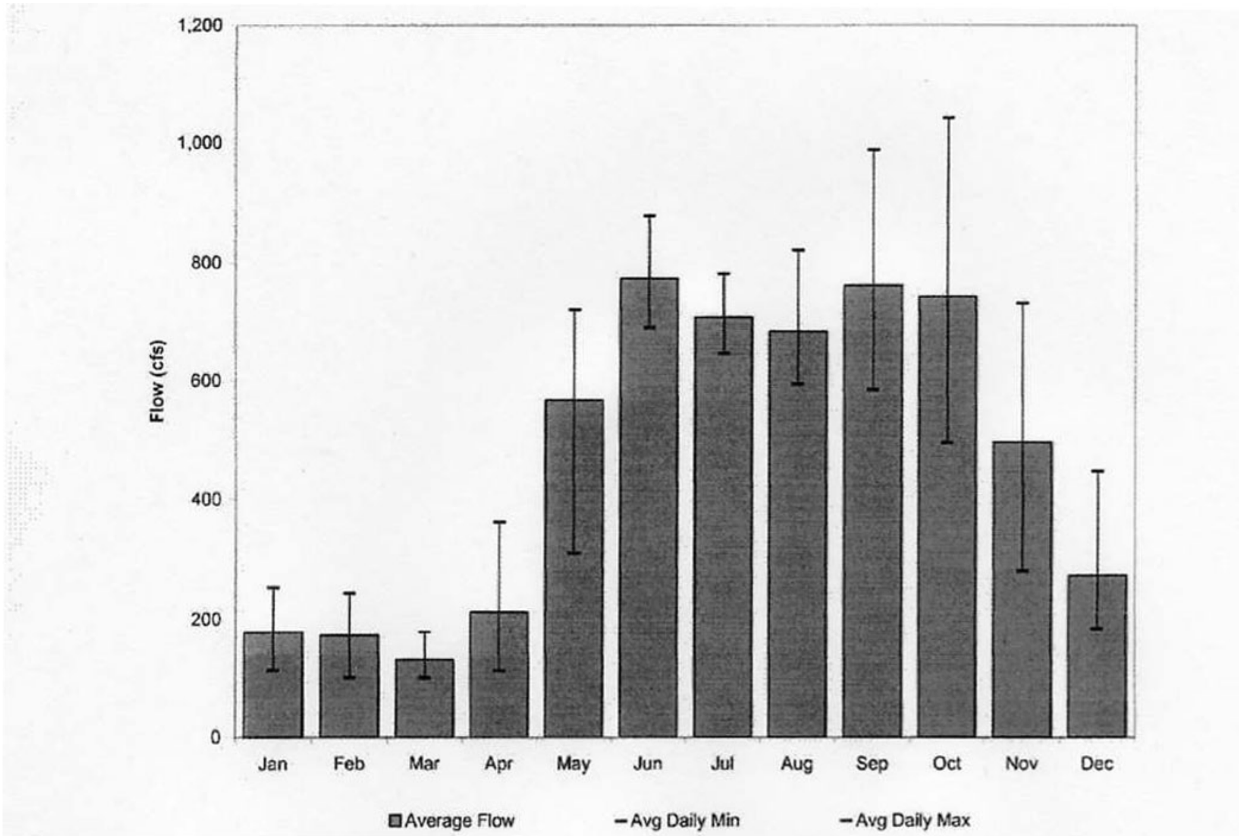


Figure 15. Average Monthly Sawmill Creek Discharge

Table 5. Current water rights relating to Blue Lake Project

Water Right	**Use**	**Amount**	**Cfs equiv.**	**MGD equiv.**	**Af/y equiv.**	**Status**
ADL 51543	Hydro	191.4 mgd	296	191.4	214,343	Certificate
"	Drinking water	8.6 mgd	13.3	8.6	9,631	"
ADL 43826	Public industrial water supply	34,722 af/y	48	31	34,723	Certificate
LAS 19669	Bulk export/	14,000 af/yr	19.4	12.5	14,000	Certificate
"	Hydro	1,000 af/yr	1.4	0.9	1,000	"
LAS	Fish	Varies by				Application

11995	habitat	month				
LAS 13236	FVU	36,190 af/yr	50	32.3	36,190	Permit
LAS 13237	PMFU	56,000 af/yr	77.4	50	56,000	Permit
LAS 20526	BL/SMC*					

* These water rights correspond to Blue Lake level and Sawmill Creek release restrictions described in the Project Operation Section.

instream flow requirements in the current license would be violated during the construction period.

Effects due to Long-Term Operation

It was decided early in the Expansion amendment process that final determinations on water rights would await issuance of the amendment by FERC. The only forseeable environmental issues which might affect long-term operation would be control of the reservoir level to facilitate rainbow trout spawning in Blue Lake and its primary inflow tributaries. Any changes in reservoir operations or instream flow which might result from engineering and environmental consultation could then be addressed as part of water rights issuance.

5.5 WATER QUALITY

5.5.1 Affected Environment

5.5.1.1 Blue Lake

Clarity of Blue Lake water near the intake is very high, but, due to the glacial source of major inlet stream, is reduced in the upper end of the lake during periods of glacial melt. Most glacial material settles out in the upper areas of the lake.

The quality of Blue Lake water in terms of dissolved solids or pollutants is exceptionally high, as evidenced by the fact that it serves as the City of Sitka's drinking water supply and requires no additional filtration prior to consumption. The City and Borough of Sitka routinely monitors the quality of Blue Lake water. Typical monitoring results are presented in Table 6. Values for various inorganic, microbiological and volatile organic components are considered quite low.

Table 6. Representative Concentrations Of Various Blue Lake Organic And Inorganic Contaminants. (City and Borough of Sitka Water and Wastewater Department data, 1999, 2009. (MRL=Method Reporting Limit, MDL= Method Detection Limit, ND=Not Detected).

Contaminant	Results	Range	Year
Turbidity*	Avg. 0.47	0.18 - 5.49 >ntu's	2009
Temp		1.5 - 10* C	
pH		6.8 - 7.0	
UV254		0.014 - 0.025	2009
TOC		ND - 1.00 mg/L	
Fecal**		0-15 CFU/100mL	2009
Total Nitrate		0.227 mg/L	2009
Alkalinity		8-16 mg/L	
Nitrites	<MDL		2001
Cyanide	< MLR		1999
Arsenic	ND		2009
Barium	0.011 mg/L		1999
Beryllium	<MRL		1999
Cadmium	<MRL		1999
Chromium	<MRL		1999
Antimony	<MRL		1999
Selenium	<MLR		1999
Thallium	<MRL		1999
Mercury	0.0002 mg/L		1999

The City conducted temperature monitoring in Blue Lake and certain of its tributaries during 2002-2005 and in 2008 period (CBS, 2005a, 2006a, EES 2009), resulting in data showing that that average surface temperatures vary between 2C and 12C (Figure 16). These studies indicated that Blue Lake stratified by late summer during and that water is uniform in temperature during the winter months.

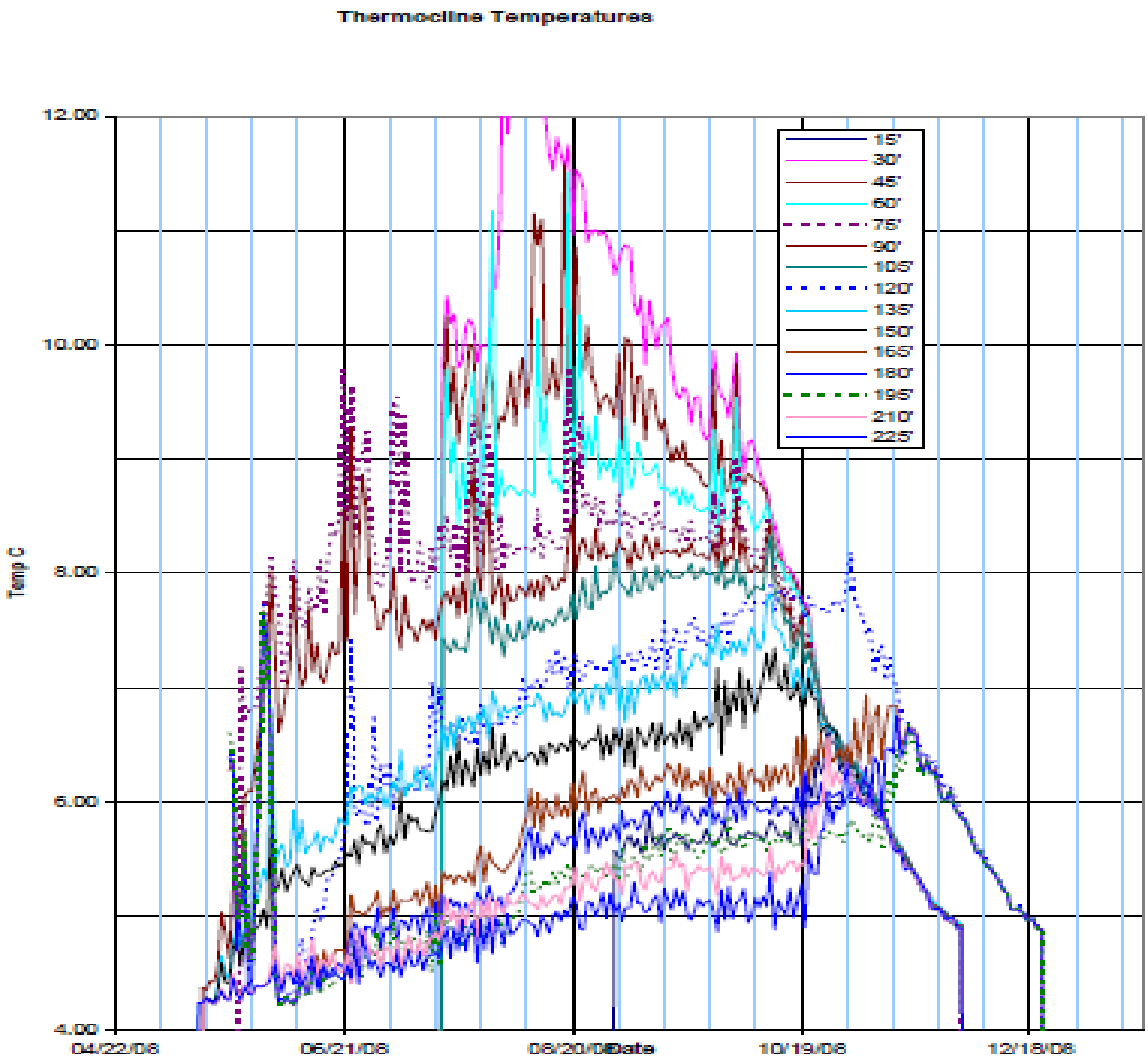


Figure 16. Composite temperatures and depth, 2005, 2008 Blue Lake Thermocline Array.

The City also conducted temperature monitoring in Blue Lake in 2008, but at greater depths than those in the 2005 studies, to better reflect depths and elevations resulting from the dam raise. One of the primary purposes for these studies was to determine water temperatures at various depths at which the new intake might be located. Using water temperature data from 2009, the City and contractors predicted intake temperatures at levels corresponding to Expansion-related intake locations. Predicted temperatures were then used to evaluate effects on fish populations downstream of the powerhouse (See Fisheries Section).

The 2008 temperature studies were conducted at depths ranging down to El 200, or a depth 225 feet below the maximum proposed reservoir surface at El 425 (See Figure 16). Comparisons between temperatures taken in 2005 and 2008 reflect the very different air temperature and precipitations in those two years, in addition to measurements at greater depth.

Consideration of both monitoring years shows a water body which stratifies rather strongly in summer and in which temperatures vary significantly from lake bottom to surface each year. Comparisons between existing temperature stratifications and those predicted after the dam raise are shown in more detail in the Fisheries section.

5.5.1.2 Sawmill Creek

Clarity of Sawmill Creek water is generally the same as for Blue Lake, particularly in the stream's upper reaches, before inflow from tributary sub-basins. Sawmill Creek carries a moderate sediment load during high flows (greater than 500 cfs) and after major rainstorms. Because of the overall good condition of the watersheds both above and below the Project dam, however, sediment input is moderate.

The quality Sawmill Creek water is also considered to be quite high in terms of dissolved solids, pollutants, although there has been no long-term monitoring of Sawmill Creek water as there has been for Blue Lake. It is expected that Sawmill Creek becomes more turbid in a downstream direction after major rainstorms and that there may be in increase in certain organic solids related to inflow of leaf pack and other detritus.

The City has monitored Sawmill Creek water temperature for approximately 2 years. Based on results of these studies, Sawmill Creek water temperatures range between 2C and 3C at the FVU and between 3C and 12C at the lower staff gage. This temperature regime characterizes Sawmill Creek as quite cold relative to other moderate-sized streams in Southeast Alaska, possibly because of the incised nature of the stream and resultant low solar insolation.

Sawmill Creek temperature is affected by releases from the Project powerhouses (CBS 2006a). During spill periods, Sawmill Creek temperature is close to that measured at the Blue Lake surface. During non-spill periods, Sawmill Creek temperature is about the same as that at the level of the Project intake (about 140 feet deep) in Blue Lake (Figure 11). In Figure 17, the term "boom" on the left side of the graph is the lake-surface temperature monitoring site; the other points are at the various monitoring sites at the designated number of miles downstream of the dam in Sawmill Creek.

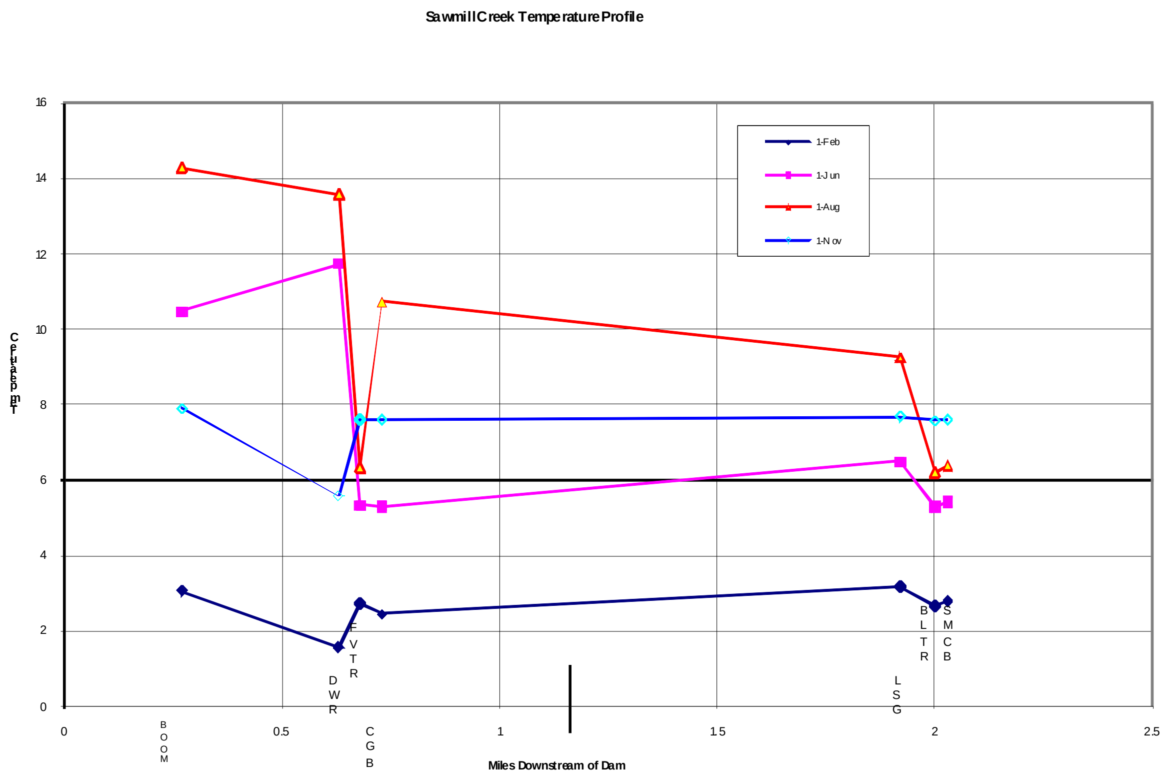


Figure 17. Sawmill Creek temperature vs. distance in miles.

In 2009, the City began monitoring Sawmill Creek temperatures downstream of the BLU powerhouse to better assess water temperature effects on fisheries in that stream reach. It was generally assumed that water temperature of water released from the BLU would be the same as that at the intake during periods when the reservoir was not spilling. Water temperature in this stream reach during spill could be determined by combining spill water with FVU water and then allowing for warming (or cooling, depending on seasonal air temperatures) as water proceeded downstream.

5.5.2 Environmental Effects and Recommendations

5.5.2.1 Construction-Related Effects

The primary construction-related effect on water quality would be the potential for input of 1) sediment from land disturbance; and 2) fuel spills or other contaminants from construction equipment operation. These potential effects would be possible at both the dam/intake and the powerhouse areas.

Generally, sediment input would be avoided or minimized by adherence to an Erosion and Sediment Control Plan (ESCP) in association with appropriate state and federal resource agencies. The City proposes to include in the plan:

- A detailed description of proposed actions by project site and schedule;
- Description of potentially-affected surface geology and soils, vegetation, slope and stability conditions, and areas of special concern for both natural and construction-related erosion impacts;
- Proposed sediment and erosion control measures on a site-by-site basis, keyed to applicable construction methods and construction season;
- A description of how spoils from road building, tunnel blasting and other disturbances will be managed and disposed of;
- A rehabilitation and revegetation plan.

Another potential source of water quality effects would be timber removal in the Blue Lake Creek valley. The logging operation in the valley will be developed in association with USFS standards and guidelines for logging, yarding and transportation.

In all cases, a primary objective would be maintenance of the Blue Lake water quality relative to drinking water standards.

5.5.2.2 Effects due to Long-Term Operation

The primary long-term effect on water quality would be changes in the water temperature regimes of Blue Lake and Sawmill Creek. This would be the result of emplacement of the new intake structure with an invert at El 320 as opposed to the existing intake structure at invert El 204. As described in the Project Description section, this intake location and depth would afford warmer water at the intake location, which would cause warmer water at both the FVU and the BLU releases and in receiving waters downstream.

No effect due to changes in the intake would be expected in Blue Lake itself. Seasonal water temperature conditions documented in the Affected Environment Section would be unchanged, except possibly in areas immediately adjacent to the intake itself.

The primary effect of these water temperature changes would be on aquatic resources in Sawmill Creek, particularly on salmon which use the stream downstream of the BLU. A detailed description of these effects is presented in the Fish section of this document. In that section, results of detailed water temperature analyses in Blue Lake and Sawmill Creek showed that the temperature changes would include warmer water during the late spring to early fall period. The City's studies indicated that these changes would not significantly affect spawning, rearing or incubation of the target salmon species analyzed.

5.6 FISH

5.6.1 Affected Environment

5.6.1.1 Blue Lake

The primary fish species in Blue Lake is rainbow trout (Oncorhynchus. mykiss). It is not known whether rainbow trout were native to the Sawmill Creek watershed prior to stocking by the USFS in 1938 and 1939 (Der Hovanisian 1994) . It is assumed that fish from these plantings spilled over the dam creating resident rainbow trout and perhaps steelhead populations in Sawmill Creek. (ADF&G, 2009a).

The Blue Lake rainbow trout population has been estimated twice in recent years. Der Hovanisian (1994), using mark-recapture techniques, estimated the total Blue Lake rainbow trout population at 4708, ranging from 3197 and 7093 fish. The City and ADF&G conducted a similar mark-recapture study during summer, 2004, which resulted in an estimate of 3604, ranging between 2848 and 4361 fish (CBS 2006b).

The relatively large size and abundance of Blue Lake rainbow make this sport fishery comparable to the best available in southeast Alaska. Difficulty of boat access limits fishing effort and catch, resulting in both fish population and sport catch stability.

Blue Lake rainbow trout spawn in lake tributaries and along shoreline areas with groundwater upwelling and/or wave action. The lake's primary inflow tributaries are Blue Lake Creek, Becky Creek, Brad Creek and Sheldon Creek (Figure 18). Studies were conducted from 2002-2005 and in 2008 resulting in reports (CBS 2005a, and Wolfe 2009) in which the author discussed 1) the relative importance of these major tributaries to spawning trout; and 2) details of the use and habitat of Blue Lake Creek, the lake's major inflow tributary and the one most affected by physical changes relative to Expansion-related water level increases.

Among the reports' major conclusions were:

1). Rainbow trout spawning occurred about equally in Blue Lake's four major inflow tributaries: Blue Lake Creek, Becky Creek, Brad Creek and Sheldon Creek (Table 7)

Table 7. Percentages of 2005 and 2008 trout use of major Blue Lake tributaries.

