# Draft Environmental Assessment

## Volume 1 – Main Report

**Whitman Lake Hydroelectric Project**
**FERC Project No. 11841-000**

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## WHITMAN LAKE HYDROELECTRIC PROJECT

## SUMMARY

Whitman Lake was the site of the first hydroelectric plant constructed in the Ketchikan area. In 1907, New England Fish Company (NEFCO) constructed a small timber-crib dam at the outlet to Whitman Lake and piped water to a 1,500 kW powerhouse located at Herring Cove. In 1927 NEFCO replaced the timber dam with a concrete dam, and continued to generate power for its cold storage facility. In 1957, NEFCO sold the hydro plant and transmission line to the City, and the City immediately decommissioned the project. Shortly thereafter, the City studied construction of a new hydro project at Whitman Lake, and in 1963 was issued a license to construct the new project. However, due to a variety of circumstances, the City eventually surrendered the license in 1968.

Except for the dam, there are very few remnants left from the earlier hydro project. The Applicant, Ketchikan Public Utilities (KPU) is now proposing to redevelop the hydropower potential of Whitman Lake. The new project will consist of:

1. Constructing a 2,450-foot long by 45-inch diameter steel pipeline from the existing Whitman Dam to the Whitman Hatchery located at Herring Cove.

2. Replacing 1,420 feet of 18-inch and 24-inch diameter steel pipe currently serving the hatchery.

3. Constructing a 6.5-foot high diversion structure on Achilles Creek and a 2,000-foot long by 21-inch diameter pipe from Achilles Creek to Whitman Lake.

4. Constructing two powerhouses near the Whitman hatchery. One will house a 3,900 kW turbine/generator unit, and the other will contain a 700 kW unit. The new generating units will be connected to KPU's existing transmission grid at Herring Cove.

Total plant capacity will be 4,600 kW, and in an average year the project will generate 16,225,000 kWh. In comparison, the Ketchikan Lakes Project annually generates an average of 19,400,000 kWh, and the Beaver Falls/Silvis Project averages 45,000,000 kWh annually.

The total construction cost of the project is estimated at $7,742,000 (assuming a mid-2004 bid price level), and the associated cost of energy is 5.8 cents per kWh based on financing with 20-year bonds at 5% interest.

The current license application was prepared under the Commission's "Alternative Licensing Procedures" which allows the Applicant, instead of FERC, to prepare the "Draft Environmental Assessment" in consultation with the resource agencies. A Preliminary Draft EA (PDEA) was prepared prior to this current Draft EA, and comments were solicited from a wide range of

federal, State and local agencies as well as non-governmental organizations. Comments received on the PDEA are included in Volume 3-Appendices together with a list of the Applicant's responses. All comments have been considered, and are addressed in this DEA where appropriate. The Commission is responsible for preparation of the Final EA.

The current Draft Environmental Assessment addresses a wide variety of environmental issues and proposes ways and means to protect, mitigate and enhance the environmental resources potentially affected by the new project. Principal issues raised during project development include:

1. Affects that the hydro project will have on existing and future hatchery operations.

   The existing Whitman Hatchery was constructed at Herring Cove in 1978 with the written understanding that KPU may someday utilize Whitman Lake and the old NEFCO powerhouse area for constructing a new hydropower project. Construction of the new hydro project will unavoidably cause some disruption to hatchery operations, but the design has taken into account concerns expressed by the owner, Southern Southeast Regional Aquaculture Association (SSRAA). The approximate 30 cfs of water supply to the hatchery will not be interrupted, water quality will not be degraded, water will be supplied with sufficient pressure head, the tailrace structure will minimize delay of returning fish caused by false attraction flows, and restrictions will be placed on vehicle access through the hatchery site during construction.

2. Providing continuous instream flows below Whitman Dam.

   Resource agencies have requested that a minimum rate of flow be discharged at the base of Whitman Dam to protect the existing fishery in the creek. Currently, there is no instream flow requirement, and approximately 900 feet of stream below the dam "drys up" about 40% of the time when the lake level falls below the spillway crest at the dam. Based on fishery studies conducted for the license application, an instream flow of between 5 and 8 cfs at the base of Whitman Dam is proposed depending on the time of year.

3. Protecting the Dolly Varden population in Whitman Lake.

   Agencies have expressed concerns over impacts the hydro project could have on the existing fish population in Whitman Lake. Dolly Varden is by far the dominant specie in the lake, but a scarcity of food and quality habitat appears to diminish their size. An issue expressed by the agencies is the need to screen the new intake to prevent entrainment of fish into the penstock. The project will have an intake sized to screen out juvenile-sized fish, which are the smallest sized fish believed to occupy the area near the dam and intake.

