FINAL
ENVIRONMENTAL ASSESSMENT
FOR HYDROPOWER LICENSE

Reynolds Creek Hydroelectric Project

FERC No. 11480-001

Alaska

Federal Energy Regulatory Commission
Office of Energy Projects
Division of Environmental and Engineering Review
888 First Street, NE
Washington, D.C. 20426

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UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

Haida Corporation

Project No. 11480-001
Alaska

NOTICE OF AVAILABILITY OF FINAL ENVIRONMENTAL ASSESSMENT

(July 7, 2000)

In accordance with the National Environmental Policy Act of 1969 and the Federal Energy Regulatory Commission's (Commission) regulations, 18 CFR Part 380 (Order No. 486, 52 F.R. 47897), the Office of Energy Projects has reviewed the application for an original license for Haida Corporation's proposed Reynolds Creek Hydroelectric Project, and has prepared a Final Environmental Assessment (FEA). The project would be located about 10 miles east of Hydaburg, Alaska on Prince of Wales Island.

On September 9, 1999, the Commission staff issued a draft environmental assessment (DEA) for the project and requested that comments be filed with the Commission within 45 days. Comments on the DEA were filed by the Alaska Power & Telephone Company, National Marine Fisheries Service, Alaska Department of Fish and Game, Alaska Division of Governmental Coordination, Haida Corporation, and Natural Heritage Institute and are addressed in the FEA.

The FEA contains the staff's analysis of the potential environmental impacts of the project and concludes that licensing the project, with appropriate environmental protective measures, would not constitute a major federal action that would significantly affect the quality of the human environment.

Copies of the FEA are available for review in the Commission's Public Reference Room, Room 2A, at 888 First Street, N.E., Washington, D.C. 20426, and on the web at http://www.ferc.fed.us/online/rims.htm [please call (202) 208-2222 for assistance].

David P. Boergers
Secretary

UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

To the Agency/Party Addressed: JUL 7 2000

In accordance with the National Environmental Policy Act of 1969 and the Federal Energy Regulatory Commission's regulations, 18 CFR Part 380 (Order No. 486, 52 F.R. 47897), the Office of Energy Projects staff has reviewed the application for, and prepared the enclosed Final Environmental Assessment (FEA) on licensing the proposed Reynolds Creek Hydroelectric Project. The project would be located about 10 miles east of Hydaburg, Alaska on Prince of Wales Island.

This FEA contains the Commission staff's analysis of the environmental impacts of the proposal and concludes that licensing the project, with appropriate environmental protective measures, would not constitute a major federal action significantly affecting the quality of the human environment.

Enclosure: Final Environmental Assessment

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SUMMARY

Haida Corporation (Haida) proposes to construct and operate the 5.0-megawatt (MW) Reynolds Creek Hydroelectric Project on Prince of Wales Island (POW), about 10 miles east of Hydaburg, Alaska. All project lands are either owned by Haida or would be acquired through a lease from Sealaska Corporation or the State of Alaska. No federal lands would be utilized for the project.

This Final Environmental Assessment (FEA) considers the effects of issuing an original hydropower license for this project and recommends conditions the Commission staff believe should be a part of any license issued. We considered the recommendations of resources agencies and others in the preparation of this FEA. We analyze the effects of project construction and operation including two alternative actions: (1) Haida's proposal with our recommended environmental measures, and (2) no action.

Reynolds Creek is a high-gradient stream that originates in the mountains east of Copper Harbor and flows to the ocean through a steep narrow canyon that widens with decreasing gradient. The proposed project is the only hydropower project proposed in the southern half of POW and intended to displace diesel-fueled electric power generation for the community of Hydaburg. Project operations would be implemented in two phases. Phase 1, with a capacity of 1.5 MW would serve only the community of Hydaburg, Alaska. Phase 2, projected for the year 2025, would increase capacity by 3.5 MW and be implemented when a distribution line is extended to Hydaburg, connecting the project with a larger POW power system.

Our analysis shows that our preferred alternative would be to issue an original license for the project, as proposed, that includes the following environmental protective and mitigative measures: (1) prepare and implement a final erosion and sediment control plan for construction; (2) hire an environmental compliance monitor; (3) prepare and implement a water quality monitoring program for construction; (4) temporarily cease construction activities for any water quality violations; (5) release minimum flows to the bypassed reach; (6) release minimum flows below the tailrace; (7) install a regulated outlet at the diversion; (8) prepare and implement a plan for hydrologic monitoring in the bypassed reach; (9) maintain minimum water levels at Lake Mellen; (10) continue required minimum flows throughout any outages; (11) maintain maximum ramping rates below the tailrace; (12) prepare and implement a plan to monitor compliance with required streamflows, lake levels and ramping rates; (13) prepare and implement a fuel

and hazardous substance spill prevention plan; (14) prepare and implement a construction plan and schedule for in-water construction; (15) prepare and implement a plan for biotic monitoring; (16) site penstock and transmission line corridors at least 100 feet from normal high water levels; (17) prepare and implement a fish and wildlife protection plan; (18) prepare and implement a final transmission line site plan; (19) consult with the State Historic Preservation Office if cultural materials are discovered during construction; (20) prepare and implement a treatment plan if property eligible for the National Register of Historic Places is discovered during construction; (21) prepare and implement operational, monitoring, and recreational plans to assess phase 2 implementation and operations on fish, wildlife, and outdoor recreation; (22) prepare and implement detailed designs for a perched-ledge tailrace; and (23) prepare and implement a plan for conducting post-construction biological and hydraulic evaluations and maintenance of the perched-ledge tailrace.

On the basis of our independent analysis, we conclude that issuing an original license for the Reynolds Creek project, with the environmental measures that we recommend, would not be a major federal action significantly affecting the quality of the human environment.

FINAL ENVIRONMENTAL ASSESSMENT

FEDERAL ENERGY REGULATORY COMMISSION
OFFICE OF ENERGY PROJECTS
DIVISION OF ENVIRONMENTAL AND ENGINEERING REVIEW

Reynolds Creek Hydroelectric Project
FERC No. 11480-001, Alaska

I. APPLICATION

On November 25, 1997, Haida Corporation (Haida) of Hydaburg, Alaska filed with the Federal Energy Regulatory Commission (Commission) an application for a license to construct, operate, and maintain the 5.0-megawatt (MW) Reynolds Creek Hydroelectric Project (project). Haida also filed with their application an applicant-prepared environmental assessment on the proposed project. The project would be located on Reynolds Creek at Lake Mellen on Prince of Wales Island (POW), about 10 miles east of Hydaburg, Alaska (figure 1). Haida proposes a phased project where phase 1 would have an installed capacity of 1.5 MW, and phase 2 would install an additional 3.5 MW of capacity, for a total installed capacity of 5 MW. The project would generate up to 23,500 megawatthours (MWh) of electrical energy per year at full capacity.

The project lands are either owned by Haida or would be acquired through a lease from Sealaska Corporation (Sealaska) or the State of Alaska. No federal lands would be utilized for the project.

II. PURPOSE OF ACTION AND NEED FOR POWER

A. Purpose of Action

The Commission must decide whether or not to issue a hydropower license to Haida for the project, and what conditions should be placed on any license issued. Issuing a license would allow Haida to construct and operate the project for a term of up to 50 years, making available electric power from a renewable resource.

The environmental and economic effects of construction and operation of the project, as proposed by Haida, are assessed in this EA. The effects of a no-action alternative are also considered.

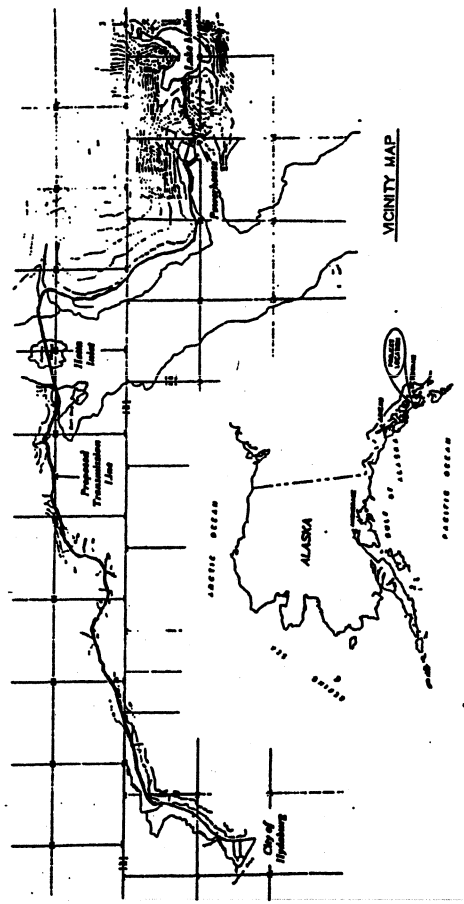


Fig. 1. Location of the proposed Reynolds Creek Hydroelectric Project and transmission line. (Source: Haida Corporation as modified by Commission staff)

B. Need for Power

Power from the project would have an immediate use in meeting the needs of Hydaburg and would be integral in meeting the POW's long-term anticipated power needs. The project would displace diesel-fueled electric power generation and, thereby, conserve non-renewable fossil fuels and reduce the emission of noxious byproducts caused by the combustion of fossil fuels. Displacing fossil fuels would also reduce the production of "greenhouse" gases and reduce the risk of oil spills associated with the handling and storage of these fuels. This is particularly important in the pristine environment of southeast Alaska where the project would be located. If the project license is denied, the project's capacity would likely need to be met with diesel generation.

Hydaburg is located within the service territory of Alaska Power & Telephone (AP&T) who currently operates and maintains the electric generation and distribution system.[1] The Hydaburg system is an isolated electrical network with no interconnection to any other utility or transmission system outside of the existing service territory. AP&T intends to purchase the power from the project to offset diesel generation in Hydaburg as outlined in a Memorandum of Understanding between the two parties, dated July 17, 1997. As the island becomes interconnected, the project's energy would be used to meet the energy requirements of all of POW. To assess this need for power, AP&T's current resources and the projected regional need for power were reviewed.

Hydaburg

Currently, all electrical generation in Hydaburg is from diesel generators owned and operated by AP&T. In 1996, the peak demand was 390 kilowatts (kW) and total sales were 1,530 MWh (175 kW average). The number of customers totaled slightly less than 200. However, peak demand has been as much as 490 kW which occurred both in 1992 and 1994. Energy sales have increased by an average of about 50 MWh over the last 10 years. Additionally, two significant loads would likely be added to the system should the project be developed. The first is the Natzuhini logging camp, located on Natzuhini Bay just north of Hydaburg. Sealaska, which owns and operates the camp, indicates that they plan to keep the camp in operation indefinitely and would favor an alternative source of generation. The camp uses about 1,400 MWh per year. Second, Haida has obtained a 20-year lease to operate the Hydaburg cold storage and ice making

[1]AP&T also holds the electrical franchise for the nearby communities of Hollis and Craig and provides wholesale power to the community of Klawock.

facilities in Hydaburg. These facilities are currently not in operation, and it is anticipated that they will be restarted in the near future. The facilities are estimated to add an additional 1,750 MWh to the system load.

Interconnected Prince of Wales Island

The Craig/Klawock area, located 22 miles north-northwest of Hydaburg, is currently served by AP&T and the Tlingit-Haida Regional Electric Authority. Up until 1995, all generation on the island was provided by diesel generators. In 1995, AP&T built the 4.5 MW Black Bear Lake Hydroelectric Project (BBL), FERC Project No. 10440. This project's output is now used to meet the electrical needs of Craig and Klawock. In 1996, the load in Craig/Klawock totaled 19,000 MWh. The average annual energy requirements for these communities has risen by 10 percent each year since 1990. The majority of generation is being supplied by BBL. The BBL's estimated average annual generation capability of 23,000 MWh is now over 80 percent used.

Figure 2 shows that the interconnection of POW continues to progress. A transmission intertie from BBL west to the community of Thorne Bay, the Goose Creek Industrial Park and Kasaan has been funded and will soon be constructed. Construction is estimated to be complete in 1999. With this interconnection in place, BBL will be essentially 100 percent utilized. AP&T also has plans to interconnect to the community of Hollis by the year 2000. To help meet future growth, AP&T is now developing the South Fork, Black Bear Creek, and the Wolf Creek Hydro Projects.

Load Forecasts

To identify the future need for power on the island, we looked at both Hydaburg's current and projected need for power as well as the projected power needs when the POW gets interconnected.

Hydaburg

Using data from Haida's Development Analysis Report, we projected energy requirements for Hydaburg from 1996-2030 for a low, medium and high load growth. Figure 3 compares the load forecasts with the phase 1 average annual energy of the Reynolds Creek Project. As the figure shows, the phase 1 output of the project is considerable when compared to Hydaburg's energy need.

POW interconnected energy needs

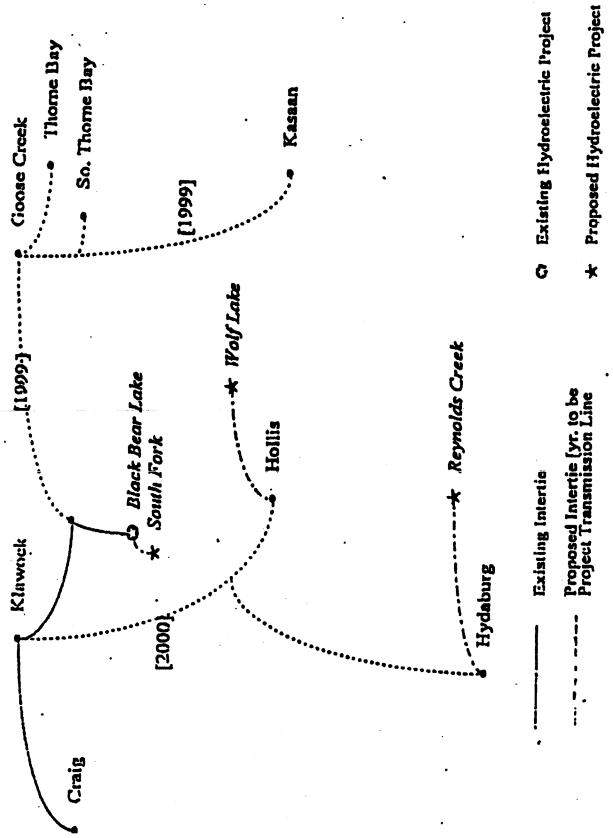


Fig. 2. Prince of Wales resource schematic. (Source: Haida Corporation as modified by Commission staff)

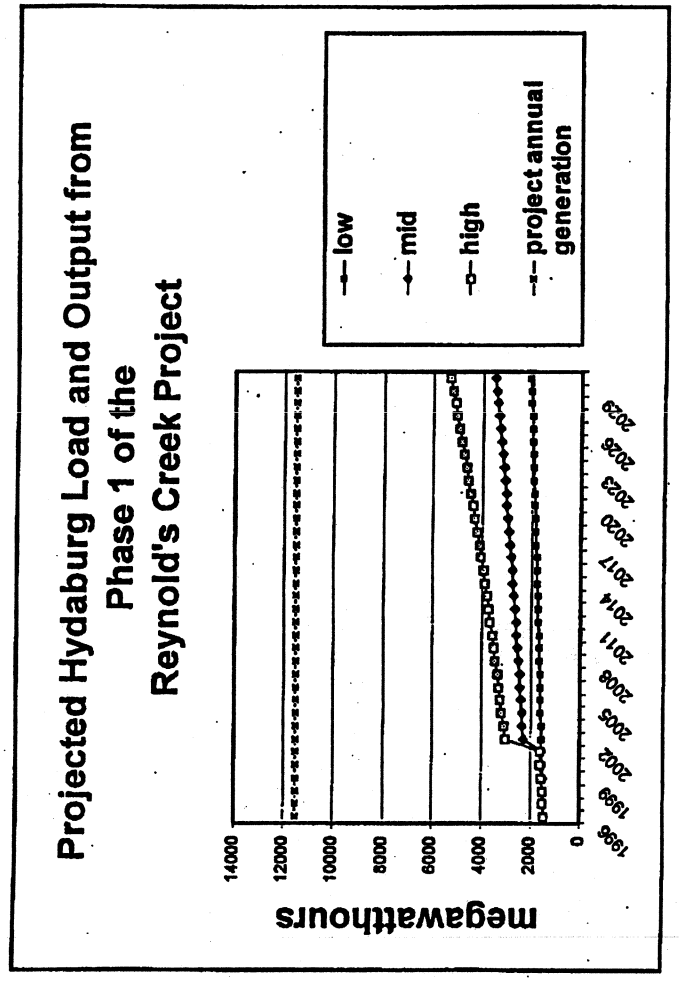


Figure 3. Annual Energy Requirements, City of Hydaburg

Using data from the Development Analysis Report for the future interconnected power system, figure 4 shows projected energy needs assuming low, medium and high load growth. The figure also shows the combined average annual energy of BBL and the three proposed hydro projects—Reynolds Creek, South Fork, and Wolf Creek. Since we don't know when Hydaburg would be connected to the other communities, we looked at how the POW interconnected system would be affected if a transmission line connecting Hydaburg isn't built. Figure 5 shows the projected energy needs for the POW without Hydaburg and compares the forecasted load with the energy capability of the existing BBL project and the proposed Wolf Creek and South Fork Projects. As figure 5 shows, without the Reynolds Creek Project, the island's interconnected communities would soon need to rely on diesel-fueled electric power generation to meet power needs.

Comparing figures 4 and 5, you can see that, if Reynolds Creek is built and interconnected with the rest of the island, the capability of the existing and planned projects would more than meet the island's requirements throughout the planning period for any of the load forecasts.

Figure 4. Annual Energy Requirements, Interconnected POWI

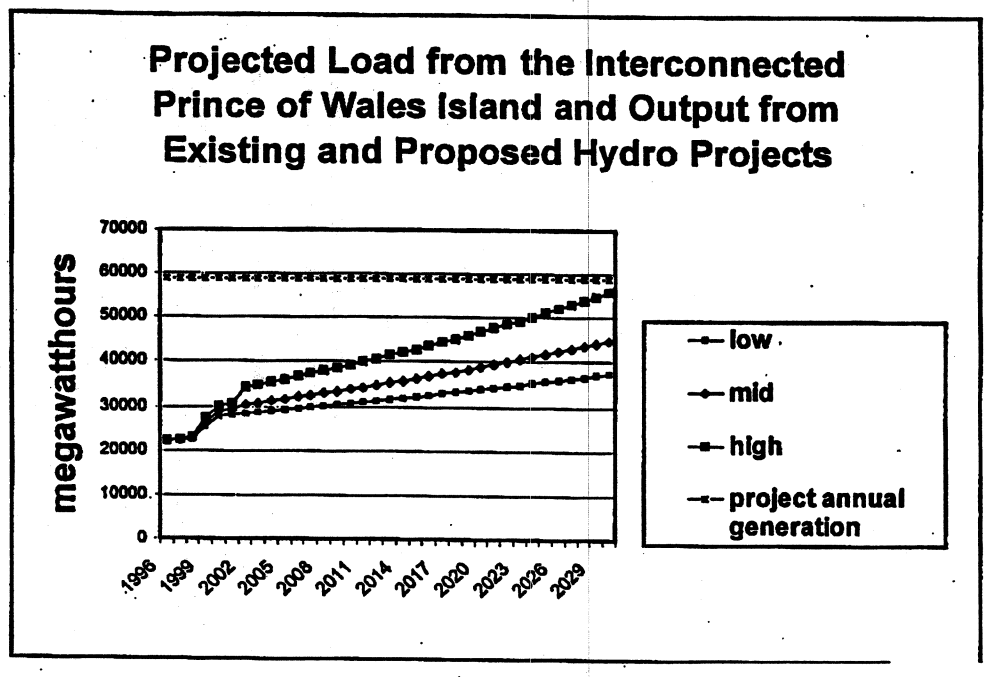
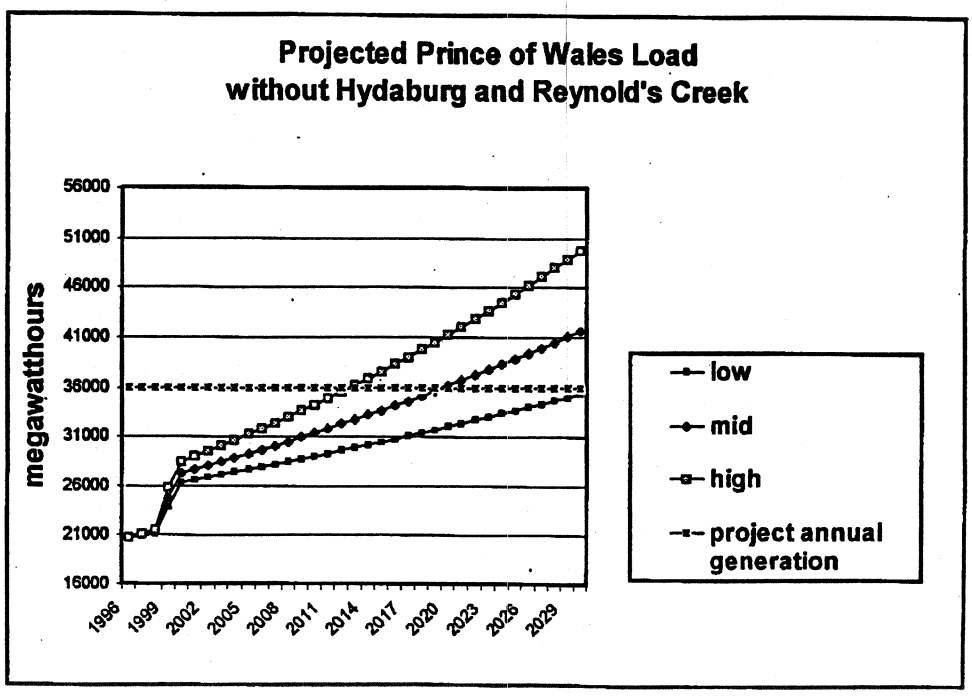


Figure 5. Annual Energy Requirements, POWI without the City of Hydaburg



III. PROPOSED ACTION AND ALTERNATIVES

A. Haida's Proposal

1. Project Facilities

Haida proposes to construct the following project structures (figure 6):

(a) 20-foot-long, 6-foot-high, concrete diversion dam, with an uncontrolled spillway, near the outlet of Rich's Pond at elevation 870 feet mean sea level (fmsl);

(b) a small concrete box-type intake structure with protective trash racks located on the left side of the diversion dam;

(c) a 42-inch-diameter, 3,200-foot-long, steel penstock above ground on saddled supports;

(d) a 40-foot-wide, 100-foot-long, pre-engineered insulated metal powerhouse on a concrete slab, with one 1,500-kilowatt (kW) horizontal impulse turbine/generator (2,000 horsepower) during phase 1, and a second 3,500-kW turbine/generator (4,700 horsepower) to be added during phase 2;

(e) an 80-foot-long by 10-foot-wide, riprap-lined tailrace channel consisting of concrete, crushed rock, and rock boulders;

(f) a switchyard, located next to the powerhouse;

(g) two access roads each 14 feet (ft) wide, totaling 500 ft long, extending from existing or proposed logging roads to the diversion/intake and powerhouse;

(h) an overhead 34.5-kilovolt (kV), 10.9-mile-long transmission line; and

(i) related appurtenances.

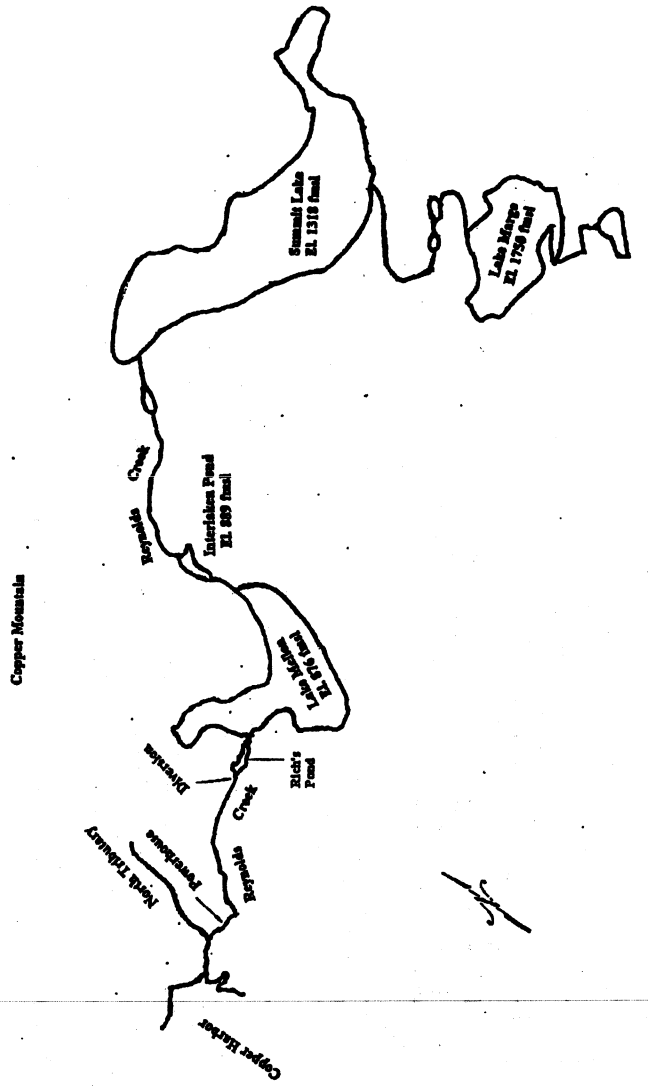


Fig. 6. Reynolds Creek watershed and proposed project facilities. (Source: Haida Corporation as modified by Commission staff)

2. Project Operation

Haida proposes to divert Lake Mellen outflows at the Rich's Pond outlet, convey the flows through a penstock to the powerhouse, and return the flow to Reynolds Creek about 3,500 ft downstream of the diversion. An unregulated opening in the diversion would release a continuous 5 cubic feet per second (cfs) to Reynolds Creek below the diversion. The top 600 acre-ft of Lake Mellen would be used to regulate the daily variations in electrical load with the daily variations in inflow to the project. Haida proposes three modes of operation: load following , block loading, and lake level control.