Tributary	2005 percent	2008 percent	Average percent
Blue Lake Creek	28	27	27.5
Becky Creek	20	25	22.5
Brad Creek	16	25	20.5
Sheldon Creek	23	17	20.0

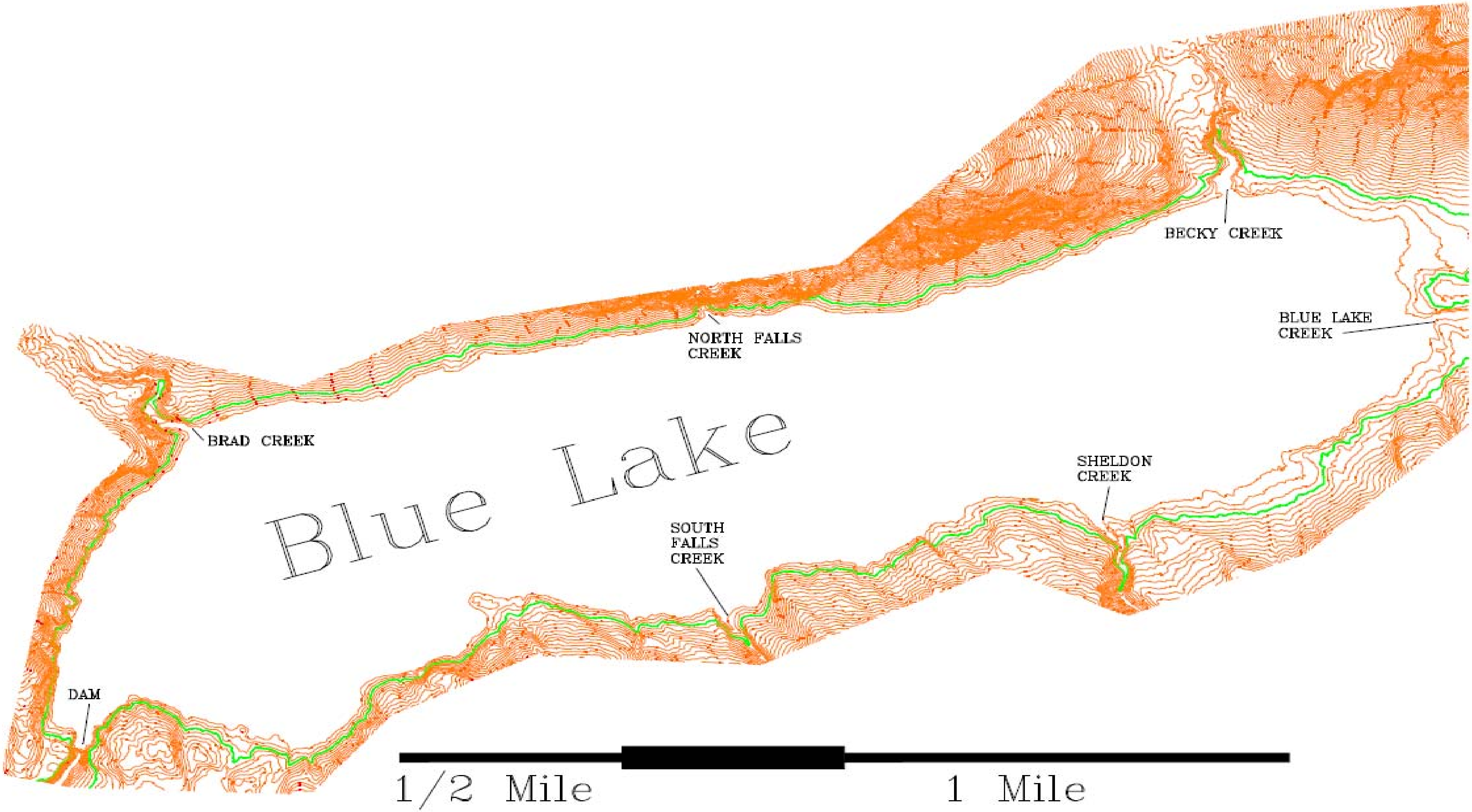


Figure 18. Map of Blue Lake and Major Tributaries

These percentages varied on a year-to-year basis, probably because of local effects, such as avalanche debris accumulation or presence of large woody debris washed down during runoff.

2). In all inflow tributaries, spawning occurred at areas where rising lake waters during the spawning period (late May through July) met the tributaries. It was hypothesized that these "interface" areas afforded good spawning habitat in terms of substrate size and intergravel aeration.

3) In Blue Lake Creek, all spawning occurred downstream of a cascade near the upper limit of the lake's existing inundation area called the "lower barrier falls" in the report. (An "upper barrier falls" occurred in the upper reaches of Blue Lake Creek). At all lake levels normally seen during rainbow trout spawning season, the lower barrier falls impeded upstream trout migration. Later in summer, after the spawning period, lake levels normally rose above the top of the barrier allowing fish access into Blue Lake Creek.

4) Blue Lake Creek analyses showed limited spawning habitat in the Creek but documented some year-around rainbow trout use of the area. It was hypothesized that trout migrated into Blue Lake Creek in mid- to late-summer each year and used the area for feeding and resting. As temperatures in Blue Lake Creek decreased in late fall, these trout generally returned to Blue Lake for overwintering.

The role of shoreline spawning was found to be limited based on very few shoreline spawning observations.

5.6.1.2 Sawmill Creek

Results of the fisheries studies and reports cited above and accounts of local sport fishers and ADF&G personnel indicate that the following six salmonid species utilize Sawmill:

Common Name(s)	**Scientific Name**
Coho (silver) salmon	*Oncorhynchus kisutch*
King (chinook) salmon	*O. tshawytscha*
Pink (humpback) salmon	*O. gorbuscha, and*
Chum (dog) salmon	*O. keta;*
Steelhead trout	*O. mykiss;*
Rainbow (resident) trout	*O. mykiss;*
Dolly Varden char	*Salvelinus malma; and*
Arctic grayling	*Thymallus arcticus*

All of the above species except for Arctic grayling and resident rainbow trout are anadromous (migrate from fresh to salt water and back again in their life cycles).

Also observed in Sawmill Creek but noted to be abundant were two species of sculpins:

Staghorn Sculpin	*Leptocottus armatus;* and
Prickly Sculpin	*Cottus asper*

No anadromous fish of any species were observed or captured upstream of a cataract at SM 0.73 called the “Falls” in the Wolfe studies. A fish passage study based on Powers and Orsborne (1985) was completed on the Falls in 2004 and a report (CBS 2005b) concluded that the Falls was impassable during the discharges at which the study was conducted.

The catalogue of anadromous fish occurrence in Alaska (ADF&G 2009b), lists four anadromous fish species in Sawmill Creek: coho, pink and chum salmon, and steelhead trout. This publication shows the upstream range of these species in Sawmill Creek to be in the vicinity of the Falls.

Sawmill Creek fish distribution varied in an upstream direction from tidewater. From the mouth upstream to the BLU (maximum tidewater), pink and chum salmon were the most abundant species. Based on ADF&G aerial index surveys and observations done during relicensing studies, an estimated 20,000 to 160,000 pink salmon utilize this area each year (ADF&G 2009d, CBS 2004,Wolfe 2002, 2003,2004,2005, EES 2009). Pink salmon also utilize the stream reaches from the BLU upstream to the Falls, but spawn here in smaller numbers. Pink salmon throughout their range often display “even” or “odd” year run strength cycles under which spawning populations alternate between comparatively large and small numbers every other year. Observations over the past eight years have indicated that Sawmill Creek pink salmon do not display this characteristic with runs varying, but over a longer period similar to other systems in the area (Heinl et al. 2008).

Also abundant in the Sawmill Creek reaches downstream of the BLU are chum salmon. Based on study estimates, chum salmon numbers in this area have ranged from 250 to 670 on a yearly basis. No ADF&G chum surveys have been used for escapement index purposes and all were taken prior to the onset of relicensing studies (ADF&G 2009d). Chum salmon are not noted as having an even-odd year cycle. As with pink salmon, chum salmon are also found upstream of the BLU, but spawning utilization is greatest below the BLU (CBS, 2004, EES 2009,Wolfe 2002,2003,2004,2005).

Steelhead, coho and king salmon were more often found in the reaches between the BLU and the Falls. Compared to numbers of pink and chum salmon, numbers of steelhead, coho and king salmon populations were small. Studies done for the relicensing documented between 30 and 50 steelhead, between 10 and 40 coho, and between 40 and 570 king salmon per year (CBS 2004, EES 2009,Wolfe 2002,2003,2004,2005). Sawmill Creek steelhead and coho salmon are thought to be native to the stream, while king salmon are thought to be strays from nearby hatchery operations.

Sawmill Creek Anadromous Fish Periodicity

Sawmill Creek anadromous salmonids varied in their typical inmigration, spawning, incubation and rearing times (See Figure 19). Earliest to inmigrate were steelhead which enter the stream as early as March with spawning in late May-early June. Steelhead eggs incubate until hatching during August. Young steelhead remain in the stream for three years after emergence and outmigrate as smolts in April or May. In Sawmill Creek, most steelhead spend two to three years in salt water.

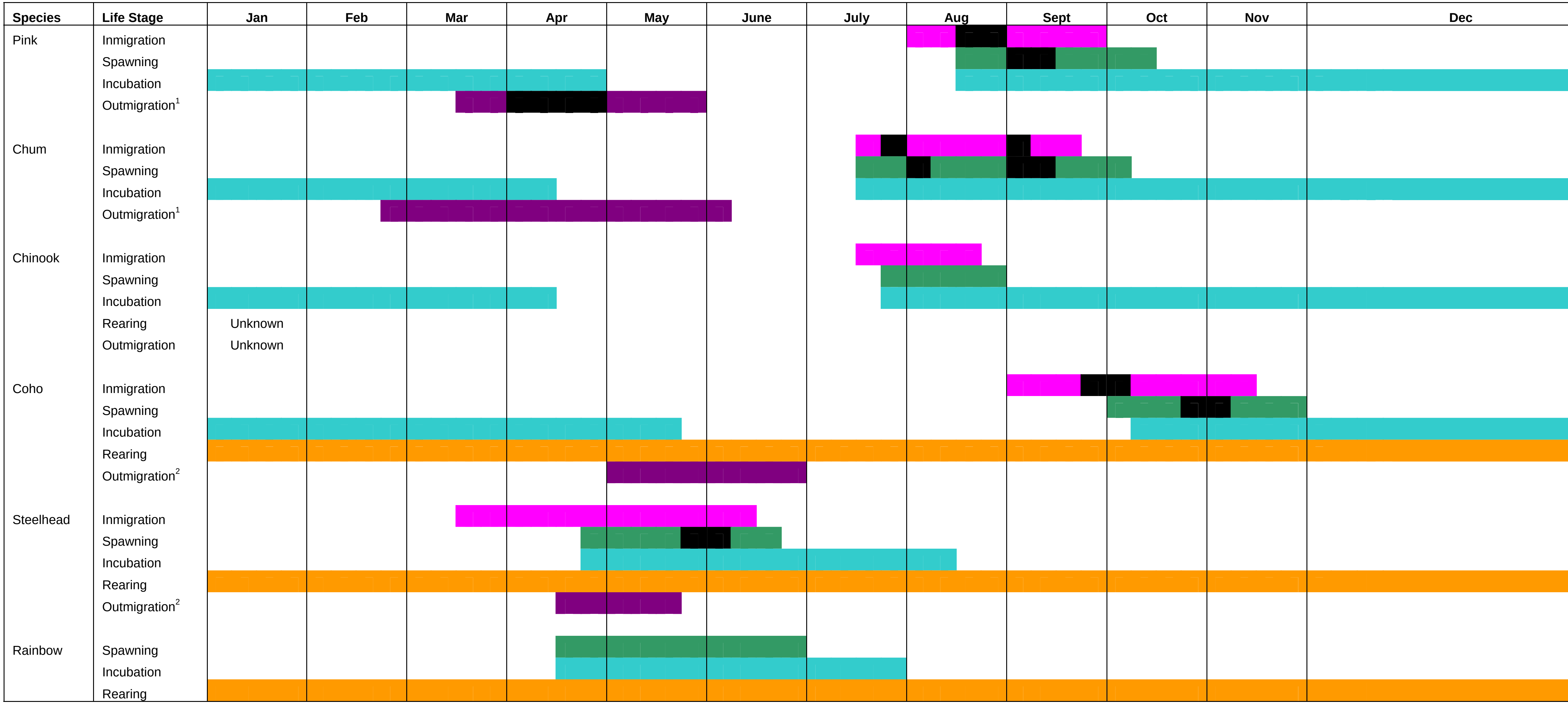
King salmon enter the stream later in summer and spawn during late summer through fall. Incubation lasts until the following spring and emergent fry probably do not survive because of a lack of rearing habitat. King salmon spend from one to five years in salt water before returning to spawn.

Coho salmon enter the stream in the fall and spawn in mid to late fall (See Figure 19). Coho eggs incubate over the winter, and fry emerge from the gravels the following year, in April and May. Coho juveniles rear in fresh water for one to two years, and typically smolt in May or early June. Sawmill Creek, typically spend about sixteen months (two seasons) in salt water.

Pink salmon enter the stream in late July and early August and spawn no later than mid-September. Chum salmon arrive earlier in July. Wolfe (2002,2003,2004,2005, EES 2009) noted two inmigration and spawning number peaks, with the first spawning occurring in early August and second occurring in early September.

Pink and chum eggs incubate over the winter and fry emerged the following April or May, with most outmigration occurring in April. For these species, there was no extended fresh-water rearing phase; fry or early juveniles of both species leave the stream soon after emergence to rear in brackish water (Wolfe 2003, 2004, 2005, EES 2009).

Pink salmon spend about two seasons (16 to 18 months) in salt water before returning to spawn. Chum salmon spend from three to five years in salt water with most in Sawmill Creek appearing to return after four years.



[1] Based on both stream observations and professional judgment due to photo negative behavior
[2] Based on similar local systems due to limited observations

Figure. 19. Stream Periodicity of Salmonids in Sawmill Creek, Sitka Alaska.

5.6.2 Environmental Impacts and Recommendations

5.6.2.1 Construction-Related Effects

Construction-related effects on fisheries at or near Blue Lake and in Sawmill Creek would relate primarily to water quality changes from sediment or hydrocarbon input near the dam and input of organic material and sediment from the timber clearing operation in the Blue Lake Creek valley. In both cases, site-specific erosion and sediment control measures will be addressed in an Erosion and Sediment Control Plan (ESCP) and various spill prevention and containment plans prepared by the City in accord with applicable resource agencies. Elements of the ESCP are described in more detail in the Water Quality section, noting that final elements and conditions of the Plan will await consultation after final design and construction schedule have been determined.

5.6.2.2 Effects due to Long-Term Operation

Blue Lake

The primary impact issue at Blue Lake is the effect of dam raising on Blue Lake rainbow trout and their ability to sustain their populations, specifically, the effect of raised water levels on the rainbow trout spawning. In their comments on the Draft 2008 Wolfe study, agencies were concerned about two primary issues relating to raised water level: 1), and 2) changes in physical factors such as water pressure after the dam raise.

Spawning Habitat Availability

Relative to the first issue availability of spawning habitat at higher reservoir levels, the stream-lake “interfaces” occur in areas where tributary streams meet the lake during the rainbow trout spawning period, which lasts from early May through June. During this period, the lake level increases as does the stream flow in the tributaries due to runoff. At each interface area, stream-borne sediment is deposited, providing suitable spawning substrate and intergravel flow. As the lake level rises, these depositional areas are formed at successively higher elevations, continuously forming new spawning habitat until the lake is at maximum level. After the dam raise, this process is expected to continue, but at respectively higher elevations. In certain tributaries, spawnable interface area is not expected to change. In other tributaries, higher stream gradient in upstream reaches (where steep canyons currently exist) would cause there to be less interface area (Figures 20, 21, 22, 23).

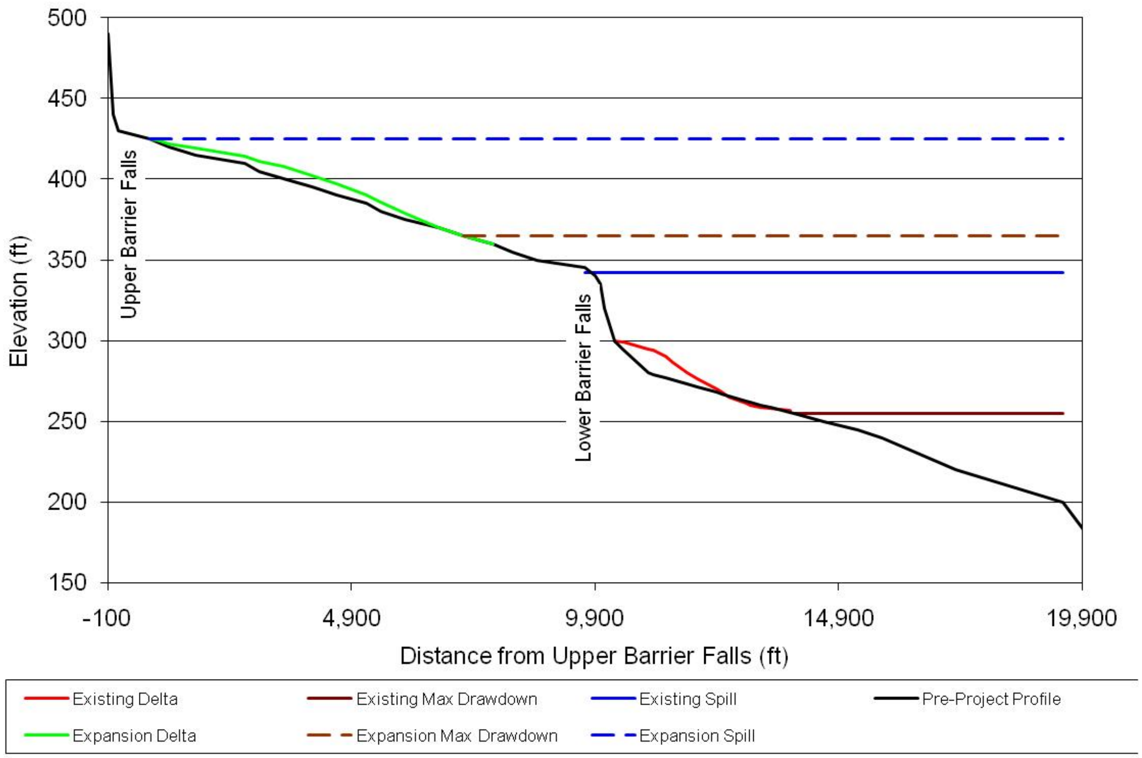


Figure 20. Longitudinal Profile of Blue Lake Creek Showing Existing and Estimated Expansion-related Delta Deposits.

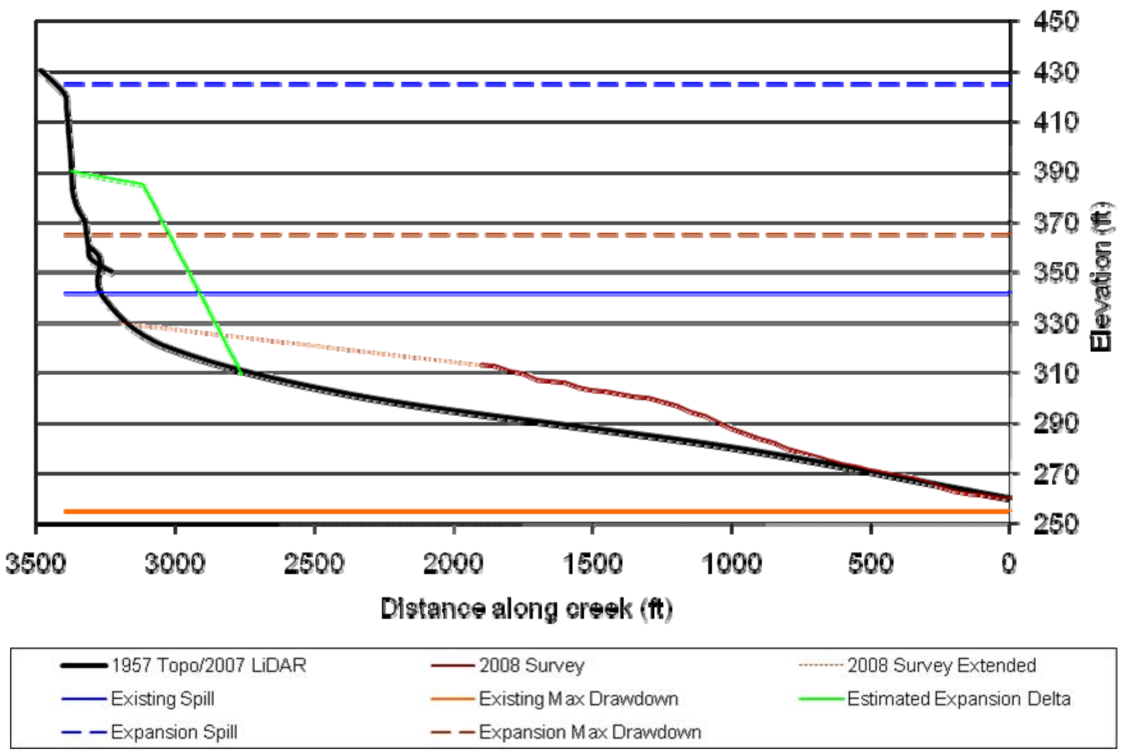


Figure 21. Estimated Existing and Expansion Longitudinal Profile of Becky Creek Delta.

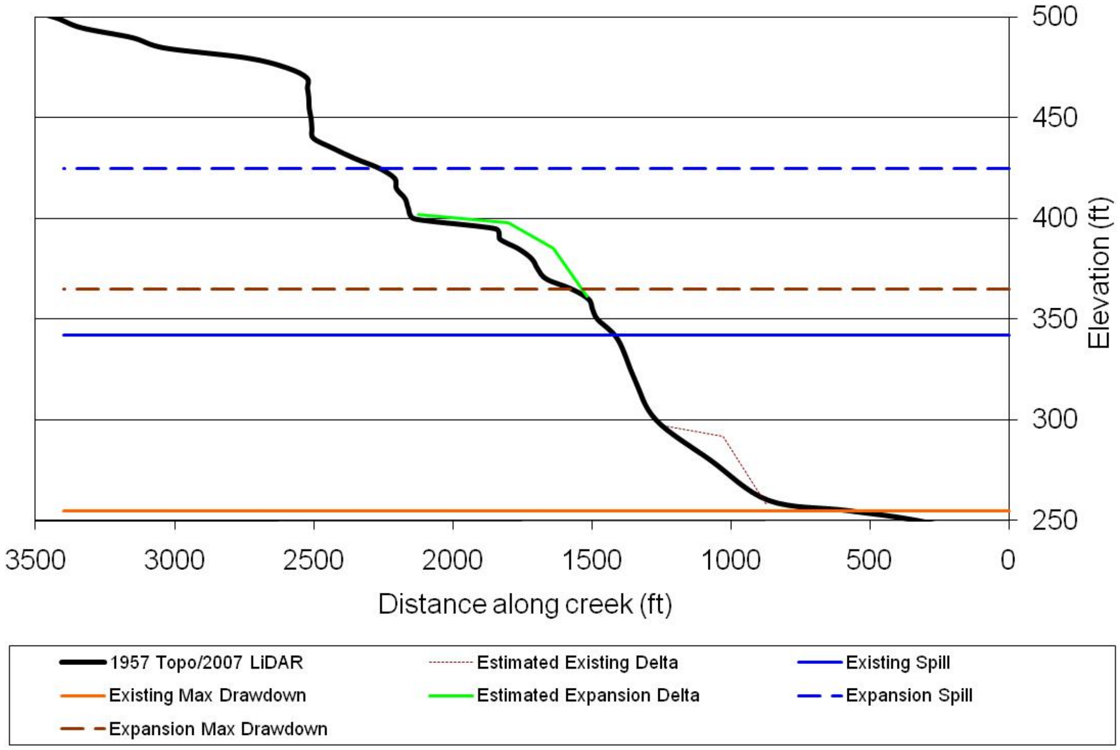


Figure 22. Estimated Existing and Expansion Longitudinal Profile of Brad Creek Delta.