4. Affects on the quality of water being diverted by the Herring Bay Water Users Association.

   The Herring Bay Water Users Association (HBWUA) currently diverts up to 70 gallons per minute from Whitman Creek to serve homes in the area. Their diversion is located 3,000 feet downstream from Whitman Dam. Concerns were expressed that the hydro project might diminish the quality of water in the creek because of flow reductions and reduced spills at the dam. The hydro project will reduce the frequency of spills at the dam and reduce the flow in Achilles Creek by diverting some of that flow to Whitman Lake. However, unlike the current condition where no minimum instream flow is required, a continuous discharge of 5 to 8 cfs will be made at the base of Whitman Dam, and a minimum of 1.5 cfs will continuously flow past the Achilles Creek diversion. Accounting for accretion flows downstream of Whitman Dam and the Achilles diversion, streamflow at the HBWUA diversion site will continuously be greater than 8 cfs, which is much greater than minimum flows currently experienced. In addition, it is proposed that a flow of 150 cfs be discharged for 24 hours at Whitman Dam on an annual basis to help flush sediments and other deposits in the creek.

5. Providing sufficient water to the hatchery and to Whitman Creek during periods of dry weather.

   SSRAA is concerned about having enough water for hatchery use during periods of low runoff. The Whitman Hatchery currently diverts an average of about 27 cfs during most times of the year. Average annual inflow to Whitman Lake is 75 cfs, however, inflow is less than 30 cfs about 30 percent of the time. This means about one-third of the time inflow to the lake is insufficient to meet current hatchery demands, and consequently the lake level will drop to meet the demands. Fortunately, the lake stores about 2,800 acre-feet of water when the level is at the spillway crest, but even with this amount of storage there have been some historical dry periods that have caused SSRAA some concerns.

   Agency demands for a continuous spill at the dam will draw the lake down quicker than historically experienced during dry periods. In addition, the Applicant is proposing to regulate the lake at a level below the spillway, thereby lowering the amount of available storage during dry times. These actions will make it necessary to adopt more efficient water management practices for Whitman Lake. Water management improvements will be realized with new water level controls and monitoring devices installed for the hydro project, and well-defined lake operating criteria. In addition, SSRAA will be encouraged to fine-tune its seasonal water demands with an eye toward conservation.

6. Impacts to forest resources within the Tongass National Forest.

   Nearly all of Whitman Lake, except the immediate dam area, and the Achilles Creek diversion and pipeline, are located within the TNF. The Forest Service has listed a

number of concerns, including but not limited to, erosion and sediment control, impacts to terrestrial species, impacts caused by construction within the existing pipeline corridor and creation of a new pipeline corridor, connectivity of Deer Creek to Whitman Lake at low lake levels, and impacts to existing recreation resources. The Applicant addresses within this DEA these and other Forest Service concerns.

event of an impending water shortage, quantifying the amount of flow reduction, and describing the conditions needed to reinstate flow rates to their normal levels.

*Herring Cove and Whitman Hatchery*

The Project will result in the diversion and discharge of up to an additional (above that already diverted by SSRAA for hatchery use) 150 cfs of freshwater from the Whitman Creek drainage into Herring Cove. The discharge would occur at the tailrace location situated directly west of the north-south oriented raceways at the western end of the Whitman Hatchery. This was SSRAA's preferred location for the powerhouse after also considering a location at the east end of the hatchery immediately uphill from the existing pressure reducing valve (PRV) building. Two potential impacts may result from the discharge of this additional freshwater into Herring Cove, both associated with returning adult fish to the hatchery.

False Attraction to Tailrace

The discharge of up to 150 cfs at the distant end of Herring Cove may falsely attract returning hatchery fish to that location. However, fish moving to the powerhouse tailrace, located 600 feet upstream from the ladder, must first pass near the attraction flows associated with the existing fish ladder. The source of attraction flow at the fish ladder comes from effluent from the six most easterly raceways. About 17 cfs of effluent is collected into a single pipe and routed to the fish ladder. The unit discharge of the attraction flow is much more concentrated at the fish ladder than at the proposed tailrace, and therefore velocities at the ladder will be greater than at the tailrace. The 17 cfs of existing attraction flow is concentrated over about a one foot width and a velocity of about 6 to 8 fps. In contrast, the 150 cfs maximum flow from the tailrace will vertically boil over a 30-foot wide sill at a maximum velocity of about 2.5 fps without tidal influence.

Eleven of the hatchery raceways have their own separate effluent discharge pipe, which discharge directly into Herring Cove. Each pipe is 12-inch diameter and discharges at about El. 20, which is above the annual maximum high tide elevation. Discharge from each pipe therefore creates significant turbulence to attract returning adult anadromous fish. Fish must pass these eleven effluent pipes, as well as the fish ladder attraction flow, before reaching the proposed tailrace. To reduce false attraction, SSRAA should consider combining the effluent from the eleven raceways into a single pipe, and re-routing the discharge to the ladder entrance. This is essentially what is already done at the six easterly raceways.

In response to the false attraction issue, SSRAA may consider construction of a collection pond at the west end of the hatchery in the vicinity of the proposed Powerhouse No. 1. KPU will work with SSRAA to arrive at a solution that satisfies the needs of both parties.