In phase 1, when the project would be a power source for Hydaburg only, load following (peaking) would be the primary mode of operation. With load following, both the turbine flows and Lake Mellen water levels would vary depending on the power demand and the inflows to Lake Mellen. Turbine flows could change instantaneously between 5 (minimum turbine capacity) to 30 cfs, but would normally fluctuate from 20 to 30 cfs twice over a 24-hour period. Any power needs in phase 1 that could not be met with available inflow or storage at Lake Mellen would be met by using the existing diesel generators. In phase 2, when the project is interconnected to a larger POW power system, the project would only peak if needed as a back-up to larger peaking facilities in the system. When load following in phase 2, turbine flows could change instantaneously between 5 to 90 cfs, but would normally fluctuate from 60 to 90 cfs twice over a 24-hour period. In both phases, flows not released through the 5-cfs opening or used to generate would be stored in Lake Mellen and overflow the diversion when Lake Mellen's surface level reaches 876.0 fmsl.

Block loading would be used during phase 1 when the electrical demand exceeds the power generated with available inflows to Lake Mellen. The turbine flows would be set, or block loaded, weekly, based on weekly forecasts of power demand and lake inflows, and maintained at a constant flow through the turbines. Small adjustments in turbine flows would be made once or twice a day according to changes in inflow to Lake Mellen. Turbine flows would be kept constant by using a combination of inflows and stored water, and water elevations in Lake Mellen would vary accordingly. Block loading during phase 1 would be unusual because of the variable demand for power when the project is Hydaburg's primary source of power. It would be a common mode of operation in phase 2, when larger facilities in the interconnected system could be used for load following. The range of constant flows could be from 5 to 30 cfs in phase 1, and 5 and 90 cfs in phase 2.

The lake level control mode during phase 1 would be used when the power demand exceeds the power generated from available inflows and Lake Mellen has been

drawn down to its minimum level of operation. Under these conditions, load following and block loading are not possible because the lake level would have to remain constant and only inflows to Lake Mellen could be used for generation. With the lake level control, Lake Mellen surfaces levels would be kept constant, rather than the turbine flows. Controlling the lake level would prevent drawdowns below any required minimum lake levels. Inflows would be released for power generation and any required minimum flows or stored. To the extent that inflows to Lake Mellen are at or near a required minimum flow in the bypassed reach or the minimum turbine flow, flows through the powerhouse could be noncontinuous as inflow fluctuates. During phase 2, when the use of stored water would increase, Haida would use the level control method more frequently. The turbine flow would be automatically adjusted to maintain the lake at some set level below the spillway crest, based on system-wide power needs, not necessarily at any minimum drawdown level. This would allow generation to be maximized during short-term increases in inflows from rainstorms. For both phases 1 and 2, turbine flows could only vary to the extent that inflow to Lake Mellen varies.

3. Proposed Environmental Measures

Haida proposes to:

- Implement a final Erosion and Sediment Control Plan (ESCP) and Best Management Practices to control runoff and prevent erosion and sediment.
- Prepare a plan to avoid fish and wildlife disturbance during construction that would include (1) timing of construction activities to minimize fish and wildlife disturbance; (2) measures to minimize blasting impacts to fish and wildlife, (3) measures to avoid conflicts between bears and humans, (4) measures to avoid disturbance to nesting bald eagles, and (5) prohibiting hunting, trapping, and fishing by construction personnel.
- Minimize areas of disturbance for construction of project facilities.
- Maintain Lake Mellen surface elevation above 874.5 fmsl during April and May to ensure that grayling have normal access to potential spawning areas.
- Maintain the surface elevation of Lake Mellen between 876 and 872 fmsl during the remainder of the year.
- Construct an unregulated spillway with similar hydraulic properties as the natural outlet to Lake Mellen.

- Monitor grayling spawning in tributaries to Lake Mellen in Years 1 and 2 following construction to ensure that access to spawning areas is not hindered by lake elevation changes.

- With Alaska Department of Fish and Game (ADF&G) approval, modify the inlet stream to Lake Mellen to provide a somewhat greater flow in an eastern distributary that currently lacks sufficient flow to allow grayling access for spawning, as mitigation for potential lost grayling spawning or rearing habitat in the reach between Lake Mellen and Rich's Pond.

- Install a low-level, unregulated outlet, sized to release 5 cfs at a lake elevation of 872.0 fmsl, in the diversion structure to continuously release flows into the bypassed reach of Reynolds Creek.

- Locate the tailrace about 40 ft downstream of the anadromous fish barrier.

- Design the tailrace to prevent access or attraction by fish and to dissipate remaining hydraulic energy before release of water to Reynolds Creek.

- Locate the transmission line to maximize the proportion of the route that follows existing roads.

- Locate the transmission line in accordance with Federal Aviation Authority requirements for aircraft safety and incorporate in the design state-of-the-art devices for raptor protection and diverters, where appropriate, for the protection of birds.

- Use existing timber harvest roads to the greatest extent possible to reduce surface disturbance and leave existing forested stream buffers intact to protect aquatic habitats.

B. Fish and Wildlife Agency Recommendations

National Marine Fisheries Service (NMFS) Recommendations. By letters dated February 9, 1999, and February 17, 2000, NMFS filed and modified, respectively, recommendations pursuant to Section 10(j) of the Federal Power Act (FPA). Summarized below, NMFS recommends that Haida:

- Restrict in-water construction to July 18 through August 7 to reduce the introduction of sediments to fish spawning areas in Lake Mellen and Reynolds Creek.

- Site the penstock and powerline corridors, and other clearing at least 66 horizontal ft from the ordinary high water of any anadromous fish streams.

- Monitor water quality during construction to determine the effectiveness of erosional control planning and implementation and cease construction activity if turbidity exceeds Alaska State Water Quality Standards until control measures are implemented.

- Provide the following instantaneous minimum flows, or the natural inflow to Lake Mellen, whichever is less, below the tailrace to assure access by salmon, steelhead, and cutthroat trout to traditional spawning and rearing areas:

Dec - Apr	25 cfs	Jul - Aug	35 cfs
May - Jun	50 cfs	Sep - Nov	40 cfs

- Provide the following instantaneous minimum flows, or the natural inflow to Lake Mellen, whichever is less, to the Reynolds Creek bypassed reach:

Jan	15 cfs	Jul - Aug	17 cfs
Feb	12 cfs	Sep	13 cfs
Mar	17 cfs	Oct - Nov	12 cfs
Apr to Jun	12 cfs	Dec	17 cfs

- Implement the following downramping rates:

Feb 16 - May 31:	1 in/hr maximum during daylight hours, (one hour before sunrise to one hour after sunset), with post license monitoring to determine any impacts, and 2 inches per hour (in/hr) maximum at night
Jun 1 - Sep 15:	1 in/hr maximum
Sep 16 - Feb 15:	2 in/hr maximum

- Monitor instream flows within the bypassed and anadromous reaches using continuously recording gaging devices and notify interested parties of non-compliance events exceeding 12 hours.

- Incorporate a fail-safe, redundant backup system to insure that instantaneous flows are provided during routine maintenance periods, emergency project shutdowns, and other potential contingencies.

- Conduct fish escapement counts during the periods March 1 to May 15, August 1 to September 21, and August 15 to November 30 to enumerate spawning steelhead, pink and chum salmon, and coho salmon, respectively, and if anadromous fish and their habitats are determined to be inadequately protected, allow for further mitigative measures.

U.S. Department of the Interior (Interior) Recommendations. By letters dated February 4, 1999, and February 14, 1999, respectively, Interior filed and modified, respectively, recommendations pursuant to Section 10(j) of the FPA. Summarized below, Interior recommends that Haida:

- Prohibit hunting, trapping, and fishing in the project area during project construction.

- Restrict in-water construction to July 18 through August 7 to reduce the introduction of sediments to fish spawning areas unless specific approval is obtained from the U.S. Fish and Wildlife Service (FWS), ADF&G, and NMFS.

- Prior to any land-disturbing activities, submit plans, approved by the FWS and other agencies, as appropriate, to be implemented during construction and operation of the project. Develop plans to address the following objectives:

  A. Develop plans to address erosion and slope instability;

  B. Monitor water quality;

  C. Monitor flows and ramping rates in the anadromous reach;

  D. Prevent and minimize impacts from spills of fuel and other hazardous substances.

  E. Provide an environmental compliance monitor to ensure effective implementation of all environmental stipulations during construction;

  F. Prevent conflicts with bears;

  G. Route and mark the transmission line to minimize bird collisions and electrocutions, and

  H. Monitor the effects of project operations (including effectiveness of required instream flows and maximum ramping rates) on spawning and rearing habitat in the anadromous reach for a period of 5 years following construction of each phase of the project, and evaluate the need for flushing flows, other channel maintenance or operational modifications to protect anadromous fish.

- Site the transmission line to follow existing roads and leave existing forested stream buffers intact.

- Consult with the FWS, NMFS, and State of Alaska to evaluate potential impacts to fish, wildlife, and outdoor-oriented recreation resulting from phase 2, prior to its implementation. Investigate opportunities to minimize environmental impacts of phases 1 and 2.

- Prepare an operational plan and an environmental monitoring plan, to be approved by FWS, NMFS, and State of Alaska, and implemented on a schedule to be established by the Commission.

Alaska Department of Fish & Game (ADF&G) Recommendations. By letters dated March 11, 1999, and February 4, 2000, ADF&G filed and modified, respectively, the following recommendations pursuant to Section 10(j) of the FPA. Summarized below, ADF&G recommends that Haida:

- Restrict in-water construction to July 18 through August 7 in any one year to reduce the introduction of sediments to fish spawning areas in Lake Mellen and Reynolds Creek and its tributaries.

- Site the penstock and clearing at least 100 horizontal ft from the ordinary high water of Reynolds Creek and its tributaries.

- Site the transmission line corridor and clearing at least 100 horizontal ft from the ordinary high water of all streams identified in the latest edition of ADF&G's *Catalog of Waters Important for Spawning, Rearing or Migration of Anadromous Fishes* (*Catalog*).

- Prepare a final erosion and sediment control plan, to be approved by ADF&G, to monitor and ensure compliance with instantaneous streamflow and lake levels prior to stream crossing activities of fish bearing waters identified in the *Catalog*.

- Develop a plan, to be approved by resource agencies, to control erosion and slope instability and minimize the quantity of sediment introduced into Reynolds Creek and Lake Mellen from project construction and operation.

- Monitor water quality during construction and continuing for 60 days following the removal of temporary erosion control structures, and cease construction activity, until appropriate sediment control measures are implemented, if turbidity downstream of construction exceeds the Alaska State Water Quality Standards or 5 nephelometric turbidity units (NTU) higher than values obtained above the construction area.

- Construct a perched-ledge, with at least a 10-foot drop in water surface elevation in the tailrace channel, to exclude the entrance of salmonids from Reynolds Creek, and maintain a sufficiently deep plunge pool beneath the ledge to allow jumping fish to land in water without injury.

- Operate the project to maintain the Lake Mellen surface level at or above 872.0 fmsl, except for the period of April 1- June 15, when the lake stage must be at or above 874.5 fmsl; and design and construct the unregulated spillway to have hydraulic properties similar to the existing natural lake outlet as much as possible.

- Install a properly designed fish screen, with an automated cleaning system, in front of the diversion to exclude the entrainment/impingement of juvenile grayling.

- Prepare a plan and maintenance program, to be approved by resources agencies, to evaluate the hydraulic design and biological effectiveness of fish passage facilities, including adult fish exclusion at the tailrace and juvenile fish screening at the diversion intake.

- Provide the following instantaneous minimum flows into the bypassed reach to provide adequate instream flows for Dolly Varden and cutthroat trout.

Jan	15 cfs	Jul - Aug	17 cfs
Feb	12 cfs	Sep	13 cfs
Mar	17 cfs	Oct - Nov	12 cfs
Apr - Jun	12 cfs	Dec	14 cfs

- Implement the following ramping rates:

Feb 16 - May 31:	1 in/hr maximum during daylight hours, (one hour before sunrise to one hour after sunset), with post license monitoring to determine any impacts, and 2 inches per hour (in/hr) maximum at night
Jun 1 - Sep 15:	1 in/hr maximum
Sep 16 to Feb 15:	2 in/hr maximum

- To monitor daylight ramping rates from February 16 through May 31:

  A. develop a plan in consultation with ADF&G and other fish and wildlife agencies no later than 6 months before any land disturbing activities;

  B. after consultation with the fish and wildlife agencies and within 6 months after the first Feb 16 to May 31 period of operation, submit a report describing the methods to assess the effectiveness of the specified ramping rates, the data collected as part of the assessment, and the analysis and conclusions based on the assessment;

  C. install monitoring equipment, such as an automatic water level sensor, to continuously record elevation of the tailwater at the site, or sites, calibrated to sites sensitive to flow fluctuations; and

  D. file with fish and wildlife agencies and the Commission operational data necessary to determine compliance with the specified ramping rates.

- Prepare a plan, to be approved by resource agencies, to monitor instream flows within the bypassed and anadromous reaches using continuously recording gaging devices, continuously record the Lake Mellen stage, and notify interested parties of non-compliance events exceeding 12 hours.

- Incorporate a fail-safe, redundant backup system to insure that instantaneous flows are provided during routine maintenance periods, emergency project shutdowns, and interruptions in the power grid.

- Design the project with remote monitoring and operation of all project components.

- Consult and obtain approval from resource agencies for a plan to ensure project construction adheres to the Erosion and Sediment Control Plan (ESCP) and fuel and hazardous substances spill plan, including a provision for an environmental compliance monitor (ECM).

- Prepare a biotic monitoring plan, to be approved by resource agencies, to address the project's potential effects on biological resources in the project area, including salmon and steelhead migration and production; grayling passage conditions and habitat at the Lake Mellen inlet, the channel between Lake Mellen and Rich's Pond, and the margins of Rich's Pond and Lake Mellen; and allow for modifications to project operations or the channel at the Lake Mellen inlet, if indicated.

- Prepare a fuel and hazardous spill prevention plan to be approved by resource agencies.

- Prepare a plan, to be approved by resource agencies, for establishing an interest-bearing escrow account for $50,000 to mitigate for fish, wildlife, and water quality impacts associated with construction and operation of the project.

- Prepare a plan, to be approved by resource agencies, to ensure bear safety during construction and operation.

- Prepare plans, to be approved by resources agencies, for aquatic habitat protection, public access, and recreation enhancement in the watershed.

- Prohibit hunting, fishing, and trapping, and limit firearm use to defense of life or property when personnel are living at the site during the construction.

C. Staff's Recommended Modifications of Haida's Proposal

Based on agency and other comments that have been filed, and our analysis in Sections V, VI, and VII, we are recommending some modifications and additions to Haida's proposed project and enhancements, which are summarized below:

- Prepare and implement a final ESCP that includes: (1) descriptions of actual site conditions, (2) final preventive measures, (3) detailed descriptions, design drawings, and locations of control measures, (4) a revegetation plan, and (5) a specific implementation schedule; and addresses all stream crossing activities of fish bearing waters identified in the *Catalog*.

- Prepare and implement a water quality monitoring program during construction that would monitor the effectiveness of the ESCP and fuel and hazardous spill prevention plan, and include daily measurements of turbidity.

- Temporarily cease construction activities immediately if water quality violation occurs, until the violation is remedied.

- Maintain an instantaneous minimum flow of 10 cfs to the bypassed reach, or the instantaneous inflow to Lake Mellen, whichever is less.

- Prepare and implement a plan for hydrologic monitoring for the bypassed reach.

- Install a regulated outlet at the diversion, capable of remote operation, and sized to provide the full range of flows required for the bypassed reach and anadromous reach.

- Release the following instantaneous minimum flows below the tailrace, or the instantaneous inflow to Lake Mellen, whichever is less:

Dec - Apr	25 cfs	Jul - Aug	35 cfs
May - Jun	50 cfs	Sep - Nov	40 cfs

- Maintain the following Lake Mellen surface elevations:

Apr 1 - Jun 15	874.5 fmsl or above
Jun 16 - Mar 31	872.0 fmsl or above

- Maintain required minimum flows during scheduled and unscheduled power outages.

- Ramp increases and decreases in flows below the tailrace at the following rates:

Jun 1 - Sep 15	1 in/hr
Sep 16 - Feb 15	2 in/hr
Feb 16 - May 31	2 in/hr - 1 hr after sunset to 1 hr before sunrise 1 in/hr for the remaining hours

- Prepare and implement a plan to monitor the effectiveness of daylight ramping rates between February 16 and May 31.

- Prepare and implement a plan to monitor compliance with required streamflows, lake levels and ramping rates.

- Prepare and implement a fuel and hazardous substance spill prevention plan, including a provision to meet annually, starting with the start of construction and continue for at least 3 years after the start of full operations, with ADF&G, FWS, and NMFS to review the results of the plan and determine whether modifications are needed.

- Prepare and implement a construction plan and schedule that would detail Haida's ability to complete in-water construction within a July 18 - August 7 period.

- Prepare and implement detailed design drawings of a perched-ledge tailrace with a minimum of a 10-foot differential between the water surface elevations of the tailrace and Reynolds Creek at the outfall of the tailrace and plunge pool to be located beneath the ledge of the tailrace.

- Prepare and implement a plan for conducting post-construction biological and hydraulic evaluations and maintenance of the perched-ledge tailrace.

- Site the penstock and transmission line corridor to provide no less than 100 ft, measured horizontally, away from the ordinary high water of Reynolds Creek, its tributaries, and from all other streams identified in the *Catalog*, unless modified by the Commission for environmental or engineering reasons.

- Prepare and implement a fish and wildlife protection plan; include measures to protect bears and wolves; and prohibit the construction workforce from fishing, hunting, and trapping.

- Prepare and implement a final transmission line design plan that includes erosion protection measures.

- If cultural materials are discovered during construction, consult with the State Historic Preservation Office (SHPO).

- If properties discovered during construction are eligible for inclusion on the National Register of Historic Places (NRHP), prepare and implement a cultural resources treatment plan.

- Prepare and implement operational, biotic, and recreation monitoring plans to assess phase 2 implementation and operations.

D. No Action Alternative

Under the no-action alternative, the Commission would not issue a license for the proposed Reynolds Creek Hydroelectric Project, and the project would not be constructed. There would be no change to the existing environment, nor would any environmental protective measures be implemented. No energy from the proposed project would be generated. The no-action alternative is the benchmark from which we compare the proposed action and any action alternatives.

IV. CONSULTATION AND COMPLIANCE

A. Agency Consultation

The following entities responded to the public notice requesting final terms and conditions, recommendations, and prescriptions, issued by the Commission on November 13, 1998.

ENTITY	DATE OF LETTER
U.S. Department of the Interior	Feb. 4, 1999
National Marine Fisheries Service	Feb. 9, 1999
Alaska Department of Fish and Game	March 11, 1999
Alaska Department of Natural Resources	March 19, 1999

B. Interventions

In addition to filing comments, Commission regulations allow that organizations and individuals may petition to intervene and become a party to the licensing proceedings. The deadline for filing motions for intervention for the project was April 15, 1998. The following entities filed for intervener status:

ENTITY	FILING DATE
National Marine Fisheries Service	April 10, 1998
Alaska Department of Fish and Game	April 15, 1998
American Rivers	April 15, 1998
U.S. Department of the Interior	April 17, 1998

C. Scoping

Scoping Document 1, which requested written comments on issues to be addressed in the EA, was distributed to concerned agencies and individuals on March 15, 1996. Scoping meetings were held in Ketchikan and Hydaburg, Alaska on May 6, and May 7, 1996, respectively, and additional site visits were held on April 23, 1997, and March 1, 1999. Those who provided written responses to scoping are:

ENTITY	DATE OF LETTER
U.S. Department of the Interior	April 22, 1996
Alaska Department of Fish and Game	June 6, 1996
Alaska Division of Governmental Coordination	June 19, 1996
National Marine Fisheries Service	June 24, 1996

Scoping Document 2 (SD2), issued July 18, 1997, included responses to the above entities' comments. We address their environmental concerns in appropriate sections of the EA.

D. Comments on the Draft Environmental Assessment

On September 9, 1999, Commission staff issued a draft environmental assessment (DEA) for the project. Comments were received from the following entities:

ENTITY	DATE OF LETTER
Alaska Power & Telephone Company	September 15, 1999
National Marine Fisheries Service	October 22, 1999
Alaska Department of Fish and Game	October 22, 1999
Alaska Division of Governmental Coordination	October 22, 1999
Haida Corporation	October 22, 1999
Natural Heritage Institute	November 1, 1999

Appendix A contains the comments and our responses. This FEA includes the changes made as a result of our considerations of these comments.

E. Water Quality Certification

By letter dated November 18, 1997, Haida requested water quality certification under Section 401 of the Clean Water Act by submitting to the Alaska Department of Environmental Conservation (ADEC) a copy of their application for a U.S. Army Corps of Engineers (Corps) permit to discharge dredged or fill material into navigable waters under Section 404 of the Clean Water Act. By agreement between the Corps and the ADEC, an application for the Corps permit may also serve as application for water quality

certification. The ADEC received this request on November 21, 1997, but didn't act on the request within 1 year from the date of receipt. Therefore, water quality certification is deemed to be waived under section 4.38(f)(7)(ii) of the Commission's regulations.

The ADEC issued a Certificate of Reasonable Assurance to Haida on July 30, 1999. The initial certificate was superceded entirely with a revised Certification of Reasonable Assurance issued on August 19, 1999. In the revised certificate, the ADEC certified that there is reasonable assurance that the proposed construction and operation of the project would comply with applicable provisions of Section 401 of the Clean Water Act, the Alaska Water Quality Standards 18 AAC 70, and the Alaska Coastal Management Program, 6 AAC 80, provided that the activity adheres to the condition below:

- ADEC grants the applicant a Short-Term variance from the Anti-degradation Policy of 18 AAC 70.015(c) and from the Turbidity and Sediment Criteria of 18 AAC 10.020(b) during the in-water work window from July 18 - August 7. The applicant shall minimize the amount and duration of turbidity and suspended sediment during construction to the greatest extent practicable; the applicant's erosion and sediment control plan must specify best management practices for in-water work to be used during construction. Throughout the construction periods, the applicant shall conduct inspections at a frequency that will ensure compliance with these best management practices. Non-adherence to the best management practices shall be reported immediately to the Department of Fish and Game.

F. Coastal Zone Management Act (CZMA)

Under Section 307(c)(3)(A) of the CZMA, the Commission cannot issue a license for a project within or affecting a state's coastal zone, unless the Alaska Division of Governmental Coordination (ADGC) determines that the project is consistent with the Alaska Coastal Management Program (ACMP). By letter dated November 18, 1997, Haida submitted a Section 404 permit application and a Coastal Project Questionnaire and Certification Statement to the Corps. The ADGC initiated its consistency review on February 4, 1999; and on July 23, 1999, the ADGC issued to Haida a Commissioner-level final consistency determination with conditions to ensure that the project is consistent with the ACMP (letter to Michael Stimac, P.E., HDR Inc., Agent for Haida Corporation, Bellevue, Washington, from Patrick Galvin, Director, Division of Environmental Coordination, Juneau, Alaska, July 23, 1999):

Summarized below, ADGC would require that:

- Limit any construction below ordinary high water to July 18 through August 7 in any one year.

- Site the corridor for the penstock and clearing a minimum of 100 ft, measured horizontally, away from ordinary high water of Reynolds Creek and its tributaries.

- Site the transmission line corridor and clearing a minimum of 100 ft, measured horizontally, away from ordinary high water of all streams identified in the latest (1998) *Catalog*.

- Follow the ESCP as described in the license application, with implementation based on actual site geological, soil, and groundwater conditions and project design, and prepare the final plan in consultation with ADF&G and Alaska Department of Natural Resources (ADNR).

- Minimize turbidity and suspended sediment during construction; use best management practices for in-water work, conduct inspections to ensure compliance with best management practices; and report non-adherence to best management practices immediately to ADF&G.

- Construct a perched ledge tailrace, with at least a 10-foot drop in water surface elevation, in the tailrace channel, and provide a sufficiently deep plunge pool beneath the ledge to allow jumping fish to land in water without injury.

- Hold Lake Mellen water levels at or above 872.0 fmsl, except for April 1-June 15, when the lake stage must be at or above 874.5 fmsl. An unregulated spillway to have the hydraulic properties similar to the existing natural lake outlet would be required.

- Install a fish screen in front of the diversion intake, designed to function at the full proposed range of diversion, to exclude the entrainment/impingement of juvenile grayling.

- Design the fish screen to provide a maximum approach velocity of 0.8 feet per second (fps) and 1/4-inch mesh if fry do not occur near the intake; and if they do, provide a maximum approach velocity of 0.4 fps, 3/32-inch mesh holes, and 1.75 millimeters (mm) for profile bar material.

- Keep fish screens free of debris accumulation, and service mesh, seals, and other components.

- Install an outlet capable of delivering at least 12 cfs from Lake Mellen to the bypass reach regardless of the stage of Lake Mellen. A valved outlet designed for both remote automated control and manual onsite operation is required if the licensee plans to pursue an alternate flow regime.

- Operate the project so that decreases in the water levels below the tailrace do not exceed the following rates:

Jun 1 - Sep 15	1 in/hr
Sep 16 - May 31	2 in/hr

and monitor the effect of ramping on fish populations and habitat.

- Continuously record flows within the bypass and anadromous reaches in Reynolds Creek and Lake Mellen water levels before, during, and following construction phases, for the life of the project; and provide the data to the ADF&G and ADNR.

- Continuously measure water used in the powerhouse or discharged from the penstock, without use in the turbine.

- Monitor reservoir inflows by modeling the relationship between reservoir stage, penstock flow, and streamflow downstream from the tailrace.

- Notify ADF&G, ADNR, Commission staff, and other interested parties whenever required instream flows have been out of compliance for 12 hours.

- Monitor fish escapement in the anadromous reach during March 1 to May 31, August 1 to September 21, and August 1 to November 30, to enumerate runs of spawning steelhead, pink and chum salmon, and coho salmon, respectively, for at least 5 years after phase 1 becomes operational. If phase 2, or a modified flow regime in phase 1, is established, continue studies for up to an additional 5 years.