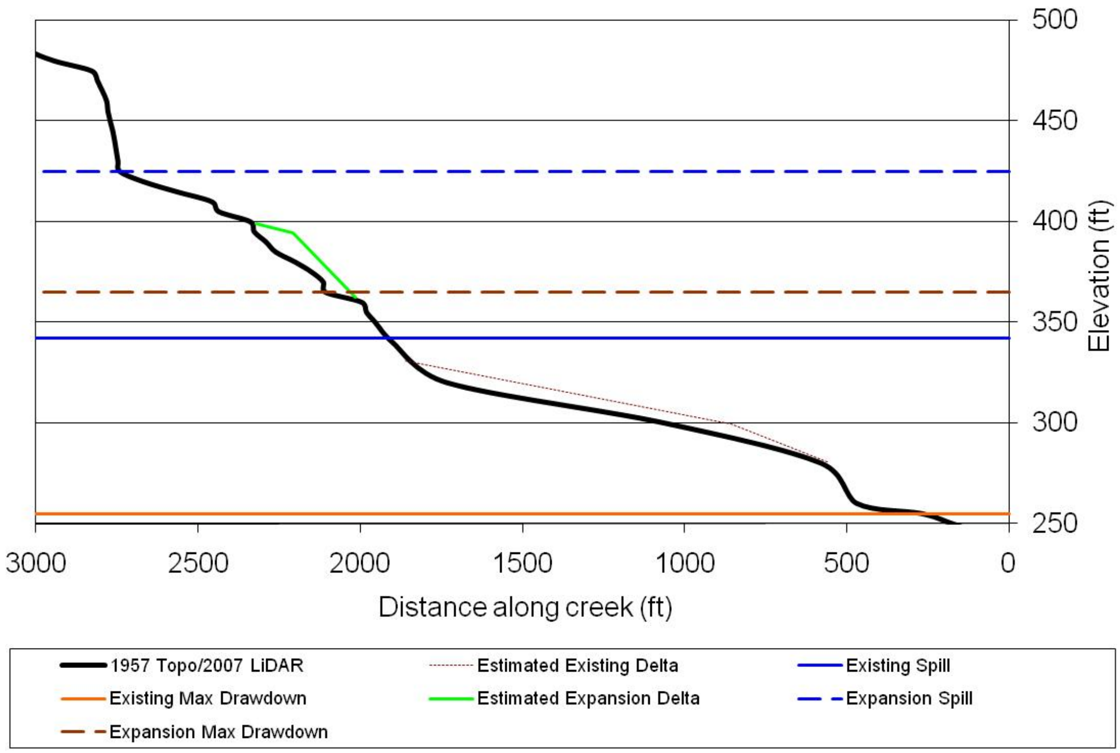


Figure 23. Estimated Existing and Expansion Longitudinal Profile of Sheldon Creek Delta.

Physical Factors

In response to the second issue, changes in physical factors such as water pressure after the dam raise. Under the existing Blue lake Project operation, the average year elevation of the reservoir on May 1 (when rainbow trout in the lake normally begin to spawn) is at El 276 which is 66 feet below the current spillway crest elevation at El 342. Trout eggs deposited at this elevation would be under as much as 66 feet of water by the time of their normal emergence, which is in about 2 months. Rainbow trout have survived for the last 50 years of operation under the pressure, temperature, upwelling and DO conditions occurring at this level of submergence. It is predicted that following the Blue Lake Expansion rainbow trout will spawn at a reservoir El 370 during a normal operating year on May 1, when rainbow trout begin to spawn. This would be 55 feet below the proposed spillway crest at El 425, meaning that the maximum incubation and emergence water depth would be 11 feet less than under the current operation conditions. Effects of Expansion-related changes in physical conditions affecting incubation and emergence, we believe, would be less than under existing conditions.

Fish Entrainment

Another issue of concern at Blue Lake was fish entrainment at the existing intake. During relicensing, it was determined that entrainment was highly unlikely because the intake was not located where the small, potentially-entrained trout reared. The existing intake is at a maximum depth of 138 feet and is over 4000 feet from the nearest inlet tributary or documented spawning location. Furthermore, in over 50 years' operation, there has been no indication of fish entrainment in the various water strainers at the Project powerhouses. The proposed intake would be only 33 feet higher providing a depth of 105 feet and the proposed intake is located at roughly the same distance from the nearest tributary or known spawning area. Based on these considerations, and a lack of both juvenile and adult fish observations and captures at this depth (CBS 2005a, 2006b, Wolfe 2009) it is predicted that entrainment would not be likely to occur with the proposed intake.

Effects of sedimentation in Blue Lake Creek

To determine the extent to which deposited sediment might affect fish habitat conditions in Blue Lake Creek, a City contractor studied the both past sedimentation due to the initial impoundment of Blue Lake reservoir, and existing sediment transport conditions in Blue Lake Creek (Dube 2010). Results of this study showed that there would be significant sediment deposition in the Blue Lake Creek valley within the entire potentially-inundated area. After seasonal sediment transport each year, however, it was predicted that substrate composition within the stream channel would roughly the same as at present. The range of substrate particles sizes would remain suitable for fish spawning and feeding.

Sawmill Creek

There were three primary areas of concern for aquatic resources in Sawmill Creek: 1) effects of altered water temperature (from the repositioned intake elevation) on Sawmill Creek anadronmous fish; 2) effects of ramping rates; 3) effects of tailrace outflows causing potential false attraction to migrating fish. These issues are discussed in the following sections:

Temperature Effects

As noted in the Water Quality section, extensive field studies and modeling were done to determine Expansion-related water temperatures at the new intake level, and to then determine effects of those water temperatures on fish in Sawmill Creek (EES 2010).

Temperature predictions were based on data from individual temperature monitoring sensors and a sensor array measuring water temperatures in Blue Lake at 15-foot depth intervals during 2005 and 2008. These data were used to establish current temperature-depth relationships and were then utilized to predict temperatures under the projected Expansion-related seasonal depth and air temperature conditions. From this, the authors developed seasonal intake level temperature regimes which served as temperature predictions for lower Sawmill Creek (below the BLU).

The predicted Sawmill Creek temperature regimes were then analyzed relative to known spawning timing for pink, chum and coho salmon (these species were selected because pink and chum salmon were the most abundant species using Sawmill Creek below the BLU, and because of potential effects on coho salmon incubation and rearing in the NSRAA hatchery on Sawmill Creek.

Spawning timing for the three target species was based on data collected in Sawmill Creek from 2001 through 2008 collected for the Blue Lake relicensing studies. Emergence timing was based on Accumulated Temperature Units (ATUs) gathered from literature on the target species in Alaska.

The proposed relocation of the intake, with invert at El 320, and dam spillway raised to El 425, was predicted to raise intake temperatures by 1C to 3C during the June-September period, with an average annual increase in water temperatures of 0.5C. Effect on winter temperatures would be minimal (<1C November-April). Analyses showed a 1-day difference in emergence timing for chum salmon with a spawning date of September 4, and a 3-day difference for pink salmon with a spawning date of September 8. Coho salmon incubation was 1 day earlier to 5 days later with a spawning date of October 30. In all, these differences were judged to be insignificant in terms of long-term effects on populations of any of the three target fish species (EES 2010).

Effects of Ramping Rates

Rapid changes of streamflow in the bypassed reach or below the tailrace have the potential to affect fish, particularly certain early life history stages. The license, issued in 2007, restricted ramping rates to those required under Condition 9 of the new license, except in special circumstances as described in the Condition as shown in Table 8.

Table 8. Allowable ramping rates by date in the bypassed reach under normal operations.

Time Period	Up-ramping Rate	Down-ramping Rate
April 1 – July 15	0.2 ft/hr	0.2 ft/hr
July 16 – Sept 30	0.1 ft/hr	0.1 ft/hr
Oct 1 – March 31	0.1 ft/hr	0.2 ft/hr

The City proposes that the ramping rates and other conditions from these documents remain in effect after the Expansion.

Tailrace Outflows

The proposed tailrace differs from the existing tailrace in that it will have no pooling (resting) area and will be about 3' lower in elevation and approximately100' downstream from the existing tailrace. Spawning at the tailrace is currently limited to a small proportion of the pink and chum, salmon runs (that tend to spawn in lower stream areas) utilizing a gravel bar adjacent to stream flows. All other anadromous species have utilized the current design for resting, we therefore feel that this design will further limit false attraction do to its lack of resting (pool) area. The draft tubes are similar to the existing draft tubes in that they are vertical with the turbine centerline above the tailrace elevation, which would prevent fish from entering them.

5.7 VEGETATION RESOURCES

5.7.1 Affected Environment

The potentially-affected Project Area (including all areas which might be affected by construction and long-term operation of Expansion-related actions) consists of about 450 acres of land, including about 30 acres below the Blue Lake dam and 420 acres above the dam. Below the dam, vegetation might be affected by construction and long-term existence of roads and the proposed powerhouse. At and above the dam, vegetation might be inundated or otherwise disturbed due to dam raising and associated construction activities.

There are no plants within the study area currently included on the Tongass National Forest sensitive plant list. Two species included on the Alaska Natural Heritage Program (AKNHP) list [Lewis's Monkey flower (*Mimulus lewisii*) and Alaska Hollyfern (*Polystichum setigerum*)] were found within the project area. One species tracked by the

Tongass National Forest [Arctic Poppy (*Papaver radicatum* or *radicatum ssp. Alaskanum*)] was located within the project area.

Areas of Vegetative Types

Vegetation field surveys conducted during 2008 (LaBounty 2010) focused on the potentially-inundated area around Blue Lake and in Blue Lake Creek (Blue Lake's primary inflow tributary) valley. Field surveys were used in association with a vegetative layer map constructed by Caouette and DeGayner (2005) to map and quantify percentages and locations of the various vegetation types. This map system used mean tree size and stand density combined with slope and soils to depict vegetation characteristics. Vegetative type areas in the following discussion are those based on Caouette and DeGayner map layers in the potentially-inundated area.
The major breakdown among vegetative types distinguished between "Forested" and "Non-Forested" areas, which were further broken down into six forested and five non-forested types, as described in the following.

Forested Vegetation Type

Forested vegetation was the predominant vegetative type in the Project Area, comprising a total of about 62 percent of the vegetative cover. There are approximately 274 acres mapped as moderately productive old growth forest in the project area (Table 9, Figure 24). Within this vegetation type, Volume Class 5, South Aspect, forests were the most extensive. All forested stands were mapped as volume class 4 (8-20 million board feet/acre) or volume class 5 (20-30 million board feet/acre)(Table 9).
The primary species of conifers in the project area were Western Hemlock (Tsuga heterophylla) and Sitka Spruce (Picea sitchensis). Less abundant, but well represented in the area is Alaska Yellow cedar (Chamaecyparis nootkatensis). The coniferous forest within the Blue Lake watershed is typical of moderately productive Spruce/Hemlock forests found in the northern portion of southeastern Alaska.

Table 9. Summary of mapped vegetation types (Caouette and DeGayner) within the potentially inundation zone. Acreage was calculated using Arc Map.

Vegetation Type	Description	Acres	Percentage of potentially-inundated area
Forested			
SD5S	Volume Class 5, South Aspect	81.9	18
SD4N	Volume Class 4, North Aspect	53	12
SD4S	Volume Class 4, South Aspect	50.6	11
SD5H	Volume Class 5, Hydric Soils	37.4	8.5

SD4H	Volume Class 4, Hydric Soils	26.6	6.5
SD5N	Volume Class 5, North Aspect	25	5.5
Total Forested		**274.5**	**62**
Non-Forested			
NF	Non Forested	74.7	17
UF	Unproductive Forested	57.4	13
FM	Forested Muskeg	20.4	4.5
S3	Recurrent Slide	13.6	3
S1	Recurrent Slide	4	<1
Total Non-Forested		**170.1**	**38**

Early and Alaska Blueberry (*Vaccinium ovalifolium* and *V. alaskense*). Red huckleberry (*Vaccinium parvifolium*), Rusty Menziesia (*Menziesia ferruginea*) were the most abundant shrubs in the understory. Small patches of Devil's club (*Oplopanax horridus*), Elderberry (*Sambucus racemosa*), Stink currant (*Ribes bracteosum*) and salmonberry (*Rubus spectabilis*) also occured in areas disturbed by small blowdown or flooding.

The most abundant herbs in the coniferous forest were Bunchberry (C*ornus canadensis*), Fern-leaf goldthread (*Coptis asplenifolia*), Five-leaf bramble (*Rubus pedatus*), and Foam flower (*Tiarella trifoliata*). Skunk cabbage (*Lysichiton americanum*) occurs in wet micro-sites within this vegetation type. Also present in the understory are a variety of ferns; Lady Fern (*Athyrium filix-femina*), Spinulose Shield fern (*Dryopteris inexpansa*) and Holly Ferns (Polystichum spp). The forest floor is characterized by a largely continuous cover of mosses and liverworts.

Non Forested Vegetation Type

The non forested vegetation mapping was less well developed than that of the forested vegetation. For this reason the non-forested vegetation will be discussed as both mapped types and as vegetation types observed in the field (tall shrub dominated slides). Within the Non-Forested type, Non Forested and Unproductive Forest types were the most extensive, as described below.

Non Forested (NF)

Areas mapped as Non Forest have less than 10 percent tree cover and comprised 17 percent of the total Non-Forested vegetative type in the project area. This vegetative type includes cliffs, rocky areas and some recurrent slides with sparse vegetation. Typical species include Sitka Spruce (Picea sitchensis), Sitka Alder (Alnus virdis var. sinuata), Devil's Club (Oplopanax horridum), and Elderberry (Sambucus racemosa).

Unproductive Forest (UF)

Stands mapped as Unproductive Forest have greater than 10 percent tree cover, but less than 8,000 board feet per acre. This vegetative type comprised about 13 percent (57.4 acres) of the total non-forested area. This vegetative type is typically in steep areas with frequent rock outcrops and widely spaced coniferous trees and tall deciduous shrubs. Areas mapped as UF occured on both shores of Blue Lake and in the Blue Lake creek valley.

Typical species included Sitka Spruce, Western Hemlock, Sitka Alder (*Alnus viridis var sinuata*), Elderberry (*Sambucus racemosa*) and Devil's Club (*Oplopanax horridus*). There are 57.4 acres mapped as UF within the inundation zone. These are predominatly tall shrub dominated slides.

Two areas mapped as UF were recurrent slides (S1 and S2), and comprised less than 4 percent of the total non-forested area. These slides were characterized by dense mixtures of such shrubs as Sitka Alder (*Alnus viridis* var. *sinuata*), Devil's Club (*Oplopanax horridum*), and Elderberry (*Sambucus racemosa*). Nettles *(Urtica dioica*), Lady Fern (*Athyrium filix-femina*), and a variety of other herbs and ferns grow under the tall shrubs in the slides. Moss ground cover was sparse in comparison to that of the forest or forested muskegs. Branches and trunks of larger shrubs were host to a variety of lichens; (*Nephroma spp, Pseudocyphellaria croaca , and Lobariar spp*.

Forested Muskegs (FM)

This vegetation type, characterized by less than 10% tree cover with shorter and smaller diameter trees than in UF, comprised about 4.5 percent of the non-forested area. FM areas were dominated by a sparse overstory of stunted trees, including Shore Pine (*Pinus contorta*), Alaska Yellow cedar, Western Hemlock and Sitka Spruce. These areas also included small shrubs such as Labrador tea (*Ledum groenlandicum*), Crowberry (*Empetrum nigrum*), Bog blueberry (*Vaccinium uliginosum*) and an herb layer dominated by short sedges including Spike Club Rush (*Trichophorum casepitosum*) and *Carex pauciflora* and *C. pluriflora*. Sphagnum and other mosses formed a semi-continuous ground cover.

Deciduous Tree/Shrub

This vegetation type, too small in areas to be mapped in the vegetative code layer, occured in a few small areas adjacent to Blue Lake Creek. In these areas, Sitka Willow (*Salix sitchensis*) was the dominant shrub in some alluvial communities. Young Sitka Spruce (*Picea sitchensis*) were found in the understory in willow stands.

Cottonwood (*Populus balsamif*era) was found as isolated individuals and in a small stand in alluvial areas. The largest stand of Cottonwood was on the south side of Blue lake Creek. The understory in the Cottonwood stand was primarily species of Holly ferns

(*Polystichum andersonii* and *P. braunii*) with a limited number of herb species including Enchanter's Nightshade (*Circaea alpina*) and Foamflower (*Tiarella trifoliata*)

Botanical resources were considered in two categories: 1) Tongass National Forest sensitive plant species; and 2) AKNHP vascular plant tracking list and species of concern.

Sensitive Plant Species

There are no federally listed rare or endangered plant species on the Tongass National forest (Dillman and Krosse 2007). The Regional Botanist, Mary Stensvold, maintains a list of sensitive plants whose populations are monitored in project areas as regulated by the NEPA (National Environmental Policy Act) process. Of the 17 vascular plant species included on the Region 10 Sensitive species list those thought most likely to occur in the Blue Lake Project area are included in Table 10.

Table 10. Sensitive plant species most likely to occur in the Blue Lake project area (Mary Stensvold, USFS Sitka Ranger District Regional Botanist).

Species	Habitat and Location Description	Occurrence on the Tongass National Forest	Occurrence on the Sitka Ranger District	State Ranking
Cypripedium montanum	Open forest, uplifted beach forest	Known	Possible	S1
Cypripedium parviflorum var. pubescens	Bogs, meadows,	Known	Possible	*
Ligusticum calderi (Calder lovage)	Occurs in subalpine boggy meadows, meadows and forest edges. Occurs on Kodiak Island, Dall Island (just west of Prince of Wales Island), and Bokan Mountain on Prince of Wales Island.	Known	Suspected	S1
Piperia unalaschcensis	Bogs, heaths, open forest, stream and river banks	Known	Suspected	S2
Romanzoffia unalaschcensis	Occurs on beach terraces or wet rock outcrops and rock crevices.	Known	Known	S2

Species	Habitat and Location Description	Occurrence on the Tongass National Forest	Occurrence on the Sitka Ranger District	State Ranking
(Unalaska mist-maid)	It Ranges from eastern Aleutians, Alaska Peninsula, Kodiak to southeastern Alaska.			

* *Cypripedium parvifolium* is S2S3, there is no ranking for subspecies pubescens
The Alaska Natural Heritage Program (AKNHP) of the Environmental and Natural Resources Institute is affiliated with the college of Arts and Sciences of the University of Alaska, Anchorage. The institute serves as a clearinghouse for information about species of conservation concern in Alaska. The AKNHP maintains a statewide Vascular Plant Tracking List (last updated April 2008) which is available online at: http://aknhp.uaa.alaska.edu/botany/Botany_tracking_page.htm.

Although many of the plants tracked by the AKNHP do not meet the criteria for the Region 10 Sensitive Species list, the rarity of the plant species and the intensity of the project disturbance warrant survey for their presence within the project area. Ranking for these species include: S1) Critically imperiled in state because of extreme rarity or some factor(s) making it especially vulnerable to extirpation from the state; S2) Imperiled in state because of rarity or because of some factor(s) making it very vulnerable to extirpation from the state; S3) Rare or uncommon in the state; and S4): Apparently secure in state, with many occurrences.

Several species on the Alaska Natural Heritage Program tracking list are known or suspected to occur in the Sitka Ranger District and occur in habitat likely to be found within the Blue Lake project area (Table 11).

Table 11. Vascular plants included on the Alaska Natural Heritage Vascular Plant Tracking list likely to occur in Blue Lake project area.