Concerns have also been raised about fish potentially coming into contact with the turbine runner. Together with minimizing attraction velocities, the tailrace will be designed to provide a physical barrier to fish attempting to enter the tailrace. Discharge from the turbine will flow into a rectangular concrete channel and spill over a concrete weir set at El. 18. Energy in the spill will be dissipated by a baffle wall and the floor before being discharged to Herring Cove over a

sill. Smooth-finished bars installed along the bottom of the baffle wall to the floor will provide an additional barrier to any fish attempting to enter the tailrace. Clear opening between bars will be one inch.

Premature Attraction of Salmon into Herring Cove

The ADF&G currently manages a mixed salmon fishery in waters just outside of Herring Cove. ADF&G has expressed concern that discharging up to an additional 150 cfs of freshwater into and then out of Herring Cove (into saltwater) could potentially prematurely attract salmon into the cove (which is closed to fishing) thereby reducing the opportunity for sport fish harvest. They also caution that marine mammals might be attracted to adult anadromous fish that do not readily proceed upstream or into the hatchery.

To address the above concerns, a Biotic Monitoring Plan is proposed, which will include provisions for monitoring affects the project might have on prematurely attracting anadromous fish, or delay in entering the fish ladder. Also, SSRAA has recently designed a new holding pond and fish ladder to replace their existing facilities at the east end of the hatchery. These improvements, together with the low exit velocity tailrace barrier, a possible new collection pond, and combining the 11 separate raceway effluent pipes into a single pipe, will improve current conditions and protect the fishery in Herring Cove.

c. Unavoidable Adverse Impacts

The construction and operation of the project will result in the following unavoidable adverse impacts to the aquatic habitats and fishery resources of the project area:

1) There will be an increase in the duration and perhaps frequency of shoreline dewatering which will primarily affect the western quadrant of Whitman Lake.

2) There may be a loss of downstream recruitment of DV char from Whitman Lake to Whitman Creek as a consequence of the reduction in spill that will be coincident with project operation. However, the current contribution of Dolly Varden to lower Whitman Creek via spill is probably low.

3) There will be a reduction in the magnitude and frequency of mid-high flows in Whitman Creek below the dam; the flow regime will be more stable and may actually benefit DV populations.

4) Herring Cove will periodically receive up to 150 cfs more freshwater inflow from Whitman Lake than under existing conditions. Effects of this may include false attraction of adults to the tailrace, and/or premature attraction of salmon into Herring Cove thereby reducing sportfish harvest potential.

5) Flows in Achilles Creek below the proposed diversion structure will be lower than under existing conditions; however, there are no fish species present in Achilles Creek and instream flows will be provided.

6) There may be some short-term impacts to aquatic resources during construction activities. Best Management Practices (BMPs) will be implemented during construction to minimize impacts.

7) Although the new intake will have a much finer screen than the current intake, there may still be some entrainment of fish. However, if they occur, losses are expected to be less than present losses of about 25 fish per year. Post-construction monitoring will more accurately quantify any losses.

## 4. Terrestrial Resources

### a. Affected Environment

Vegetation

A survey for threatened, endangered and sensitive plant species was conducted in August 1999. The survey involved two botanists walking the pipeline corridors and other project areas examining and documenting the areas that would be affected by ground disturbance, shoreline effects or indirect impacts from changes in hydrology.

The Whitman Hydroelectric Project area includes a variety of conifer forest types ranging from mature and old-growth stands to managed stands of younger generation trees. Old-growth stands are generally characterized by multi-aged trees of various sizes, large dead standing and fallen logs, a range in the degree of canopy closure, and variation in the composition and density of understory. In contrast, managed stands typically have even-aged trees, a high density of trees until thinned, and a relatively depauperate understory. Figure 4-1 is an aerial photograph, which shows the general type of vegetation within the project area.

The most common native species of conifer trees on Revillagigedo and surrounding islands include western hemlock (*Tsuga heterophylla*), Alaska-cedar (*Chamaecyparis nootkatensis*), western red cedar (*Thuja plicata*), and Sitka spruce (*Picea sitchensis*), with mountain hemlock (*Tsuga mertensiana*), subalpine fir (*Abies lasiocarpa*), Pacific silver fir *(Abies amabalis*), and shorepine (*Pinus contorta* var. *contorta*) occurring in lesser amounts. Deciduous tree species include red alder (*Alnus rubra*) and black cottonwood (*Populus trichocarpa*).

Common understory shrub species include huckleberry and blueberry (*Vaccinium* spp.), devil's club (*Oplopanix horridus*), rusty menziesia (*Menziesia ferruginea*), salmonberry (*Rubus spectabilis*), western thimbleberry *(Rubus parviflorus*), and bunchberry (*Cornus canadensis*). Common herbaceous species include skunk cabbage (*Lysichiton americanum*), fern-leaved goldthread (*Coptis asplenifolia*) and a variety of ferns, mosses, grasses and sedges.

Acidic bog areas known as muskeg are also common in the Revillagigedo Island area. Muskeg, typically dominated by sphagnum moss, occurs in wet poorly drained areas and has deep accumulations of organic matter. Common muskeg species include small shrubs such as