- Minimize or mitigate aquatic impacts during channel construction between Lake Mellen and Rich's Pond, monitor fish passage and channel stability between Lake Mellen and Rich's Pond and the Lake Mellen inlet from April 1- May 31; and monitor the shorelines of Lake Mellen and Rich's Pond for grayling stranding. Monitoring would continue for at least 5 years after phase 1 becomes operational. If phase 2 or modified phase 1 operations cause changes in Lake Mellen and/or Rich's Pond, monitoring would be required for 5 years after that occurs.

- Follow specific instructions regarding bear safety.

- Maintain or exceed the following instantaneous flows below the tailrace, or the inflow to Lake Mellen, whichever is less:

Dec - Apr	25 cfs	Jul - Aug	35 cfs
May - Jun	50 cfs	Sep - Nov	40 cfs

- Provide fail-safe and redundant backup provisions for indefinite flow continuation.

G. Section 18 Fishway Prescriptions

Section 18 of the FPA states that the Commission shall require construction, maintenance, and operation by a licensee of such fishways as the Secretaries of Commerce and Interior may prescribe. Commerce recommends that Haida be required to provide fishways at the project when prescribed by the Secretary of Commerce under Section 18 of the FPA. Although fishways have not been prescribed by Commerce at this time, it is appropriate for the Commission to include a license article which reserves the Commission's authority to require any fishways Commerce may prescribe in the future. We recognize that future fish passage needs and management objectives cannot always be predicted when the license is issued.

Interior submitted, by letter dated February 4, 1999, and modified by letter dated February 14, 2000, the following fishway prescriptions under Section 18 of the FPA:

- To ensure that Arctic grayling have normal access to traditional spawning areas, Lake Mellen water surface elevation (stage) shall be maintained at or above 872.0 fmsl, except for the period of April 1 - June 15, when the lake stage must be at or above 874.5.

- Arctic grayling access to spawning habitat in Reynolds Creek above Lake Mellen shall be monitored in Years 1 and 2 following construction of each phase to ensure that access to spawning areas is not hindered by project operation. Monitoring results, including photographs, shall be submitted to the FWS in Ketchikan and Juneau, and the ADF&G in Douglas and Craig. If, in the opinion of the resource agencies, remedial work is necessary to improve grayling migration, a plan shall be developed by the licensee, approved by the resource agencies, and implemented prior to the subsequent spawning season.

- A low-level outlet shall be installed in the diversion structure to continuously release flows into the bypassed reach of Reynolds Creek, and ensure that cutthroat trout and Dolly Varden char in the bypassed reach have access to traditional spawning and rearing habitats. The outlet shall be regulated to continuously release instantaneous flows at of above the following rates:

Jan	15 cfs	Jul-Aug	17 cfs
Feb	12 cfs	Sept	13 cfs
Mar	17 cfs	Oct-Nov	12 cfs
Apr-Jun	12 cfs	Dec	14 cfs

This prescription may be modified, if post-construction evaluation and modeling demonstrate that flows other than those shown above will provide access to habitat adequate to support the fish populations in the bypass reach.

- The intake in Rich's Pond shall be screened to prevent migrating Arctic grayling from entering the penstock, and to allow safe access to overwintering habitat in the vicinity of the intake. Screen mesh shall not exceed 1/4 in, measured in the narrowest direction, and water velocity shall not exceed 0.8 fps. If fry < 60 mm are documented in the vicinity of the intake, the screen mesh must not exceed 3/32 in and the water velocity must not exceed 0.4 fps. A cleaning system shall be included to prevent accumulation of debris and maintain water velocity below the rates given above.

- Fish shall be excluded from the tailrace by a perched ledge, with at least a 10-foot drop. A plunge pool shall be provided below the ledge, to allow jumping fish to land in water without injury.

- Access by salmon, steelhead, and cutthroat trout to traditional spawning and rearing areas below the powerhouse shall be maintained by providing instantaneous flows within 100 ft downstream of the tailrace at or above flows specified below. When inflow to Lake Mellen is less than the flows specified below, flows through the tailrace may go as low as inflow to Lake Mellen, but no lower. Lake stage during such periods may not increase unless and until the flows specified below are met or exceeded.

Dec - Apr	25 cfs	Jul - Aug	35 cfs
May - Jun	50 cfs	Sept - Nov	40 cfs

The project must be equipped to provide these instantaneous flows at all times, including during shutdowns, outages, load rejections, or any other circumstances.

- Access to secure rearing habitat in the margins of Reynolds Creek shall be maintained for juvenile coho, pink, and chum salmon, and steelhead and cutthroat trout by limiting flow reductions to the rates specified below. These ramping rates must be based on gaging through a control structure or narrow stream reach below the tailrace but above any major tributaries below the tailrace. Flow reductions shall not exceed:

Feb 16 - May 31:	2 in/hr from one hour after sunset until one hour before sunrise; 1 in/hr for the remaining hours
Jun 1 - Sep 15:	1 in/hr maximum
Sep 16 to Feb 15:	2 in/hr maximum

This prescription may be modified, if post-construction evaluation and modeling demonstrate that ramping rates other than those shown above are required to provide adequate access to secure rearing habitat below the tailrace.

H. Public Utilities Regulatory Policies Act (PURPA) of 1978

In its license application, Haida stated its intent to seek benefits under Section 210 of PURPA, a program to foster development of small power projects. The program also allows fish and wildlife agencies to issue mandatory conditions for a project which receives PURPA benefits. By letter dated January 11, 1999, Haida requested withdrawal of its intent to seek PURPA benefits. On February 11, 1999, the Commission granted a waiver of §4.35(b)(3) of the Commission's regulations and accepted Haida's withdrawal of its request for PURPA benefits. Because we granted Haida's withdrawal request, we gave the fish and wildlife agencies additional time, until March 5, 1999, to submit their final recommendations for the project.

V. ENVIRONMENTAL ANALYSIS [2]

In this section, we first describe the general environmental setting of the project area. We then discuss the cumulative and site-specific effects of the resources affected by the project including effects of the proposed action, action alternatives, and no action.

[2] Unless otherwise indicated, the source of our information is Haida's application for license, and supplemental filings by the applicant.

In our detailed assessment of each relevant resource, we first describe the affected environment -- which is the existing condition and the baseline against which to measure anticipated changes of the proposed project and any action alternative -- and then we discuss environmental effects of the project including proposed protection, mitigation, and enhancement measures. In this section we also make recommendations for measures that do not have a substantial economic affect on the project. Our recommendations for the measures that have effects on other power or non-power resources are found in the, Section VII, Comprehensive Development and Recommended Alternatives.

A. General Description of the Reynolds Creek Project Area

Southeast Alaska, an area 500 miles long and 120 miles wide, is characterized by many saltwater islands, rugged mountains, and numerous lakes and streams. Heavy precipitation nurtures towering evergreen forests interspersed with muskeg, icefields, and glaciers.

Reynolds Creek is a high gradient stream that originates in mountains to the north and east of Copper Harbor on the southwest side of POW, the largest island in the Alexander Archipelago of southeast Alaska. The Reynolds Creek drainage is a narrow glacial valley with steep walls that are wooded, except where rock cliffs are too steep for vegetation or where avalanche paths limit vegetation to shrubs.

Portions of Reynolds Creek Basin were clearcut before 1944 and additional areas were disturbed from copper mining in the early part of this century on Copper Mountain. When mining started in the area, the community of Coppermount had a smelter that handled ore from Copper Mountain and other mines in the Hetta Inlet area. The mining and smelting activities were short-lived and have been abandoned for over a half century.

In 1997, Sealaska announced its intentions to conduct timber harvesting operations in the drainage basin below Lake Mellen and began constructing a road system to access the area. It is expected that the logging road system will be complete prior to initial construction of the Reynolds Creek Project.

B. Cumulative Impacts

According to the Council on Environmental Quality's Regulations for implementing NEPA (50 CAR §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, including hydropower and other land and water development activities.

During the scoping process we identified aesthetics and recreation, including hunting and fishing, as resources that have the potential to be cumulatively affected by the Reynolds Creek Project. Although development activities in the vicinity of the project area are limited, these resources were chosen because logging and road construction in the project area could promote more permanent structures and hunting and fishing.

The ADF&G has stated a concern about cumulative socioeconomic and environmental impacts of hydropower projects on POW and how they may impact each other if connected to an intertie.

1. Geographic Scope

The geographic scope of analysis for cumulatively affected resources is defined by the physical limits or boundaries of: (a) the proposed action's effect on the resources, and (b) contributing resource effects from other hydropower and non-hydropower activities.

For aesthetic and recreation resources, we define the geographic scope as the Reynolds Creek drainage from the inlet of Lake Mellen downstream to tidewater, and the transmission line route to the city of Hydaburg. This geographic area was chosen because the construction of permanent structures could alter the aesthetic character of the landscape and recreational hunting and fishing.

2. Temporal Scope

The temporal scope of our cumulative analysis includes past, present, and future actions and their effects on each resource that could be cumulatively affected. For purposes of our analysis, the temporal scope will look 50 years into the future (expected term of license), concentrating on the effect on the resources from reasonably foreseeable future actions. The historical discussion will, by necessity, be limited to the amount of available information.

3. Cumulative Effects Analysis

Aesthetics

The Reynolds Creek drainage rises from tidewater to alpine tundra on the ridge tops and mountains encircling Lake Mellen. Lake Mellen is surrounded by a mix of thick

conifer forest, gray rock cliffs, slide paths from adjacent mountainsides, and limited park-like areas of taiga or muskeg. Past clearcutting of the side of Copper Mountain on the north side of Copper Harbor has affected the wilderness aspect of the view from the water and air.

Logging by Sealaska is expected to continue around the west flank of Copper Mountain into Copper Harbor and beyond Reynolds Creek during the next few years. Logging is expected to transform the hillsides from mostly unroaded and forested to mostly roaded and logged. As a result, the amount of clearing associated with project construction (about 7 acres for the diversion, penstock, powerhouse, and short access road) would not make a discernible contribution to degradation of the project area's viewscape, but would add to cumulative influences of development.

Looking into the future, the logged areas in the Reynolds Creek drainage would begin to re-establish through natural vegetative succession processes. Access to the project facilities would be maintained, but regrowth of surrounding vegetation would help to screen the features from observers except when viewed from the air or from limited vantage points on the ground. No other hydroelectric development is planned for the southern portion of POW, and non-hydro developments are not anticipated.

The 10.9-mile-long transmission line would be a developmental feature in the already disturbed hillsides and valleys along the route. Its presence would be apparent to observers in nearby aircraft, to those utilizing the roads that it would follow, and to those in the immediate area of the Hetta Inlet crossing. However, from the distance in the air, the more dominant noticeable feature would be the existing roadway. Regrowth of harvestable timber would be precluded along the transmission line right-of-way. Thus, the transmission line would be a permanent feature to the viewscape along its route, but its contribution to cumulative aesthetic impacts, given other land use alterations and disturbance, should not be significant.

Recreation and Other Land Uses

There are no developed recreation facilities located near the project area and recreational use is limited because of the remote location, difficult access, and private land ownership. The State's Comprehensive Outdoor Recreation Plan (SCORP), indicates that southeast Alaska communities are small and have limited road systems, making it difficult to go more than one hour without a boat or aircraft. Although the road system on POW is more extensive than in other parts of southeast Alaska (1,400 miles), any resulting increase in recreational usage in the project area should not be discernible because: (a) the project area is remote, (b) the project area does not attract, nor is

expected to attract, more recreational pursuits, (c) extensive timber harvesting practices in the Reynolds Creek Basin may turn recreationists to other areas, and (d) private property ownership will likely combine to limit access. Therefore, project effects on outdoor recreation in the project area are considered to be minor, project-specific, and not cumulative in nature.

Hydroelectric Development

The Reynolds Creek Project, if constructed, would play a part in the continuing development of southeast Alaska. On POW, there are one existing and three proposed hydroprojects (table 1). None are in the vicinity of Reynolds Creek. Table 2 shows the hydroprojects in southeast Alaska that we have licensed, are currently evaluating, or are expecting to evaluate for a possible license. [3] Given the size of the area, this list is a relatively small number of hydroprojects in the region.

There is a proposal to integrate hydroelectric generation in southeast Alaska by connecting intertie segments (Acres International 1998). This intertie initiative would connect presently isolated load centers, increase system reliability, reduce or avoid diesel dependence, encourage economic development, and stabilize and equalize power rates. The interconnection between POW with the existing North-South Grid is estimated at about $40,000,000 in costs and would probably not occur before the year 2025. If deemed needed and feasible, the project would be connected to this intertie, when established.

The project would contribute to an increasing human imprint on the POW because of the new project features and transmission line that would be constructed. However, the environmental effects of the project, combined with the effects of the other licensed projects on the island would still be minor.

Table 1. Hydroprojects on Prince of Wales Island, Alaska.

PROJECT NAME	PROJECT NUMBER	DISTANCE FROM REYNOLDS CREEK	CAPACITY	STATUS
Reynolds Creek	P-11480		5.0 MW	Proposed

[3] Preliminary permits have been issued for other new projects in southeast Alaska, but we typically don't consider such projects in our cumulative assessment because historically only a small percentage have resulted in filed applications.

Wolf Lake	P-11508	23 miles N	2.2 MW	Proposed
Black Bear Lake	P-10440	28 miles NW	4.5 MW	Licensed
South Fork[1]	DI97-1	27 miles NW	3.0 MW	Proposed

[1] On September 22, 1997, the Commission determined that this project is not under the Commission's jurisdiction for licensing.

Table 2. Hydroprojects in Southeast Alaska, Excluding Prince of Wales Island.

PROJECT NAME	PROJECT NUMBER	LOCATION	CAPACITY	STATUS
Connell Lake	P-11599	near Saxman	1.9 MW	Proposed
Kahtaheena River	P-11659	near Gustavus	0.6 MW	Proposed
Ketchikan Lakes	P-420	near Ketchikan	4.2 MW	Proposed
Lake Dorothy	P-11556	near Juneau	31.4 MW	Proposed
Otter Creek	P-11588	near Skagway	7.0 MW	Proposed
Sunrise	P-11591	near Wrangell	4.0 MW	Proposed
Upper Chilkoot	P-11319	near Haines	6.2 MW	Proposed
Whitman Lake	P-11597	near Ketchikan	3.9 MW	Proposed
Beaver Falls	P-1922	near Saxman	7.1 MW	Licensed
Goat Lake	P-11077	near Skagway	4.0 MW	Licensed
Mahoney Lake	P-11393	near Saxman	9.6 MW	Licensed
Swan Lake	P-3015	on Revi Island	22 MW	Licensed
Tyee Lake	P-2911	near Wrangle	20 MW	Licensed

C. Project Phasing

Haida proposes to implement the project in two phases. During phase 1, up to 30 cfs from Reynolds Creek would be diverted to a single turbine generating power for the Hydaburg community. For phase 2, projected by the year 2025, a second turbine would be added to divert up to an additional 60 cfs, and a 5-foot section of penstock would be constructed to provide flow to the new unit. At total capacity, a maximum of 90 cfs could

be diverted from Reynolds Creek. Phase 2 implementation would depend on the load growth on POW and when an electrical distribution line is extended to Hydaburg.

Haida and the resource agencies tried unsuccessfully to reach a mutual agreement on language for a proposed license article that would specify conditions for a phase 2 environmental effects analysis. Haida requests that we review only the effects for phase 1 of this project in our EA, and when phase 2 is implemented, reevaluate only any effects to aquatic resources. The NMFS, ADF&G, and ADGC believe that the environmental effects of both phases should be considered before any license is issued for the project. Interior does not believe that adequate information is available to address phase 2, and has recommended that Haida consult with the agencies prior to the construction and operation of phase 2. [4]

In preparing this EA, the Commission staff used the available information to evaluate and recommend protective and mitigative measures for Haida's proposed 5-MW project. Our recommended measures are based on our analysis of the resource needs, rather than a specific project phase, and would apply for the term of any licensed issued. For example, staff's recommended minimum flows for the bypassed reach are based on our evaluation of the need for fisheries protection, [5] not the project phase. During phase 2, flows diverted for power generation [6] would increase, but the required minimum flow for fisheries would not change, unless based on the results of post-license monitoring, the Commission finds that alternative flows would protect the fisheries.

Prior to the implementation of phase 2, Interior recommends [7] that the licensee consult with the FWS, NMFS, and State of Alaska to evaluate potential impacts to fish, wildlife, and outdoor-oriented recreation resulting from construction and operation of phase 2. Interior's recommended consultation would consider opportunities to minimize environmental impacts of both phases 1 and 2, and the licensee would prepare an

[4] Specific agency recommendations are addressed in Section V, Environmental Analysis.

[5] Our analysis of instream flows is found in Section V.D.2, Aquatic Resources. Our recommendation is found in Section VII, Comprehensive Development and Recommended Alternative.

[6] Our economic evaluation is found in Section VI, Developmental Analysis.

[7] Unless otherwise indicated, our references to agency recommendations are from those listed in Section IV, Consultation and Compliance.

operational plan and environmental monitoring plan for approval by the resources agencies.

We believe that our environmental measures recommended in this FEA adequately address the anticipated impacts of phase 1, and allow for later modification should post-licensing data show that alternative measures would be needed to protect resources. These measures are described in the individual resource sections of the FEA. We agree that operational and environmental monitoring plans would help assess any needed measures for phase 2 implementation. Therefore, we recommend that prior to phase 2 implementation, Haida prepare operational and environmental monitoring plans, developed in consultation with NMFS, FWS, ADF&G, and ADNR to assess the impacts of phase 2 implementation and operation on fish, wildlife, and outdoor recreation. The plan would specify the methods to be used for monitoring and evaluating any effects of phase 2, and would require approval by the Commission before the turbine and penstock section could be installed for phase 2.

D. Proposed Action and Other Action Alternatives

In this section, we discuss the effects of the project alternatives on environmental resources. For each resource, we first describe the affected environment, which we view as the existing condition and baseline against which we measure effects. We then discuss and analyze the specific environmental issues.

1. Geology and Soil Resources

a. Affected Environment

The Alexander Archipelago is a regionally seismic area, as evident by the numerous faults that have been mapped in the project vicinity. While no major destructive earthquakes have been reported in this area, southeast Alaska is considered to be seismically active.

The project site lies on a large igneous rock mass (granodiorite) overlain by a thin layer of soil. The gorge below Rich's Pond is carved into granodiorite by glacial and stream action. The streambed at the outlet of Rich's Pond is comprised of a large blocky colluvial deposit.

The area surrounding Rich's Pond is composed of exposed bedrock and areas of muskeg. The soils along the penstock route are generally thin (less than 10 ft) and stable due to the heavy vegetative cover that provides additional cohesion to the soil mass. The

soils along Reynolds Creek near the powerhouse site and the mouth of Reynolds Creek are composed of alluvium and could have a thickness of 10 ft or more. This soil consists mostly of a granular, sand and cobble mixture having little to no cohesion. The cohesion that is currently being provided by the heavy vegetative cover will be reduced significantly as timber in the Reynolds Creek Basin continues to be harvested. Within the basin, existing slopes are relatively stable. Minor surficial soil creep is occurring but is limited to the top 1 to 2 ft of loose top soil (clay, silt, and sand) and organic cover close to steep slopes. This type of movement is common on saturated, oversteepened soil slopes that are underlain by a rock base. Mass wasting, in the form of large block failure, has been observed in the stream canyon's vertical cliffs and along steep slopes. The north side of Copper Harbor may also show signs of mass movement.

b. Environmental Impacts and Recommendations

Erosion and Sediment Control

Construction disturbance can increase erosion and sediment production and harm aquatic resources.

Haida has developed a preliminary ESCP that they would finalize in consultation with FWS, NMFS, and ADF&G when the project would undergo final design (see November 1997 plan in Appendix B of the application for license (Haida Corporation 1997a). The final ESCP would provide detailed site-specific measures, including sediment ponds, sediment barriers, soil erosion matting and mulches, drains, surface water control, stormwater management, surface stabilization practices, a revegetation plan, and the use of Best Management Practices (BMPs), to minimize erosion and to prevent sediment from reaching any surface waters.

The NMFS, Interior, and ADF&G recommend that Haida prepare a final ESCP for their approval before conducting any land-disturbing or land-clearing work. ADF&G and ADGC recommend that the final ESCP be based on site-specific conditions and project design and include detailed descriptions and design drawings of preventive measures, a revegetation plan, and an implementation schedule. The ADGC would require that the final plan be developed in consultation with the ADF&G and ADNR.

Staff Analysis

Project construction would require: (1) vegetation removal, excavation, and blasting that would disturb about 7 acres of vegetation and soils; (2) in-stream construction at the diversion/intake structure and tailrace; (3) excavation of about 10

cubic yard (cyd) of material from the stream bank to construct the tailrace; (4) excavation of 200 cyd of material in the channel between Rich's Pond and Lake Mellen; and (5) the discharge of about 3,500 cyd of fill material into 0.5 acre of waters (streams and wetlands) to construct the diversion structure, 500 ft of access roads, powerhouse, tailrace, and other project features. Although construction of the 10.9-mile-long transmission line would require aerial crossing of Hetta Inlet via Jumbo Island and some vegetation clearing in the right-of-way, no grubbing, fill, or excavation would occur in the right-of-way. If unchecked, the above construction activities would be likely to increase erosion and sediment production, which would temporarily increase turbidity levels and sedimentation in Reynolds Creek, Lake Mellen, and other surface waters.

Because the project area has steep slopes, high precipitation rates, erodible soils, and requires work in and near streams and other waters, erosion and sedimentation would be likely to occur during construction unless appropriate preventive measures would be taken. Any project induced erosion or sedimentation problems would contribute to that which may be occurring in the Reynolds Creek Basin due to timber harvesting and its associated road building and may threaten fish spawning areas. Installation of the second turbine (phase 2) would not require any soil disturbing activities because the infrastructure would already be in place.

The measures described in Haida's ESCP should be effective at reducing soil erosion and sedimentation impacts during project construction to minimal levels. However, because these are only conceptual level plans, we recommend that the ESCP be finalized in consultation with FWS, ADF&G, ADNR and NMFS, and that it include the ADF&G and ADGC's recommended measures: (1) descriptions of actual site conditions; (2) final preventive measures; (3) detailed descriptions, design drawings, and locations of control measures; (4) revegetation measures;[8] and (5) a specific implementation schedule. The plan would address all stream crossing activities of fish bearing waters identified in ADF&G's *Catalog*. Also included would be provisions to meet annually with the NMFS, FWS, ADNR and ADF&G starting with the initiation of soil-disturbing activities and continuing for three years following the completion of construction, to review the results of the monitoring, and methods that would be used to recommend to the Commission whether monitoring should cease or be modified.

[8] ADF&G recommended that the revegetation plan address location and density of willow plantings. The final ESCP plan should address the need and planting methods for all plants, including willows.

Furthermore, clearing for the penstock and transmission line corridors should be sited a minimum of 100 ft from the ordinary high water mark of Reynolds Creek, its tributaries, and other waters important to anadromous fish to protect water quality and stream function (see Section V.D.3, Terrestrial Resources, for discussion of the recommendation).

The costs of a final ESCP, penstock and transmission line siting are included in Haida's construction proposal and added costs for our recommended measures would be minimal.

Monitoring

High turbidity results when sediments enter streams following soil disturbance.

The ADF&G would have Haida monitor the effectiveness of the final ESCP and adherence to the fuel and hazardous substances spill prevention plan (see Section V.D.2, Aquatic Resources) by: (1) hiring a representative of the ADF&G as an environmental compliance monitor (ECM) with specific authority to enforce compliance with the final ESCP, and other required measures, including the fuel and hazardous substances spill prevention plan; (2) monitoring turbidity levels downstream of the construction site to ensure that turbidity levels would not exceed state standards or would be 5 NTU higher than values above the construction site, and (3) holding an annual meeting between agencies and licensee to review and evaluate monitoring activities and reports and to modify or decide on continuation of monitoring activities. ADF&G adds that once the project would be operational, Haida should provide travel funding for an ADF&G representative to inspect the project annually. NMFS filed a similar request for a water quality monitoring plan, and Interior also recommends an ECM. The ADGC and ADEC granted Haida a short-term variance from the Anti-degradation Policy of 18 ACC 70.015(c) and the Turbidity and Sediment Criteria of 18 ACC 10.0205(b) for sediment and turbidity during the in-water work from July 18-August 7.

Haida disagrees with: (1) the need for a water quality monitoring plan, arguing that an ECM and water quality monitoring program during construction would be duplicative, and therefore, that a separate monitoring plan would be unnecessary; (2) NMFS' and ADF&G's recommendations that all construction must stop in the event of a water quality violation, even if only one component of the construction would be causing the violation; (3) ADF&G's recommendation that construction cease if the difference between turbidity upstream and downstream of the construction activities would be greater than 5 NTU; and (4) ADF&G's recommendation that Haida monitor water quality

daily and report the results of the monitoring weekly, arguing that the timing, location, and reporting of the monitoring should be left to the discretion of the ECM.
O

Haida proposes to include with their final ESCP, provisions for routine inspection of the project site to ensure that objectives of the final ESCP would be met. Haida does not object to an ECM provided by the agencies, but does not believe that funding of the ECM should be required. Instead, Haida proposes that the agencies identify those activities of critical importance, and then, Haida would notify the agencies of the timing of the activities so that an agency ECM could be present.

Staff Analysis

The Reynolds Creek watershed provides excellent habitat for a large diversity of fish and wildlife resources that could be negatively affected during construction through noncompliance with environmental permits and stipulated regulations. Given the remoteness of the area, we believe that securing an environmental monitor during project construction would help protect the resources of the area. Before any construction activity could begin at a Commission-licensed project, a licensee would be required to comply with the Commission's Construction Quality Control Inspection Program (Program). The Program requires a plan for inspecting and monitoring erosion control and other measures to protect the environment in the project area to include, where appropriate, an onsite monitor for particular construction activities.

We discuss the costs of providing an ECM in Section VI, Developmental Analysis, and make our final recommendation in Section VII, Comprehensive Development and Recommended Alternative.

We do not agree that annual inspections by an ADF&G representative are necessary to follow compliance with environmental measures, because our recommendations require consultation with the ADF&G regarding environmental measures, including the review of post-license operational records, when appropriate. Further, Haida's and the Commission's compliance activities for environmental measures are available at no cost to the ADF&G through the Commission's internet site. Finally, we recommend that the AGF&G have reasonable access to project lands and facilities as the ADF&G determines is necessary. Therefore, we do not recommend that Haida fund annual inspection trips for an ADF&G representative. See Section V.D.2, Aquatic Resources for discussions of agency access to operational records and project lands and facilities.