Species	Habitat and Location Description	Occurrence on the Tongass NF	Occurrence on the Sitka RD	State Ranking
Arnica lessingii ssp. norbergii (Norberg arnica)	Occurs in alpine and subalpine meadows, arctic and alpine tundra, heath and open woods.	Known	Known	S2
Galium kamschaticum	Occurs in open forest, along forest edges and in meadows.	Known	Known	S2

Species	Habitat and Location Description	Occurrence on the Tongass NF	Occurrence on the Sitka RD	State Ranking
(Boreal bedstraw				
Glyceria leptoctachya (Davy Manna grass)	Grows in wet lowland habitats including swamps and stream and lake margins. Also colonizes disturbed areas such as ditches and roadsides.	Known	Known	S2
Hymenophyllum wrightii (Wright Filmy Fern)	Prefers humid shaded boulders, cliffs and damp woods and occurs at the base of trees and rock outcrops or in crevices of tree trunks. Occurs in coastal areas of Southeast Alaska and has been documented on Biorka and Mitkof Islands.	Known	Known	S1
Isoetes truncata (Truncate Quillwort)	Grows immersed in shallow water of lakes and ponds and is known to occur on Kodiak and Vancouver Islands.	Suspected	Suspected	S1
Ligusticum calderi (Calder lovage)	Occurs in subalpine boggy meadows, meadows and forest edges. Occurs on Kodiak Island, Dall Island (just west of Prince of Wales Island), and Bokan Mtn. on Prince of Wales Island.	Known	Suspected	S1
Listera convallarioides (Broadlipped twayblade)	Occurs in open forest and along forest edges.	Known	Known	S2
Mimulus lewisii (Pink monkey-flower)	Occurs in avalanche tracks, disturbed floodplains and gravel bars, open streambanks	Known	Known	S2
Poa laxiflora (Loose-flowered Bluegrass)	Occurs in upper beach meadows and open forests. Several sightings have been documented in Southeast Alaska at Sandborn Canal at Port Houghton, and Admiralty Island.	Known	Known	S2S3
Polystichum	Occurs on rock outcrops, cliffs in alpine	Known	Known	S1

Species	Habitat and Location Description	Occurrence on the Tongass NF	Occurrence on the Sitka RD	State Ranking
kruckebergii (Kruckeberg's Holly fern)	habitats			
Polystichum setigerum (Alaska Holly Fern)	Occurs in open, well drained forests	Known	Known	S2S3
Romanzoffia unalaschcensis (Unalaska mist-maid)	Occurs on beach terraces or wet rock outcrops and rock crevices. Ranges from eastern Aleutians, Alaska Peninsula, Kodiak to southeastern Alaska.	Known	Known	S2
Sausurrea americana (American sawwort	Occurs in subalpine meadows and brushfields	Known	Known	S3
Senecio moresbiensis (Queen Charlotte Butterweed)	Occurs in montane to alpine habitats in shady wet areas and bogs on open or rocky slopes and in open, rocky heath or grass communities.	Known	Suspected	S2
Stellaria ruscifolia ssp. aleutica (Circumpolar starwort)	Occurs in moist gravelly sites along creeks in alpine or subalpine areas. Range is limited to coastal southeastern and south-central Alaska and the Aleutian islands.	Known	Suspected	S3

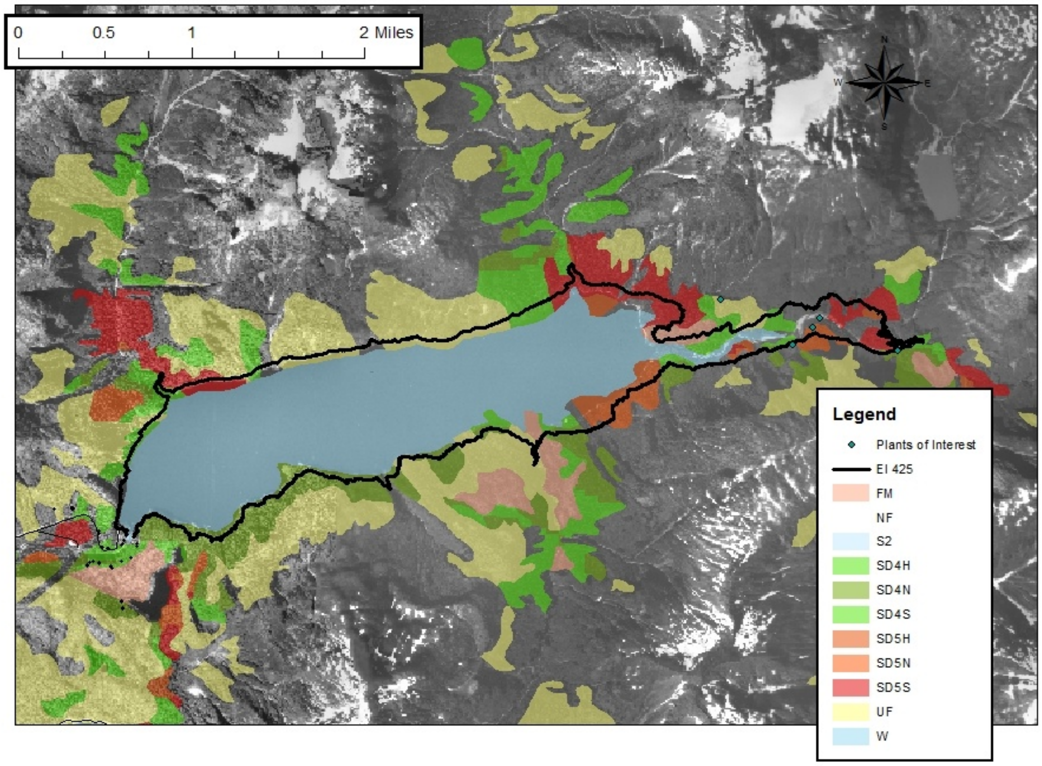


Figure 24. Vegetation Code Mapping for Blue Lake Project Expansion Area.

5.7.2 Environmental Impacts

5.7.2.1 Summary

The expansion of the Blue Lake dam will inundate up to 430 acres of National Forest lands resulting in total loss of the vegetation resources within the inundation zone. Populations of two plant species included on the Alaska Natural Heritage Vascular Plant Tracking list growing in the projected inundation zone will be drowned. There will be a reduction in species rich gravel bars within the watershed. Environmental impacts to the area below the dam are thought to be negligible because of the relatively minimal expansion of existing industrial footprint and the relative lack of undisturbed vegetation.

5.7.2.2 Above the dam

The projected flood zone is approximately 80 ft above the current high water mark around Blue Lake reservoir. The flood zone includes up to 430 acres of National Forest lands including the existing shore line of Blue Lake and lands in the Blue Lake Creek valley

5.7.2.2.1 Construction-Related Effects

Construction activity could disturb existing vegetation in the dam/intake and Blue Lake Creek areas above the projected inundation zone.

Construction of a new intake valve will involve bringing heavy machinery and workers on the existing road and ramp to Blue Lake Reservoir. Impacts of this activity are believed to be minimal because of current industrialized nature of this area. The new intake structure will be at elevation 320, approximately 20 ft below the current lake level. The planned location of the new intake valve is a rocky cliff with little or no vegetation.

In the Blue Lake Creek valley, the primary construction-related disturbance would be the logging operation to remove timber prior to inundation. The planned harvest activities will be confined to areas within the inundation zone, but there is a possibility that there could be some damage to vegetation outside of the inundation zone from the movement of logging equipment or falling trees.

The timber harvest will be designed to minimally impact the vegetation above the projected inundation zone. Trees will be harvested to approximately elevation 425 ft and will be conducted in such a way to ensure minimal impact to the duff and soils. The timber transfer plan is not yet complete but will be designed for minimal impart to vegetation above the projected inundation zone.

Slash from timber harvest will be burned in an area within the projected inundation zone.

Heavy machinery and workers will be brought to the logging operation on the existing road and ramp to Blue Lake Reservoir. Impacts of this activity are believed to be minimal because of current industrialized nature of this area.

Machinery and workers could facilitate the introduction of noxious weeds to the project area above the dam. Equipment brought in from other areas may be contaminated with seeds and other parts of non-native species. Once established, weed species may displace native species, be unpalatable to native wildlife, and decrease plant species diversity in the project area.

5.7.2.2.2 Long term operation

Approximately 430 acres of vegetated land will be inundated by the expansion project. Inundation is projected to drown vegetation below the 430 ft elevation contour.

The rising lake level will create a new shore line; it is not known if existing vegetation will adapt to the shore line conditions and persist or if future shoreline vegetation will be the result of post inundation colonization. Existing vegetation may not persist because of seasonal change in water levels, root zone inundation, debris accumulation, and possible ice damage.   Understory vegetation could be impacted by an increase in available light (side lighting). If existing vegetation does not persist along the new shore line; colonization of the shoreline will presumably occur from wind borne seeds (Sitka spruce, Western Hemlock, Sitka Alder) or bird born fruit/seed (Elderberry, Salmonberry, Devil's club) from within the Blue Lake Watershed.

Prior to raising the dam, merchantable timber will be harvested from the inundation zone. Removal of the timber prior to inundation and slash removal should limit the amount of debris accumulating on the shore after raising the water level. This may lessen some potential impacts of debris on future shore line vegetation. A floating debris burn area will be designated between the spill and maximum draw down lake level. A floating boom will be deployed to collect any floating debris which accumulates during lake expansion. Debris will be disposed of in the debris burning area.
Much of the existing Blue Lake shore vegetation is a narrow band of Sitka Alder; it is likely that this band of vegetation will eventually establish itself on the new shoreline over time. Areas of the lake shore which are steep are expected to experience a relatively small change in vegetation character over the short term because of lake expansion.

Two types of existing vegetation may be extirpated at least in the short term from the above the dam portion of the watershed. The meadow or mudflat delta dominated by graminoids such as Lake shore sedge (Carex lenticularis) and Bluejoint (Calamagrostis canadensis) on the eastern shore of Blue Lake will be inundated. It is probable that a delta will develop where Blue Lake creek in projected to join Blue Lake approximately 1.9 miles upstream (Dubé, 2010). The post expansion project delta may support similar vegetation to what currently exists. Prior to the initial Blue Lake hydro project a delta existed where Blue Lake creek entered Blue Lake, but a record of its vegetation has not been found.

The most dramatic change in vegetation will be in the narrow valley bottom along Blue Lake creek. Areas of vegetated gravel bars, deciduous riparian forest and productive coniferous forest will be inundated. Most vegetation types found in the projected inundation zone are well represented in other part of the watershed, the one exception is vegetated gravel bars. The projected inundation zone encompasses all of the large gravel bars on Blue Lake creek. On a reconnaissance of the upper valley (to approximately 2.5 miles past Glacier creek) one large and a few small gravel bars were located.   There was a substantial amount of snow remaining in the valley bottom, covering the creek, so (June 19, 2009) which may have hidden existing herb rich gravel bars. One species that will be at least temporarily extirpated from the above the dam area is Cottonwood (Populus balsamifera. It was only found in a few sites within the projected inundation zone.

Gravel bars may reestablish over time because of continued sedimentation, however the topography of the valley is narrower above the inundation zone which may continue to limit formation of gravel bars and therefore the vegetation associated with the gravel bars.

An additional effect of the expansion project on vegetation above the inundation zone is expected to be associated with increased recreation access to the Blue Lake Watershed. The number of recreationists accessing the backcountry is currently limited by difficulty of access to the boat launching area near the terminus of the Blue Lake access road. With higher lake elevations in late summer and fall, it would be possible for all boats, particularly those with larger motors, to reach the launch area, even using two-wheel drive vehicles. Increased recreational use and equipment and people involved in timber extraction could facilitate introduction of invasive plant species.

The City proposes to modify the existing Reservoir Management Plan to implement measures including, but not limited to: 1) limiting launch facilities; 2) outboard motor size restrictions; 3) parking limits and others, as determined during Stakeholder consultation. As discussed in the Water Quality section, recreational access to Blue Lake has not been encouraged or facilitated in the past due to the Lake's use as Sitka's drinking water supply. Future Reservoir Management measures could address water quality and invasive species.

5.7.2.2.3 Below the Dam

Project impacts below the dam will be construction related and due to long term operation. Construction activity could disturb vegetation in the powerhouse, parking lot, staging areas and access roads.

In the powerhouse area, construction-related effects would be slight because the area is currently industrialized and often visited by Blue Lake Project workers, hunters, fishers and other recreationists. Blasting and excavation work would result in permanent removal of vegetation in construction areas.

Construction impacts from the dam and powerhouse cannot be precisely assessed until the final design of the project is complete. Precise location of the Powerhouse is not known. Once the area is delineated there will be a site specific survey completed.

Vegetation along the road was impacted by original project, recurrent slides and recreational use.

The most recent sensitive and rare plant surveys below the dam were conducted for the Blue Lake power line corridor in 2003 by Tongass National forest biologist, B. Kriekhaus. Kriekhaus surveyed the Beaver Lake trail and the Bear Mountain area in 2003 and 2004. Field surveys completed in 2003 and 2004 were conducted following the Region 10 protocol for surveying sensitive and rare plants (USDA 2001). Earlier surveys used similar methods and were conducted by Mary Stensvold, Regional Botanist for the Forest Service. Surveys for the Blue Lake area occurred at various intensity levels that were dependent on the habitat. Forest Service surveys focused primarily on unique and unusual habitats within the project area but also traversed the edges and interior areas of proposed harvest units and proposed road lines.

No sensitive plant populations have been located in or directly around Blue Lake or the associated power facilities.

5.8 WILDLIFE RESOURCES

5.8.1 Affected Environment

Wildlife in the Project area represent important resources to the local population in terms of hunting, trapping and wildlife viewing. Generally, the area supports the typical wildlife species seen in this part of Southeast Alaska. No Alaska federally threatened or endangered species have been sighted or reported in the Project land area, although one species, the marbled murrelet, occupies the area, and is listed variously as threatened or endangered in the lower 48.

Following are descriptions of the most abundant or environmentally important species within various wildlife groups. The sources of this information are Bovee (2005,2006, done for the Project relicensing and 2010, done to more specifically evaluate Expansion-related actions).

In the 2005 and 2006 Bovee reports, wildlife surveys were concentrated at or near: Sawmill Creek; 2) the Blue Lake Road; 3) the Blue Lake area near the dam; and 4) along the Project Transmission Lines and Corridors within the Blue Lake basin and near Sawmill Creek. The 2010 Bovee studies concentrated on the potentially-inundated areas of Blue Lake and the Blue Lake Creek valley.

Wildlife resources in the Project area were described in seven major groups in the Bovee reports:

- Large Mammals;
- Small Mammals;
- Furbearers;
- Raptors;
- Songbirds;
- Shorebirds; and
- Waterfowl.

Within these groups, the reports noted the overall status of various species, particularly those whose populations might be

Large Mammals

Large mammal species observed in the Bovee study area were:

Mountain Goat	*Oreamnos americanus*
Sitka Black-tailed Deer	*Odocoileus hemionus sitkensis*
Brown Bear	*Ursus arctos*

Mountain Goats

Mountain Goats in the Blue Lake basin are a regionally important resource, due primarily to their healthy populations around the lake and to relatively easy access provided by the Blue Lake boat launch. Goats were frequently observed in the slopes above Blue Lake where they find good escape cover and feeding conditions. Exact life history and habitat utilization for goats, particularly in the potentially-inundated areas of the Blue Lake Creek valley has not been observed. It is speculated, based on goat behavior in other similar areas, that goats utilize the lower elevations on such valleys to overwinter.

While goat hunting access in the Blue Lake area has been noted as good, but limited by access which is restricted by steep slopes around the lake. Most goat hunting is done using boat access.

Mountain goats were established on Baranof Island in 1923 with 18 animals from Tracy Arm (Mooney 2008). Hunting began in 1949 and currently there is a one goat bag limit with a registration permit. Harvest numbers in 1976-2008 ranged between 28 and 75 goats per year (Figure 25). The Blue Lake subunit constitutes a significant percent of goats harvested, with an average of 20% of the Unit 4 harvest. Since summer, winter, and breeding ranges overlap into adjacent subunits, their harvest numbers were combined which resulted in an average 55% of the harvest for unit 4 in this central core area of Baranof Island. The actual percentage of goats harvested in the Blue Lake watershed is probably between 20 to 50% of the overall harvest.

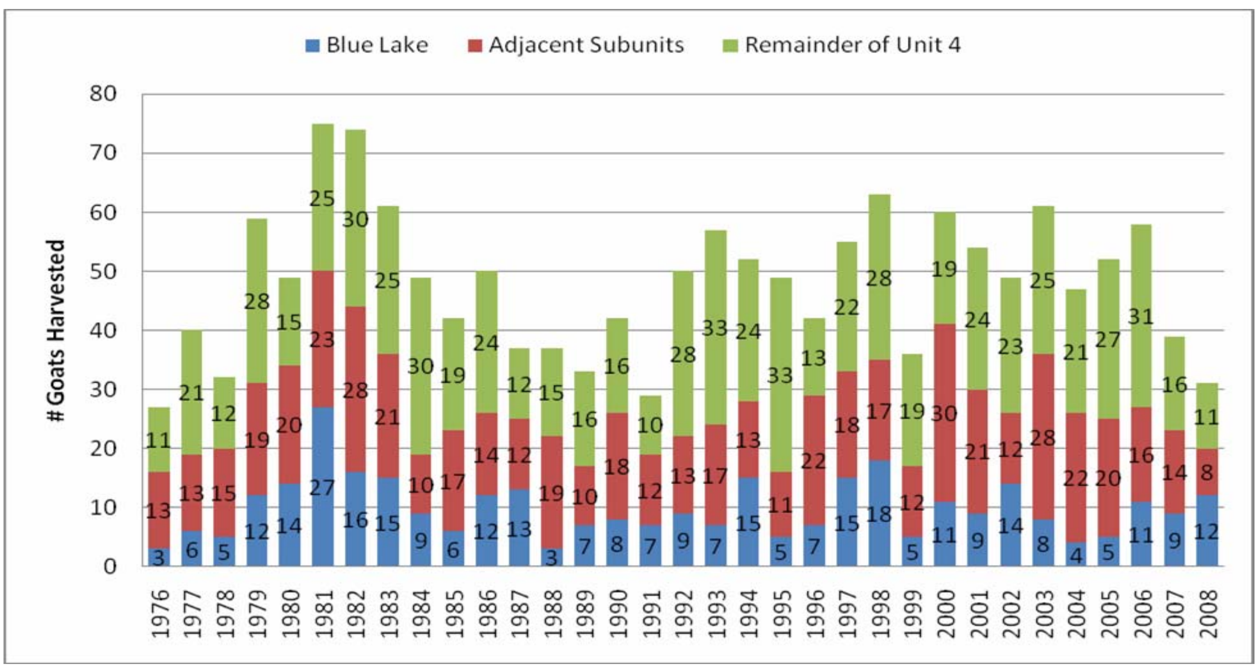


Figure 25. Goat Harvest for Blue Lake, Adjacent Subunits, Remainder of Unit, and Unit 4 Total, 1976-2008

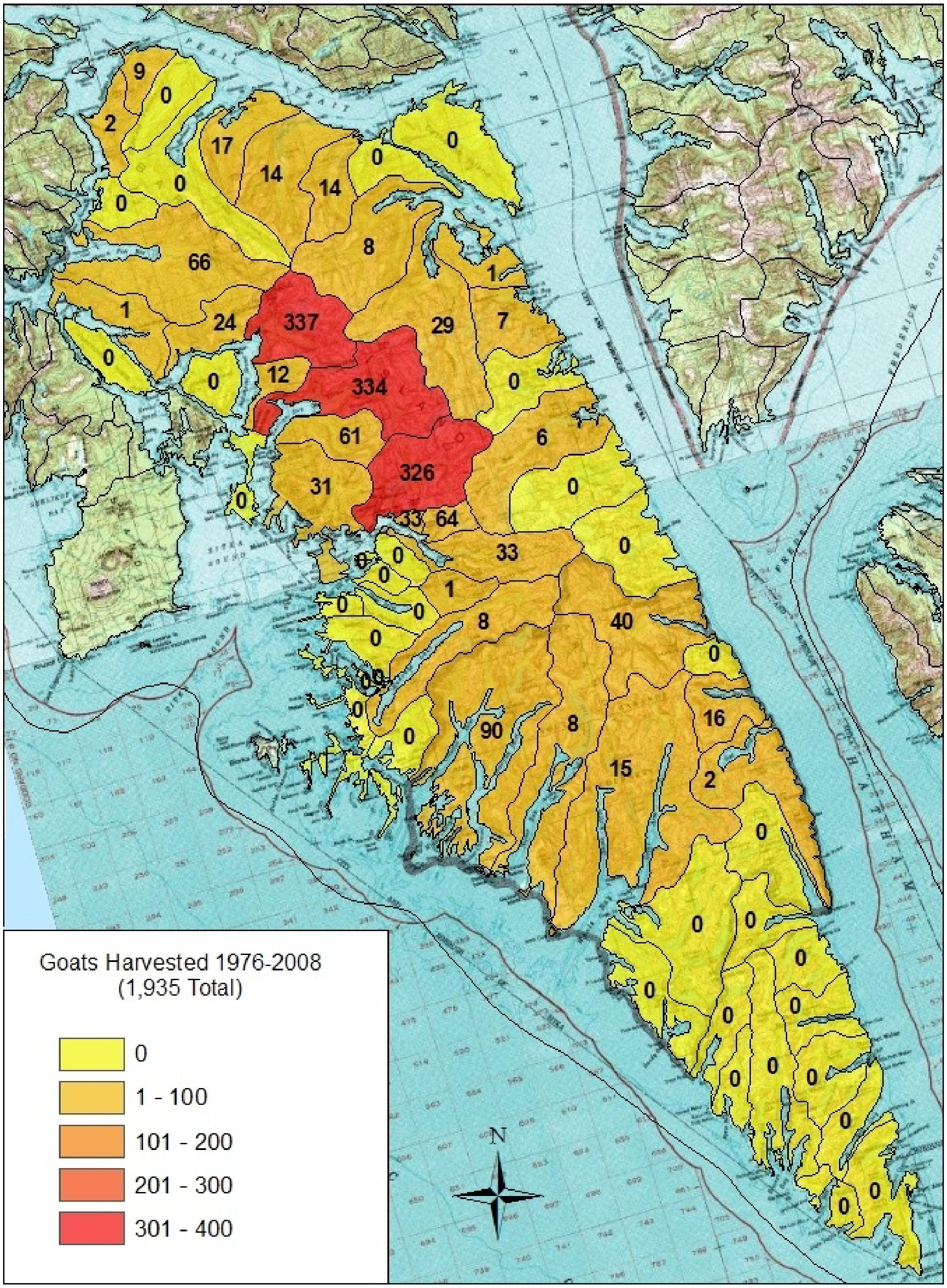


Figure 26. Baranof Island Historic Goat Harvest 1976-2008 (ADF&G unpublished data)

Figure 26 shows historical harvest of goats in Unit 4, by subunit and demonstrates the importance of the central part of the island to goat harvest, which includes the Blue Lake watershed.

The Sitka Tribe of Alaska has been allowed a spring harvest of 3 goats since March 2004 for subsistence and traditional use (P.Mooney, pers. comm 2008). There is no record of goats harvested in the Blue lake area under this program.

