

BLACK BEAR LAKE HYDROELECTRIC PROJECT

NO. 10440

ATTACHMENT 'A'

BLACK BEAR LAKE HYDRO
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BLACK BEAR LAKE HYDROELECTRIC PROJECT

NO. 10440

ATTACHMENT 'B'

BLACK BEAR LAKE HYDRO PROJECT DESCRIPTION

It took 5 years to license the Black Bear Lake Hydroelectric Project (BBL Hydro). Total project costs were approximately \$10 Million. The BBL Hydro project is a 4.5 MW hydroelectric project at Black Bear Lake on Prince of Wales Island, approximately 15 miles NE of Klawock. This lakes spill elevation is 1687 feet msl, with a surface size of 215 acres. With the licensed 15 foot drawdown, the lake provides approximately 3200 acre-feet of storage. The lake is used as a reservoir, rather than using a dam, which is accomplished by using a siphon. The project is load-following with the only restriction being that startups and stops cannot exceed 1 cfs per hour, but operations may follow load.

Because there are rainbow trout in the lake, a screened intake is used to prevent fish from going into the penstock. A siphon, which is set up on the crest of land at the edge of the lake, is used initially to draw water out of the lake. Once the siphon is established, water passes through both an HDPE and steel penstock to the valve house where flow can be turned on or shut off without losing the siphon. The valve house also has a bypass pipe for bypassing flows to the creek when additional water is needed in the anadromous reach below the powerhouse. When the valve is opened at the valve house, the water flows through approximately 4,900 feet of pipe, some of which is buried and other above ground, to the powerhouse and the turbine.

The water is pressurized by the amount of head the project has (i.e. 1,500 foot drop in elevation) and the small nozzle (needle) the water must pass through as it strikes the runner (a series of spoon-like protuberances on a wheel) in the turbine, which in turn turns the generator creating electricity. The electricity then goes to the substation where a step-up transformer adjusts the current to the voltage that is wanted on the electrical grid, in this case 34.5 kV. Switchgear in the powerhouse is located in the office where the operations are monitored and adjusted to meet load demand. Operations are also set up to monitor them from a remote location (i.e. one or more of our central offices).

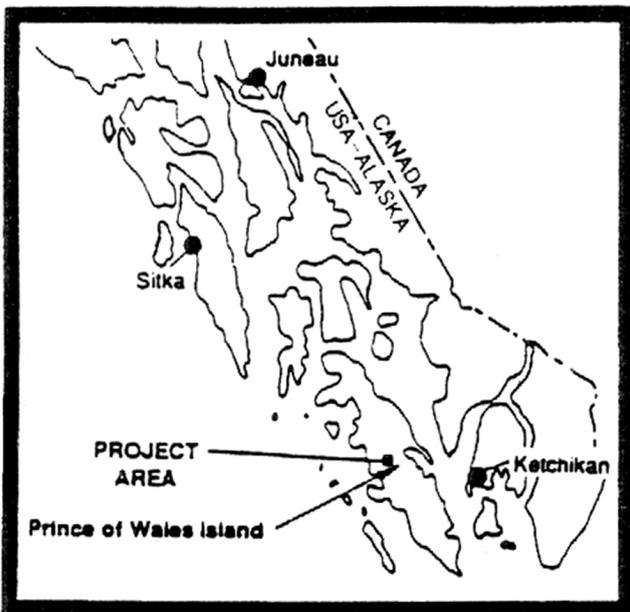
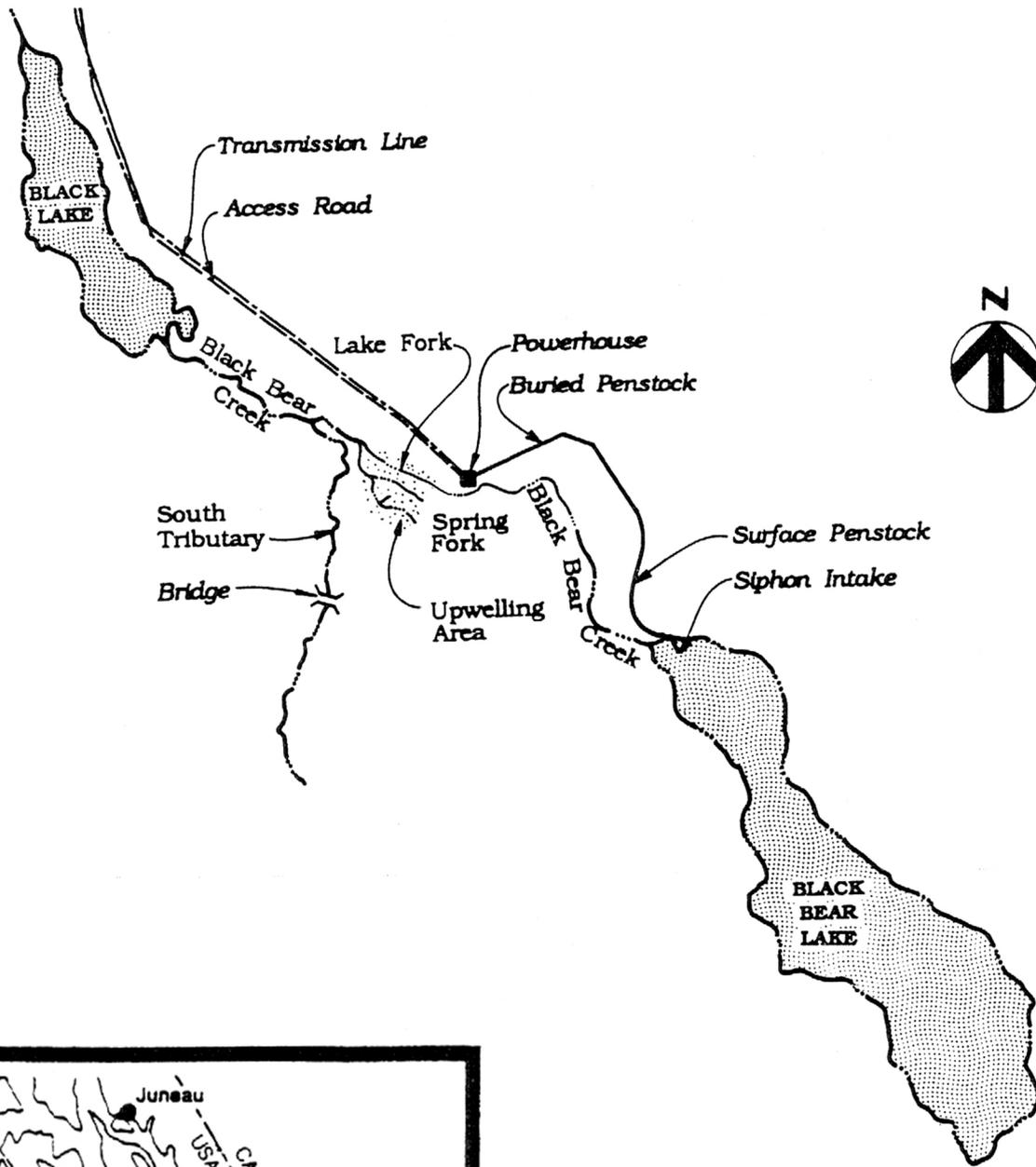
As mentioned, there are rainbow trout in the lake that were stocked there in the 50's. ADF&G had been concerned that our annual drawdowns may be impacting the trout's sustainability by dewatering their spawning beds. Population surveys were conducted for 7 years and a habitat survey was conducted in 2002. The habitat survey found spawning habitat not just at the lake outlet but around the lake and at differing elevations, indicating that the lake trout spawn at other locations than just the lake outlet and are able to spawn when the lake experiences summer drawdowns. This proves the population is sustainable with project operations.