We believe that an annual meeting would allow Haida and the resource agencies to jointly adapt monitoring programs according to resource needs, minimize risk in attaining conservation objectives, and provide a demonstration of monitoring protocols. Such provisions would help to ensure successful implementation of revegetation and soil stabilization efforts, which could take several years to completely take hold. However, post-construction monitoring efforts need not occur indefinitely. We, therefore, recommend that Haida include in its final ESCP: (1) provisions to meet annually with ADF&G, ADNR, FWS, and NMFS to review the results of the monitoring for at least 3 years following the start of land-disturbing or land-clearing activities; (2) methods that would be used to annually report and evaluate the success of ESCP results; and (3) methods or mechanisms that would be used to determine when monitoring should cease or be modified.

The Alaska water quality standards for freshwater lakes and streams designated as *Growth and Propagation of Fish, Shellfish, Other Aquatic Life, and Wildlife*, require that an activity not cause stream turbidity and lake turbidity to rise 25 NTU and 5 NTU, respectively, above natural conditions. [9] The state standards were specifically established to protect water quality and aquatic resources, and therefore, we agree with Haida that these standards would adequately protect these resources in the Reynolds Creek watershed. In their comments on the DEA, ADF&G agrees that the stream standard of 25 NTU would be acceptable as opposed to their original recommendation for a stream standard of 5 NTU (letter from Clayton Hawkes, Hydroelectric Project Review Coordinator, ADF&G, Douglas, Alaska, October 22, 1999).

Water quality monitoring would be essential to ensure that state water quality standards would not be violated. In order to protect aquatic resources, we recommend that Haida submit a plan, prepared in consultation with the NMFS, FWS, ADNR and ADF&G to monitor water quality during construction. The plan would include provisions for sampling turbidity upstream and downstream of all construction activities daily, reporting the results to ADF&G weekly, and FWS, NMFS and ADNR upon request, and if an Alaska state water quality violation would occur, ceasing all construction events in the immediate area of the violation until the problem would be remedied. The plan should specify the type of equipment, resolving power, and calibration method, and require monitoring to continue for 60 days following the removal of temporary erosion control structures.

[9] Water Quality Standards, 18 AAC 70, as amended through May 27, 1999.

The recommendations from NMFS and ADF&G do not allow for deviations from the state water quality criteria. Allowing violations to occur during instream construction work could adversely effect anadromous fish resources, including habitat, which NMFS and ADF&G intend to protect through their water quality monitoring recommendations. Therefore, our recommended water quality monitoring plan should include a provision to monitor water quality at all times that in-water or ground-disturbing construction activities would occur, including the July 18 to August 7 construction period.

The cost of water quality monitoring would be a one-time construction cost that we consider minimal.

c. Unavoidable Adverse Impacts

Localized, short-term erosion and sedimentation would likely occur in Reynolds Creek during construction of the penstock, powerhouse, switchyard and tailrace, particularly because of proposed instream dredging and excavation. Soil disturbance would continue until construction would be completed. With our recommended measures for a final ESCP, turbidity monitoring, and ceasing construction in the event of a state water quality standard violation, the effects from project construction would be minor. Erosion could also result during construction of the transmission line, but it should be minor because of the use of existing roads, minimal clearing, no grubbing or filing, and implementation of appropriate ESCP measures.

2. Aquatic Resources

a. Affected Environment

Climatic conditions at the site are dominated by weather systems originating in the Gulf of Alaska. Both high and low temperatures are moderated by the proximity to saltwater. Over much of the year, particularly from September through June, low pressure systems bring extensive moisture to the region. These systems are often accompanied by strong winds, especially in the fall and winter. Average annual rainfall usually exceeds 100 inches. Near sea level, the majority of the precipitation falls as rain, with increasing amounts of snowfall above about 1,000 fmsl. Infrequent high pressure systems bring colder air to the region for periods of up to 5 or 10 days in winter with temperatures falling into the teens or lower. High pressure and dry periods are more common in the late summer with high temperatures into the 60's and 70's.

Water Quantity

Streamflow data was recorded at two US Geological Survey (USGS) gages on Reynolds Creek. USGS gaging Station No. 15081995, located on Reynolds Creek at Lake Mellen outlet, operated for the period July 1982 through September 1985. Haida entered into a cooperative agreement with the USGS to reestablish this gage in 1998 and it is currently recording data. USGS gaging Station No. 15082000, located on Reynolds Creek near its mouth at Copper Harbor, was in operation for the period June 1951 through September 1956.

Using USGS data, Haida estimated the average annual flow at the diversion site as 57 cfs. Table 3 shows the estimated monthly average, high, and low flows in Reynolds Creek at the point of diversion using actual gage data from 1952-1956 and 1983-1985. High flows occur with rains in October and November and snow melt in May and June. Low flows occur in mid- to late summer and mid-winter.

Table 3. Estimated average monthly flows for Reynolds Creek at the proposed diversion site (Source: Haida Corporation 1997).

Month	Average (cfs)	Minimum (cfs)	Maximum (cfs)
October	83	51	124
November	63	38	93
December	51	19	97
January	58	18	129
February	63	24	107
March	43	15	98
April	49	20	86
May	80	52	124
June	69	38	90
July	38	27	50
August	43	11	79
September	49	20	76
Estimated average annual flow = 57 cfs			

Water Quality

Water quality data has been and continues to be collected near the tailrace site and in Rich's Pond near the outlet of Lake Mellen. Table 2 lists water quality data available to date. The data illustrate that the existing water quality is unimpaired. Water temperature exhibits the expected normal seasonal variability, corresponding to changes in air temperature. Dissolved oxygen in the system has a high concentration. The pH is

near neutral. Turbidity and total suspended solids (TSS) are low or near the method detection limit.

Water Rights

On July 27, 1995, Haida filed an application with the ADNR for a water right of 30 cfs from Reynolds Creek to operate the project on a continuous basis. An amendment to the water right application increasing the total quantity from 30 cfs to 90 cfs was requested in a letter dated November 12, 1997.

Table 4. Water quality data for Reynolds Creek for 1995 - 1998 (Source: Haida Corporation 1997).

Date[1]	Site	Air Temp (°C)	Water Temp (°C)	pH	Conductivity (μmhos/ sq cm)	DO (ppm)	Turbidity (NTU)	(ppm)
Jul-95	tailrace[2]	22	16.2	-	30	-	-	-
	Rich's Pond[3]	25.5	17.8	-	30	-	-	-
23-Apr-96	Rich's Pond	-	4	-	20	-	-	-
21-May-96	Rich's Pond	-	7.8	7.38	20	9.9	0.39	-
	tailrace	-	8.5	7.48	77	11.7	0.39	-
7-Jun-96	Rich's Pond	-	8	-	25	-	-	-
23-Apr-97	tailrace	6.5	3.8	5.8	22	-	0.1	U[4]
	Rich's Pond	10.3	3.2	5.1	21	-	0.27	U
28-Jun-97	tailrace	17.1	15.8	7.6	0	10.1	0.1	0.6
	Rich's Pond	17.1	14.6	7.6	0	10.2	0.1	1.1
30-Jul-97	tailrace	14.2	14.6	8.1	34.2	9.3	-	-
	Rich's Pond	15.2	14.7	8.1	34.6	8.9	-	-
30-Sep-97	tailrace	10.7	10.5	8.2	0	9.2	0.2	U
	Rich's Pond	9	10.4	7.6	0	8.9	0.2	U
5-Feb-98	tailrace	4.8	3.1	8.2	-	13	0.13	0
	Rich's Pond	5.4	2.6	8.4	-	12	0.12	0
6-May-98	tailrace	8.6	8.0	8.2	-	10.7	0.15	0.3
	Rich's Pond	11.8	7.9	7.9	-	10.4	0.14	0.1
19-Jun-98	tailrace	18.4	13.8	7.9	37.3	9.6	0.18	0
	Rich's Pond	15.9	14.0	8.3	37.5	9.8	0.17	0
Average				7.6	32.4	9.9	0.20	0.05

[1] 1995 and 1996 data collected by Pentec Environmental; 1997 data collected by Haida Corporation and HR Alaska, Inc.
[2] Located near the proposed tailrace site.
[3] Located near the proposed diversion.
[4] Undetectable.

Fisheries

Haida conducted fisheries surveys of selected areas in the Reynolds Creek drainage during 1994 through 1997 (Pentec 1997a), and supplemented this information with agency survey data and literature reviews. Figs. 7 and 8 show the general timing of the various life history stages of fish from the project area.

Upper Reynolds Creek flows from Lake Marge at about 1,750 fmsl, down a series of cascades to Summit Lake at about 1,318 fmsl, then through a relatively wide and gently sloping valley to Lake Mellen at about 876.0 fmsl. In the 1960s, the ADF&G (1982) introduced Arctic grayling in Lake Marge and Summit Lake. Since then grayling have become well established in Lake Marge, Summit Lake and Lake Mellen and in connecting stream reaches and ponds. All three lakes, and Interlaken Pond, above Lake Mellen support healthy Arctic grayling fisheries. For about 100 ft upstream from Lake Mellen, deep pools and relatively low velocity areas adjacent to the main channel of Reynolds Creek appear to offer excellent grayling habitat. At that point a bedrock ledge crosses the stream creating a drop of about 3 ft that may prevent or at least limit upstream access from Lake Mellen.

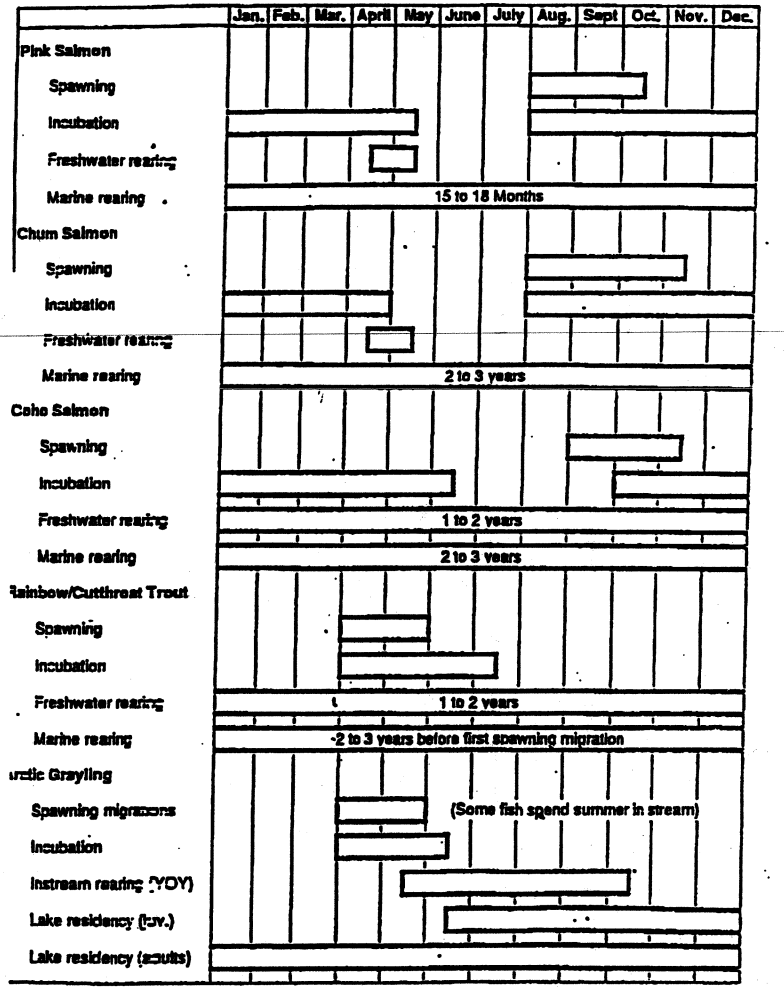
Lake Mellen is a sub-alpine lake with a surface area of 150 acres and a drainage of 5.2 square miles. The lake basin is steep-sided and rocky with old-growth evergreen vegetation down to the water's edge. The shoreline of Lake Mellen is generally composed of talus and bedrock. Shoreline habitat is enhanced by numerous trees that have fallen from the banks. Although steep in places, the lake bed near the inlet is relatively flat, shallow, and strewn with grounded logs. The shoreline adjacent to the inlet is composed of loose, cobble-sized talus. The Lake Mellen inlet is a small deltaic fan of rubble and a lower gradient distributary channel split from the main channel.

The outlet of Lake Mellen is formed by a shallow sill that has collected a large quantity of logs that are aligned across the outlet where they have floated and grounded on the sill. Grayling were abundant along and among these logs during surveys in July 1995 and 1997 (Pentec 1997a). Downstream of the logs, the outlet passes through a broad, shallow channel about 197 ft long into Rich's Pond, about 6 ft lower in elevation than Lake Mellen. Rich's Pond is shallow, with one broad, very shallow lobe with a silty bottom and a single small island. The rest of the pond shoreline is composed of talus and rock. The connecting channel between Lake Mellen and Rich's Pond has a rock rubble bed that is covered with a dense growth of filamentous algae during the spring and summer.

Figure 7. Timing of life stages of Dolly Varden (Source: Haida Corporation as modified by Commission staff).

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Spawning									xx	xxxx	xx	
Incubation	xxxx	xxxx	xxxx	xxxx	xxx	xx			xx	xxxx	xxxx	xx
Fry emergence				xx	xxxx	xx						
Juv/Adult	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx

Fig. 8. Life History of Arctic grayling, trout, and salmon in the project area. (Source: Haida Corporation)



Except during high runoff conditions, the outflow from Rich's Pond disappears beneath the surface and flows through boulder-sized talus. Flow emerges from the talus into the first of a series of cataracts leading directly into a steep, rocky canyon. The proposed 6-foot diversion would be at the outlet of Rich's Pond, raising its elevation to the same elevation as the natural outlet to Lake Mellen.

From Lake Mellen to the proposed powerhouse site, Reynolds Creek has an overall 23 percent gradient (figure 9). The upper 1,800 ft of the bypassed reach is a series of cascades and waterfalls with an average grade of greater than 30 percent. Although not directly surveyed, no significant fish habitat is provided by this reach (Pentec 1997a). Below 300 fmsl, the gradient moderates to about 11.1 percent for the next 1,290 ft in length. This reach includes a series of step pools interspersed with cascades and waterfalls. Banks remain steep, the stream bed consists of bedrock and coarse boulders, and turbulence is high except during low flows when some quieter pool margins are available. Resident cutthroat trout and Dolly Varden were the only species collected in these pools.

Below about elevation 95 fmsl, Reynolds Creek is accessible to anadromous fish. The length of the anadromous reach is about 1,100 ft, through an old-growth forest typical of lower elevations on POW. Stream gradient is relatively constant up to about elevation 75 fmsl. Above this point, gradient increases to about 11 percent for the 90 ft in distance between the elevations of 80 and 90 fmsl. Above the 90 fmsl, the gradient increases to about 25 percent for the short distance (about 40 ft) up to the anadromous fish barrier. The proposed tailrace would discharge at about elevation 90 fmsl.

About 625 ft downstream of the tailrace site, a tributary, North Tributary, joins Reynolds Creek. The lower portion of North Tributary has good streambed gravels and during the September 1995 survey supported the highest density of pink and chum salmon spawning observed. The tributary is a source of smaller gravel that provides spawning habitat in the anadromous reach of Reynolds Creek. A portion of the flow in this tributary comes from a spring of several cfs that enters the stream about 200 ft upstream of its confluence with Reynolds Creek.

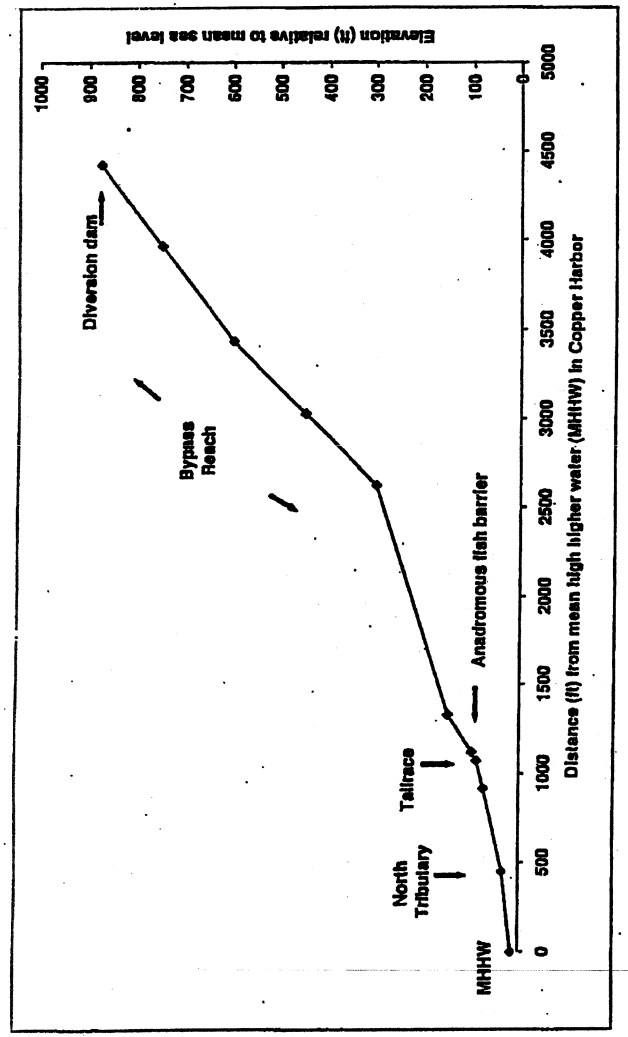


Fig. 7. Profile of the Reynolds Creek bypassed reach. (Source: Haida Corporation as modified by Commission staff)

Species recorded in the anadromous reach include pink, chum, and coho salmon; cutthroat and steelhead trout; and Dolly Varden. The ADF&G has records of aerial counts of salmon spawning escapement to streams in the Copper Harbor area since at least 1974 (Pentec 1997a). Because of the size of the streams and the dense tree canopy, the data are primarily from Copper Harbor, and the numbers may represent fish from several streams. The numbers may underrepresent the number of fish using streams in the area, however, because fish already in the streams are not counted (Pentec 1997a).

These data show numbers of pink salmon in the harbor peaking from mid-August into early September and chum salmon present only after mid-September. Peak numbers of pink salmon in the harbor and lower streams have exceeded 100,000 twice in the last 10 years (Pentec 1997a). Chum salmon have been inconsistently reported because surveys are infrequently conducted after the first week in September. The maximum reported number of chum salmon is just over 100, but the numbers reported during a September 1995 survey suggest much higher run sizes are likely.

Pink salmon begin to move into Reynolds Creek in mid- to late August. Initial spawning probably occurs in lower stream areas. Access to areas farther upstream becomes easier when fall rains increase in September. Spawning probably peaks in late August or early September and extends through September. Fry leave the streambed gravels in early spring and move quickly to marine areas to rear. Chum generally enter the system somewhat later in the fall than do pink salmon, but the presence of numerous active spawners and a few spent fish seen in early September suggests a considerable overlap with pink salmon activity. It is likely that chum salmon continue to spawn into mid-October, as only relatively old carcasses were seen along the river banks in early November 1994. Like pink salmon, chum fry leave the system quickly upon emergence from the gravel.

Above about 75 fmsl spawning habitat is limited, and during the September 1995 survey, the numbers of spawners dropped markedly in this area compared to below 75 fmsl. Although a significant number of pink salmon spawners (100's) reached the area above 75 fmsl, their spawning opportunities there are probably limited. At about 85 fmsl there is a cascade 6 to 8 ft in height that is passable by a side channel at high flows. Another higher and steeper cascade beginning at about elevation 95 ft was designated as the anadromous barrier by agency biologists during site visits in July 1995 and April 1997.

ADF&G (1979) reported no available spawning habitat above 75 fmsl. Surveys conducted in July 1995 and 1996 assessed salmonid rearing habitat and potential sources

of spawning gravels in this reach as boulders and coarse, angular rubble with very little gravel of a size in which fish could actually construct a redd. As a result, spawning probably consists of releasing eggs and sperm among the rubble. Only those eggs that lodge in cracks among the rubble would have a chance of surviving to the fry stage. This condition gets increasingly severe with distance upstream. The potential contribution to production of fry beginning at about elevation 85 fmsl is likely negligible.

Reynolds Creek below 75 fmsl, has good spawning and rearing habitat in a series of pools formed by low cascades, mostly over large woody debris. The pools typically had low velocity tailout glides among large cobbles. ADF&G personnel reported capturing coho fry in North Tributary (ADF&G 1995).

b. Environmental Impacts and Recommendations

Project operation

Project operations can divert streamflow and alter the natural hydrologic regime.

Haida has proposed three modes of operation (load following, block loading, and lake level control) to accommodate the variable flow range in Reynolds Creek and the two phases of the project.

No parties have objected to these operational modes as long as aquatic resources are protected by limitations in Lake Mellen drawdowns, adequate flow volumes and timing in the bypassed and anadromous reaches, and restrictive ramping below the powerhouse.

With adequate protections for aquatic resources, we agree that the three modes of operation that Haida proposes would provide the best flexibility for project operations. Therefore, we recommend that Haida operate the project as load following, block loaded, and lake level controlled as proposed for phases 1 and 2, as long as all resource protections are fully met. We describe the three modes of operation in detail in Section III.A.3, Project Operation, and discuss the proposed and recommended limitations for Lake Mellen drawdowns, minimum flows, and ramping rates, in detail below.

Minimum flows - bypassed reach

Reduced flows in bypassed reaches may harm aquatic resources.

Haida proposes to release an instantaneous minimum flow of 5 cfs below the diversion to benefit cutthroat trout and Dolly Varden in the bypassed reach. Haida would construct an unregulated opening in the diversion sized to pass 5 cfs when the Lake Mellen elevation is at 872.0 fmsl. Haida believes that the limiting factor for fish production in the stream is likely to be the frequent naturally-occurring high flow events that scour gravels and limit the amount of spawning and rearing habitat. Haida states that the steep gradient and confined bedrock channel of Reynolds Creek limit habitat for all life stages. By diverting flows from the bypassed reach, Haida states that the project would decrease flows above bankfull levels and likely increase the amount of suitable habitat in the reach over the course of a year.

The agencies have recommended various flows (table 5) for the protection of resident cutthroat trout and Dolly Varden in the bypassed reach.

Table 5. Instantaneous instream flows recommended and evaluated for the Reynolds Creek bypassed reach (in cfs). (Source: Commission staff)

MONTH	FLOWS (cfs)			
	Haida	ADNR	ADGC	ADF&G NMFS Interior
January	5	10	12	15
February	5	10	12	12
March	5	10	12	17
April	5	10	12	12
May	5	10	12	12
June	5	10	12	12
July	5	10	12	17
August	5	10	12	17
September	5	10	12	13
October	5	10	12	12
November	5	10	12	12
December	5	10	12	14

The ADNR recommends at least 10-cfs whenever Lake Mellen is at or above the lower limit of its operating range. ADNR states that, given the hydrologic and habitat data now available, 10 cfs represents the best compromise consistent with the value of protecting genetically-isolated resident fish and the power generation values, given the applicant's insistence on a fixed-orifice bypass flow arrangement. The ADNR states that a 10-cfs minimum flow may not allow the population to fully utilize the habitat area, but appears to be sufficient to sustain some population.

The ADGC would require at least 12 cfs when Lake Mellen is at or above 872.0 fmsl and, if Haida plans to pursue a modified flow regime, they would further require: (1) installation of a regulated outlet that would be automated to operate remotely, but could be operated manually on site; and (2) studies, along with ADF&G and ADNR, to monitor, review and evaluate any minimum flows.

ADF&G, NMFS and Interior recommend variable monthly minimum flows from 12 to 17 cfs to ensure that Dolly Varden and cutthroat trout in the bypassed reach have access to traditional spawning and rearing habitats. ADF&G developed the variable flow recommendation by analyzing the available hydrologic data, needs of the species, a combination of projected long-range hydrologic characteristics of the Reynolds watershed, seasonal fish periodicity by life phase and an adaption of Tennant (1975), and also considered the importance of variable monthly flows to the maintaining the fishery (Poff 1999). ADF&G compared their recommended flows with the monthly duration curves provided by Haida and found that their recommended flows are at or near the 100 percent exceedence levels for all months. Interior, NMFS and ADF&G believe that their recommended flow regime provides the lowest flows that could protect the species because their recommended flows are among the lowest flows experienced by the fisheries in the bypassed reach. These three agencies are concerned that the 10-cfs minimum flow recommended in the DEA issued for Reynolds Creek would be insufficient to maintain habitats, protect eggs and larva in spawning areas, and provide access to spawning and rearing areas within the bypassed reach. They believe that a 10-cfs flow could result in extirpation of the species. Interior also recommends a regulated outlet.

Haida's proposed flows and all agency-recommended flows are based on release at the diversion and an accretion of 6 cfs within the bypassed reach.

Staff analysis

On June 19, 1998, HDR Inc., Haida's consultant, conducted a flow study of the bypassed reach using the Instream Flow Incremental Methodology (IFIM). Two sites were selected for transects, with 2 transects at each site. Site 1 was representative of an 80-foot reach determined to provide spawning habitat; and site 2 was representative of a 1,290-foot reach dominated by step pools. The results of the flow study showed (figure 10) that 20 cfs provides optimum spawning habitat at site 1, with fry, juvenile, and adult habitat continuing to increase above 27 cfs, the maximum flow modeled at site 1. Site 2 (figure 11) shows that spawning and fry habitat do not appear to change significantly over the range of flows analyzed, while juvenile and adult habitat continue to increase above 23.5 cfs, the highest flow modeled at site 2. Based on the results of the IFIM, spawning and fry habitat were found to be the limiting factors for fish in the reach.

We combined the data from sites 1 and 2 of the IFIM study to calculate the percent of weighted usable area (WUA) available for different life stages by the recommended flows for the reach (table 6).