Sitka Black-Tailed Deer

While few Sitka black-tailed deer were observed during the surveys, pellet counts and other methods suggested healthy populations of deer in the Blue Lake watershed, relative to available habitat. The primary limiting factor for deer in the study area was deemed to be lack of preferred habitat. The potentially-inundated area is not considered ideal deer habitat and populations there are currently low.

Deer harvest data is available for larger areas but is not broken down by watershed. From personal communication with hunters, the study area is important for a few hunters but the majority of deer harvest in Unit 4 is in other areas of easier access and higher deer density. Most hunting pressure in the Blue Lake area is for mountain goats.

Least observed among large mammals were brown bears. Only brown bears occupy the Project area. While rarely seen, they are considered to be relatively abundant in the Project area, particularly in the slopes above Blue Lake. There is limited brown bear hunting within the Project area.

None of the large mammals in the Project area are species of concern relative to abundance or habitat needs.

Small Mammals

Forest Deer Mouse	*Peromyscus keeni*
Common Shrew	*Sorex cinereus*

Both of these small mammal species are known to be common in southeast Alaska, although there is some confusion as to their status.

Furbearers

Four furbearer species were identified during the Bovee surveys. Red squirrel is included in this category, although they are not normally used for fur.

Red Squirrel	*Tamiasciurus hudsonicus*
Marten	*Martes americana*
Mink	*Mustela vison*
River Otter	*Lontra canadensis*

Among these species, the red squirrel was by far the most common. They were particularly abundant in forested areas and near Project roads. Next most abundant among furbearers was the marten. Sign from several martens were seen, primarily in forested areas in the Blue Lake study area. Mink sign was relatively rare in the study area, with most observations made near Sawmill Creek. Two river otters were seen, in the lower areas of Sawmill Creek.

Raptors

Bald Eagle	*Haliaeetus leucocephalus*
Northern Saw-whet Owl	*Aegolius acadicus*

The most abundant raptor was the bald eagle. Several sightings were made in the upper end of Blue Lake. Bald eagles are notably common throughout the Sitka area. The saw-whet owl was noted in response to an owl call; no individuals were sighted. Several unconfirmed sightings of raptors thought to be goshawks were made, but not entered because of a lack of assurance of identification.

Songbirds

A total of at least 22 songbird species were observed during the 2004-2005 wildlife surveys. More detailed descriptions of relative abundance and habitat use are in Bovee (2006, 2010).

Songbird Common Name	***Scientific Name***
Wilson's warbler	*Wilsonia pusilla*
yellow-rumped warbler	*Denroica coronata*
black-capped Chickadee	*Poecile atricapilla*
common raven	*Corvus corax*
Steller's Jay	*Cyanocitta stelleri*
northwestern crow	*Corvus caurinus*
swallows of unknown species	
pine siskins	*Carduelis pinus*
common redpoll	*Carduelis flammea*
dark-eyed junco	*Junco hyemalis*
fox sparrow	*Passerella iliaca*
song sparrow	*Melospiza melodia*
Swainson's thrush	*Catharus ustulatus*
hermit thrush	*Catharus guttatus*
varied thrush	*Ixoreus naevius*
American robin	*Turdus migratorius*
winter wren	*Troglodytes troglodytes*
brown creeper	*Certhia americana*
cedar waxwing	*Bombycilla cedrorum*

golden-crowned kinglet	*Regulus satrapa*
red-breasted sapsucker	*Sphyrapicus ruber*
northern flicker	*Colaptes auratus*
rufous hummingbird	*Selasphorus rufus*

Among songbirds, warblers and chickadees were the most common. Exact species identification was difficult for most of these sightings. Next most common among songbirds were ravens, followed by swallows of undetermined species. The remaining songbirds on the list were either sighted infrequently, or identified by sign.

Shorebirds

American Dipper	Cinclus mexicanus
belted Kingfisher	*Ceryle alcyon*
common snipe	*Gallinago gallinas*
spotted sandpiper	*Actitis macularia*

All species of shorebirds observed, except for common snipe, appeared often in the surveys. Dippers were common along Sawmill Creek, as were kingfishers. Sandpipers were often seen near the Blue Lake shoreline.

Waterfowl

marbled murrelet	*Brachyramphus marmoratus*
trumpeter swan	*Cygnus buccinator*
ring-necked duck	*Aythya collaris*
Canada goose	*Branta canadensis*
bufflehead	*Bucephala albeola*
glaucous-winged gull	*Larus glaucescens*
herring Gull	*L. argentatus*
mallard	*Anas platyrhynchos*
harlequin duck	*Histrionicus histrionicus*
Barrow's goldeneye	*Bucephala islandica*
common merganser	*Mergus merganser*

Among waterfowl species, trumpeter swans were the most common, seen regularly on or near Blue Lake in the winter months. Other species, including ducks and mergansers were seen frequently. The ring-necked duck and marbled murrelet are species of concern based on recent classifications of rarity.

5.8.3 Environmental Impacts and Recommendations

5.8.2.1 Construction-Related Effects

The primary construction-related disturbance would be from the logging operation during timber removal prior to inundation, principally in the Blue Lake Creek valley but also along the lake shore. This disturbance would affect deer, bear, marten, small mammals, waterfowl, and possibly goats, depending on the time of year of the activity.

In the dam/intake area, blasting noise might cause short-term disturbance to wildlife in the immediate and adjacent areas and possibly to goats on nearby hillsides one to 2 miles away. No bears are known to inhabit the dam/intake area.

In the powerhouse area, construction-related effects would be slight because the area is currently industrialized and often visited by Blue Lake Project workers, hunters, fishers and other recreationists. Blasting and excavation work might disturb bears seeking to visit Sawmill Creek during the salmon spawning period, but numbers of such bears have been historically small. Deer are uncommon in the powerhouse area and those in the area have habituated to human activity. There are no known goat populations in the area, or within the effects of blasting or excavation noise.

The City proposes to prepare a Wildlife Disturbance Avoidance plan after approval of the Expansion final design and construction schedule. This Plan will seek to determine how wildlife disturbance might best be minimized, primarily through accommodations in seasonal and daily work scheduling.

5.8.2.2 Effects due to Long-Term Operation

Inundation Effects

The most obvious effect due to the project will be the loss of forested habitat and its eventual flooding. This habitat consists mostly of spruce-hemlock forests and steep non-forested areas, such as slide zones and rock (Figure 27, Table 12).

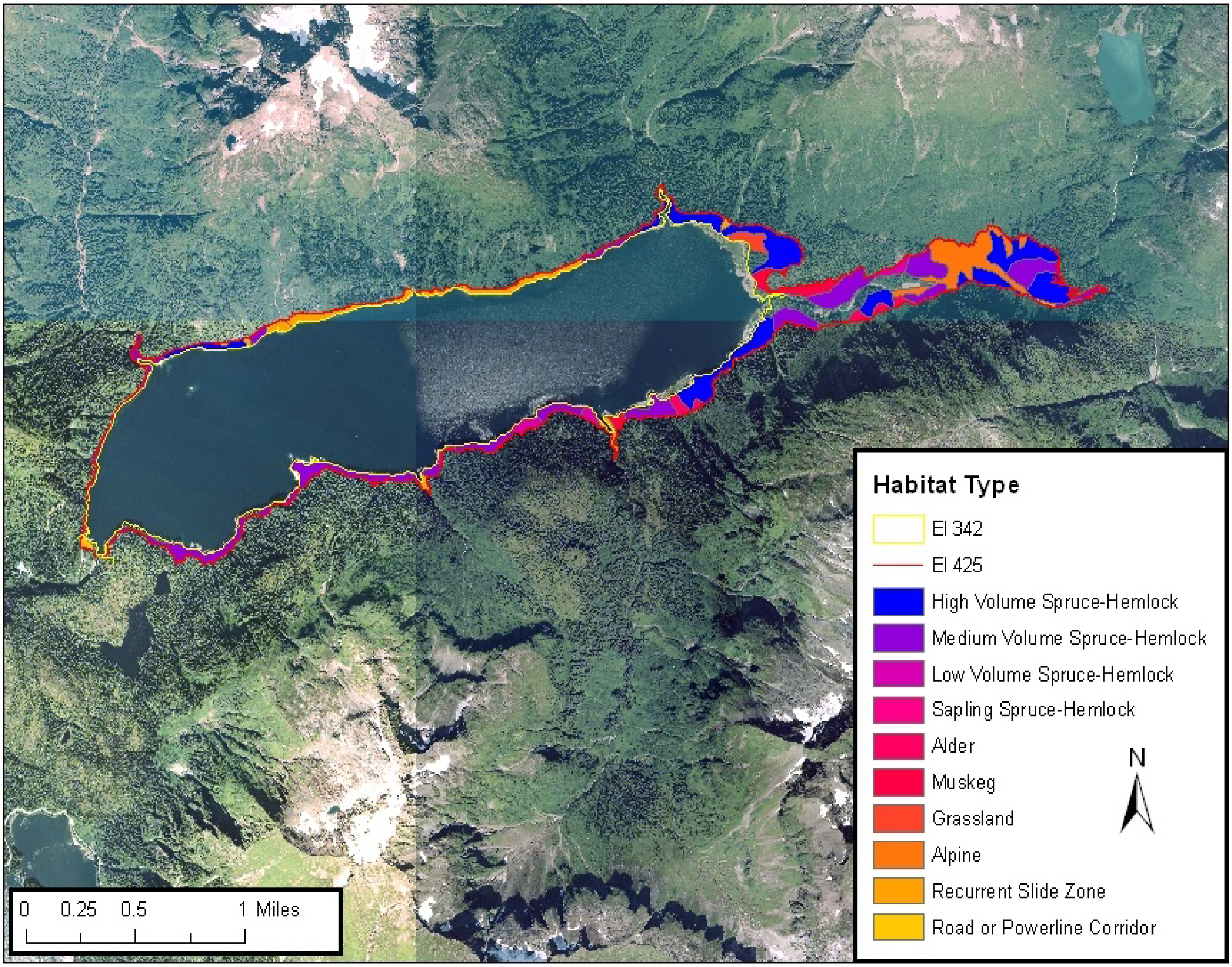


Figure 27. Blue Lake Project Area, Habitat Type within the Inundation Area, Blue Lake Expansion Project

The inundation area would result in loss of an estimated 318 acres (1.4%) from the 22,628 acre watershed. The expected habitat loss by habitat type due to inundation is presented in the vegetation section, above. The greatest impact to loss of wildlife habitat would be the 20.3 percent reduction in High Volume Spruce-Hemlock forest. This habitat is thought to consist of Highly Productive Old Growth (HPOG). The 9.1 percent reduction of Medium Volume Spruce-Hemlock would consist most likely of Productive Old Growth (POG). However, in both of these habitat types, the value to wildlife is reduced due to the lack of south facing aspect, absence of salmon streams, and great distance to the ocean.

Table 12. Acres by Habitat Type for Entire Watershed, Inundation Area, and % Reduction, Blue Lake Expansion Project

	Watershed		Inundation		
Habitat Types	**Acres**	**Percent loss**	**Acres**	**Percent loss**	Percent Reduction
High Volume Spruce-Hemlock	505.1	2.2	102.7	32.3	20.3
Medium Volume Spruce-Hemlock	1201.3	5.3	109.0	34.3	9.1
Low Volume Spruce-Hemlock	277.3	1.2	12.0	3.8	4.3
Muskeg	201.9	0.9	13.5	4.2	6.7
Alder	179.5	0.8	8.8	2.8	4.9
Grassland	5.9	0.0	5.9	1.9	100.0
Recurrent Slide Zone	4149.9	18.3	28.2	8.9	0.7
Alpine, Rock, and Ice/Snowfield	16101.2	71.2	36.0	11.3	0.2
Road or Power Line Corridor	6.2	0.0	2.1	0.6	33.3
Total	22628.3		318.1		

Nevertheless, this will certainly reduce the carrying capacity for deer, marten, owls, forest birds and small mammals within the watershed. Other wildlife, such as brown bear and waterfowl, would be affected too, but to a lesser degree. Waterfowl that feed, rest and possibly nest along the estuary shoreline would certainly be displaced during construction and the inundation years but after several years of new lake levels it is believed that similar habitat would become available to waterfowl again. One exception to the effect on waterfowl would be the Harlequin Duck. Bovee (2006, 2010) found that one pair of Harlequin Ducks would typically use Blue Lake Creek valley to raise young and this habitat would be permanently lost.

Although the effect of this project on goats is unclear, it does present a significant possible impact to wildlife, both from potential habitat loss, as well as, increased hunter access, thus increased harvest level. It is currently unknown whether goats use the valley bottom or margins as overwintering habitat and dispersal corridors, but it is suspected, based on documented goat behavior in southeast Alaska that goats utilize lower elevations in late winter and spring, particularly when snow conditions in higher elevations reduce food supplies. This habitat is typified by south-facing, forested slopes adjacent to steep escape terrain which is common in the study area along the northern lake shore and Blue Lake Creek valley. There is also concern that flooding the upper valley will restrict dispersal of goats from one ridge complex to another and limit genetic diversity.

General observations of sign during Bovee's 2008 summer and fall surveys did not show evidence of goat utilization in the Blue Lake Creek valley bottom, but there were no direct observations during the late winter and spring periods.

The City proposes to conduct, in association with ADF&G Wildlife Division, aerial surveys of the Blue Lake Creek valley during winter and spring of 2010. These surveys will be based on radio-tagging goats which might be likely to migrate into the valley, and tracking those goats throughout the wintering period.

Effects of Increased Access

Another Expansion-related effect on wildlife is expected to be associated with increased boat access on Blue Lake, affording easier access to goat hunters traveling to the Blue Lake Creek basin. Numbers of hunters accessing that area are currently limited by difficulty of access to the boat launching area near the terminus of the Blue Lake access road. With higher lake elevations in late summer and fall, it would be possible for all boats, particularly those with larger motors, to reach the launch area, even using two-wheel drive vehicles. Increased hunting pressure on goats accessible from the Blue Lake Creek valley might reduce goat populations or discourage them from using the valley in favor of nearby areas with less hunting pressure.

The City proposes to modify the existing Reservoir Management Plan to implement measures including, but not limited to: 1) limiting launch facilities; 2) outboard motor size restrictions; 3) parking limits and others, as determined during Stakeholder consultation. As discussed in the Water Quality section, recreational access to Blue Lake has not been encouraged or facilitated in the past due to the Lake's use as Sitka's drinking water supply. Future Reservoir Management measures, in addition to those limiting rcreation access, must also address drinking-water issues.

5.9 THREATENED AND ENDANGERED SPECIES

5.9.1 Affected Environment

Only two animal species are federally listed as threatened or endangerd, the Steller Sea Lion and the humpback whale. Both of these species reside within the marine areas of Sitka Sound and Silver Bay.

5.9.2 Environmental Impacts and Recommendations

No issues relative to impacts to these species were raised during initial consultation or Scoping for the Expansion. Prior to the final application for the Expansion license amendment, the City will determine which party, among the City or various resource agencies, will prepare a Biological Evaluation (BE) documenting federally-listed species within an area of potential effect. This effort will involve formal consultation among the City, USFS, USFWS and NMFS.

5.9.2.1 Construction-Related Effects

At this time, no construction-related effects are expected on threatened or endangered species. Contruction-related effects on water quality and fisheries, described in those sections of this document, will assure that there would be no negative effect on the marine environments occupied by the two listed species.

5.9.2.2 Effects due to Long-Term Operation

At this time, no effects due to long-term operation are expected on threatened or endangered species.

5.10 CULTURAL RESOURCES

5.10.1 Affected Environment

Three recent cultural resource investigations have been conducted in the Project Area: 1) The Blue Lake Road was surveyed by Charles Mobley (n.d.), 2) the campground area and site locations along the Sawmill Creek drainage were surveyed by Campbell Rabich (1989), and 3) cultural resources in the Project area were surveyed in 2005 and 2008 by Paul Rushmore of PaleoLogics, Wrangell Alaska, (Rushmore, 2005, 2009.) Mr. Rushmore's studies included a literature review (including the sources cited above), consultation with the STA, USFS and ADNR, State Historic Preservation Officer (SHPO) and field surveys within the Area of Potential Effect (APE), defined by the Project Boundary.

Rushmore's 2009 studies expanded on the APE from the 2005 surveys to include all lands within the potentially-inundated areas around Blue Lake, including lakeshore and tributary stream valleys, most extensive of which was the Blue Lake Creek valley at Blue Lake's east end.

During consultation, USFS raised the issue of a corduroy road built in 1898 to access the Pande Basin mine from Blue Lake. Prior to the 2008 fieldwork, a review of Alaska Heritage Resource Survey (AHRS) records and atlases at the Office of History and Archaeology (OHA) documented segments of this corduroy road. The OHA assigned this site the AHRS record number, SIT-733.

During the 2008 field surveys, the road was walked on documented on a base map of the area (Figures 28 and 29). Further consultation with USFS and SHPO indicated that this road does not qualify for inclusion on the National Register of Historic Places (National Register). Neither the 2005 nor the 2008 surveys found any areas around Blue Lake which would be eligible for inclusion on the National Register.

For the 2005 surveys, STA conducted interviews with tribal members. Results of the interviews indicated that certain traditional uses, primarily fishing and berry gathering, were impacted by construction of the APC mill and the Blue Lake Project. The interviews did not indicate Project-related impacts on or conflicts with known cultural sites, artifacts or other cultural/historical values known to the interviewees. Prior to the 2008 literature and field surveys, Paleo Logics informed STA of the archaeological survey project. STA had no additional concerns regarding the Project beyond the 2005 testimonies