There are also salmonid species that use the creek below the projects tailrace, i.e. chum, pinks, sockeye, coho, and dolly varden. Because of this we are required to have a minimum flow in the creek that varies from month to month. Monitor of this anadromous reach was completed after five years in which no impacts were found from project operations.

Although, the original license required development of recreational facilities at Black Bear Lake with the U.S. Forest Service (FS), once the conceptual design was investigated on-site it was determined that it would be impractical. Presently, the FS has developed an off-site location for a recreation cabin on the Island that the licensee will fund through a contractual agreement of \$200,000, which was paid to the FS in January 2006.

BLACK BEAR LAKE HYDRO FACT SHEET

Name of Project	Black Bear Lake Hydroelectric Project, FERC Project No. 10440	
Project Location	Sections 1 and 12; T73S, R82E, CRM. On Prince of Wales Island, Tongass National Forest; 8.6 miles east of Klawock in southeast Alaska. Approximate latitude 55°33' and longitude 132°53'.	
Intake	Submerged wedge wire screen at elevation 1,662.	
Reservoir	Name:	Black Bear Lake
	Surface Elevation:	1,687
	Surface Area:	215 Acres
	Storage Capacity:	
	Net:	3,200 Acre Feet
	Operation:	The net storage will be utilized by siphoning the reservoir down 15 feet to a minimum elevation of 1,672.
Siphon	Siphon 600-foot-long, 30-inch-diameter HDPE penstock with a vacuum pump assembly and structure at the high point elevation 1,695.	
Penstock	Total Length:	4,900 feet
	Diameter and Type:	30-inch HDPE and steel material
	Components:	820 feet buried intake and siphon 1,930 feet supported on concrete saddles 2,150 feet buried pipe to the powerhouse
Flow Continuation	24-inch diameter, 180-foot pipe to creek above falls	
Powerhouse	Size:	44 feet by 67 feet
	Number of Units:	2
	Type of Turbine:	Horizontal Twin-Jet Pelton
	Turbine Rating:	3,175 hp each; 6350 hp total
	Flow:	45 cfs
	Head:	
	Gross:	1,490
	Net:	1,440
	Generator Rating:	2.25 MW each; 4.5 MW total
	Voltage:	4,160 volts
Distribution Line	Voltage:	34.5 kV
	Length:	4.5 miles
	Type:	Overhead on wooden poles
Average Annual Energy Production	23,000 MWh	



BLACK BEAR LAKE HYDROELECTRIC PROJECT Prince of Wales Island, Alaska FERC NO. 10440	
ALASKA POWER & TELEPHONE COMPANY Port Townsend, Washington	
LOCATION MAP	
HDR Engineering	FIGURE E1-1