Table 6. Weighted usable area (WUA) for Dolly Varden and cutthroat trout based on Haida Corporation's IFIM results. (Source: Commission staff)

Bypassed reach flow (cfs)	Spawning WUA as a percent of maximum WUA (sq ft/1000 ft)	Fry WUA as a percent of maximum WUA modeled [1] (sq ft/1000 ft)	Juvenile/adult WUA as a percent of maximum WUA modeled [1] (sq ft/1000 ft)
17	95.8	80.0	85.1
15	89.7	76	80.6
12	84.0	73	71.5
10	80.0	71	65.5
5	49.0	48	4.0

[1] For both fry and juvenile/adults, habitat was increasing at the highest flow modeled for site 1 (see figure 10), and no maximum WUA was determined.

Fig. 10. IFIM Site 1- Square feet of weighted usable area per 1,000 stream for Dolly Varden and cutthroat in the Reynolds Creek.

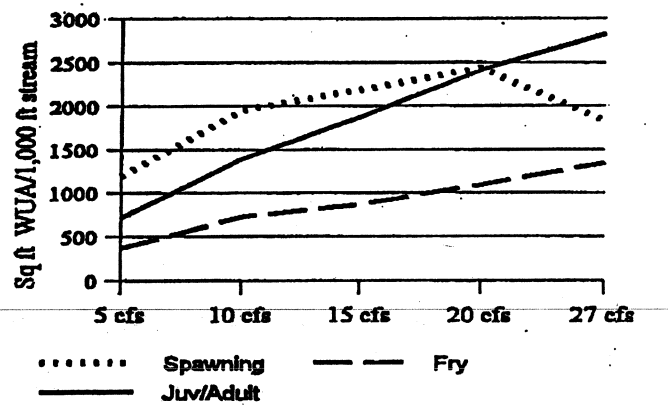
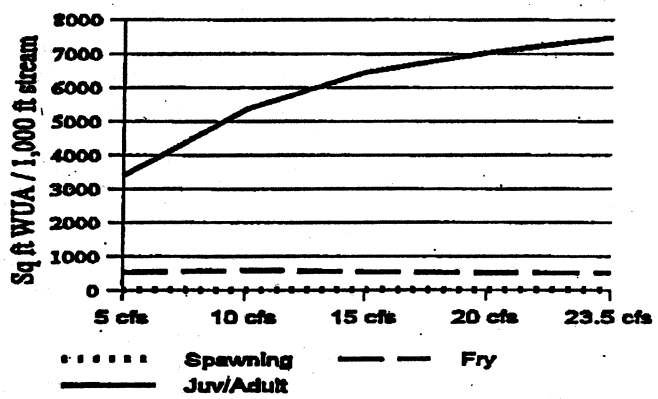


Fig 11. IFIM Site 2 - Square feet of weighted usable area per 1,000 f stream for Dolly Varden and cutthroat trout in Reynolds Creek.



The results of the IFIM study show that significant gains (10 percent or more) in weighted usable area for all life stages occur between 5 and 10 cfs and between 10 cfs and 15 or 17 cfs. At 17 cfs, less than 80 percent of fry habitat would be available.

Because only two transects were established in a stream reach and the IFIM study was not developed in consultation with the resources agencies, we also used Tennant (1975) to associate the proposed and recommended flows with general stream conditions for Reynolds Creek (table 7). This method considers the benefits of flow levels related to the hydrocycle and life stage by associating general stream conditions with varying percentages of a stream's average annual flow. Rather than emphasizing habitat for specific species, Tennant (1975) can be used to draw general conclusions about the effects of flows on channel widths, depths and velocities; fish migration potential; wetted streambed; cover for fish and fur animals: habitat for wildlife nesting, denning, nursery, and refuge; riparian vegetation; water temperature; and invertebrate types and abundance. The well-being of most aquatic organisms in the stream is assumed to correspond to the relative well-being of these stream features.

Table 7. Seasonal flows, in cfs, derived from the Reynolds Creek average annual flow by using Tennant (1975). (Source: Commission staff)

General stream condition	Recommended flows for April-September [1]	Recommended flows for October-March
Outstanding	34.2	22.8
Excellent	28.5	17.1
Good	22.8	11.4
Fair or degrading	17.1	5.7
Poor or minimum	5.7	5.7
Severe degradation	below 5.7	below 5.7

[1] These months cover most of the primary growth activities for cutthroat trout and Dolly Varden.

Table 7 shows that Haida's proposed flows could result in severe degradation of the general stream conditions. The flow recommendations of the ADGC and ADNR could result in poor to fair or degrading stream conditions from late spring through early

fall, the primary growth period, and fair or degrading to good stream conditions over the winter months. The flows recommended by the ADF&G, Interior and NMFS could result in fair to degrading conditions during the growth months, and good to excellent conditions for overwintering.

Because more flow would remain in the bypassed reach during phase 1 than phase 2, we considered the effects of the project's diversions on flows during both phases. In table 8 we show the percent of time that flows in bypassed reach would exceed a 10-cfs minimum in phases 1 and 2.

Table 8. Estimated percentage of time, by month, that flows in the Reynolds Creek bypassed reach would exceed 10 cfs under pre-project conditions and during project phases 1 and 2. (Source: Commission staff)

	Estimated percentage of the time flows would exceed 10 cfs		
MONTH	Pre-project	Phase 1 30 cfs project diversion	Phase 2 90 cfs project diversion
January	98	50	25
February	100	70	25
March	99	50	10
April	100	70	10
May	100	90	25
June	100	90	10
July	100	50	10
August	100	50	10
September	99	70	10
October	100	90	50
November	100	75	25
December	100	50	25

Based on the percent of the drainage area flowing to the bypassed reach Haida estimates that an additional 6 cfs would accrue by the lower end of the reach. With their proposed 5 cfs release at the diversion dam, Haida believes that flows of 11 cfs would be

available for much of the fisheries habitat found in the reach. NMFS and ADF&G comment that the hydrological data is too limited to support Haida's assumption that an additional 6 cfs would accrue in Reynolds Creek by the lower end of the reach. The agencies also point out that Haida's calculations are based on averaged hydrologic data and any accrued flows would not reach 6 cfs during low flow periods.

ADF&G further states that the presence of springs near the confluence of North Tributary and Reynolds Creek indicates that a portion of flows in the bypassed reach are subsurface. If so, there could be two influences related to project operations (letter to Michael B. Stimac, P.E., HDR Inc., Bellevue, Washington; from Clayton Hawkes, Hydroelectric Project Review Coordinator, Alaska Department of Fish and Game, Douglas, Alaska, December 29, 1998): (1) the bypassed reach could lose surface water rather than gain, so that any of the recommended minimum flows may be inadequate to support fish in the bypassed reach, and (2) the reduction of underground hydraulic pressure when flows are diverted to the penstock could reduce the springs which provide spawning habitat at the North Tributary. Increasing the diversion from 30 cfs to 90 cfs during phase 2 could significantly increase both effects. No hydrologic monitoring of the bypassed reach has occurred to determine whether the reach gains or loses flows, or the extent to which the spring in North Tributary is dependent on hydraulic pressures from Reynolds Creek upstream of the anadromous barrier.

Because ground and surface flow interactions are unknown at the project site, we can't conclude that 6 cfs would accrue in the bypassed reach. Therefore, if the project is licensed, to determine whether the bypassed reach loses or accrues flows, and whether the project's diversion affects the springs in the lower North Tributary, we would recommend that Haida prepare and implement a plan, in consultation with the NMFS, FWS, ADF&G, ADNR and USGS to assess the hydrology of the project's drainage area below the diversion. We believe that the monitoring could be accomplished with minimal costs by using gages and other recording devices Haida would obtain for compliance monitoring and by observation at the springs.

Reynolds Creek supports small, but undetermined, numbers of cutthroat trout and Dolly Varden. The fish in the bypassed reach appear to be reproductively isolated by barrier falls upstream and downstream of the pools that hold them. Interior states that the cutthroat trout and Dolly Varden were likely isolated when glaciers receded following the last ice age. Given their reproductive isolation in what all parties agree to be an extreme environment, it is likely that genetic drift may have occurred, and these fish may represent a unique strain (letter to Paul Berkshire, HDR Inc. Bellevue, Washington; from Steve Brockman, U.S. Fish and Wildlife Service, Ketchikan, Alaska, February 27, 1998). Interior maintains that it's possible the cutthroat trout in the bypassed reach contribute to

the more robust cutthroat trout population in the anadromous reach below the proposed tailrace site, and given the apparent uniqueness of the cutthroat trout in the bypassed reach it is not appropriate to equate low numbers of fish with low relative value. FWS and ADF&G are cooperatively trying to locate funding within their respective agencies to study the genetics of the populations to support federally listing the species as threatened or endangered. NMFS and FWS stress that these populations are important because they are reproductively isolated populations in an extreme environment adding to their scientific value (e.g. how species adapt, how distribution patterns form) and ethical value (e.g. biodiversity).

Species that survive adverse conditions are those with the genetic diversity to live at both representative and extreme conditions (Wilson 1992). Conserving genetic diversity is important because it is what gives rise to new species and subspecies that can better adapt to new or altered conditions, thereby contributing to the survival of a species under adverse conditions. New subspecies are associated with areas of relatively recent glacial retreat because these areas are relatively young in evolutionary time, isolated, and contain many unoccupied niches (Wilson 1992). Griswold (1996) documented significant variations in cutthroat trout residing above and below migration barriers for an Oregon river basin and a southeast Alaska river basin. Griswold concluded that populations above the barrier may contribute unique information to those below the migration barrier, and if so, the populations above the barrier could have long term effects on the persistence of the fishery below the barrier.

ADNR states that the fish in the bypassed reach are genetically isolated, but not valued for subsistence, commercial or sport utilization. Haida believes that the reach could not support future sport fishing because of the small size of fish in the bypassed reach, low density of fish, difficult access through private property and better fishing elsewhere. ADF&G disagrees that the fish in the bypassed reach lack value for subsistence or sport. ADF&G adds that POW is one of the fastest growing areas in Alaska in population and fishing activity; and in southeast Alaska, from 1987 to 1997, the number of anglers and days fished increased by about 42 percent. ADF&G and NMFS believe that the increasing demand for sport fishery resources will likely occur in areas that now appear to be remote, and thus they do not want to see any population of fish eliminated.

We are unable to place a future value on this fishery because we have no predictions of the potential or likelihood for demand for fishing in remote locations, access to the site and the user days that this limited fishery could support. In any event, no one asserts that under existing conditions the bypassed reach is fished for sport, subsistence or commercial purposes.

If the project further limits habitat over a long period of time, it is possible that the bypassed fisheries could not be sustained. We agree with Haida that high flows may be a limiting factor in high gradient streams; however, we don't agree that reducing peak flows in the stream can compensate for a year-round average minimum flow that is lower than the lowest flows of record. Haida's proposed minimum flow would provide less than 50 percent of fry habitat and only 4 percent of juvenile and adult habitat, according to the IFIM results. Tennant (1975) finds flows equal to 10 percent of the average annual flow are suitable to provide short-term survival habitat. Haida's proposed minimum flow represents about 10 percent of the average annual flow for Reynolds Creek. Further, averaging habitat availability over a year cannot meet the temporal needs of a fishery.

Dolly Varden and cutthroat trout in the reach may have adapted to selective use habitat as a result of competing for limited resources such as rearing habitat and food. When two salmonid species coexist in streams the differences in habitat preferences are probably related to balancing the costs of holding positions which provide cover, a hydrodymanic advantage and access to food (Wooton 1990). Further, Wooton (1990) finds that these differences in habitat preferences probably do not apply to all populations, so that a pair of competing salmonid species may behave differently from one stream to another. Haida, ADF&G, NMFS and Interior agree that the limiting factor in the stream is habitat. Because two species are competing for a limited amount of existing habitat, it is difficult to predict how an additional habitat limitation (i.e. diverting flow from the stream) would affect either or both species. It appears that reducing instream flows would be likely to upset the existing balance of habitat, resulting in additional competition and potentially contributing to the loss of either or both species.

Because a minimum flow regime for the bypassed reach would affect the project's economics, we make our flow recommendation in Section VII, Comprehensive Development and Recommended Alternative. The effects on project economics are discussed in Section VI, Developmental Analysis.

Unregulated outlets can ensure that any required minimum flow is released without the attention of a project operator and only require maintenance when clogged. Because pressure on the upstream side of the diversion would increase as the lake elevation increases, an unregulated outlet would release a higher flow at higher lake levels. Haida estimates that if the outlet were designed to release 5 cfs at 872.0 fmsl, it would release about 6 cfs when Lake Mellen is at 876.0 fmsl. Similarly, ADNR's and ADGC's unregulated releases of 10 and 12 cfs, respectively, at 872.0 fmsl would result in a slightly higher minimum flow at higher lake elevations.

A major disadvantage of an unregulated outlet, is the difficulty of making modifications as flow needs change, and maintaining seasonal flow variations, if needed. With an unconstructed project, predictions of impacts to resources are based on the best available information. Post-license monitoring would be necessary to determine the extent of any impacts, and whether any protective measures are adequate for the resources.

Because installing a regulated outlet at the diversion would affect the project's economics, we make our recommendation for a regulated or fixed outlet in Section VII, Comprehensive Development and Recommended Alternative. The effects on project economics are discussed in Section VI, Developmental Analysis.

Lake Mellen surface elevations

Fluctuating lake levels can adversely affect shoreline habitat and fish access to upstream spawning grounds.

Haida initially proposes to maintain Lake Mellen water levels as follows:

- for April and May, 874.5 fmsl or above to ensure grayling access to spawning areas at the inlet and tributaries to Lake Mellen, and modify the inlet channel in consultation with the resource agencies if post-project monitoring shows that project operations affect grayling access; and

- from June through March, at or above 872.0 fmsl.

Interior, ADF&G and ADGC recommend that lake levels from April 1 through June 15 be held at or above 874.5 fmsl to benefit grayling access to spawning habitat, and from June 16 through April 30 at or above 872.0 fmsl. ADF&G further recommends that Haida construct an unregulated spillway with the same hydraulic properties [10] as the natural lake outlet.

The NMFS and ADNR have not made recommendations for Lake Mellen surface levels.

Staff analysis

[10] We interpret these to be elevation and spill capacity.

Arctic grayling spawning habitat extends about 100 ft upstream of Lake Mellen, where farther access may be limited by a 3-foot bedrock ledge. Grayling move from the lake into Reynolds Creek during April and May to spawn. Some fish remain in the streams during the summer. Emergence occurs through mid-June.

On April 8, 1998, Haida surveyed the inlet to Lake Mellen from 870.0 to 880.0 fmsl to determine the lake elevations that allow grayling migration. The survey results show that Reynolds Creek enters Lake Mellen over a rock rubble delta fan. When Lake Mellen is at 876.0 fmsl, grayling can access Reynolds Creek through four channels, two of which are well-defined below 875.0 fmsl, including one channel well-defined to 871.0 fmsl. Because Haida proposes to make channel modifications, with the approval of resource agencies, we agree that a minimum lake level of 874.5 fmsl would be adequate for grayling access to spawning grounds.

As figure 7 shows, incubation and emergence would be occurring from the beginning of April through the first half of June. Reducing lake levels below 874.5 during this time downstream channel access to Lake Mellen could have harmful effects on grayling escapement. The agencies recommend lake elevations of 874.5 fmsl or higher for 15 days longer than proposed by Haida. We believe that an additional 15 days of restricted drawdowns would not significantly affect project economics, and recommend that Haida maintain a minimum level at or above 874.5 fmsl from April 1 through June 15, and further, that Haida conduct post-operational monitoring, in consultation with the FWS and ADF&G, to determine any effects of project operations on grayling access to spawning grounds. If post-project monitoring indicates a need to modify the inlet as a result of project operations, we agree that Haida, with the approval of the FWS and ADF&G, should make the necessary modification. Such modification would be low cost and similar to that described by Haida on page 44 of its Preliminary Draft Environmental Assessment, filed as part of its license application (Haida Corporation 1997a).

We believe that lake levels as low as 872.0 fmsl from June 16 through March 31 would avoid any affect on grayling spawning or incubation periods, and would not affect overwintering habitat because grayling movement is reduced during the winter months. Because Haida calculated the project's economics based on drawdowns to 872.0 fmsl from June through March, project economics would not be affected by maintaining a minimum lake levels at or above 872.0 fmsl from June 16 through March 31. Therefore, we recommend that lake levels should be maintained at 872.0 fmsl or higher from June 16 through March 31.

Constructing the project spillway with the same hydraulic properties as the natural spillway would help maintain the natural conditions at the lake outlet as closely as possible, thereby protecting aquatic resources from unnaturally high lake levels during high flows. With Haida's proposed outlet elevation, the project spillway could be constructed with hydraulic properties as close as possible to the natural outlet without effecting project economics. Therefore, we recommend that Haida construct the Lake Mellen outlet at the same elevation and with the same hydraulic properties, as closely as possible, of the natural Lake Mellen outlet.

Phase 2 would increase the withdrawals from Lake Mellen, but as long as any lake level requirements established during phase 1 are maintained through phase 2, we do not believe phase 2 operations would significantly affect grayling access to upstream spawning areas or disrupt shoreline habitat.

Minimum flows - anadromous reach

Flow reductions in an anadromous reach can disrupt salmonid migration and reproduction.

Haida does not propose minimum flows in the anadromous reach, but agrees in principle with a license condition that would allow minimum flows to be reduced when inflows to Lake Mellen would be reduced beyond the recommended minimum flows.

To assure access by steelhead, salmon, and cutthroat trout to traditional spawning and rearing areas, ADNR, NMFS, Interior, and ADGC have recommended instantaneous minimum flows for below the tailrace (table 8), or the natural inflow to Lake Mellen, whichever is less.

Table 8. Resource agencies' minimum flow recommendation for below the tailrace. (Source: Commission staff)

Agencies' recommendation			
Dec - Apr	25 cfs	Jul - Aug	35 cfs
May - Jun	50 cfs	Sep - Nov	40 cfs

The ADF&G has not recommended minimum flows for the anadromous reach.

Staff analysis

Salmon spawning occurs in the fall from August through September (pink), August through mid-November (chum) and September through mid-November (coho); and emergence occurs in the spring. Steelhead and cutthroat trout spawn in April and May and emerge in May and June. During the remaining months juvenile coho salmon and trout are present, as they rear in freshwater for 1 to 2 years before outmigration.

The agencies believe their recommended minimum flows would maintain access by salmon, steelhead, and cutthroat trout to traditional spawning and rearing areas below the powerhouse.

Haida's wetted perimeter study shows that a 23-cfs flow would maintain a wetted stream bed, indicating that 25 cfs could be sufficient to protect redds from dewatering. Higher flows, however, would be needed to support active life stages. The transect data provided by Haida show that 23 cfs would provide less than 6 inches of depth for over 75 percent of the stream width at the cross section measured. Salmon and trout generally spawn in depths of at least 10 to 12 inches, although chum and coho salmon have been known to spawn in water as shallow as 6 inches (Groot and Margolis 1991).

The flows recommended by the agencies appear reasonable because they would add necessary depth for juveniles and adult migration and spawning and tend to follow the natural hydrograph. The combination of generation flows and bypassed reach flows would provide the flows recommended by the agencies below the tailrace most of the time without any effect on project economics. Therefore, we recommend that minimum flows below the tailrace as recommended by the resource agencies, or the instantaneous inflow to Lake Mellen, whichever is less, be adopted.

Flow continuation

When a project shuts down, flows to downstream resources can be interrupted.

For planned or unplanned short-term outages, Haida proposes to use jet deflectors to continue any required minimum flows below the powerhouse. For planned, long-term outages, Haida would delay the outage until Lake Mellen overflows at the diversion to provide uninterrupted flows. If an unplanned, long-term outage occurred, minimum flows from the bypassed reach would supply flow to the anadromous reach until the lake overflowed the diversion.

ADF&G, ADGC and NMFS recommend that a fail-safe, redundant backup system be incorporated into the project design to ensure that any required instantaneous flows would be provided throughout all shutdowns. To overcome the delay in flows from the

diversion outlet arriving at the anadromous reach during an outage, ADF&G and NMFS suggest installing a pipeline that would connect to the penstock immediately above the powerhouse, allowing flows to bypass the powerhouse and discharge into the anadromous reach when an outage occurs at the powerhouse. The agencies recommend that the bypass pipeline be equipped with a Howell-Bunger valve.

NMFS, ADF&G and ADGC recommend that Haida notify ADF&G, ADNR, Commission staff, and other interested parties whenever required instream flows have been out of compliance for 12 hours.

Interior has not made a recommendation regarding flow continuation.

Staff analysis

Trout and salmon redds and emergent fry are found in Reynolds Creek below the tailrace from early August until mid-July of the following year, and juvenile trout and coho salmon rear in the stream year around, so that any unplanned outage carries a risk of dewatering redds or stranding fry and juveniles.

As proposed, when power is lost for any reason, the deflectors would automatically swing into place between the nozzles and the turbine runners, deflecting flow away from the runners. If the plant operator determines that the project can not be restarted within a short time, the flows through the powerhouse would be discontinued, and flow continuation would be provided from Lake Mellen. When the lake overflows at the diversion, additional flows, equal to the inflow of Lake Mellen would be continuous below the powerhouse.

The extent to which overflows at the diversion could be used to meet a flow requirement would depend on how close the Lake Mellen surface level is to 876.0 fmsl. Haida's analysis shows that most of the time, during phase 1, Lake Mellen could be operated near its spill level. Seasonal drawdowns could occur during phase 1, however, and drawdowns would be more frequent in phase 2. During these drawdowns, the lake surface could be 2 to 4 ft below 876.0 fsml. Haida's analysis also shows that when Lake Mellen is 872.0 fmsl, and inflows to the lake are 40 cfs, about a 50 percent exceedence level in some winter months, it would take 7 to 10 days to bring the Lake Mellen surface level to 876.0 fmsl, based on a 5-cfs release for the bypassed reach. If the inflow to Lake Mellen were 10 or 17 cfs, we calculated that it would take about 30 and 18 days, respectively, to bring the lake level from 872 to 876 fmsl, even if no minimum flows were released at the outlet.

The agencies believe that releasing flows from the diversion outlet may cause a critical delay which could result in dewatering the anadromous reach to the point of stranding salmonids, leaving them vulnerable to predation and dessication. ADF&G estimates that the lag time from diversion outlet to the anadromous reach would be about 20 to 25 minutes (Summary of 10(j) meeting, Douglas, Alaska; December 16, 1999). Our own estimate, calculated from Haida's transect data for the bypassed reach and gradients for sections of the bypassed reach (Haida Corporation 1998a, 1998b), show a lag time of about 20 minutes.

During unplanned long-term outages, as proposed, flows below the tailrace could be as low as 11 cfs, if the bypassed reach is a gaining reach, or less than 5 cfs if it is not. The results of Haida's wetted perimeter study show that 23 cfs is required to maintain a wetted streambed. Among the alternative minimum flows being considered for the bypassed reach, none would be adequate to maintain a wetted streambed in the anadromous reach. Consequently, for all alternatives, a significant loss to recruitment could occur during an extended outage. The risk of extended dewatering would be significantly greater during phase 2, when drawdowns could be more frequent, potentially resulting in a significant loss of viable eggs and/or young fry. Further, unplanned outages may result in juvenile or adult stranding because there would be no opportunity to ramp flows. North Tributary enters Reynolds Creek about 625 feet below the tailrace and would supplement any flows released below the tailrace. There are no tributaries that enter Reynolds Creek between the tailrace and North Tributary, leaving 60 percent of the anadromous reach dependent on project operation and flow continuation measures to supply flows.

Because an unplanned, extended outage could affect at least 60 percent of the anadromous habitat in Reynolds Creek; the period of dewatering and stranding could be up to 2.5 weeks; and the risk to the anadromous fishery exists year around, we believe a backup flow continuation method is needed to support Haida's proposed combination of jet deflector and spillway release to continue minimum flows for outages. One option would be the regulated diversion outlet discussed with the minimum flows for the bypassed reach. A second option is the shunt pipeline equipped with a Howell-Bunger valve as recommended by the ADF&G and NMFS. A third option is a pipeline equipped with a sleeve valve, as described by Haida's letter dated February 18, 2000.

In reviewing Howell-Bunger valve uses, we find it is an excellent choice for aerating discharge and dissipating energy and could be effective for a high head project like Reynolds Creek (Davis and Sorensen 1969), but has an open air discharge that may not be suitable during severe weather conditions in southeast Alaska. Both Howell-Bunger and sleeve valves, however, are well-suited for discharge into stilling basins,

which could be incorporated into the project design. ADF&G and NMFS specified the Howell-Bunger valve to protect against low dissolved oxygen conditions should there be an outage when the reach is densely populated with migrating salmonids (Summary of 10(j) meeting, Douglas, Alaska, December 16, 1999); therefore, we believe that both the aeration and energy dissipating functions are important to the agencies in specifying the Howell-Bunger valve.

We are unclear, though, why the agencies feel that a specific valve is necessary to meet conditions for this project. For most projects, the license specifies conditions and the licensees select materials that would allow the conditions to be met. We would not typically specify a type of valve, for example, because depending on the final project design, the licensee may find more than one type of suitable valve within a wide price range. If this project is licensed, Haida could select the type of valve, with review by the Commission's regional office, to ensure any flow continuation requirements are met.

Because any method of flow continuation would affect project economics, we discuss the costs of flow continuation options in Section VI, Developmental Analysis, and make our final recommendation in Section VII, Comprehensive Development and Recommended Alternative.

Notification of outages would cost a minimal amount and we agree that fisheries would benefit from greater protection from prompt attention to outages. Therefore, we recommend that Haida notify ADF&G, ADNR, Commission staff, and other interested parties whenever required instream flows have been out of compliance for 12 hour, and report any measures being taken to address any effects of the outage to downstream resources.

Ramping Rates

Ramping rates are unnaturally rapid changes in flows over periods of minutes, hours, or days. Rapid changes in flows can be immediately lethal to fish and invertebrates or have indirect, delayed biological effects.

Haida has not proposed any ramping rates to protect aquatic resources in the anadromous reach, but does agree that during phase 1 the project could operate in accordance with a 1-in/hr rate, which would apply only to downramping and would not prohibit daytime ramping.