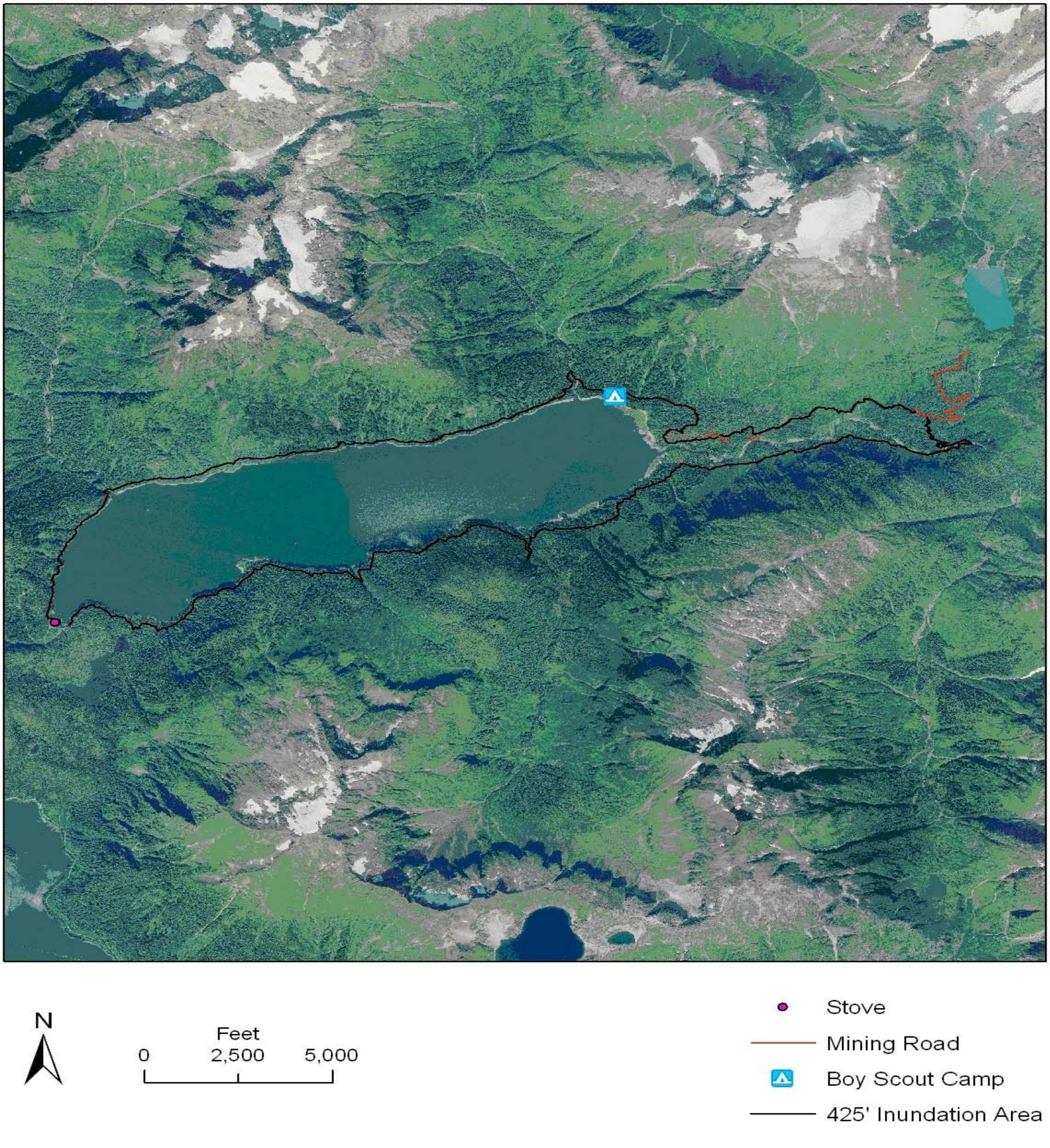


Figure 28. Blue Lake Project map Showing Bande Basin Mining Road Location

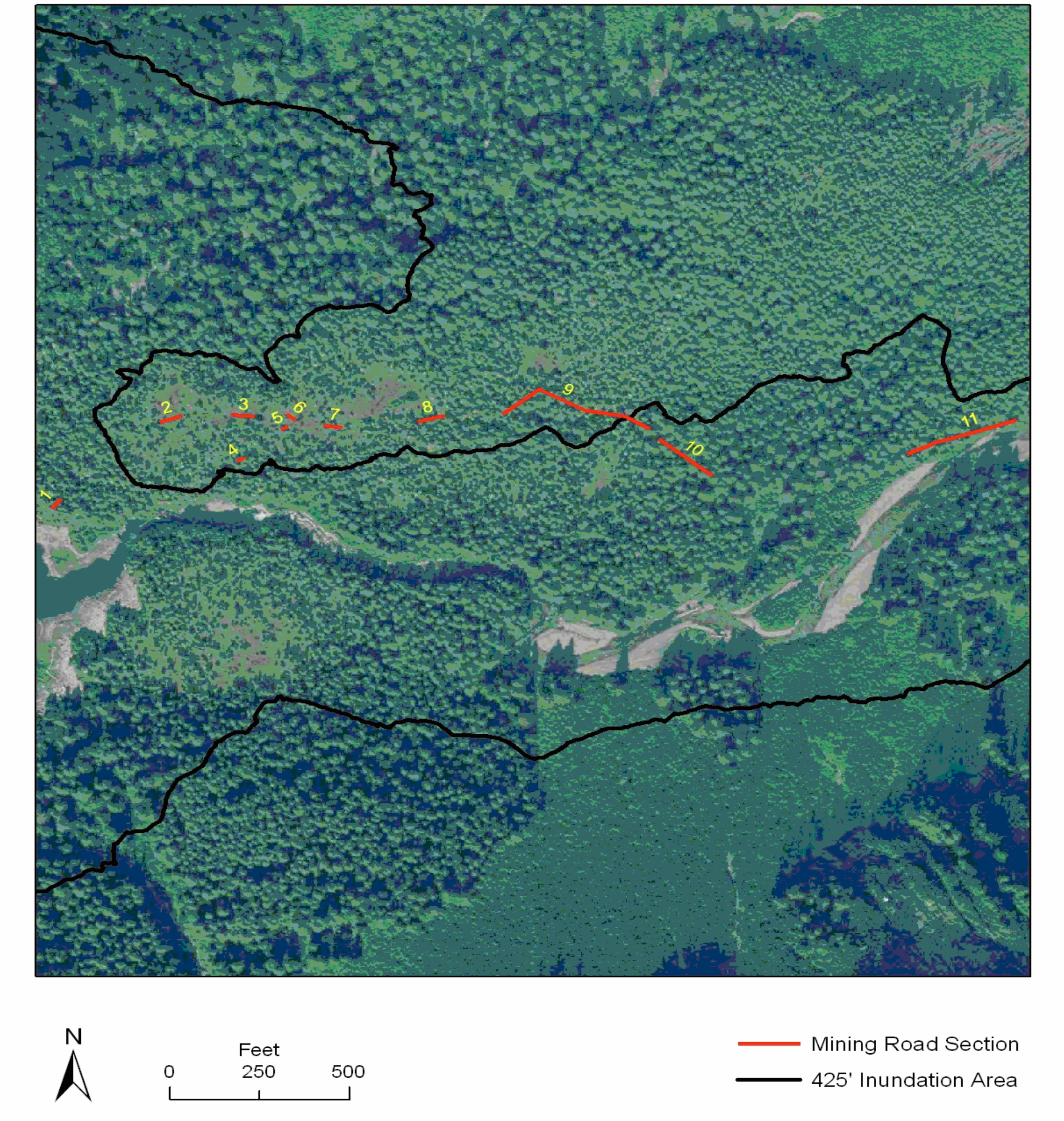


Figure 29. Detail of Bande Basin Mining Road Relative to Reservoir at El 425

The following descriptions of cultural resources in the APE are from Rushmore, 2005, with modifications from more recent studies, including Rushmore, 2009.

5.10.1.1 Alaska Native History

Information collected from Goldschmidt and Haas (1946) and STA suggests that at the time of European contact members of the Kiks'adi clan of the Sitka Tribe had possession of Silver Bay and surrounding drainage systems, though no village sites are reported in the Project area.

With European contact in the late 1700s came the introduction of metal, guns, and contagious diseases, all of which had a significant effect on Native Alaskans. Smallpox was the greatest killer, first brought to the Tlingit by the Spanish in 1775. The greatest epidemic in Southeast Alaska was that of 1835-38, the disease spreading northward from California along the Northwest Coast affecting Alaska Natives well into the interior, on the Aleutians, and on the Arctic coast (de Laguna, 1991:361). Typhoid fever raged in 1819, 1848, and 1855 (Krause 1956:103). Smallpox was reintroduced in 1862 to the Tlingit as the miners began to move through their traditional territories.

As a result of European contact and rapid population decline from introduced diseases, traditional Tlingit settlement patterns and culture underwent fundamental change in the early 19th Century. Tlingit groups abandoned many traditional village and subsistence sites in favor of locations where trade goods were more available after the establishment of Russian forts and trading posts at Sitka in 1799 and at Wrangell in 1834. After destroying the Russian fort at Saint Archangel Michael in 1802, the Sitka Tribe was forced by the Russians to leave the area in 1804. The tribe was invited to resettle near New Archangel (Sitka) in 1822 (Krause 1956).

After the purchase of Alaska by the United States in 1867, a dramatic change occurred again in the lives of the Sitka Tlingit with the nonnative development of a substantial mining effort around Indian River and Silver Bay, followed closely by the fishing and timber industry (Selkregg 1976). As these industries developed, clan and tribal rights to their traditional territories became tenuous at best.

5.10.1.2 Mining History

Mining activity in the Silver Bay area includes historic mines, prospects, and mineral occurrences around Silver Bay itself, as well as properties east of Sitka in the Indian River basin. Prospecting for gold in the area began around 1871 and continued on a sporadic basis well into the 1990s.

The nearest mining claim to the APE is called Pande Basin, also known as Glacier Lake Placer, which is owned by Pande Basin Gold Mining Company. The claim itself is outside of the APE, though portions of the corduroy road (described above) used to access the mine sites are in the APE.

5.10.2 Environmental Impacts and Recommendations

5.10.2.1 Construction-Related Effects

Construction related effects would most likely occur in the dam/intake area and in the powerhouse area due to land clearing for access roads, staging areas and installation of new project features. Rushmore's 2005 and 2009 surveys in these areas, while limited, revealed little potential for occurrence of historic properties. In the powerhouse area, essentially all lands which might be affected by construction have been previously disturbed. In the dam/intake area, disturbance will be primarily in areas not thought to have been used by Native Americans or by early Sitka inhabitants.

Prior to and during construction in all Project areas, however, the City will ensure, through implementation of a Cultural Resources Monitoring Plan, that workers be aware of cultural resources which might be disturbed by iminent land clearing or other construction activities. If resources are encountered, the Construction Superintendent will contact USFS, Sitka Ranger District (the responsible agency with offices nearest the construction site) and report the situation.

5.10.2.2 Effects due to Long-Term Operation

The primary long-term effects would be due to inundation in the Blue Lake Creek valley and around the lake margins. As described above, parts of three segments of the corduroy road used to access the Pande Basin mine fall within the APE, and would be inundated due to the dam raise. These segments, however, were not eligible for listing on the National Register.

Regarding all other potentially-affected cultural resources in the APE, Rushmore, 2009, made this statement:

"The results of an intensive archaeological survey of the proposed Blue Lake Project Expansion as currently described in City and Borough of Sitka 2008 Scoping Document 1 (SD1) should be considered to have no effect on any properties listed on or determined eligible for listing on the National Register of Historic Places. No significant cultural resources were recorded for the Blue Lake shoreline, basin, and dam site area (Upper APE), and the areas proposed for the turbine, tunnel, and surge chamber (Lower APE). A determination of "No Historic Properties Affected" is recommended by Paleo Logics."

5.11 RECREATION RESOURCES

5.11.1 Affected Environment

Recreation resources in the Blue Lake Project area are diverse, but, at present, not well documented. The major recreation activities are hiking, hunting, fishing and camping during the spring, summer and fall months.

5.11.1.1 Sport Fishing

Sport fishing is popular on both Blue Lake and Sawmill Creek, with Blue Lake offering the greater recreational opportunity. The Blue Lake/Sawmill Creek system offers perhaps the most accessible fresh water sport fishery to Sitka area residents, although access difficulties probably reduce overall recreational use of these areas. Fresh-water sport fishing in the Project area is primarily done by local area residents; the area is not known to attract large numbers of out-or-region anglers, as does the Sitka area marine king salmon fishery.

Blue Lake reservoir offers excellent rainbow trout fishing, primarily by boat access. The Sport Fish Division of ADF&G conducts post-season surveys of area anglers. Blue Lake surveys from 1984 through 2003 that numbers of Blue Lake anglers ranged from 48 to about 536 per year. Rainbow trout harvest during these years ranged from 47 to 1116. Blue Lake rainbow trout populations, as discussed in the Fish Resources section, above, have remained relatively stable over the past ten years.

Rainbow trout fishing on Blue Lake is to some extent restricted by the lack of easy access, but, since Blue Lake is the City of Sitka's domestic water supply source, heavy recreational use is not encouraged through maintenance of access and boat launch facilities.

Sawmill Creek sport fishing effort is focused on steelhead in spring and early summer and king salmon in mid to late summer. Low steelhead populations in Sawmill Creek and difficult access to the most productive fishing areas limit the catch of this species. Only steelhead greater than 36 inches may be kept. Although no formal numbers are available, it is estimated (from BLU operator angler observations) that approximately 40 to 50 anglers harvest fewer than ten steelhead annually.

Sawmill Creek king salmon fishing has improved recently, due to liberalized early season fisheries for this species. As discussed in the Fish Resources section, above, Sawmill Creek king salmon populations are thought to be largely of hatchery origin and are not likely to spawn in Sawmill Creek, making them favored sport fishing target species.

Fishing for chum and pink salmon, while these species are periodically quite numerous, is not as intense as that for steelhead and king salmon.

5.11.1.2 Hunting

Sport hunting in the Project area is popular with Sitka area residents. Hunting for Sitka black-tailed deer is the most popular pursuit, although numbers of hunters for all big- and small-game and birds in the Project area are poorly known. Hunters use the Blue Lake road to provide access to black-tailed deer hunting, most frequently near the US Forest Service campground and Beaver Lake.

Deer hunting is also facilitated by the road to Blue Lake, the Blue Lake boat launch and subsequent access to shoreline areas. The area surrounding Blue Lake Creek, the primary inflow to Blue Lake in its extreme eastern end is good overwintering habitat for black-tailed deer, but hunting effort in the area is not well documented.

Deer hunting in the Project area is done under both sport and subsistence regulations (subsistence hunting numbers are discussed the section on that resource topic.)

Goat hunting is done primarily by accessing Blue Lake by boat and subsequent hiking to upslope areas of good goat habitat. Goat hunting, like black-tailed deer hunting, is done under both sport hunting and subsistence regulations.

Hunting for small game and birds, primarily snowshoe hare and ptarmigan, is also done in the Project area. Steep terrain and limited access restrict these activities which are done by more hunters in other areas.

5.11.1.3 Camping

Camping in the Project area is limited to the USFS campground (called "Sawmill Creek Campground") near the FVU. This area offers 11 campsites, restrooms and a parking lot. No RV hookups or other amenities are offered. The approximately 1 acre parking lot adjacent to the campground provides parking for day users and hikers.

While USFS does not keep detailed records of campground use at this location, it is estimated that approximately 1000 people per year use the campground. General usership consists of overnight campers using primarily tents, and to a lesser extent RV's, and day users seeking to picnic, hike nearby trails, or fish in Sawmill Creek or Beaver Lake.

Significant vehicular travel in the area appears to result from visitors simply driving to and from the campground without leaving their cars. This use may relate to sightseeing along the Blue Lake road which offers dramatic canyon views, and, at the Blue Lake overlook, an expansive view of the lake itself.

Within the area accessible to Sitka area residents and visitors, one other campground, the Starrigavin campground, which offers relatively easy road access. The Starrigavin campground provides for greater annual usership because of its easier access from the main Sitka road system.

5.11.1.4 Hiking

The USFS administers the Beaver Lake hiking trail which begins across the Sawmill Creek bridge from the Sawmill Creek campground. This 2 mile trail to Beaver Lake is a popular hiking destination. Hikers also use the Blue Lake access road for foot travel, especially when the road is seasonally closed to vehicular travel.

During 2004, the City and USFS began a use survey for the trail. Recording traffic counters were installed near the trailhead with the objective of determining number of hikers using the trail by season. Results of this monitoring survey were available in fall, 2006. Additional monitoring was conducted in 2009 as well.

In addition to the Beaver Lake traffic counters, the City also installed counters on the Blue Lake road to determine the number of hikers which use the road year around.

Environmental Impacts and Recommendations

5.11.2.1 Construction-Related Effects

The primary construction-related recreation effects, particularly at Blue Lake and at the Blue Lake Campground would be: 1) reduction in the recreation experience quality due to human activity and noise; and 2) temporary recreation access restrictions during the construction period. It is likely that the City will restrict access to the Blue Lake Overlook and any associated boat launching during construction at the dam, intake and staging areas. Vehicular or foot travel on the Blue Lake Access road may be restricted at certain times due to road modification or mobilization of heavy equipment. Detailed access restrictions in terms of time and place will not be known until the final construction schedule and directives have been developed and approved. Recreation access will be considered during development of the final schedules and access restriction plans.

5.11.2.2 Effects due to Long-Term Operation

The raised water level due to dam raising would significantly ease access to the Blue Lake waterline during all seasons. Relative to existing conditions, water levels both at maximum drawdown, expected in late-spring through summer, and those at maximum levels, expected in summer, fall and winter, would afford access to boat trailers and those carrying canoes or kayaks. Of particular interest in this respect would be access during the spring-summer periods when rainbow trout fishing is at its best, and during the later summer-early fall period when hunters, particularly those seeking mountain goats would launch boats to access the Blue Lake Creek valley and its extensive access into goat hunting areas. Without increased regulation of hunting and fishing in and around Blue Lake, recreation levels would likely to increase.

As noted in the wildlife section of this document, this increased access to goat hunters, related to Sitka's relatively large hunting population, might significantly increase the number of goat, and to a lesser extent, deer hunters in the area.

Finally, as a result of eased recreation access by boat, the overall number of Blue Lake users would be likely increase, with effects on Blue Lake's water quality. Detailed effects of this issue and potential changes in the City's Blue Lake Watershed Management Plan are discussed in the water quality section of this document.

The City seeks input on this issue from resource and land management agencies, including but not limited to, the City and Borough of Sitka, USFS, and ADF&G.

5.12 SCENIC AND AESTHETIC RESOURCES

5.12.1 Affected Environment

Blue Lake

Blue Lake is the central feature of an expansive viewshed which includes the lake itself, rugged mountains, steep forested slopes and waterfalls entering the lake. Also included, for those who travel to the eastern end of the lake is Blue Lake Creek valley, a lower relief forested area surrounding Blue Lake Creek, the lake's primary source of inflow.

Because of the very steep terrain around the lakeshore (except in the Blue Lake Creek valley) and dense vegetation, viewing Blue Lake is feasible only from a limited number of overlook or access sites, and from the surface of the lake itself. Blue Lake is drawn down approximately 60 feet each year as a result of hydroelectric power generation and municipal drinking water use. This drawdown leaves a "bathtub ring" of exposed, unvegetated lakebed which contrasts sharply with the forested areas above and the lake below.

Except for the effects of drawdown, Blue Lake offers a largely unimpacted scenic experience, with no habitation or industrialization. Aesthetics effects on Blue Lake would result primarily from the proposed raise in lake level and the "bathtub ring" associated with drawdown.

Sawmill Creek

Sawmill Creek begins below the Blue Lake Project dam and flows 2 miles to tidewater in Silver Bay. Almost all of the Sawmill Creek canyon is steep sided and heavily forested, and is viewed primarily from the Blue Lake Road which affords infrequent views from the inside of a car or from roadside pull offs. Scenic values in the Sawmill Creek canyon are in many areas quite spectacular, particularly when viewed from the stream itself. However, foot travel within the canyon is difficult and in some cases dangerous. Downstream from the base of the Project dam is the Sawmill Creek campground, a USFS managed facility near the north bank of Sawmill Creek. Except at the campground, Sawmill Creek is rarely accessed because of its extremely steep surrounding topography and the objective danger of using water craft.

In the lower reaches of Sawmill Creek are features of the Blue Lake hydroelectric project, including the penstock, powerhouse, tailrace and switchyard, and the Sawmill Creek Industrial Park (SCIP). The SCIP is industrialized for a distance of about ¼ mile. At the lower tunnel portal, the City's water treatment plant is a prominently visible feature. In all, lower Sawmill Creek from the powerhouse access bridge to tidewater is a heavily industrialized area with limited scenic and aesthetic values.

5.12.2 Environmental Impacts and Recommendations

5.12.2.1 Construction-Related Effects

At the Blue Lake dam and intake construction sites, heavy equipment and large work crews will be visible during the entire construction period. Noise from human and mechanical activity, as well as periodic blasting, will also reduce the aesthetic experience of the area, even as currently accessed by car. The City will probably restrict access to the site during the construction period for safety reasons, however. The overall aesthetic effect during the construction period, particularly at the dam/intake area, will be greater than that during long-term operation because of the need to widen roads and prepared staging areas. After construction, the City will follow provisions of a rehabilitation plan to reduce long-term scenic impacts and restore vegetation in specified areas.

Similar construction-related impacts will occur in the powerhouse area. Work crews and equipment will be visible and noise from equipment operation and blasting will be noticeable. Construction effects in this area, however, will be comparatively low because of the currently-disturbed nature of the area.

5.12.2.2 Effects due to Long-Term Operation

To address Expansion-related aesthetic impacts throughout the proposed area of the Expansion, the City conducted a scenic and aesthetic resource study based on the USFS aesthetics evaluation method (CBS 2009a and 2009b, USFS 1995). The study method involved noting initial values of the scenic environment as viewed from specific points designated in the Forest Plan. Near Blue Lake, this evaluation addressed scenic impacts as viewed from the Blue Lake Overlook and another overlook near the dam itself. In the powerhouse area, viewpoints from the Blue Lake Access Road were established.

In the Blue Lake area, the study evaluated the long-term effects of reservoir elevation raising and the operational "bathtub ring". Results showed that views from the Blue Lake Overlook, while changed in terms of overall water elevation, would not be significantly impacted (Figures 30 through 33). At full reservoir level, the quality of the views would be essentially the same as at present, with water intersecting the forested shoreline. At maximum drawdown, the visual effect of the "bathtub ring" would be slightly improved because Expansion-related operations would reduce the scale of the drawdown.

Figure 30. Blue Lake from Overlook, Water at El 342

Figure 31. Blue Lake from Overlook, Dam at El 342, Drawdown to El 270

Figure 32. Blue Lake from Overlook, Dam at El 425

Figure 33. Blue Lake from Overlook, Dam at El 426, Drawdonw to El 365

Scenic effects in the Sawmill Creek canyon and below were to be noted from a position on the Blue Lake Road, and involved primarily the powerhouse area. Here, it was noted that effects would be significant during construction but that long-term effects, after removal of existing Project elements and installation of the new powerhouse, with associated landscaping and revegetation, would be essentially neutral.

5.13 SUBSISTENCE RESOURCES

5.13.1 Affected Environment

Section 810 of the Alaska National Interest Lands Conservation Act (ANILCA) of 1980 requires an evaluation of effects to subsistence hunting, fishing, and gathering resources and the subsistence lifestyle for any project that uses federal public lands. Subsistence uses in the Project area include hunting, fishing, berry and other botanical gathering, and taking of certain shellfish.

5.13.1.1 Subsistence Status of the General Area

ANILCA created a preference for rural Alaska residents who use subsistence resources on federal public lands. Within the Blue Lake Project area, the USFS, ADF&G and USFWS regulate various aspects of subsistence hunting, fishing and gathering, depending upon the resource and location.

The USFS controls subsistence hunts on its lands and is the only federal land manager involved in the project area. The Alaska Department of Fish and Game (ADF&G) controls hunting by urban, non-resident, and other non-rural hunters on these same lands and on any other land where hunting is allowed.

5.13.1.2 Federal Public Land Affected

Federal public land is land owned by the federal government that is open to the public and unencumbered by overlying selection by the State of Alaska or by Native corporations formed under ANILCA. All lands owned or operated by the federal government in the Blue Lake Project area are administered by USFS, Sitka Ranger District, Tongass National Forest. The total area of federal public land within the Project Boundary is about 812 acres.

5.13.1.3 Subsistence Communities and Their Resource Use Areas

The nearest community, Sitka, is approximately 5 miles north of the Project Area. Sitka is a traditional subsistence community as defined by ANILCA or designated by the ADF&G, Board of Fisheries or Board of Game. This classification is currently being reviewed because Sitka's population may increase beyond the level specified in ANILCA.

In 1996, the ADF&G Division of Subsistence, in cooperation with STA, conducted a household subsistence survey in Sitka (among other southeast communities) to determine the fish, game and other resources used by subsistence users in the community (ADF&G,

1997). The survey showed that almost every Sitka household (97 percent) used at least one species of subsistence resources.

Based on the sample, it is estimated that more than 1,746,463 pounds of wild resources were harvested by Sitka households from February 1, 1996 through January 31, 1997. Overall, the average Sitka household used 572 pounds of wild resources in the survey year, or about 205 pounds per person.

Fish contributed the major portion of the usable weight harvested (55 percent), while land mammals contributed almost 25 percent, marine invertebrates contributed 13 percent and vegetation contributed 3 percent (Table 13).

Table 13. Estimated Total Subsistence Harvests of Wild Resources, Sitka, by Resource Category, February 1996 - January 1997 (Pounds of Usable Weight)

Subsistence Resource	Total Pounds Harvested	Mean Pounds Per Household	Pounds Per Person
Fish	953,206	312	112
Land Mammals	434,971	142	51
Birds and Eggs	5,068	1	0.6
Marine Invertebrates	234,496	76	27
Marine Mammals	62,358	20	7
Vegetation	56,362	18	6

5.13.2 Environmental Effects and Recommendations

5.13.2.1 Changes in Resources, Habitat, or Competition for Resources

The primary effect on these factors would related to inundation of the Blue Lake Creek valley. While it is unknown exactly how many subsistence users visit the valley, it is known to offer fishing, hunting and trapping opportunities to non-subsistence users, and is likely used by subsistence users as well. Habitat losses would include those for goats, primarily during the overwintering period, waterfowl and furbearers. Loss of riparian habitat and the stream character of the Blue Lake Creek during a substantial portion of the year would cause competition of these habitat resources in the remaining unaffected areas on the valley.