The Interior, NMFS, ADF&G, and ADNR recommend the following ramping rates below the tailrace:

Jun 1 - Sep 15	1 in/hr
Sep 16 - Feb 15	2 in/hr
Feb 16 - May 31	2 in/hr from 1 hour after sunset until 1 hour before sunrise and 1 in/hr during other hours, with monitoring of daylight ramping

The Interior, NMFS and ADF&G initially recommended that no daytime ramping (i.e. no daytime changes in project discharge) occur from February 16 to May 31 to protect salmon fry during emergence and outmigration; however, are willing to accept a 1 in/hr rate as long as monitoring occurs to evaluate the effectiveness of the ramping regime.

ADF&G further recommends that Haida be required to (1) develop a monitoring plan in consultation with resource agencies no later than 6 months before any ground breaking activity occurs for the project; (2) after consultation and within 6 months after the first February 16 to May 31 period of operation, submit a report describing the methods to assess the effectiveness of the specified ramping rates, the data collected as part of the assessment, and the analysis, and conclusions based on the assessment; (3) install monitoring equipment, such as an automatic water level sensor, to continuously record elevation of the tailwater at the site, or sites, calibrated to sites sensitive to flow fluctuations, and (4) file with fish and wildlife agencies and the Commission operational data necessary to determine compliance with the specified ramping rates (letter from Clayton Hawkes, Hydroelectric Project Review Coordinator, Alaska Department of Fish and Game, Douglas Alaska; February 4, 2000).

ADNR would prohibit daylight ramping from February 16 through May 31, but allow Haida to request ramping rates more appropriate to Reynolds Creek when operational data is available.

The ADGC supports monitoring to determine the effectiveness of the rates.

The ADF&G recommends that increases and decreases in project discharges adhere to its recommended ramping rates, while Interior, NMFS, ADGC, and ADNR recommend that only decreases in discharges meet the above criteria.

Staff Analysis

Haida objects to a prohibition on daytime ramping because it would severely affect the project's capacity for load following. Haida describes the Reynolds Creek anadromous reach as a U-shaped channel with no increase in wetter perimeter above 23

cfs. We have read no description of the channel below the tailrace that includes the low gradient gravel bars or side channels that could contribute to a stranding risk for steelhead or cutthroat trout fry in Reynolds Creek. The lack of these features, however, would reduce attenuation, and could increase the potential for adverse flushing effects from frequent and rapid increases in discharges.

Haida states that cross section data gathered from the anadromous reach was intentionally taken at one of the broader shallower runs where stranding would be most likely to occur. The cross section profile showed little risk of stranding at that location. Haida submitted raw stage and discharge data, including hourly stage data, for water year 1985, obtained from the USGS decommissioned gage near the outlet of Lake Mellen. Haida also submitted provisional hourly gage data for October 1, 1998, to May 4, 1999, recorded near the outlet of Lake Mellen. To estimate the natural hourly stage fluctuations in the anadromous reach, Haida obtained a rating curve for the USGS gage previously sited in the anadromous reach, and applied the rating curve to the flows recorded near Lake Mellen for the week of October 1-7, 1984 (letter from Michael V. Stimac, Manager, Licensing and Environmental Services, HDR Engineering, Inc., Bellevue, Washington; February 18, 2000).

The data submitted by Haida shows that from February 16 through March 27, 1985, the data of record for the period of emergence, Reynolds Creek flow fluctuations were 1 in/hr or greater on only 3 occasions for periods lasting from 4 to 9 consecutive hours. Haida's calculated data for February 16 through May 4, 1999, in the anadromous reach shows no occasions when flow fluctuations exceeded 1 in/hr.

The agencies recommended ramping rates are based on criteria developed by the Washington Department of Fish and Wildlife (Hunter 1992) for large to medium-sized rivers, those with average annual flows of 500 cfs or higher. The average annual flow for Reynolds Creek is 57 cfs. The prohibition of daytime ramping from February 16 to May 31 was established to protect emergent pink, chum, and coho salmon fry; and a 1-in/hr rate, was established to protect emergent steelhead and rainbow trout fry. A 2 in/hr maximum rate from June 1 to September 15 was established to protect rearing juvenile coho salmon and steelhead trout and resident fishes, which rear for a year or more in freshwater.

The 1 in/hr rate for steelhead fry was established because they are found in riffles over gravel bars and in the margins of riffles making steelhead fry more vulnerable to gravel bar beaching than salmon fry. Steelhead fry on gravel bars with slopes of less than 4 percent in the Sultan River (Olson and Metzgar 1987) and less than 5 percent in the Skagit River (Beck and Associates 1987) were significantly more likely to be stranded

than steelhead fry on gravel bars with steeper slopes. We are unaware of stranding studies for cutthroat trout.

Stranding studies have found that salmon fry that are inactive during the day are significantly more likely to be stranded during daylight than night hours (Beck and Associates 1987, Olson and Metzgar 1987, Washington Department of Fisheries 1992). In small, short coastal streams, the migration of pink salmon fry from spawning ground to ocean is commonly completed in one night (Groot and Margolis 1991). Peak migration occurs in the early hours of darkness and there is almost no daytime migration. Chum fry typically emerge at night and immediately migrate downstream, but can be active during light and dark hours (Groot and Margolis 1991). Coho fry are active during daylight and seem to tolerate a wide range of light intensities (Groot and Margolis 1991).

During phase 2, the proposed block-loading and lake level control operations would result in small changes in discharge that would have little impact on downstream resources. An unramped, load-following operation with project discharges at 90 cfs, however, could significantly affect aquatic resources below the tailrace.

We believe that 1 in/hr during daylight hours for the emergence period would be adequate to protect salmon fry in Reynolds Creek during phase 1, because the project flows should not expose substrate conducive to stranding. This rate is a conservative approach to fry protection, within the capability of the project, and would not have a significant effect on project economics.

Because a flow requirement of 25 cfs in the anadromous reach from December to April is very near the average low flows during this period, which range from 15 to 24 cfs, ADF&G believes that side channel and channel margin habitat, important for juvenile rearing, may be eliminated by potential dewatering. ADF&G cites Bradford *et al.* (1995) that significantly more subyearling coho and rainbow trout are stranded during daylight than at night. ADF&G finds that newly emerged fry, which are less than half of the lengths of the subyearlings in the study, would be much more vulnerable to flow decreases and increases, and may not be protected on the stream margins. ADF&G finds a 1-in/hr rate acceptable; however, if monitoring were conducted to determine impacts on salmonids, providing adequate method and frequency of monitoring, to test the adequacy of the rate to protect aquatic resources below the powerhouse.

NMFS concurs with ADF&G regarding the increased vulnerability of juvenile salmonids to downramping during daylight hours, because juvenile salmon seek refuge from predators in side channels and cobbles at the stream's edge where they are subject to fatal stranding during downramping. NMFS states that ADF&G recently noted that

monitoring fish mortality may be difficult if juvenile salmonids retreat deeply into substrates upon detection of retreating water.

We believe that the agencies' recommended ramping rates are appropriate because their varied rates would provide seasonal protection for the life stage needs of salmon and steelhead fry and juveniles. Because a 1-in/hr limit on daylight ramping from February 16 through May 31 is a higher hourly rate of fluctuation than naturally occurs under almost all conditions in Reynolds Creek, we agree that monitoring is necessary to determine whether the rate would adversely affect fry. We also believe that increases and decreases in the rate of project discharges should be ramped because rapidly decreasing flows could strand fry and juveniles and rapidly increasing flows could have a flushing or scouring effect. We are not able to determine the effects of ramping rates on the project's economics, because the changes in flow are small and a large number of variables are involved. Therefore, we recommend that Haida implement the agencies' recommended ramping rates for increases and decreases in the rate of project discharges, including a 1-in/hr daylight rate from 1 hour before sunrise until 1 hour after sunset from February 16 through May 31.

Because of the potential for changes up to 1-in/hr to strand fry and subyearling salmon during the emergence period, we recommend that Haida, in consultation with the resource agencies, prepare and implement a plan to monitor the effectiveness of a 1-in/hr daylight ramping rate from February 16 through May 31. The plan would include at a minimum all four elements recommended by the ADF&G, except that the plan need not be prepared 6 months prior to any ground-breaking activities. A license, if issued, would specify when the plan must be completed and submitted to the Commission, for approval.

ADF&G recommended that Commission staff evaluate battery storage as a reasonable and feasible alternative, under FPA Section 10(a). ADF&G believes that battery storage could be used to displace energy lost because of a daytime ramping prohibition, and cites the Metlakatla Power and Light Project on Annette Island, Alaska as a remote, stand-alone hydro project that has successfully turned to battery storage systems to handle electrical load fluctuations. NMFS recommends battery storage, auxiliary power, or future load supplementation, when Hydaburg is connected to a grid, be analyzed as an option to higher impact operational regimes. Haida responds that the use of battery storage as a means of meeting load would be expensive, although no cost information is provided (letter from Michael V. Stimac, Manager, Licensing and Environmental Services, HDR Engineering, Inc., Bellevue, Washington; February 18, 2000).

Commission staff are able to evaluate only the energy project that is before us in recommending that a project be issued or denied a license. No information has been presented by Haida or the agencies that would allow us to assess the benefits, impacts and costs of battery storage to load follow for Hydaburg. If issued, a license for the Reynolds Creek Project would require reasonable measures as determined by the Commission to protect, mitigate and enhance resources affected by the project, including resources affected by load following. As long as a licensee is in compliance with all license measures, the licensee could chose its preferred method of providing supplemental energy for load following.

Operational Monitoring

It is necessary to determine compliance with measures to provide flows for fisheries.

Haida proposes to submit a post-license monitoring plan, prepared in consultation with the FWS, NMFS, ADF&G, ADNR, and USGS, to address compliance monitoring for flow releases at the diversion dam, Lake Mellen stage, flow and stage below the powerhouse, flow in the penstock, calculation of Lake Mellen inflows, and reporting of monitored flow and stage values.

NMFS recommends continuously recording gages to monitor instantaneous flows in the bypassed and anadromous reaches, and report non-compliance with required minimum flows that is not corrected within 12 hours to the Commission and resource agencies.

Interior recommends that Haida monitor flows in the bypassed and anadromous reaches, the surface elevation of Lake Mellen, and ramping rates in the anadromous reach.

The ADF&G recommends that Haida consult with and obtain approval from resource agencies for a monitoring plan that would ensure compliance with any streamflow and lake level provisions of the license. The plan would require Haida to install and maintain continuously recording devices within the bypassed and anadromous reaches to ensure that all reaches of Reynolds Creek, including reaches that are not supplemented with flow from groundwater, receive any required flows; and require Haida to submit any rating curves or other regression relationship used to calculate discharge to the ADF&G annually, or whenever a shift in rating curve is observed, whichever occurs first. The Lake Mellen stage would be continually recorded, the data summarized and submitted to the ADF&G. Post construction flows and lake stages would be submitted to

the ADF&G statewide and Region 1 flow coordinators, and other interested parties, in the form of continuous and mean daily discharges and lake stage readings, in paper and electronic format.

The ADNR recommends that instantaneous discharge downstream from the tailrace be recorded, with rating curves and supporting data submitted upon initial establishment of the rating curve and whenever the rating is adjusted. The Lake Mellen surface elevation would be continuously monitored. Water used in the powerhouse or discharged from the penstock without use in the turbine would be recorded at least hourly. Streamflow measurements in the upper end of the bypassed reach would be taken over the full range of reservoir operation elevations, to establish the flow-stage relationship for bypass release flows. Reservoir inflows would be monitored by modeling the relationships between reservoir stage, penstock flow, and streamflow downstream from the tailrace, with continuous calculation of the model at least hourly. The model would be jointly approved by the ADNR and ADF&G, and data submitted monthly in documented electronic or other agreed-upon format.

We agree that minimum flow requirements, lake levels, and ramping rates must be monitored to ensure compliance with any license requirements. Any recommendation for flow and stage monitoring would be incorporated into a plan to be developed by Haida in consultation with the NMFS, FWS, ADF&G, ADNR, and USGS and include provisions for continuous recording devices to monitor flows in the bypassed reach and below the tailrace, and the water levels of Lake Mellen, and reporting provisions to the resource agencies. We would expect all monitoring devices and placement to comply with USGS standards.

In Section VI, Developmental Analysis, we discuss the costs associated with gaging devices, and in section VII, Comprehensive Development and Recommended Alternative, we make our recommendation.

Water Quality of Lake Mellen and Reynolds Creek

In SD2, Haida indicated that they would assess how Lake Mellen and Reynolds Creek water quality (including water temperature, pH, gas saturation, turbidity, specific conductance, and suspended sediments) would be affected by the proposed project construction and operation. In addition, Haida specifically identified the issue of how water quality would affect salmonid spawning areas.

Staff Analysis

Water temperature

The incubation time of salmonid eggs is largely dependent on water temperature; in general, the warmer the water temperature, the faster the incubation time (Groot and Margolis 1991). Hydroelectric project operations can influence the water temperature of a river, and thereby, potentially alter salmonid incubation times. Changes in existing water temperature regimes, which individual salmonid populations have adapted to over time, can result in emergent fry populations being susceptible to lower food availability and increased mortality (Groot and Margolis 1991).

Under existing conditions, most of the flow that enters the bypassed reach of Reynolds Creek originates from the surface of Lake Mellen via passage through Rich's Pond, a very small water body connected to Lake Mellen by a short channel. Consequently, the water temperature of Reynolds Creek at the outlet of Rich's Pond is largely a function of the surface water temperature of Lake Mellen. Under the proposed action, the water temperature of Reynolds Creek at the outlet of Rich's Pond would likely continue to be a function of the surface temperature of Lake Mellen, because Haida's proposed intake would be located at the current outlet and draw from the surface waters of Rich's Pond.

The proposed project would have the greatest effect on Lake Mellen surface water temperatures when there would be storage of water in Lake Mellen. Storage of water increases the hydraulic residence time of a water body, which allows the surface waters longer exposure to warming or cooling conditions. The use of stored water in Lake Mellen under the proposed operation would most likely occur during the typical low flow months of March, April, July, August, and September (see table 1). The greatest potential for solar warming would be during the summer months. However, because of the small storage capacity of Lake Mellen (600 acre-ft) and the tendency for lakes at the latitude of the region to generally mimic air temperatures during the summer months, we do not expect substantial warming relative to existing conditions to occur.

Water temperature data indicate that, throughout the year, very little heating or cooling of the flow occurs as it travels the length of the proposed bypassed reach (table 4). On average, the water temperature of the flow changes only about 0.4 degrees Celsius, even though the numerous small cascades and waterfalls, which characterize the reach, thoroughly mixes and exposes the flow to atmospheric heating and cooling. Therefore, generally, there would not be substantial heating or cooling occurring in the bypassed reach under the proposed action.

Reduced flows below the tailrace site could occur during winter low flow periods and expose any incubating salmonid eggs along the margins of the stream to freezing and/or drying conditions, thereby reducing egg-to-emergence survival. The reduced flow would also allow for greater atmospheric cooling of the water, which could lengthen the incubation time of the eggs.

The extent of the effect of proposed project operations on the incubating eggs would ultimately depend upon the location of the salmonid redds in relation to the margins of the stream and the extent to which Lake Mellen inflow, initial Lake Mellen surface elevation, and Haida's load demand would cause prolonged low flow conditions, over and above that which would occur in the absence of the proposed project. Such combination of factors is difficult, if not impossible, to predict.

Other Water Quality Parameters

Gas supersaturation occurs at hydroelectric projects when water passing over a spillway plunges into a deep pool or where vortices form at intakes. The hydrostatic pressure in the deeper waters forces into solution (i.e. dissolves) any air entrained by the plunging water or intake vortices. These actions can cause water to become supersaturated (with respect to atmospheric pressure) with nitrogen and oxygen, the main components of air. Gas bubble trauma can develop in fish that take in the supersaturated water through their gills.

Under the proposed action, water would not plunge into any deep pools. Any air entrained at the intake would not be discharged into deep pools but would come out of solution as the water would jet onto the impulse turbine and tumble and cascade over the tailrace and within the stream. Therefore, there would be no gas supersaturation effects related to the proposed project.

We do not identify any project operational effects that would cause changes in pH, specific conductance, or turbidity.[11]

Fuel and Hazardous Substances

Interior and ADF&G recommend, and Haida proposes to, develop and implement a fuel and hazardous substances spill plan to help prevent and minimize any effects

[11] We discuss erosion and sedimentation effects due to proposed project construction in section V.D.1, Geology and Soils Resources.

associated with the handling of fuel and other hazardous substances during proposed project construction and operation.

Spills of fuel and other hazardous substances during the construction and operation of projects can adversely affect aquatic resources. We agree that a plan would be necessary in order to lessen the chance of a spill occurring and, should a spill occur, provide steps to take to prevent or minimize effects on aquatic resources. We, therefore, recommend that a fuel and hazardous substances spill prevention plan be prepared in consultation with the NMFS, FWS and ADF&G.

Timing of In-Water Construction

In-water construction disturbs sediments and can adversely affect aquatic resources.

NMFS, Interior and ADF&G recommend that all in-water construction occur only between July 18 and August 7 in any given year to protect salmonid spawning and incubation from sedimentation effects. Interior adds the condition that the construction window could be increased if specific approval is obtained from the FWS, NMFS, and ADF&G. The ADGC recommends Haida to limit construction below ordinary high water to the July 18 to August 7 period recommended by the agencies, but would relax the restriction somewhat with ADF&G concurrence and if Haida would provide adequate mitigation.

Haida agrees to the July 18 to August 7 construction window in principle; however, they are concerned that they would not be able to complete all construction activities, including removal of the cofferdam at the intake, by August 7. Haida is evaluating different cofferdam types that would limit or avoid sediment generation during removal; therefore, Haida would prefer that the determination of a final construction window be deferred to after any license for the project would be issued.

Staff Analysis

Salmonids spawn in Reynolds Creek during either the late summer/early fall period or in the spring, depending upon the species (figure 7). Incubation occurs year-round except for a very small window from about July 15 to August 1. The July 18-August 7 construction window recommended by the agencies would generally coincide with a period in Reynolds Creek when there would be very little or no spawning or incubation activity. Consequently, sediment disruption and/or deposition resulting from

proposed construction activities would not likely affect spawning or incubating salmonids.

The July 18-August 7 construction window could be too small for Haida to complete all of its proposed in-water construction, especially removal of its cofferdam. The result would be that temporary structures could be left standing in the stream until July 18 of the following year, being exposed to high flows and potential washout, which in the case of a temporary earthen cofferdam, would expose spawning and incubating salmonids to sediment deposition and the associated adverse effects that the agencies intend to avoid with their recommendations.

We, therefore, agree that the July 18-August 7 construction window would protect spawning and incubating salmonids, if it would be physically possible for Haida to complete construction within this period. In order to best ensure that aquatic resources would be protected, we recommend that Haida submit a final construction plan and schedule, developed in consultation with the NMFS, FWS, and ADF&G that would detail Haida's ability to complete construction within the July 18 to August 7 period. The plan at a minimum should identify all construction, land-disturbing, and land-clearing activities and include schedules for completion. The plan must include a provision for all in-water construction to occur between July 18 and August 7. If the plan and schedule, and comments and recommendations of the agencies [12] show that a modified construction period would protect stream resources, the Commission may modify the instream construction window.

Fish Screening

Fish can be entrained in the intakes of hydro projects.

Haida proposes to install a trashrack with a clear space of 2 in at the intake. Interior recommends, as a Section 18 measure, and ADF&G recommends that Haida install a fish screen in front of the proposed intake structure to prevent grayling from entering the proposed penstock. Both state that the screen should be designed to protect grayling fry at least as small as 60 mm (2.7 in), and smaller if it could be documented that

[12] A July 1 to August 7 construction window would only effect the tail-end of the rainbow/cutthroat trout incubation period (figure 9), so that this window would be one possible alternative that would minimize construction effects on spawning and incubating salmonids while at the same time potentially allowing Haida enough time to complete construction.

grayling less than 2.7 in would be present. Both agencies also state that the screen should contain an automatic cleaning system. The ADGC recommends that Haida install a screen in front of the intake consistent with the criteria recommended by Interior and ADF&G.

Haida argues that the addition of a screen in front of the intake would be unnecessary, because: 1) few fish congregate and would congregate at the Rich's Pond outlet; 2) grayling presently do not and would not tend to migrate downstream out of Rich's Pond; 3) grayling would not be present at the 8 to 12-foot depths of the intake; 4) grayling would tend to shy away from contact with the screen; and 5) the intake would be designed such that grayling would be able to swim away and avoid being pulled into the intake.

Staff Analysis

Currently, flow out of Rich's Pond passes beneath the surface through boulder-sized talus and, at high water, over an outlet channel and into lower Reynolds Creek. [13] Haida reports that the submerged natural outlet is only about 3 to 4 feet deep under most flow conditions (letter by Michael V. Stimac, P.E., Manger, Licensing and Environmental Services, HDR Engineering, Inc., Bellevue, Washington, September 24, 1998).

Both Haida and ADF&G have reported collections and sightings of grayling within and near the outlet of Rich's Pond. [14] These collections and sightings mostly occurred during the months of June and July, and were of adult grayling, although Haida reported seeing juveniles among the logs and deep channels within the outlet area. Haida did not capture any grayling fry in the outlet area even though concurrent sampling turned up fry at numerous locations in the system above Rich's Pond (letter by Michael V. Stimac, P.E., Manager, Licensing and Environmental Services, HDR Engineering, Inc., Bellevue, Washington, December 9, 1999).

Repeated surveys in lower Reynolds Creek have not revealed any grayling populations, even though the existing natural outlets afford downstream passage and are located at depths that non-wintering grayling have been found. The absence of grayling

[13] We define lower Reynolds Creek as the portion of Reynolds Creek downstream of Lake Mellen.

[14] See the license application and ADF&G's Reynolds Creek Field Trip June 16-17, 1999, report attached to our January 21, 2000, 10(j) meeting summary.

in lower Reynolds Creek is likely not attributed to competition with other salmonids, because grayling are commonly found to coexist with other salmonids (Scott and Crossman 1973). Therefore, the absence of grayling in lower Reynolds Creek suggests that grayling presently do not tend to migrate out of Rich's Pond to any large degree, behaviorally or otherwise.

ADF&G believes that the intake pipe would be attractive to grayling seeking feeding, overwintering and hiding areas, and if they would enter the pipe, would not be able to escape the pull of the pipe (letter by Clayton Hawkes, Hydroelectric Project Review Coordinator, ADFG, Douglas, Alaska, October 25, 1999). FWS states that the proposed intake would have differing hydraulics than the existing natural outlet, implying that there could be more downstream migration out of Rich's Pond than currently occurs (letter by Teresa A.N. Woods, Field Supervisor, FWS, Juneau, Alaska; October 25, 1999).

Haida's proposed trashrack with a 2-in clear space would be insufficient to screen out fry, juvenile, or adult grayling, and therefore could not prevent grayling from voluntarily or involuntarily entering the intake pipe. Grayling of all sizes could be involuntarily drawn through the trashrack if they would be unable to outswim the pull of the flow immediately in front of the trashrack.

Based on the Exhibit F drawings in the license application, we estimate that the trashrack would be 8-foot by 14-foot, which provides an area of 112 square ft. Haida did not provide the thickness of the individual bars of the trashracks. Assuming a bar thickness of 0.25 in, we estimate the open area of the trashrack to be about 98 square ft. Therefore, at a maximum hydraulic capacity of 90 cfs, we estimate the approach velocity of Haida's trashrack to be about 0.9 fps.

Bell (1990) reports that grayling in the 44- to 88-mm (2- to 4-in) size range exhibit sustained swimming speeds that vary from about 1.5 to 2.5 fps. Therefore, grayling fry greater than 2 in could easily swim against our estimated 0.9-fps approach velocity and avoid being involuntarily pulled through the trashrack. [15] ADF&G reports that very small emergent grayling fry in the size range of 8 to 11 mm (0.35 to 0.5 in) have very slow swimming speeds that may be lower than salmon and steelhead, and therefore, would need approach velocities that would be lower than 0.4 fps as found in the NMFS criteria.

[15] Grayling juveniles and adults have higher sustained swimming speeds than fry (Bell 1990). Therefore, non-injured, non-diseased juveniles and adults could also outswim the pull of the intake pipe.

Therefore, very small emergent grayling fry, if they would pass within a foot or so of the trashrack, would be pulled through.

It would be unlikely that grayling fry would be located at the intake site. Grayling fry in the Reynolds Creek system emerge in early summer and reach a size of about 50 to 60 mm by mid-July (letter by Michael V. Stimac, P.E., Manager, Licensing and Environmental Services, HDR Engineering, Inc., Bellevue, Washington; December 9, 1999). Haida has captured fry in early summer at various locations throughout the system above the intake site but not at the intake site. Additionally, we would expect that if grayling fry currently concentrate at the intake site, some of them would be carried over the outlet to Rich's Pond and establish populations in lower Reynolds Creek. [16] However, no populations of grayling have been located downstream.

Grayling that would voluntarily pass through the trashrack would enter a large box-like area within the intake structure. At the back and bottom of the intake, flow would enter the intake pipe (penstock). Grayling, once within the intake structure, could voluntarily enter the intake pipe. [17] At the normal phase 1 flows of 20 to 30 cfs, the velocities going through the 42-in intake pipe would range from about 2 to 3 fps. At the normal phase 2 flows of 60 to 90 cfs, the velocities would range from about 6 to 9.5 fps. Therefore, most of the time, only adult grayling, with sustained swimming speeds of 3 to 7 fps (Bell 1990), would be able to escape back upstream out of the pipe or avoid being involuntarily pulled into the pipe if they would pass immediately in front of the pipe opening.

It would be unlikely that overwintering grayling would voluntarily choose to enter the intake pipe. Overwintering juveniles and adults tend to seek deeper, slack-water areas or pools as the water temperatures cool and their metabolism slows. Therefore, even

[16] June and July, the months that fry are present in the system, on average are the highest flow months of the year. Therefore, spillflow out of Rich's Pond and into Lower Reynolds Creek is likely highest, on average, these two months of the year. Because grayling fry concentrate in shallower, near-shore areas where food and cover tend to be more abundant, the likely mode of egress out of Rich's Pond would be over the outlet as opposed to being pulled with the flow through the openings in the talus.

[17] Because the area of the intake pipe would be much smaller than the area of the trashrack, for a given flow, the approach velocity at the trashrack would always be lower than the intake pipe velocity. Therefore, grayling that would involuntarily be pulled through the trashrack would ultimately be involuntarily pulled through the intake pipe.

though grayling would likely locate in the vicinity of the intake during the winter months, it stands to reason that overwintering grayling juveniles and adults would not likely seek to enter the intake pipe or approach the trashrack, where there would be high velocities and little or no velocity shelters, which is the very type of environment grayling seek to avoid by retreating to deeper, slack-water areas.

During the ice-free, non-winter months, grayling tend to be located in shallow environments, where warmer water temperatures, food, and cover tend to be more abundant. Haida's studies show numerous accounts of grayling locating in shallow, near-shore areas and feeding on the surface in open-water areas. Scott and Crossman (1973) report that grayling captured by gillnets in Great Slave Lake were found no deeper than 10 feet. Therefore, the intake would be located at a depth that would be at the limit or a little deeper than one would typically expect to find nonoverwintering grayling, especially fry and juveniles.

The intake pipe would provide an extremely harsh environment for aquatic insects, the primary food source of juvenile and adult grayling. Therefore, we disagree with ADF&G that grayling would seek the intake pipe as a feeding area. The same high velocity environment would make the intake pipe unsuitable as a source of cover, so we also disagree with ADF&G that grayling would choose the intake pipe, given that there would be more suitable natural cover types that would continue to be located along the margins of Rich's Pond. [18]

Based on the information we have before us, including the results of studies conducted in the project vicinity and documented known habits of grayling, we conclude that downstream grayling movements out of Rich's Pond after the proposed project would be operational, whether the movements would be voluntary or involuntary, would not differ substantially from the likely very low, inconsequential downstream movements that presently occur, and that therefore, there would be little benefit gained for the Lake Mellen and Rich's Pond grayling populations from installing a screen that would exclude any or all size classes of grayling from entering the intake and ultimately being killed by the project's turbines. [19] Because downstream movements out of Rich's Pond should not

[18] Examples of more suitable cover types include fallen trees, openings in the talus in near shore areas, large rocks, and some dispersed aquatic vegetation.

[19] Any grayling that currently migrate downstream out of Rich's Pond are likely not able to return back to Rich's Pond due to numerous cascades and waterfalls that occur

(continued...)

significantly increase over that of existing conditions, the Lake Mellen and Rich's Pond grayling populations would likely not decline due to the absence of a screen at the intake.

In Section VI, Developmental Analysis, we discuss the costs associated with screening the intake, and in Section VII, Comprehensive Development and Recommended Alternative, we make our recommendation.

Tailrace design and construction

Tailrace flows may attract inmigrating salmonids and cause a delay in spawning.

The ADF&G and ADGC recommend that Haida utilize a perched-ledge tailrace design with a 10-ft minimum head differential between the water surface elevations of Reynolds Creek and the tailrace. Interior prescribes a perched-ledge tailrace under Section 18. The ADGC recommends Haida design the tailrace consistent with the criteria recommended by ADF&G.

Haida proposes to design the tailrace consistent with the agencies' recommendations.

Staff Analysis

Haida would locate the outfall of the tailrace about 50 ft downstream of the anadromous fish barrier that has been identified by ADF&G. Flows discharging from the tailrace would exceed or nearly equal flows in the bypassed reach at times; therefore, migrating anadromous fish could mistake the tailrace for the stream channel. Migrating anadromous salmonids could be delayed in reaching their spawning grounds if they would enter the tailrace.

Haida's proposed and the agency-recommended perch-ledge design would be effective at preventing upstream migrating anadromous salmonids from entering the proposed tailrace. We agree that, in order to be effective, the hydraulic differential between the tailrace and Reynolds Creek water elevations should be a minimum of 10 ft, the minimum recommended hydraulic head differential to serve as a jumping barrier for

[19](...continued)
immediately below the outlet of Rich's Pond. Therefore, just as if the grayling would be killed by the proposed project's turbines, grayling that currently migrate out of Rich's Pond are lost to the Rich's Pond population.

salmonids (Wagner 1967 and NMFS 1993 as reported in Commission 1995). We agree with ADF&G that, in order to prevent injury to jumping fish, there should be a plunge pool located below the tailrace outfall that would be free of protruding rocks and of sufficient depth to prevent fish from striking the stream bottom as they would fall back into the pool.

Because the tailrace design and implementation is included in Haida's proposal, it would not affect project economics. Therefore, we recommend that, for the benefit of salmonids below the tailrace, Haida prepare and implement design drawings of its proposed perched-ledge tailrace.

Post-Construction evaluation and maintenance of screen and tailrace

Structures installed to protect fisheries should be evaluated for effectiveness and maintained in good working order.

The ADF&G and ADGC recommend that Haida develop and implement a plan to evaluate, monitor, and maintain the recommended intake screen and tailrace.

Staff Analysis

We agree with ADF&G and ADGC that evaluation, monitoring, and maintenance of any required intake screen and specific tailrace design after construction would be necessary to ensure that the facilities would be operating according to the intended designs and to identify any unforseen deficiencies in the designs that would require correction. Maintenance to the intake screen would include the clearing of debris and sediment from the screen face and any movable components. Hydraulic and biological monitoring of the screen would be necessary to ensure that impingement onto the screen face would be minimized or avoided. Maintenance to the tailrace area would include the removal of any obstructions in the plunge pool that jumping fish could fall upon and become injured.

Maintenance of the tailrace would be part of Haida's normal maintenance activities and costs. We envision evaluations that would consist of observations of whether jumping fish end up in the tailrace or strike rocks as they land in the plunge pool, observations of the fish screen in operation, and looking for injured fish near the facilities. Photographs could be included as documentation, and the evaluations could be incorporated with other on site maintenance and monitoring activities. Maintenance and evaluations would not affect the project's economics, so we recommend that Haida, in consultation with the NMFS, FWS, ADF&G and ADGC, prepare and implement a plan to

evaluate the effectiveness of the project tailrace. We defer our recommendation as to whether to include the intake screen in this plan to Section VII, Comprehensive Development and Recommended Alternative, because we deferred our recommendation for a screen at the intake.

Biotic Monitoring Plan

The effectiveness of environmental measures should be determined.

Interior recommends that Haida monitor anadromous salmonid spawning and rearing habitat in Reynolds Creek downstream of the powerhouse and evaluate the need for flushing flows, other channel maintenance, or operational modifications to protect anadromous fish. Interior recommends that grayling access to spawning areas on Reynolds Creek upstream of Lake Mellen be evaluated for the first 2 years after construction.

The NMFS recommends that Haida monitor the number of steelhead and pink, chum, and coho salmon that return to Reynolds Creek to spawn (escapement) so that a determination could be made as to whether there would be a need for further mitigative measures at the project.

The ADF&G recommends a biotic monitoring plan that includes provisions to: 1) monitor salmonid escapement; 2) maintain and monitor grayling passage in the channel between Lake Mellen and Rich's Pond; 3) monitor the margins of Lake Mellen and Rich's Pond for stranding of grayling fry; and 4) conduct an annual meeting with the agencies for purposes of discussing study results, project operations, and the need for further protection, mitigation, or enhancement measures. ADF&G recommends that if stream bank erosion occurs or juvenile grayling fish passage is adversely affected in the project area, project operations would be modified immediately to alleviate adverse conditions. ADF&G recommends that monitoring should continue for at least 5 years after phase 1 of the project would become operational and an additional 5 years if a change in project operations would be implemented that would modify the flow regime of lower Reynolds Creek. ADF&G also recommends that an additional 5 years of monitoring should be conducted after phase 2 would become operational.

The ADGC recommends that Haida monitor salmonid escapement, passage of grayling in the channel between Rich's Pond and Lake Mellen, and stranding of grayling fry in Rich's Pond and Lake Mellen.

Haida proposes to develop and implement an aquatic resources monitoring plan that includes provisions to: 1) conduct salmonid escapement counts in Reynolds Creek downstream of the powerhouse; 2) monitor and maintain grayling habitat in the channel between Lake Mellen and Rich's Pond; 3) monitor and maintain fish passage conditions at the inlet to Lake Mellen; 4) monitor fish populations in the bypassed reach; 5) prepare annual monitoring plans each monitoring year; 6) prepare an annual report of monitoring results for review by the agencies; 7) conduct an annual meeting to review the results of the monitoring program.

We interpret Haida's proposal to be nearly consistent with the recommendations and requirements of Interior, NMFS, ADF&G, and ADGC, except that Haida proposes that any monitoring after phase 2 have the following conditions: 1) the monitoring should be limited to the aquatic resources; 2) the monitoring should have a duration of no more than 5 years; and 3) the monitoring should have a provision to terminate in less than 5 years based on the monitoring results (letter filed by Michael V. Stimac, P.E., Manager, Licensing and Environmental Services, HDR Engineering, Inc., Bellevue, Washington, February 18, 2000).

Staff Analysis

The biotic monitoring plan proposed by Haida and recommended by the agencies would provide the benefit of determining whether any environmental measures that would be required by the Commission in any license issued for the proposed project would be effective at protecting, mitigating, or enhancing: 1) grayling populations and habitat in Lake Mellen, Rich's Pond, the channel between Rich's Pond and Lake Mellen, and Reynolds Creek upstream of the inlet to Lake Mellen; 2) cutthroat trout and Dolly Varden populations in the bypassed reach; and 3) anadromous salmonid populations in Reynolds Creek downstream of the proposed tailrace. The monitoring results could be used by the Commission to determine the necessity of providing additional protection or mitigation measures.

Any biotic monitoring plan would need to detail: 1) the study goals; 2) the specific parameters that would be monitored to meet the established goals; and 3) how the plan would be designed to isolate project-related effects. Isolating for project-related effects would be important for measuring such parameters as salmonid escapement, which could be influenced by many non-project effects, including predation, overfishing, and climatic conditions.

We believe that any biotic monitoring plan should provide for annual monitoring for 5 consecutive years after phase 1 and 5 consecutive years after phase 2 becomes fully

operational. This length of time would be necessary in order to allow enough time for the aquatic resources to show any response to operation of both phase 1 and 2 of the proposed project. The Commission could direct additional monitoring based on the results of the monitoring studies and the comments and recommendations of Haida and the consulted agencies.[20] Phase 2 operation would be very different than phase 1 operation when considering that intake flows would be three times higher under phase 2. Therefore, we disagree with Haida that there should be a provision to terminate the monitoring, based on the monitoring results, in less than 5 years after phase 2 would become fully operational.

We agree with Haida's proposal and ADF&G's recommendation that Haida include in the monitoring plan a provision for Haida to hold, for the duration of the monitoring, an annual meeting with FWS, NMFS and ADF&G to review the monitoring results. This measure would allow for the early detection of any unforeseen adverse effects that could quickly be brought to the attention of the Commission for determination as to whether any additional action would be necessary. For the same reason, we agree with Haida's proposal to prepare an annual report of the monitoring results. Such a report should be filed with the Commission and copied to the FWS, NMFS and ADF&G for review.

We disagree with the ADF&G's recommendation to modify operations immediately if stream erosion occurs or juvenile grayling fish passage is adversely affected by the project because most situations may not warrant immediate modification of operations. We expect the biotic monitoring program to measure, as accurately as possible, any adverse effects that are identified so that they can be addressed at the next meeting with the consulted agencies. We recommend that the biotic monitoring plan address how to handle potential situations involving unforeseen, severe project effects to erosion or juvenile grayling passage, if any, by enumerating the conditions under which project operations would be modified and how those conditions would be determined.

In Section VI, Developmental Analysis, we discuss the costs associated with developing and implementing an aquatic resources monitoring plan, and in Section VII, Comprehensive Development and Recommended Alternative, we make our recommendation.

Agency Access to Project Facilities

[20] Additionally, if Haida would propose a change in project operations during the term of any license issued for the project, then the Commission would determine, at that time, if additional monitoring would be required.

The ADF&G recommends that ADF&G representatives, who show proper credentials, have free and unrestricted access to, through, and across access routes leading to project lands, all project lands and all project works.

Because resource agencies manage fish and wildlife resources in the Reynolds Creek watershed, we recommend that Haida allow representatives of the NMFS, FWS and ADF&G, who show proper credentials, unrestricted access to project lands and works in the performance of their official duties. For safety and liability reasons, we also recommend that advance notification be required.

Consultation

The ADF&G recommends we require that Haida initiate consultation with the resource agencies on post-license plans at least 6 months prior to land-disturbing activities; resource agencies be able to approve plans; resource agencies be allowed 30 days lead time, in writing, for agency comment and consultation; plans be submitted to the Commission at least 30 days before the scheduled date to initiate activities related to the plan; plans be implemented after written approval is received from the Commission; and if agreement on the plan is not reached, project implementation be halted.

We recommend that the Commission's standard consultation requirements, which include most of those recommended by the ADF&G, be included in any license granted to Haida. That is, all plans would be developed in consultation with the specified resource agencies. The licensee would prepare a draft plan, after consultation with the agencies, then submit the draft plan to agency personnel and allow the agencies a minimum of 30 days to provide comments and recommendations on the draft plan. Haida would prepare a final plan based on the agencies' input. The final plan would be filed with the Commission for approval, along with agencies' comments and recommendations on the draft plan, including an explanation of how the agencies' comments have been accommodated by the final plan. All plans would be implemented only after approval by the Commission. Construction-related plans must generally be filed with the Commission between 90 and 180 days prior to any ground-disturbing or land-clearing activities. We do not recommend that Haida be required to initiate consultation 6 months before an activity because plans may vary in depth and subject. We do not recommend that the Commission halt construction if an agreement or plan is not reached through the consultation process, because the Commission would determine whether or not a license violation exists, and if so, any measures that may become necessary to establish compliance with the license.

Unavoidable Adverse Effects to Aquatic Resources

There could be minor, long-term temperature changes in lower Reynolds Creek that could lengthen the incubation time of salmonid eggs. With our recommended operational and biotic monitoring plans, however, any effects should be minimal.

3. Terrestrial Resources

a. Affected Environment

Vegetation

The Reynolds Creek Basin is steep and rocky and generally densely vegetated with old growth forest dominated by western hemlock, except where rock cliffs are too steep for vegetation or where avalanche paths limit vegetation to scrub communities. On thinner soils and on muskegs, such as found at Rich's Pond, the western hemlock is replaced by stunted lodgepole pine and Alaska yellow-cedar.

Sealaska began logging on the private lands in the basin in 1997, and is expected to continue around the west flank of Copper Harbor and beyond Reynolds Creek in the next few years. An additional logging road system to access higher areas in the basin is expected by 2000. As the logging roads in the basin are constructed, the amount of area logged will progressively increase, transforming the hillsides from mostly unroaded old growth to a mosaic of clear-cuts. Sealaska's logging activities include areas slated for construction of the proposed transmission line, penstock, and powerhouse, except for a 66-foot-wide riparian buffer required to be left by the Alaska Forest Practices Act. In the lower portion of the Reynolds Creek Basin, logging has already removed old-growth forest typical of lower elevations on POW. The overstory consisted of large Sitka spruce (≥ 39 in in average diameter) and western hemlock (average 20 to 30 in in diameter) with lesser numbers of western red cedar. Logging left only those larger trees within the required 66-foot buffer. A riparian community dominated by red alder with an understory of salmonberry and stink currant remains more or less intact along the stream channel.

Wetlands are abundant on POW; over 45 percent of land surface on POW is classified as wetland (Hall 1991). Although much of the project area has steep gradient and is well drained, limited on-site ground truthing of National Wetland Inventory maps identified the following primary wetland types in the project area (classification follows Cowardin et al. 1979): palustrine forested, palustrine unconsolidated bottom (muskeg), palustrine scrub-shrub, estuarine intertidal, and lacustrine unconsolidated bottom. The area surrounding Rich's Pond has muskeg; some palustrine forested-wetlands also occur along Reynolds Creek. Saltwater-influenced wetlands are found along Copper Harbor and Hetta Inlet.

Wildlife

The productive old growth habitat in the Reynolds Creek Basin supports a diversity of wildlife, including black bear, Sitka black-tailed deer, Alexander Archipelago wolf, a number of furbearers, and other small mammals. [21] The basin also provides habitat for raptors and songbirds, some of which prefer old growth, such as the goshawk. Associated riparian and other shrubby habitats are used by vireos, flycatchers, and thrushes for foraging and nesting. The intertidal delta at the mouth of lower Reynolds Creek, Copper Harbor, and Hetta Inlet could be used by various resident and migrant gulls, shorebirds, and waterfowl. Although no bald eagle nests were observed in the project area, bald eagles are common on POW and may frequent Copper Harbor, Hetta Inlet or the Hydia River.

Black bears are common in the project area. Tracks and sign were abundant along Reynolds Creek in July and November 1995, and an individual was seen just below the lower USGS gaging station in September 1995. They may forage on berries, grasses, and succulent forbs in muskegs near the project or on salmon during anadromous runs in Lower Reynolds Creek.

b. Environmental Impacts and Recommendations

Vegetation and Wetlands

Project construction would result in the short-term disturbance of about 4.5 acres of vegetation and the permanent elimination of about 2.5 acres of vegetation. Most of the project is not located in wetlands or other water of the United States. About 0.3 acres of wetlands or other waters would be filled or excavated or both. An additional 0.6 acres of wetlands would be cleared to construct the transmission line, but no grubbing, excavation, or fill would be required. The diversion dam at Rich's Pond would raise water levels about 6 ft, inundating a relatively steep shoreline, and permanently flooding less than 1 acre of wetlands. Water levels would fluctuate in Rich's Pond and Lake Mellen depending on power demand and flow, but would not likely exceed Lake Mellen's natural high water level. Water level increase around Rich's Pond and changing water levels would cause muskeg wetland plants and some trees on both of the lake's edges to die.

[21]The Alexander Archipelago wolf is a species of concern that will be discussed in section V.D.4., Threatened and Endangered Species, as well as its primary prey species, the Sitka black-tailed deer. Other species of special concern to the resource agencies, Queen Charlotte goshawk, marble murrelet, etc. are also discussed in section V.D.4.

Haida proposes to limit the amount of vegetation clearing and wetland fill and excavation to the minimum necessary for construction of the project facilities. They also propose to use existing or planned logging roads to access the site and to construct the transmission line, thereby reducing vegetation and wetland loss and alteration. Haida agrees to prepare a revegetation plan as part of its final ESCP, but would also allow natural succession to proceed to complete revegetation. Haida proposes no other mitigation for vegetation or wetland impacts. No recommendations to mitigate for vegetation and wetland impacts were filed by the resource agencies, except for recommending minimum riparian buffer widths which are discussed next.

Staff Analysis: Although about 7 surface acres would be directly altered or lost during project construction, an additional undistinguishable area would be indirectly affected by changes in light penetration, wind, and moisture availability that would result from a reduction in overstory canopy. This could lead to changes in the understory in adjoining undisturbed areas and the loss of some shade-tolerant species. Although stands of Sitka spruce and hemlock regenerate rapidly (Deal 1997), it would likely take 150 to 260 years to develop old-growth characteristics in the reclaimed areas (FS 1997). Although a very limited area would be affected by construction, these effects would add to those resulting from the logging operations in the basin. Most of the project has been designed to avoid wetlands or other waters of the United States; however, some impacts to wetlands is unavoidable.

We recommend that Haida prepare a revegetation plan as part of the final ESCP in consultation with the agencies (Section V.D.1, Geology and Soils Resources). Additional vegetative or wetland mitigative measures are not needed because: (1) proposed vegetation clearing has been minimized to the extent feasible; (2) revegetation measures should help start the natural recovery process and control soil loss which could slow recovery; (3) only minimal clearing along the proposed transmission line right-of-way would be needed and would receive minimal maintenance for the duration of the license; (4) project features have been designed to avoid wetlands, inasmuch as possible, while still achieving sound engineering design; and (5) wetland acreage that would be affected by the project would be negligible when compared to the overall extent of wetlands in the project vicinity and on POW.

Riparian Buffers

Riparian zones serve many important ecological functions: controlling stream shading (heat energy), providing inputs of large woody debris and organic matter needed for fish spawning and rearing habitat and food production, contributing to bank stabilization, regulating inputs of fine sediment from surface erosion, influencing nutrient

cycling (Spence et al. 1996), providing wildlife habitat and travel corridors, and providing connectivity between watersheds. Removal of riparian vegetation would be required to construct the project diversion dam, the penstock and transmission line stream crossings, and the powerhouse and tailrace.

Haida agrees to provide a 66-foot buffer between project facilities and Reynolds Creek and other anadromous fish streams, except for the diversion dam, stream crossings by the penstock and transmission line, powerhouse and tailrace. Haida would also construct the transmission line to follow existing roads to the extent possible and to site the transmission line to leave existing forested stream buffers intact to the maximum extent possible, which is consistent with Interior's recommendation.

The ADF&G and ADGC recommends that the corridor and clearing for the penstock and transmission line be sited a minimum of 100 horizontal ft away from the ordinary high water of Reynolds Creek, its tributaries, and all streams identified in ADF&G's 1998 *Catalog*. Exceptions were provided for the diversion, intake, powerhouse, tailrace, and instream crossings of the penstock and transmission line. NMFS made a similar recommendation, but only required a clearance of 66 ft consistent with the Alaska Forest Practices Act.

Staff Analysis

We agree that some clearing of riparian vegetation would be necessary at the powerhouse, tailrace, diversion dam, and at stream crossings. The penstock and transmission line would be constructed primarily in areas that either have been or will be logged. Project facilities and their rights-of-way (the transmission line right-of-way would be 30 ft wide for vertically constructed portions and 100 ft on Jumbo Island) would be permanent, whereas succession would regenerate forests in the surrounding clearcuts. Deal (1997) reports that stands of Sitka spruce and western hemlock regenerate rapidly after clear-cutting and other disturbances because of their prolific seed production. Therefore, retaining as much of the remaining riparian buffer as possible is important to afford the greatest protection possible to streams, water quality, and the ecological functions described above.

Castelle (1992) found recommended buffer widths varied from 50 ft to 200 ft or more depending on the desired function (i.e. sediment removal, temperature moderation), location, and slopes. The Forest Ecosystem Management Assessment Team concluded that a buffer width equal to the average height of two site-potential trees or 300 ft, whichever was greater, is needed to ensure that the full array of ecological functions are maintained in key watersheds with fish-bearing streams (Forest Service and Bureau of

Land Management 1994). On the Tongass National Forest, the Forest Service applies a 100-foot no timber harvest corridor on class 1 fish streams in order to ensure protection of riparian habitat. The Alaska Forest Resources Protection Act of 1990 requires either a 66-foot or 100-foot riparian buffer (depending on the stream type and slope) on private lands to protect riparian areas and their ecological functions from significant adverse effects of timber harvest, but applies 100-foot buffers on state lands.

The preponderance of the literature reviewed suggests that buffer widths effective in preventing significant water quality impacts, and maintaining and protecting fish and wildlife habitat and other important functions are generally 100 ft or greater, with buffer effectiveness increasing with buffer width. We therefore recommend, that except for the diversion dam, intake structure, powerhouse, tailrace, and instream crossings of the penstock and transmission line, Haida site the project penstock and transmission line corridor and limit clearing within these corridors to provide the maximum riparian buffer feasible, but no less than 100 ft, measured horizontally, away from the ordinary high water mark of Reynolds Creek, its tributaries, and from all other streams identified in the *Catalog*. If during final design of the project facilities, it is determined that this would not be practicable in all areas for environmental or engineering reasons, Haida may, following consultation with the ADF&G, FWS, and NMFS, request the Commission modify this requirement. This would be part of Haida's construction costs, and not a significant effect on project economics.

Wildlife

Project construction would increase human activities, roads, and noise in the area, and would generate waste.

Haida proposes to prepare a fish and wildlife protection plan, subject to approval of the agencies, which would describe the measures to be followed during construction to avoid fish and wildlife disturbance. The plan would address: (1) timing of construction activities to minimize fish and wildlife disturbance, (2) measures to minimize blasting impacts to fish and wildlife, (3) measures to minimize and mitigate for impacts to aquatic resources in the channel between Rich's Pond and Lake Mellen, (4) measures to avoid bear-human conflicts, (5) measures to avoid disturbance to bald eagles, and (6) prohibitions on hunting, trapping and fishing in the project area by construction-related personnel. Haida also agrees to design and construct the transmission line to minimize bird collisions and electrocutions.

Improper garbage disposal and increased human presence and noise during the 1- to 2- year construction period could adversely affect wildlife by degrading habitats,

displacing wildlife from construction areas, attracting wildlife to unnatural food sources, altering behavioral patterns through habituation toward people, increasing bear-human conflicts, and increasing fishing, trapping and hunting pressure on fish and wildlife populations. The transmission line could represent collision and electrocution hazards to bald eagles, waterfowl, and other birds, particularly during inclement weather.

To reduce potential bear-human conflicts and to prevent over exploitation of fish and wildlife resources during construction, ADF&G and Interior recommend that Haida prepare (a) a bear safety plan in consultation with ADF&G and FWS, and (b) take measures to prohibit the construction work force from hunting, fishing, and trapping on project property during construction. Such provisions would include incorporating ADF&G fishing and hunting regulations into employee/employer work standards and contracts for all employees, contractors, and subcontractors to prevent exploitation of fish and wildlife. Penalties for violation would include termination of employment. Interior also recommends that Haida route and mark the transmission line to minimize bird collisions and electrocutions. The ADF&G further recommends to restrict firearm use by construction workers to defense of life or property.

Staff Analysis: We believe that Haida's proposed Fish and Wildlife Protection Plan would be prudent and would help minimize potential impacts to fish and wildlife, and recommend that Haida prepare, in consultation with ADF&G and FWS, and file the plan for Commission approval.

To minimize bear-human conflicts we also agree with ADF&G that Haida include measures for bear safety as part of their Fish and Wildlife Protection Plan. The bear safety measures should include: (1) instructions for operating practices when in bear country that minimizes possible conflict, (2) instructions to minimize encounters and avoid areas often used by bears, (3) instructions for keeping construction sites and refuse areas clean of substances that attract bears, (4) installing bear-proof garbage receptacles and other measures to prevent bears from obtaining food or garbage during construction periods, and (5) procedures to deal with problem bears.