No changes are expected to occur to fish populations in Blue Lake.

5.13.2.2 Changes in Resource Availability due to Alteration in Migration Pattern or Location

There is no known major migration pattern in the area for terrestrial wildlife. Mountain goats are known to move from basin to basin but these movements are not considered migratory. Migratory waterfowl are known to use the existing Blue Lake Creek delta area, but it is unlikely that, after construction is complete, there would be reductions in areas for waterfowl resting.

5.13.2.3 Physical or Legal Barriers to Accessing Resources

The current barrier to access to Blue Lake is the difficulty in launching boats because of conditions at the Blue Lake access road. As discussed in various sections above, access after the dam raise would be significantly eased because the water level would be higher and boat launching possible using only two-wheel drive vehicles. Access to non-powered craft would also be easier because of the carry distance.

5.13.2.4 Cumulative Impacts on Federal Land

Cumulative impacts of relicensing on subsistence activities would be the same as impacts described in the Cumulative Impacts Section. Generally, if the City's final recommendations improve access or usability of locations in which hunting, fishing and gathering are done, it is expected that relicensing will offer an overall improvement to subsistence users. No individual or cumulative impacts are expected.

5.14 LAND USE

5.14.1 Affected Environment

Land ownership and management within the Project area is complex, particularly in or near the primary transmission line route as it nears the community of Sitka. Generally, however, land ownership in the Project area falls within three major categories: 1) US Forest Service, Tongass National Forest lands; 2) City and Borough of Sitka lands, 3) University of Alaska and Sheldon Jackson University lands, and 4) lands in private ownership (Figure 34) In the Sawmill Cove Industrial Park, various land parcels are leased to industries operating in the Park, including, at the time of this document, the True Alaska Bottling Company, Baranof Frozen Foods, Fortress of the Bears, Silver Bay Seafoods, Sitka Bike and Hike, and Theobroma Chocolate Company.

Land use in the Project area generally follows the major ownership categories listed above. Tongass National Forest lands are managed under the Tongass Land Use Plan (TLMP) Lands under City ownership are used for power generation, water supply and commercial and industrial purposes, each administered by various City offices and departments. Among land use changes which might affect the amendment process is the NSRAA fish hatchery constructed within the SCIP.

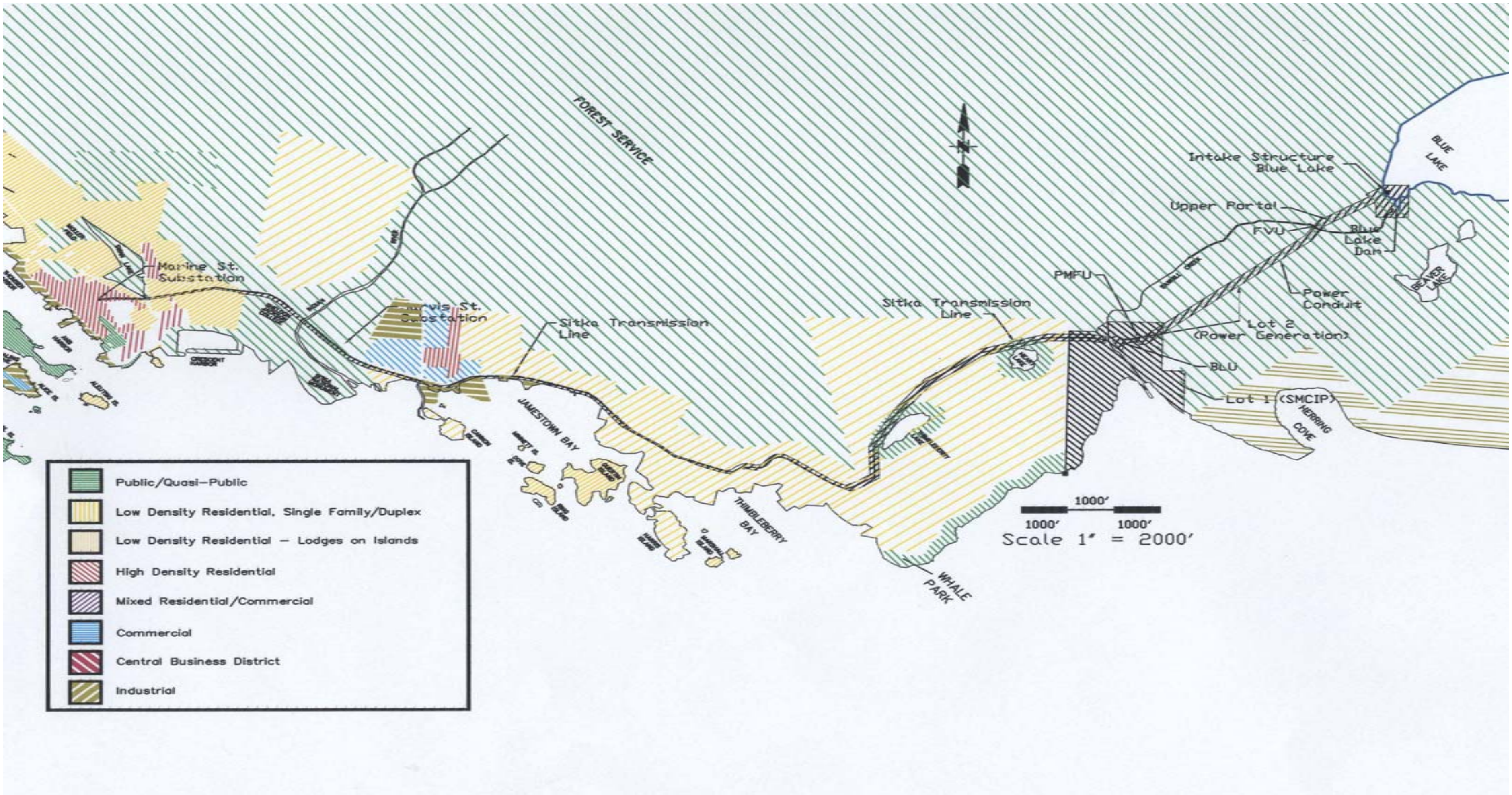


Figure 34. Land Use Designations within Blue Lake Project area.

5.14.2 Environmental Impacts and Recommendations

No significant land use changes are expected as a result of either construction or long-term operation of the Blue Lake Project Expansion.

5.15.1 Affected Environment

The Sitka economy and population size is considered stable at the time of this application. Recent additions in the fish processing industry and other small business both in the City and at the SCIP have brought some new jobs and associated services to the area. The economic downturn has caused an estimated loss of about 158 jobs in the area, with an overall unemployment rate increased from 4.3% to 7.9%.

In terms of energy costs, Sitka enjoys one of the lowest electrical energy rates in Alaska, with charges averaging about nine cents per kilowatt hour. A major purpose of the Expansion is to avoid large increases in these very favorable rates which would result if future load growth had to be met with diesel generation.

5.15.2 Environmental Impacts and Recommendations

5.15.2.1 Construction-Related Effects

Construction-related effects of the Expansion will be primarily from increases in local workforce necessary to construct the Project features and local goods and services necessary to maintain that workforce. The City believes that the overall average workforce would be around 60 workers, including skilled and unskilled job categories.

Also expected during the construction period would be an incremental increase in local economy from direct provision of parts and material for equipment maintenance, fuel, and certain hardware directly related to Project construction. Much of the heavy equipment needed for construction will have to be barged to Sitka, temporarily increasing the need for barge services, dockage and storage. Total input to the Sitka economy from construction is difficult to estimate at this time, but will be better known as final design, construction schedule, mobilization needs and workforce become available before the final amendment application

5.15.2.2 Effects due to Long-Term Operation

Long-term effects of the expansion would relate primarily to stabilization of electrical energy costs. While electricity rates would rise in Sitka over present levels due to financing costs for the Expansion, over the long term, costs would be substantially reduced because the Expansion's increased hydroelectric generation would preclude use of diesel generation and its associated costs to ratepayers. Over the term of the existing Blue Lake license, it is estimated that the Expansion would save ratepayers nearly $5,000,000 per year in comparison to electrical costs if the Project were not built and diesel generation was used to meet expected electrical energy needs (See Developmental

Analysis Section, following). These savings would relate to about $1,700 per year savings for the average residential electrical customer and $6,700 per year for the average commercial electrical customer in Sitka. Increased electrical energy costs have been shown to affect all economic sectors in small Alaskan communities which are isolated from other generating resources.

6. DEVELOPMENTAL ANALYSIS

6.1 POWER AND ECONOMIC BENEFITS OF THE PROJECT

As stated in the Purpose and Need Section of this EA, The City's recent electrical load forecasts show a marked increase in electrical demand in the near future, based increased fuel costs in Sitka and construction of high energy-need industries in Sitka. Under these conditions, the City predicts an increase in expensive and polluting diesel generation within a few years unless hydroelectric generating capacity is increased.

The Expansion's additional generating and water storage capacity, in addition to increased hydraulic head, would result in an additional 32,000 megawatt hours (MWh) per year of hydroelectric-generated energy per year, over that generated by the existing Project. If this amount of energy were generated using diesel generators, at $0.35/kWh, instead of by Expansion related hydro generation, the additional cost would be about $4,160,000 per year, or $124,800,000 over the 30-year term of the existing FERC license. This differential cost would be passed directly to the Electric Department's rate payers.

6.2 COST OF ENVIRONMENTAL MEASURES

The City has not yet begun development of proposals to Protect, Mitigate and Enhance resource values (PM&E Measures). Likely PM&E measures would include:

- Implementation of Erosion and Sediment Control measures to avoid effects on water quality and aquatic resources during construction, including rehabilitation and revegetation prescriptions;
- Modification of the City's Watershed Management Plan to address concerns about increased access related to higher lake levels;
- Implementation of construction schedules to avoid wildlife and recreation disturbance;
- Installation of new recreation facilities or improvements in existing recreation areas including campgrounds and picnic areas;
- Installation of interpretive signing near recreation areas;
- Recreation facilities including trail building and maintenance in the Sawmill Creek basin.

Costs for these proposals would necessarily await development of an approved list of measures for inclusion in the final amendment application.

7. RECOMMENDATIONS OF FISH AND WILDLIFE AGENCIES

No recommendations or terms and conditions have been received from resource agencies or other stakeholders at this time. Negotiations leading to these conditions will begin during the review period for this draft application, and will continue through the issuance of the amendment and development of amendment articles and conditions.

8. CONSISTENCY WITH COMPREHENSIVE PLANS

The following five comprehensive state and federal management plans were identified as relevant during the Blue Lake Project relicensing.

8.1 CITY OF SITKA COMPREHENSIVE PLAN (CSCP). CITY AND BOROUGH OF SITKA

Applicable provisions of the CSCP are found in Section 2.2, regarding Electrical Infrastructure. Subsections 2.2.3 and 2.2.4 address energy projects in general and, in some instances, hydroelectric power because of its economic and environmental advantages over diesel generation, as follows, in quotes:

2.2.3 To select system improvement projects as follows:

- The highest priority will be accorded to those projects, which are deemed most essential to system safety and security;
- The next highest priority will be accorded to those projects which provide the highest return on investment; and,
- When selecting among projects of comparable return on investment to give priority to projects which make conservation and efficiency improvements to the existing system over new generation projects requiring large capital expenditures.

2.2.4 To conduct on-going planning that includes researching alternatives and monitoring changes in electrical system usage, costs and available technologies, including investigation of the following:

- Set up rate structure or incentive for both residential and commercial electrical users that encourages conservation.
- When it appears that demand will outstrip hydro capacity within a foreseeable period of time, consider, as a last resort, giving incentives to those who switch from all electric to another form of heat.

- Seek information regarding convertible heating systems and technological improvements in appliances, etc. and make this information available to consumers.

- Develop a storm water management and maintenance program.

- Require new infrastructure be constructed to the City and Borough Standard Construction Specifications (CBSS)."

The City of Sitka City Engineer, Dan Jones, stated that the Blue Lake Expansion project is consistent with all energy-related conditions in the CSCP.

8.2 SITKA COASTAL MANAGEMENT PLAN. ALASKA DEPARTMENT OF NATURAL RESOURCES

The Uses and Activities section of the Sitka Coastal Program, (page 53 to 59 under Energy Facilities), is the primary section in the Sitka Coastal Program which might pertain to the Expansion. This section references Goals and Policies specific to this project from the Sitka Comprehensive Plan (2.1.16, 2.3.5, and 2.3.6) which are discussed under that plan.. The proposed Expansion is consistent with referenced Sitka Coastal Program and Sitka Comprehensive Plan goals, objectives, and policies. The Sitka Coastal Management Program has no enforceable policies applicable to the Expansion.

State Statute 11 AAC 112.230, regarding Energy Facilities constitutes the State's Coastal Zone Management Program recommendations, and directs that siting and approval of major energy facilities by districts and state agencies must be based, to the extent practicable, on a number of standards and directives. Most of the standards in this Statute direct the siting of facilities to avoid or minimize social or environmental impact. The locations of Expansion features and activities are to a great extent fixed by the siting of the original Blue Lake Project features.

Review by the City's Coastal Program Coordinator, Marlene Campbell, showed that, for siting and other considerations applicable to this Project, the Expansion is consistent with the Statue's standards and directives.

8.3 TONGASS LAND USE MANAGEMENT PLAN (TLMP). UNITED STATES FOREST SERVICE,TONGASS NATIONAL FOREST, JUNEAU.

Applicable provision of the TLMP, revised most recently in 2008, regard the Land Use Designations (LUD's) of potentially-affected areas within the Project Boundary and those visible from certain points outside the Boundary. As shown in Figure 34 in the Land Use Section, three primary LUD's apply to all lands potentially-affected by the Expansion: Municipal Watershed (MW) and Semi-Remote Recreation (SRR) and Transportation and Utility Systems (TUS). See Figure 35 below.

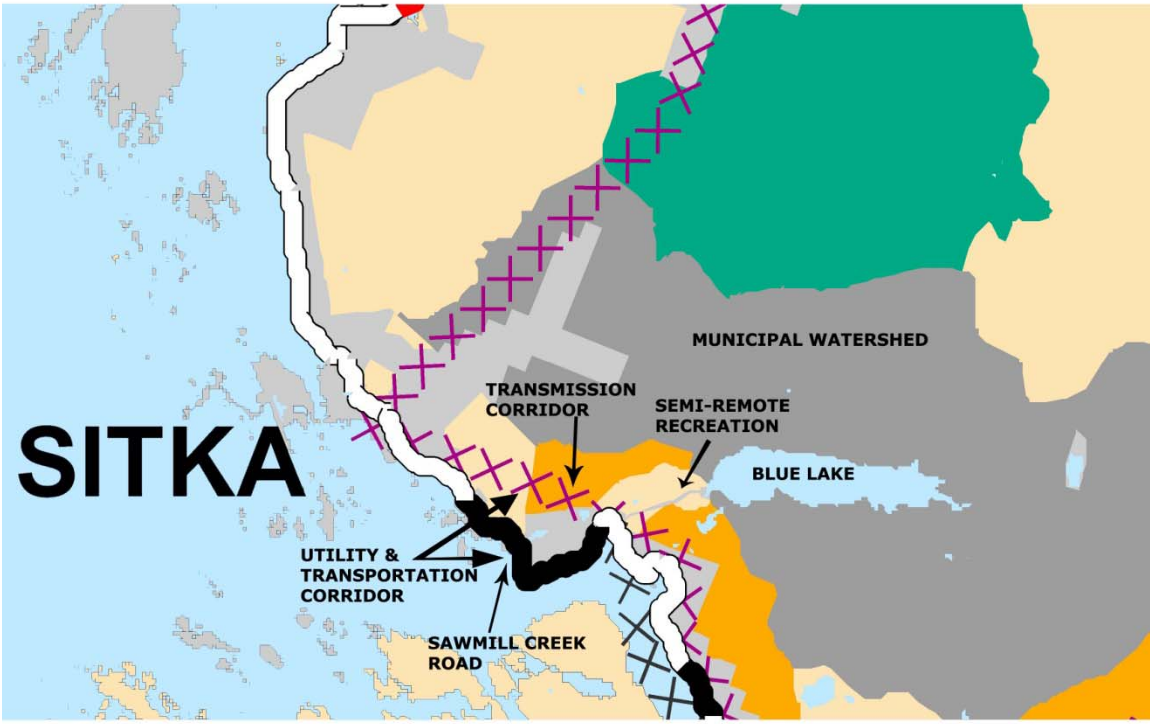


Figure 35. Tongass Land Use Designation.

The primary planning goal of the MW LUD is maintenance and protection of water quality standards for the City's drinking water supply. As explained in the water quality section, all Expansion-related actions which might affect Blue Lake water quality must be considered prior to construction. In particular, increased access due to higher lake levels might increase recreation use of the lake. As explained in that section, the City intends to modify the existing access restrictions in their Watershed Management Plan to address this issue.

The SRR and TUS LUD's will remain largely unimpacted by Expansion-related activities and construction.

Aesthetic effects in all LUD's were addressed through implementation of an Aesthetics Resources impact analysis, conducted according to USFS standards (See Aesthetics Section, above). In this study, effects on Blue Lake relative to dam raising were considered to be minimal after construction was complete.

8.4 SAWMILL COVE INDUSTRIAL PARK PLAN. CITY AND BOROUGH OF SITKA WATER FRONT DEVELOPMENT PLAN. CITY AND BOROUGH OF SITKA

The mission of the SCIP plan is to develop the park in a fiscally responsible manner that maximizes its economic benefit to the community through creation of meaningful jobs in conformance with established community plans and policies. It is planned that during the

Blue Lake Project Expansion contractors will rent parcels and facilities at the SCIP for construction offices and staging areas. The city will use SCIP facilities to stage equipment. The use of SCIP will provide jobs in the community and be of economic benefit to both SCIP and the city. This is consistent with the plan. The parcels and facilities leased will be determined and the lease terms negotiated during the final design.

8.5 SITKA NON-MOTORIZED TRANSPORTATION PLAN. CITY AND BOROUGH OF SITKA

The Blue Lake Project Expansion is consistent with the Non-Motorized Transportation Plan in that the new project features are outside the plans designated area. The one new project feature that will involve public access will be the Blue Lake access road at the lake itself. This road will be shortened to less than 100 yards length. Because Blue Lake is the source of City's drinking water public access to the road will likely be discouraged if not restricted in accordance by the City's Watershed Control Plan ordinance.

8.6 SITKA TRAIL PLAN, 2003

The Sitka Trail Plan 2003 was prepared to identify and plan for maintenance, operation, and construction of existing and future trails on and around Baranof Island. The plan was developed by Sitka Trail Works in conjunction with six other partners. In reviewing the Blue Lake Project Expansion for consistency with the plan, it appears that the only project feature to be altered by the project is the Blue Lake Road (NFSR 5755) which is 2.18 miles long. This road provides public access to Blue Lake, USFS campground and Near Town Trails in the Sawmill Cove Area identified in the plan.

It is expected that the Blue Lake Road will require minor upgrading to decrease the radius of curvature and swales at the far end of the road to permit the transport of heavy construction equipment to the dam site for construction of the dam. This will be done by the City during construction.

It is planned that following construction of the Expansion Project the road will be improved by the city and resurfaced as described in the 2007 FERC license P-2230 condition 11. Improvements to the campground will also be made following the project expansion in accordance with license condition 10.

These improvements to the Blue Lake Road will collectively enhance the access to the Near Town Trails in the Sawmill Cove area, which is consistent with the Sitka Trail Plan.

8.7 NORTHERN SOUTHEAST AREA PLAN, ALASKA DEPARTMENT OF NATURAL RESOURCES

The Blue Lake Project Expansion has been reviewed for consistency with the Northern Southeast Area Plan. The only state uplands affected by the project is the DOT Sawmill Creek Road right of way. The city will be applying for a driveway permit to access the right of way to access the new powerhouse. Tidelands and Navigable water are under the jurisdiction of DNR. The only proposed project change in the tidelands is the location of the new powerhouse tailrace which is 200’ downstream of the existing tailrace. There is no proposed change in instream flow. The city has included DNR and ADF&G in the consultation process to address all habitat and instream flow concerns. The project expansion includes construction of a new intake structure at Blue Lake ADF&G will be consulted on this change.

9. LITERATURE CITED

"ANHP Home Page." Alaska Natural Heritage Program. 28 Mar. 2009 <http://aknhp.uaa.alaska.edu/Default.htm>.

ADF&G 2009a. Sport Fishing the Sitka Alaska Area. ADF&G Division of Sport Fish, Juneau AK. http://www.sf.adfg.state.ak.us/Static/Region1/guides/PDFs/roadside.pdf

ADF&G. 2009b. Catalog of waters Specified as Important for the Spawning, Rearing, or Migration of Anadromous Fishes. ADF&G Habitat and Restoration Division, Anchorage AK.

ADF&G, 2009c. Atlas to the Catalog of Waters Specified as Important for the Spawning, Rearing, or Migration of Anadromous Fishes. ADF&G Habitat and Restoration Division, Anchorage AK.

ADF&G. 2009d. Alex Fisheries Information Database. ADF&G.

Alaska Natural Heritage http://aknhp.uaa.alaska.edu/botany/Botany_tracking_page.htm

Athearn. M.J. 1954. Preliminary Geologic Report for the Blue Lake Project. U.S. Dept. of the Interior, Bureau of Reclamation. AK Geologic Report No. 4. Junea AK. March 1954.

Bovee, K. 2005. Wildlife Investigations for 2005. In Support of Blue Lake Project (FERC No.2230) Relicensing. Prepared for: City And Borough Of Sitka ElectricDepartment, Sitka, AK.

Bovee, K. 2005. Wildlife Investigations for 2004-2005. In Support of Blue Lake Project (FERC No.2230) Relicensing. Prepared for: City And Borough Of Sitka Electric Department, Sitka, AK. Prepared By: Kent Bovee Sitka AK. June, 2005.

Bovee, K. 2006-2007. Vegetation Surveys, Blue Lake Hydroelectric Project (FERC No. 2230) Relicensing. Prepared for: City And Borough of Sitka Electric Department, Sitka, AK. Prepared By: Kent Bovee Sitka AK.

Bovee, K. 2006. Wildlife Investigations for 2005. In Support of Blue Lake Project (FERC No.2230) Relicensing. Prepared for: City And Borough of Sitka ElectricDepartment, Sitka, AK. Prepared By: Kent Bovee, Sitka AK. February, 2006. 16 pp. plus Appendix.

Bovee, K. 2010. Final 2008 Wildlife Studies Report. In Support of Blue Lake Project (FERC No. 2230) Expansion. Prepared For: City And Borough of Sitka Electric Department, Sitka, AK. January, 2010. 34 pp.

Caouette, John and Eugene DeGAyner. 2005. Predictive mapping for tree sizes and densities in southeast Alaska. Landscape and Urban Planning 72:49-63

Cascade Appraisal Services, Inc., 2009a. Draft Timber Resources Study Plan. Report prepared for City and Borough of Sitka Electric Department by Cascade Appraisal Services, Wilsonville OR, February 2009. 8pp.

Cascade Appraisal Services, Inc., 2009b. Blue Lake Dam Expansion Timber Inventory Specification Report. Report prepared for City and Borough of Sitka Electric Department by Cascade Appraisal Services, Wilsonville OR, 9pp.

CBS. 2004. Sawmill Creek Fisheries Information Paper. Prepared by City and Borough of Sitka Electric Department, In Support of: Blue Lake Hydroelectric Project (FERC No.2230) Relicensing, 17 pp.

CBS. 2005a. Blue Lake Water Temperature and Rainbow Trout Spawning Studies 2002-2005. Prepared by City and Borough of Sitka Electric Department, In Support of: Blue Lake Hydroelectric Project (FERC No.2230) Relicensing. November 2005. 26 pp.

CBS. 2005b. Powers and Orsborne Fish Passage Evaluation: Sawmill Creek Falls, Blue Lake Project, Federal Energy Regulatory Commission (FERC No. 2230), City and Borough of Sitka, Licensee. January 2005. 12pp

CBS, 2006a. Saw Mill Creek and Blue Lake Water Temperature Studies for 2005. Blue Lake Hydroelectric Project (FERC No. 2230) Relicensing. 16 pp.

CBS. 2006b. Population Estimation of Adult Rainbow Trout in Blue Lake Near Sitka Alaska. Prepared by: City and Borough of Sitka Electric Department In Support of: Blue Lake Hydroelectric Project (FERC No.2230) Relicensing. 23 pp.

City and Borough of Sitka Electric Department (CBS). 2008a. Draft Blue Lake Rainbow Trout Spawning Survey Study Plan for 2008. Prepared by: City and Borough of Sitka Electric Department In Support of: Blue Lake Hydroelectric Project (FERC No.2230) Expansion. February 2008. 10 pp.

CBS. 2008b. Draft Blue Lake Creek and Tributaries Study Plan for 2008. Prepared by: City and Borough of Sitka Electric Department In Support of: Blue Lake Hydroelectric Project (FERC No.2230) Expansion. March 2008. 11 pp.

CBS. 2008c. Draft Wildlife and Vegetation Resources Study Plan. Prepared by: City and Borough of Sitka Electric Department In Support of: Blue Lake Hydroelectric Project (FERC No.2230) Expansion. May 2008. 7 pp.

CBS. 2009a. Draft Scenery Resources Study Plan. Prepared by: City and Borough of Sitka Electric Department In Support of: Blue Lake Hydroelectric Project (FERC No.2230) Expansion. April 2009. 3 pp.

CBS. 2009b. Draft Scenery Resources Study Report. Prepared by: City and Borough of Sitka Electric Department In Support of: Blue Lake Hydroelectric Project (FERC No.2230) Expansion. July 2009. 19 pp.

de Laguna, F. 1991. Tlingit. In Handbook of North American Indians, Vol. 7: Northwest Coast, W. Suttles, ed., pp.203-228. Washington D.C.: Smithsonian Institution.

Der Hovanisian, John. 1994. Stock Assessment of Rainbow Trout in a Southeast Alaska Impoundment. Unpublished Master's Thesis, University of Alaska Fairbanks.

Dillman, K. and P. Krosse. November 2007. Guidance for Preparing a Botany Resource Report. Tongass National Forest. Tongass National Forest

Dillman, K., P. Krosse, and C. Sever. November 2007. Tongass National Forest-Guidance for Biological Evaluations: Sensitive Plants. Tongass National Forest

Dube, K 2009. Draft Sedimentation Study Plan for Blue Lake Project (FERC NO. 2230) Expansion. City and Borough of Sitka, Licensee. January, 2009. 6pp.

Dube, Kathy. 2010. Final Reservoir Sedimintation Study Report Blue Lake Project (FERC NO. 2230) Expansion. City and Borough of Sitka, Licensee. January, 2009. 33pp.

EES, 2010. Evaluation of change in Blue Lake Hydroelectric project intake location of water temperatures and anadromous salmonid utilization in Sawmill Creek. City and Borough of Sitka, Licensee. Prepared By: Dennis Schult and John Blum. February, 2010. 32pp.

Goldschmidt, W.R., and T.H. Haas. 1946. Possessory Rights of the Natives of Southeastern Alaska: A Detailed Analysis of the Early and Present Territory Used and Occupied by the Natives of Southeastern Alaska, Except the Natives of the Village of Kake (Partially Treated), Hydaburg, and Klawock: a Report to the Commissioner of Indian Affairs. Mimeograph copy on file, Office of History and Archaeology, Anchorage.

Hatch Energy. 2010. Technical Memorandum- Geotechnical Findings Report. Prepared For: City and Borough of Sitka, Licensee. Prepared By: Hatch Consultants. January, 2010. 39pp.

Heinl, S.C. D.M. Eggers, and A.W. Piston. 2008. Pink salmon stock status and escapement goals in Southeast Alaska and Yakutat. Alaska Department of Fish and Game, Special Publication , No. 08-16 Anchorage. 48pp. http://www.boards.adfg.state.ak.us/fishinfo/meetinfo/2008-2009/Sitka/dept-rep-rc3/sp08-16.pdf

Krause, A. 1956. The Tlingit Indians: Results of a Trip to the Northwest Coast of America and the Bering Straits, translated by Erna Gunther. The American Ethnological Society, Monograph 26, University of Washington Press, Seattle.

Kriekhaus, B. November 23, 2004. Survey Summary Report for FS Region 10 Listed Sensitve Plant Species and Alaska Natural Heritage Program Rare Plant Species. For the Blue Lake FERC Re-licensing Project.

Kriekhaus, B. January 2005. Resource Report for Sensitive and Rare Plants. For Guided Floatplane Access to lakes within the South Baranof Wilderness. Tongass National Forest. Sitka Ranger District.

LaBounty, K. 2010. Final Vegetation Investigations Report for 2008. Blue Lake Project, Federal Energy Regulatory Commission (FERC) No. 2230. City and Borough Of Sitka, Licensee. Prepared By: Kitty LaBounty, Sitka AK. February, 2010. 21 pp.

Mobley, C.M. n.d. An Archaeological Survey of the Blue Lake Road, Sitka, Alaska. Submitted to USDA Forest Service, Sitka Area Office, Sitka, Alaska.

Powers, P. D. and J. F. Orsborn. 1985. Analysis of Barriers to Upstream Fish Migration - An Investigation of the Physical and Biological Conditions Affecting Fish Passage Success at Culverts and Waterfalls. Final Project Report Part 4 of 4. Report to Bonneville Power Administration. Albrook Hydraulics Laboratory, Washington State University, Pullman, Washington.

R&M Consultants, Inc., 2009. Boundary Rim Stability Survey, Blue Lake Hydroelectric ProjectSitka, Alaska, Prepared For: Hatch Acres Corporation, Prepared By: R&M Consultants, Anchorage, AK. 11pp.

Rabich-Campbell, C. 1989. An Archaeological Survey of the Blue Lake Small Hydro Additions, Sitka, Alaska. Report prepared for R.W. Beck and Associates, Seattle, WA.

Rushmore, P. 2005. Archaeological Assessment of the Blue Lake Hydro Electric Relicensing Project: (FERC No.2230). Report prepared for City and Borough of Sitka, Electrical Department.

Rushmore, P. 2009. Cultural Resources Survey Report: Blue Lake Hydroelectric Project (FERC No. 2230) Expansion, Sitka, Alaska. Report prepared for City and Borough of Sitka, Electrical Department.

Selkregg, L.L. Alaska Regional Profiles: Southeast Region. Arctic Environmental Information and Data Center, University of Alaska, Anchorage.

Streveler Gregory P and Daniel M. Mann, 2008. Draft Study Plan of the Mineral Potential of the Blue Lake Area With Particular Emphasis on the Area to be Inundated by the Raising of the Blue Lake Dam. Prepared for City and Borough of Sitka by Icy Strait Environmental Services, Gustavus, AK.99826. 3pp.

Streveler Gregory P and Daniel M. Mann, 2009. Mineral Potential of the Blue Lake Area. Report prepared for City and Borough of Sitka by Icy Strait Environmental Services, Gustavus, AK.99826. 10pp.

USDA Forest Service. 2001. Procedures for Sensitive Plant Biological Evaluations Tongass National Forest.

USDA Forest Service. 2008. Tongass Land and Resource Management Plan Final Environmental Impact Statement and Record of Decision, Plan Amendment. R10-MB-603a. USDA Forest Service, Alaska Region.

USDA Forest Service. 1995. Landscapes Aesthetics: A Handbook for Scenery Mangement USDA Forest Service Agricultural Handbook Number 701.

Wolfe, K.F. 2002. Fisheries Survey Annual Report, Sawmill Creek, 2001. Blue Lake Project, Federal Energy Regulatory Commission (FERC) No. 2230. City And Borough Of Sitka, Licensee. Prepared By: Karl Wolfe, Sitka, AK. January, 2002. 22pp

Wolfe, K.F. 2003. Sawmill Creek Fisheries Survey Annual Report For 2002 Studies. Blue Lake Project, Federal Energy Regulatory Commission (FERC) No. 2230. City And Borough Of Sitka, Licensee. Prepared By: Karl Wolfe, Sitka AK. March, 2003. 41 pp.

Wolfe, K.F. 2004. Sawmill Creek Fisheries Survey Annual Report For 2003 Studies. Blue Lake Project, Federal Energy Regulatory Commission (FERC) No. 2230. City and Borough of Sitka, Licensee. Prepared By: Karl Wolfe, Sitka AK., April, 2004. 41pp.

Wolfe, K.F. 2005. Sawmill Creek Fisheries Survey Annual Report For 2004 Studies, Blue Lake Project, (FERC) No. 2230. Prepared For: City And Borough Of Sitka, Licensee. Prepared By: Karl Wolfe, Sitka AK., March, 2005. 46pp.

Wolfe, K.F. 2010. Final 2008 Fisheries Studies Report Blue Lake Project, (FERC) No. 2230 Expansion. Prepared For: City And Borough Of Sitka, Licensee. Prepared By: Karl Wolfe, Sitka AK., March, 2005. 58pp. plus Appendix.

10. BLUE LAKE EXPANSION MAILING LIST

PARTICIPANT LIST

BLUE LAKE EXPANSION AMMENDMENT

City and Borough of Sitka, AK,
3/05/10

Alaska Department of Natural Resources
ADNR, DCOM Juneau
dnr.dcomprajnu@alaska.gov

Bill Allerton
FERC
Bill.allerton@ferc.gov

Erin Allee
Alaska Department of Natural Resources, Alaska Coastal Management Program
PO box 111030
Juneau, AK 99811-1030
907-465-8790
erin.allee@alaska.gov

Margaret Beilharz
USFS R10/R6 Hydropower Team
McKenzie Bridge, OR 97413-9612
541-822-7228
mbeilharz@fs.fed.us

Roger Birk
R10 Hydropower Team
U.S. Forest Service
P.O. Box 21628
Juneau, AK 99802-1628
907-586-8843
rbirk@fs.fed.us

Judith Bittner
State Historic Preservation Officer
550 West Seventh Avenue, Suite 1310
Anchorage, AK. 99501-3565
907-269-8715
Judy.Bittner@alaska.gov

Carrie (McMullen) Bohan
Environmental Program Specialist III
Southeast Drinking Water Program Office
410 Willoughby #303
Juneau, AK 99801
(907) 465-5333 phone
(907) 465-5362 fax
Carrie.bohan@alaska.gov

Linda Books
Linda.books@alaska.gov

Kent Bovee
Biologist
210 A Marine St.
Sitka, AK 99835
(907) 752-0710
boveek@mail.ssd.k12.ak.us

Doug Boyer
FERC
805 SW Broadway, Suite 550
Portland OR 97205
Douglas.boyer@ferc.gov

Bruce Brand
FERC
Bruce.brand@ferc.gov

Christopher Brewton
Utility Director
City of Sitka, Electric Department
105 Jarvis Street
Sitka, Alaska 99835
907-747-1870
chrisb@cityofsitka.com

Mark Buggins Environmental Director
City and Borough of Sitka
100 Alice Loop
Sitka, AK 99835
907-966-2256
markb@cityofsitka.com

Dennis Callagher
dcallagher@fs.fed.us

Marlene Campbell, Special Projects Director
City and Borough of Sitka
100 Lincoln St.
Sitka, AK 99835
907-747-1855
Campbell@cityofsitka.com

Paul Carson
Currents Consulting
11045 Exeter Ave NE
Seattle, WA 98125
206-440-5433
paul_carson@comcast.net

Cascade Appraisal
cascade@cascadeappraisal.com

Bob Chadwick, Area Sport Fish Biologist
ADF&G
Sport Fish Division
304 Lake Street, Room 103
Sitka, AK. 99835-7563
907-747-5551
Bob.chadwick@alaska.gov

Ken Coffin, Supervisory Biologist
U.S. Forest Service
204 Siginaka Way
Sitka, AK 99835
907-747-4343
kcoffin@fs.fed.us

Jim Cowley
cowleyjb@telus.net
Keith Cox
marlincox@gmail.com

John DerHovanisian
John.derhovanisian@alaska.gov

James Dinley, Municipal Administrator
City and Borough of Sitka
100 Lincoln St.
Sitka, AK 99835
907- 747-1808
jimdinley@cityofsitka.com

Melissa Dinsmore, Lands Specialist
USDA Forest Service
204 Siginaka Way
Sitka, AK 99835
907-747-4201
mdinsmore@fs.fed.us

Kathy Dube
kdube@watershednet.com

John Dunker
Alaska Department of Natural Resources
Division of Water
400 W. Willoughby Avenue
Juneau, AK. 99801-1724
907-465-2533
john.dunker@alaska.gov

Perry Edwards
USFS
204 Siginaka Way
Sitka, AK 99835
907-747-4220
pedwards@fs.fed.us

Richard Enriquez
U.S. Fish and Wildlife Service
3000 Vintage Boulevard, Suite 201
Juneau, AK. 99801
907-780-1162
Richard_Enriquez@fws.gov
Dan Etulain
danetulain@gmail.com

Jeff Feldpausch
Resources Protection Director
Sitka Tribe of Alaska
208 Lake St.
Sitka, AK 99835
907-747-7469
Fax 907-747-7506
jfeldpausch@sitkatribe.org

Jim Ferguson
Hydropower Coordinator
Alaska Department of Fish and Game
333 Raspberry Road
Anchorage, AK. 99518
907-267-2312
jim.ferguson@alaska.gov

Lexi Fish
Sitka Conservation Society
lexi@sitkawild.org

John Flory
jpflory@yahoo.com

Erich Gaedeke
FERC
Erich.gaedeke@ferc.gov

David Gann
DNR DCOM
David.gann@alaska.gov

Lon Garrison
Lon_garrison@nsraa.org

Lisa Gassman
Sitka Tribe of Alaska
456 Katlian St.
Sitka, AK. 99835
907-747-7500
lgassman@sitkatribe.org

Carole Goularte, District Ranger
U.S. Forest Service
204 Siginaka Way
Sitka, AK 99835
(907) 747-4218
cgoularte@fs.fed.us

William Guey-Lee, Chief
Engineering & Jurisdiction Branch
Division of Hydropower Administration
& Compliance
888 First St. NE
Washington, DC 20426
Phone: 202-502-6064
Fax: 202-219-2732
william.guey-lee@ferc.gov

Barth Hamberg
USFS
204 Siginaka Way
Sitka, AK 99835
907-747-6671
bhamberg@fs.fed.us

Roger Harding
Roger.harding@alaska.gov

Scott Harris
Sitka Conservation Society
scott@sitkawild.org

Stephen Hart
Hatch Acres
shart@hatchenergy.com

Vaughn Hazel
Vhazel@fs.fed.us

Dan Hess
U.S. Geological Survey
P.O. Box 1568
Juneau, AK. 99801
907-586-7216
dlhess@usgs.gov

Randy H. Host
rhost@usgs.gov

Shawn Johnson, Fishery Biologist
Alaska Department of Fish and Game
Sport Fish Division
P.O. Box 110024
Juneau, AK. 99811-0024
907-465-4302
shawn.johnson@alaska.gov

Kate Kanouse
AK DF&G
Division of Habitat
PO Box 110024
Juneau, AK 99801
kate.kanouse@alaska.gov

Sue Karl
skarl@usgs.gov

Eric Kollgaard
ebkollgaard@astound.net

Brenda Krauss
Alaska Department of Environmental Conservation
Division of Water
410 Willoughby Ave, Ste. 303
Juneau, AK. 99801
907-465-5321
Brenda_Krauss@dec.state.ak.us

Buck Lindekugel
Southeast Alaska Conservation Council
buck@seacc.org

Robert Loiselle
President & CEO
Shee Atika, Inc
315 Lincoln Street, Suite 300
Sitka, AK 99835
907-747-3534
info@sheeatika.com

Stefanie Ludwig
DNR
Stefanie.Ludwig@alaska.gov

Deborah Lyons
Sitka Trail Works
801 HPR
Sitka, AK 99835
trail@gci.net

Scott H. Maclean
Scott.maclean@alaska.gov

Monica Matz
ADF&G
Sport Fish Division
304 Lake Street, Room 103
Sitka, AK. 99835-7563
907-747-5355
monica.matz@alaska.gov

Phil Mooney
Phil.mooney@alaska.gov

Justin Nettle P.E
Federal Energy Regulatory Commission
Portland Regional Office
805 SW Broadway, Suite 550
Portland, OR. 97205
(503) 552-2741
Justin.Nettle@ferc.gov

Larry Nesheim
lnesheim@att.net

Dean Orbison, Engineer
City of Sitka, Electric Department
105 Jarvis Street
Sitka, Alaska 99835
907-747-1827
deano@cityofsitka.com

Jack Ozement
jozment@worldnet.att.net

Jessica Perkins
Sitka Tribe
Jessica.perkins@sitkatribe-nsn.gov

Anne Pollnow
Aepollnow@hotmail.com

Mike Prewitt
8205 Ashworth Avenue North
Seattle, WA, 98103-4434
206-525-3483
cmikeprewitt@gmail.com

Gary Prokosch
ADNR Water Resources
gary.prokosch@alaska.gov

Patrick Regan P.E.
Federal Energy Regulatory Commission
Portland Regional Office
805 SW Broadway, Suite 550
Portland, OR. 97205
(503) 552-2741
patrick.regan@ferc.gov

Steve Reifenstuhl
Steve.reifenstuhl@gmail.com

Kim de Rubertis
Consulting Engineer
PO Box 506
Cashmere, WA 98815
509-782-3434
derubertis@aol.com

Anji Russell
City of Sitka
105 Jarvis St.
Sitka, AK 99835
anjulie@cityofsitka.com

Sue Schrader
Southeast Alaska Conservation Council
419 Sixth St. Suite 200
Juneau, AK 99801
907-586-6942
sue@seacc.org

Terry Schwarz
ADNR Water Resources
terence.schwarz@alaska.gov

Linda Speerstra
U.S. Army Corps of Engineers
P.O. Box 16
Sitka, AK 99835
907-747-0658
linda.speerstra@usace.army.mil

Greg Streveler
Grigori@gustavus.ak.us

Andrew Thoms, Executive Director
Sitka Conservation Society
Box 6533
Sitka, AK 99835
907-747-7509
andrew@sitkawild.org

Jackie Timothy
AK DF&G
Division of Habitat
PO Box 110024
Juneau, AK 99801
jackie.timothy@alaska.gov

Floyd Tomkins
kaytee@acsalaska.net

Troy Tydingco
ADF&G
Com Fish Division
304 Lake Street, Room 103
Sitka, AK. 99835-7563
907-747-6688
troy.tydingco@alaska.gov

Coyne Vanderjack
Shee Atika
coyne@sheeatiak.com

Susan H. Walker
Marine Resources Specialist
Habitat Conservation Division
National Marine Fisheries Service
P.O. Box 21668
Juneau, Alaska 99802-1668
907-586-7646
susan.walker@noaa.gov

Karl Wolfe
P.O. Box 2796
Sitka, AK 99835
907-966-2919
wildernesswolfe@alaska.net

Ron Wolfe
Natural Resources Manager
Sealaska Corporation
One Seaalaska Plaza, Suite 400
Juneau, AK 99801
907-587-1512
nr@sealaska.com

Heather Woody, Research Biologist
Sitka Tribe of Alaska
456 Katlian St.
Sitka, AK. 99835
907-747-6506 ext. 10
hwoody@sitkatribe.org