The basin is not known to receive heavy recreation pressure because of its remoteness and limited access across private lands. However, the addition of the project construction work force, in conjunction with logging roads and activities in the basin, would improve access to fish and wildlife habitats and may subject fish and wildlife populations to additional hunting and fishing pressures and possibly over-exploitation. ADF&G expressed particular concern for Arctic grayling, which they say are vulnerable to over-fishing, and for the unfair advantage afforded to construction workers over other users because of the sites' remoteness.

We agree that provisions to prohibit the construction force from fishing, trapping, and hunting during the construction period would further protect fish and wildlife of the project area. We recommend that Haida include, as part of its Fish and Wildlife Protection Plan, measures to control hunting, trapping, and fishing within the project boundary by the construction workforce, and it's proposed measures to minimize possible encounters and conflicts with bears. The plan, prepared in consultation with the ADF&G and FWS, should include a description of how such prohibitions would be implemented and enforced. The Commission does not have jurisdiction to enforce firearms restrictions.

Designing and siting transmission lines in accordance with the suggested guidelines in *Suggested Practices for Raptor Protection on Power Lines - The State of the Art in 1996* (APLIC 1996) and *Mitigating Bird Collisions with Power Lines: The State of the Art in 1994* (APLIC 1994) can minimize electrocution and collision hazards to birds. We recommend that Haida prepare, in consultation with ADF&G and FWS, and file for Commission approval, a final transmission line design plan that includes measures that conform to the above guidelines.

As Haida's proposed measures, these would be included in the estimated construction costs, and, therefore, not a significant addition to project costs.

Mitigation Fund

The ADF&G and ADGC recommend that Haida establish a $50,000 interest-bearing escrow account to be used by a council composed of ADF&G, FWS, and NMFS to implement fish and wildlife mitigation, enhancement, and monitoring plans to mitigate for fish, wildlife and water quality impacts associated with project construction and operation. Haida is opposed to the mitigation fund because the various conditions proposed by the agencies are intended to avoid or mitigate for all expected impacts.

Staff Analysis

ADF&G recommends that Haida establish a fund for any unforeseen events that impact fish and wildlife resources as a result of the project that cannot be otherwise mitigated by changing project operations. ADF&G points out that the Commission required escrow accounts in the Terror Lake and Power Creek Projects, FERC Nos. 2743 and 11243, respectively, and did not use the applicant's ability to fund mitigation as a criterion.

Haida responded to ADF&G's comments by letter dated December 9, 1999, that an escrow account for the Power Creek Project was established to mitigate for unavoidable project impacts that were expected by all parties, but that the various conditions recommended by the agencies for the Reynolds Creek Project are intended to avoid or mitigate for all expected project impacts.

For the Terror Lake Project, located on Kodiak Island, Alaska, the Commission approved a $500,000 trust fund to fund research, acquisition of land, and other activities to benefit the Kodiak brown bear as one provision in an offer of settlement submitted jointly by the applicant, resource agencies, and non-governmental organizations (letter from Edward Weinberg; Duncan, Weinberg, and Miller; Washington DC; September 9, 1981). [22] For the Power Creek Project, located near Cordova, Alaska, the Commission required a $50,000 escrow account to implement fish and wildlife mitigation, enhancement and monitoring plans, as proposed by the applicant and agreed to by resource agencies. [23] For both projects, the applicant and all parties to the project agreed to detailed conditions for the funds, for example: tax status, accounting procedures, joint decision making responsibilities, processes for approving expenditures, etc.

In absence of an expressed commitment of the parties to work together in establishing mutually acceptable conditions for a fund and carrying out the demands of operating a fund, we question the benefit of requiring one. If there are disagreements among the parties at initiating a fund or in setting its purpose and procedures, then the fund may not be the most effective means of providing environmental measures. ADF&G's recommended fund would be administered by a council that does not include the Haida.

The ADF&G makes and we recommend a variety of prudent and viable measures to protect fish and wildlife resources during project construction and operation; including preparation of a final ESCP and hazardous spill prevention plan, riparian buffer restrictions, Lake Mellen surface elevation limits, ramping rates, minimum instream flows, fishing and hunting restrictions, avian electrocution and collision protection measures, and measures to follow and ensure compliance with the environmental measures. We believe that these measures would be adequate to protect and mitigate fish and wildlife impacts. Further, monitoring requirements are recommended to determine if other corrective measures are warranted. If, during the term of a license, there is a need

[22] 17 FERC ¶ 61,026.

[23] 81 FERC ¶ 62,230.

for other mitigation, protection, or enhancement measures, the Commission can reopen the license through certain standard articles included in any license issued and require mitigation as appropriate. We therefore do not see a need for the fund and do not recommend that Haida establish the $50,000 escrow account.

Because the project will require a capital-intensive investment, we recommend that Haida file a financial plan prior to the start of any construction or ground-disturbing activities.

c. Unavoidable Adverse Impacts

Seven acres of vegetation and less than 1.5 acres of wetlands would be lost or altered from project construction. Additional riparian vegetation would be cleared to construct the transmission line. Some disturbance and temporary displacement of wildlife would be unavoidable during construction. These effects would be minimized by implementing the measures described in the Fish and Wildlife Mitigation Plan, revegetation measures, required riparian buffers, and avian collision and electrocution avoidance measures.

4. Threatened and Endangered Species, and Federal Species of Concern

a. Affected Environment

At the time the DEA was issued, the American peregrine falcon was the only federally-listed threatened and endangered species known to occur in the project area. On August 25, 1999, the FWS removed it from the endangered species list. We concluded in the DEA that the project would not affect the American peregrine falcon because (1) it occurs in the project area infrequently as migrants; (2) the project site doesn't support large numbers of the falcon's primary prey species, shorebirds and waterfowl, and project construction and operation would not reduce habitat for these species; and (3) although not particularly vulnerable to transmission line collisions because of their keen eyesight and maneuverability, designing the transmission line to reduce the potential for avian collisions would also benefit the peregrine.

The Snake River sockeye salmon (endangered), Snake River fall chinook salmon (threatened), and Snake River spring/summer chinook (threatened) are federally-listed. In the DEA we found that the Snake River sockeye salmon, Snake River fall chinook salmon, Snake River spring/summer chinook, and stellar sea lion (endangered) may occur in Hetta inlet but would not be affected by the project because (1) these species do not occur in Reynolds Creek; (2) construction and operation would not require any work in

the marine environment, other than shipping of equipment and materials, that would reduce or modify the foraging habitat of these species; and (3) no sea lion rookeries or haulouts are located in or near the project area. We still conclude for the reasons stated above that the project would not affect any of these species and no further consultation pursuant to the Endangered Species Act is required.

Other species of concern that may occur in the project area include: Thurber's reedgrass, marbled murrelet, Queen Charlotte goshawk, harlequin duck, olive-sided flycatcher, and Alexander Archipelago wolf.[24] We address these species below.

Thurber's Reedgrass: This species occurs in a variety of habitats including beach meadows and marshy wet areas, lake shores, sandy or rocky soils, and forest openings from sea level to the alpine zone. Suitable habitat occurs in the general vicinity of the proposed transmission line, however, no plants resembling this reedgrass were found during a 1997 survey (Pentec 1997).

Marbled Murrelet: The marbled murrelet, a small seabird found along coastal areas from Alaska to central California, feeds primarily on small fish and invertebrates in near-shore marine waters, and generally nests in old-growth and mature forest and on the ground in treeless areas in Alaska (DeGange 1996). It is common and widely distributed throughout southeast Alaska, but on POW it is mostly found in the northern portion of the island (DeGange 1996). While information on population status and trends in southeast Alaska is incomplete, Interior is concerned about its status because of loss and modification of nesting habitat due to logging of old-growth forests, oil spills, and gill-netting (DeGange 1996).

Queen Charlotte Goshawk: The Queen Charlotte goshawk, a subspecies of the northern goshawk that inhabits southeast Alaska, inhabits deep conifer-dominated mixed woodlands and preys chiefly on birds, ducks, and small mammals. They prefer low-elevation, large, unfragmented stands of productive old-growth and mature forest (Iverson et al. 1996). The bird shows a lower habitat specificity in the winter, often

[24] Concerns about impacts to the spotted frog were initially raised during scoping. There are no records of spotted frog occurrence on POW (Pentec 1997), and surveys in 1995, 1996, and 1997 revealed no frogs, tadpoles, or juveniles. Therefore we do not expect the project to impact this species. Similarly, we do not expect any impacts on lenticular sedge var. dolia because of the lack of suitable habitat--high mountain elevations from timberline to alpine, and almost always in or at the waters edge--at the project site, and because it is was not found during a 1997 site survey (Pentec 1997).

ranging into other habitats. Most of the mature forest habitat in the project area may be suitable for both hunting and nesting, however no goshawks were detected during a July 1995 survey that followed standard FS protocols. The major factor threatening the goshawk is continuing decline of old-growth forests needed for nesting and foraging (Iverson et al. 1996).

Harlequin Duck: The harlequin duck is a common year-round Alaska resident that is found throughout much of the state except the Arctic coast (Gabrielson and Lincoln 1959). They typically nest along rock shores adjacent to rapids of turbulent mountain streams and rivers, usually within 6 ft (but up to 60 ft) of water (DeGraaf et al. 1991). Harlequins appear to select the largest anadromous salmon streams for nesting (Crowley 1993). Nest sites generally have shelter overhead, such as a recess in a stream bank or under shrubs or stranded debris. Their non-breeding habitat is near shore marine waters along rocky coasts (Armstrong 1983).

Olive-Sided Flycatcher: The olive-sided flycatcher breeds in wooded regions from central Alaska south to northern Baja, California and central Arizona and winters in South America. Its preferred habitat is open coniferous forests and forest edges along lakes, streams, and muskegs and lumbered areas and other woodland clearings. They were heard in Reynolds Creek drainage in 1996 (Pentec 1997).

Alexander Archipelago Wolf: The Alexander Archipelago wolf population, found on the mainland and all the larger islands in southeastern Alaska, is estimated at about 1,000 animals (Person et al. 1996). Person and Boyer (undated) estimated that about 30 to 40 percent of the wolf population in southeastern Alaska could be on POW. They are common in the project area. Wolves were observed and heard along the north shore of Copper Harbor during the field reconnaissance in November 1994 and abundant wolf tracks were observed in the project area during July and November 1995 surveys.

Person et al. (1996) identified three principal issues relating primarily to past and planned timber harvest on both federal and private lands that raise questions about the long-term viability and distribution of wolves in southeast Alaska: (1) a decline in carrying capacity for deer, the wolves primary prey, (2) the effect of road use by humans on mortality and displacement of wolves, and (3) continued exploitation of wolves. Logging of productive old-growth forests, which provide important winter habitat and high quality forage for deer, is a principal factor in reducing an area's carrying capacity for deer. Deer often concentrate in the isolated forests, increasing their vulnerability to increased wolf predation; wolves often use logging roads to access these remaining stands (Person et al. 1996).

b. Environmental Impacts and Recommendations:

Species of Special Concern

Thurber's Reedgrass. Thurber's reedgrass was not found during a survey of the project area. If present, it could be adversely affected by the increase in Rich's Pond level and from the fluctuating levels in Lake Mellen and Rich's Pond. However, these effects would be dampened by the recommended limits on lake level fluctuations.

Marbled Murrelet and Queen Charlotte Goshawk. If present, these birds could be adversely affected by the additional removal of old-growth and riparian forests. Logging in the Reynolds Creek Basin has or will remove much of the old-growth forest, making the remaining forests more valuable to these species. The project would contribute a relatively small amount to that loss. Our recommended measures to minimize the amount of clearing necessary and to retain the greatest amount of riparian buffer feasible would minimize the project's potential effects on these species.

Harlequin Duck. Reynolds Creek may provide suitable nesting habitat for the harlequin duck. If present, construction activities could temporarily disturb and displace nesting hens. Modifications of flows in the bypassed reach could reduce habitat quality of the bypassed reach for nesting. The recommended minimum flows (see Section V.D.2, Aquatic Resources) would minimize the adverse impacts.

Alexander Archipelago Wolf. Project construction would contribute to the three major factors affecting wolves on POW: loss of old-growth habitat, additions of roads, and potentially increasing the exploitation of wolves by construction workers. Project effects would be small relative to timber harvesting, but would still be additive. We recommend a number of measures to reduce these affects: (1) minimizing the amount of area cleared of vegetation, (2) preparing a revegetation plan as part of the final ESCP, (3) maintaining as large riparian buffers as feasible, and (4) implementing measures to prevent hunting by construction personnel.

c. Unavoidable Adverse Impacts

There are no unavoidable adverse impacts to threatened and endangered species. The project would remove some old-growth forest that provides habitat for marbled murrelet, goshawks and wolves, but recommended measures that reduce vegetation clearing, maintain riparian buffers, and reduce and minimize wildlife disturbance and hunting during construction would minimize the impacts.

5. Aesthetic Resources

a. Affected Environment

The Reynolds Creek drainage rises from tidewater to alpine tundra on the ridge tops and mountains surrounding Lake Mellen. Lake Mellen is surrounded by a mix of thick conifer forest, gray rock cliffs, slide paths from adjacent mountainsides, and limited park-like areas of taiga or muskeg. Past clearcutting of the side of Copper Mountain on the north side of Copper Harbor has affected the wilderness aspect of the view from the water and from aircraft flying over the area or up Hetta Inlet. No other visible signs of human disturbance were evident in the Reynolds Creek drainage prior to 1997, except for a tailings pile from a small crystal mine high on the south flank of Green Monster Mountain just north of Summit Lake.

The west flank of Copper Mountain, which would be traversed by the transmission line, is being logged progressively from the Sealaska base on the west side of Copper Mountain. A road was built on Sealaska lands south into Copper Harbor and around Reynolds Creek in 1997 and a floating dock and construction camp at an old Coppermount site. Major logging activity began in 1997 and it is expected that the entire lower Reynolds Creek Basin will be logged in the next few years. Logging will also extend into higher elevations on the northwest and southwest flanks of Lake Mellen. The remainder of the transmission line route across Jumbo Island, along Deer Creek and the Hydaburg River has virtually all been logged in the past 20 years and presents a mix of various stages of regrowth.

b. Environmental Impacts and Recommendations

Project construction would cause traffic, noise, dust, and exhaust emissions from construction machinery traveling along existing private roads leading to, and at the project site during construction. Construction of the penstock, powerhouse, and tailrace would require clearing of some old growth timber that would make these facilities visible from the air or to individuals accessing the site. Clearing of construction staging areas would be minimized. Some portion of the facilities may also be visible from the water in Hetta Inlet or Copper Harbor. However, the effects of these actions would be insignificant when compared to the more widespread logging and road building activities in the Reynolds Creek Basin.

Permanent project features including the diversion/intake structure on Lake Mellen, the penstock, powerhouse, and access roads would alter the visual quality of the area. In addition, the materials used in constructing project facilities would use natural

colorings to blend, to the extent possible, with the natural surrounding landscape. Since the surrounding area would continue to be logged, these disturbances would not greatly affect the aesthetics of the area.

Project operation would not result in fluctuation of Lake Mellen beyond its natural range of variation and should not affect the aesthetic experience of the few individuals who may access the lake by float plane to fish. The increased water elevation of Rich's Pond should result in no adverse aesthetic effect.

The transmission line would add an element of permanence and structure to the already disturbed nature of the hillsides and valleys along the route which have already been clearcut. As we've stated, to the degree possible, Haida plans to establish the line parallel to existing roads. Although the overhead transmission line would result in visual impacts, particularly as it crosses Hetta Inlet and over Jumbo Island, the more noticeable visual element from the distance is the existing road system and associated timber clearing on the landscape.

Therefore, because of the extent of existing and planned road building and timber harvesting in the project area, we don't consider the effects of project construction on aesthetics to be significant. Section V.B, Cumulative Impacts, further discusses cumulative effects on aesthetics.

c. Unavoidable Adverse Effects

Construction of the dam, the penstock, and the powerhouse introduce man-made elements into the existing landscape. However, because non-project road building and timber harvesting activities are occurring in the project area before construction of the project, the adverse impacts would be relatively minor, but long-term as the area returns to forest over time.

6. Cultural Resources

a. Affected Environment

Haida conducted a cultural resources inventory of the project area (Campbell, 1996). No archeological or historic sites, eligible for inclusion in the National Register of Historic Places (NRHP), were identified. Although the Coppermount mine facilities are located within the project area and dates to the turn of the century, this property was determined to be ineligible for inclusion in the NRHP (Campbell 1996). The Alaska Department State Historic Preservation Office (SHPO) concurred with this determination

(letter from Judith E. Bittner, State Historic Preservation Officer, Alaska Office of History and Archaeology, Anchorage, Alaska; to Bonnie Lindner, Licensing and Environmental Services, HDR Engineering, Bellevue, Washington, September 17, 1998).

b. Environmental Impacts and Recommendations

The proposed project would not have an effect on historic properties. However, if cultural material(s) are discovered during project construction, Haida should notify the Commission and consult with the SHPO; and if an archeological site or other cultural resource property is discovered, Haida should evaluate the discovered property(s) for eligibility for inclusion in the NRHP, pursuant to Section 106 of the National Historic Preservation Act. If the property is determined eligible for inclusion in the NRHP, Haida shall prepare a management plan to mitigate any possible effects to the discovered eligible property in consultation with the SHPO and the Advisory Council on Historic Preservation. The management plan shall be written and conform to the Department of the Interior Archeology and Historic Preservation: Secretary of the Interior's Standards and Guidelines. All related correspondence and reports would be filed with the Commission.

Therefore, we recommend that Haida consult with the SHPO if cultural materials are discovered during construction. If any property eligible for the NRHP is discovered during construction, we recommend that Haida prepare and implement a cultural resource management plan. These expenses may not occur, so we did not consider their effects on project economics.

c. Unavoidable Adverse Impacts

None.

7. Recreation and Other Land Uses

a. Affected Environment

Southeast Alaska has 12 percent of Alaska's outdoor recreation acreage and 9 percent of all recreation facilities and trails. Its coastline is convoluted by fjords and glaciers in the north. Because of this geography, excluding the usually popular walking/running and driving, water-related activities of motorboating and fishing have the highest participation rates. In contrast to statewide averages, with the exception of camping and motorboating, most outdoor recreation in southeast occurs within 1 hour of the community. The Tongass National Forest and the Haines State Forest provide over 17

million acres for outdoor recreation pursuits. The Tongass National Forest alone is 82 percent of the southeast's total recreation acreage and provides the majority of the region's outdoor recreation facilities and trails (ADNR 1988).

There are no developed recreation facilities located on or near the proposed project. Recreational use is limited because of difficult access and private land ownership at and adjacent to the project. Lake Mellen is accessible by float plane or helicopter. However, it is difficult to access via float plane under many weather conditions because of steepness of surrounding terrain.

Copper Harbor is accessible by boat and may occasionally be visited for recreational crabbing or hunting. Past clearcutting of the side of Copper Mountain on the north side of Copper Harbor has been colonized by an early scrub/shrub community dominated by alder. A floating dock and temporary logging construction camp were established in this area in 1997, and road building and logging may have diminished deer use. Fishing opportunities in Copper Harbor are not unique although halibut and rockfish are probably present. Pink and chum salmon can be caught in the harbor in late summer.

b. Environmental Impacts and Recommendations

Interior and ADF&G made a recommendation that public access and recreational enhancement plans be developed because surface water and submerged lands to the ordinary high water are owned and managed by the State, if they meet State navigability requirements. The concern is maintaining public access to State lands and any available recreational opportunities.

Construction and operation of the project would not create or enhance recreational opportunities. Public access to the project area would not be enhanced. Public use of the area would continue as at present, with most use at Copper Harbor, including the mouth of Reynolds Creek, about 1,000 ft downstream of the proposed tailrace site. Therefore, there would be no change to the existing public access and recreational use of the area of Reynolds Creek affected by the proposed project.

Construction activities would create noise and similar effects that could adversely affect recreational use of Reynolds Creek below the project site. These adverse impacts would be minor because of the distance from the project site to Copper Harbor, and short-term because Haida proposes a 7-month construction period. Operation of the project would have no effects on public use of the area because project facilities would be on private land.

Based on the above, the preparation of public access and recreational enhancement plans do not appear necessary, and they are not recommended.

c. Unavoidable Adverse Impacts

A 7-month construction period on private land would ensure that only minor and short-term disturbances would affect recreational use of Copper Harbor and the mouth of Reynolds Creek.

8. Socioeconomic Resources

a. Affected Environment

Although Alaska is the largest state in the United States by land mass, it is the second smallest state by population. Southeast Alaska comprises 12 percent of the State's population. The total population for Alaska in 1990 was 553,600 and is estimated to increase to 716,500 by the year 2000 (Alaska Department of Labor 1996). The annual growth rate for the state between 1990 and 2000 is anticipated to be about 2.57 percent, while the annual growth rate for Ketchikan/Hydaburg area is far below that at 0.87 percent (Alaska Department of Labor 1992).

Hydaburg with a population of about 500, is a first-class city with a city manager form of government. It is not part of an organized borough. Population trends are affected by employment opportunities. Natural resource-based industries have sustained southeast Alaska's economy in the past and present. They include forestry, fishing, and mining. For Hydaburg, commercial fishing is the main economic activity and logging has also been important in the area.

Hydaburg is not a tourist destination, and accommodations and support services are fairly limited at this time. Areas where employment growth is expected to occur are mining, services, and wholesale/retail trade. Declines are forecasted for construction, seafood processing and government (Alaska Department of Labor, 1994). Most of these industries experience seasonal swings in employment, usually peaking in the summer months. For example, unemployment in the Ketchikan area, a major population center for southeast Alaska, ranged from a high of 11.95 percent in January to a low of 3.7 percent in August for 1995.

b. Environmental Impacts and Recommendations

Project construction would require on-site employment of up to 30 workers. Most construction personnel would be hired from Hydaburg, Craig, Klawock, and Ketchikan areas. Some workers might commute by ferry from other islands in southeast Alaska on a weekly basis and stay in available accommodations or camp near the project site during the week and return home on weekends. Few, if any, workers are expected to relocate during the construction period. Because the construction work would not be likely to draw families with school-age children, the project's impact on local government services would be neglible.

Short-term benefits to the Hydaburg economy would include reduced unemployment and more local spending by construction workers. In addition, the project contractor would purchase some equipment and material from suppliers in the general area, providing additional short-term benefits.

The project would not displace any residences or business establishments. Once the proposed facilities are operational, the project would generate additional revenue for Haida through the sale of power to AP&T.

Because the project's socioeconomic impacts would be primarily beneficial, Haida is not proposing any mitigation measures specifically addressing Socioeconomics. One to two permanent, full-time jobs would result from long-term project operation.

c. Unavoidable Adverse Impacts

None.

D. No-Action Alternative

Under the no-action alternative, the Reynolds Creek Project would not be constructed. There would be no changes to the physical, biological, or cultural resources of the area and electrical generation from the project would not occur. The power that would have been developed from a renewable resource would have to be replaced from nonrenewable fuels. The noise and air quality impacts of the existing diesel fuel-fired generation system would continue unabated or at increased levels as the local electrical demand increased. The risk of spills of diesel fuels would likewise continue at current or increasing levels. The financial benefits to the residents of Hydaburg in the form of lower electrical rates and to Haida in terms of project operating revenues would not be realized.

VI. DEVELOPMENTAL ANALYSIS

A. POW Energy Plan

The Reynolds Creek Project is being developed by Haida, which was formed under the Alaska Native Claims Settlement Act to represent Haida native village of Hydaburg. Initially, the project would displace the diesel generation requirements of Hydaburg and would provide the residents a source of clean and price stable energy.

Ultimately, the project would form an integral part in the ever expanding POW electrical infrastructure. As such, the potential benefits of displacing diesel generation extend beyond Hydaburg to the rest of POW. Because of these benefits, in 1996 Congress appropriated a $3,000,000 construction grant to help fund development of the project. Remaining funding would be provided from additional grants, loans, or Haida capital.

In September 1997, a regional energy plan for POW was drafted by Haida. Technical support and recommendations for this plan were provided by Sealaska and AP&T. The Alaska Division of Energy reviewed the draft regional energy plan and the final copy was published in January, 1998. The purpose of the energy plan is to quantify the benefits of the various energy alternatives for the island and to identify the best long-range strategy for interconnecting POW. This energy plan also projects electrical load growth and generation requirements, identifies and predicts timing of future resources, and targets the transmission intertie to connect the various communities of POW. This plan would ultimately become part of the larger plan to interconnect southeast Alaska.

Until 1995, all generation on the island was provided by diesel generators. Hydropower was first introduced to the island in 1995 when AP&T completed construction of the 4.5 megawatt BBL. The BBL's output is currently used to meet the electrical needs of Craig and Klawock. In 1996, approximately 80 percent of the 23,000 MWh of expected average annual generation of the project was used. A new electrical intertie has been funded and will soon be constructed to connect the City of Thorne Bay to the Craig/Klawock power grid. Once completed, most, if not all, of BBL's energy potential will be used. An intertie to Hollis is also being constructed and these loads will soon be interconnected with the system.

The project would have an initial capacity of 1.5 MW and be capable of producing 11,500 MWh of energy on an average water year. Besides providing energy, once interconnected, the project would provide reliability, generation redundancy and operational flexibility to the electrical system. At the time when additional generation is required on the system, which would be around 2025, the project would be expanded by

adding a 3.5 MW generation unit. This expansion (phase 2) would allow the project to generate a maximum of 23,500 MWh, annually.

This phased approach is designed to match generation requirements with needs and to keep the liveliest cost of hydropower generation at or below the current cost of diesel generation.

B. Cost of environmental mitigation and enhancement measures

We evaluated the costs of the environmental measures recommended by Interior, NMFS, ADF&G, ADNR, and ADGC, including the costs resulting from minimum flow mitigation and the intake screen.

1. Minimum flow requirements

We determined the amount of energy that would be lost from the minimum flows for the bypassed reach recommended by the resource agencies (table 9) and calculated the corresponding costs. In evaluating the minimum flow recommendations and their effect on project economics, we considered the mid-load energy forecast.

Table 10. Annual costs of minimum flows for the mid-load forecast. (Source: Commission staff)

Proposal	Annual energy generation	Lost annual energy generation	Total annual cost of mitigation
Haida	6,380 MWh	baseline	baseline
ADNR, Staff	6,100 MWh	280 MWh	$24,600
ADGC	5,950 MWh	430 MWh	$37,800
Interior, ADF&G, NMFS	5,740 MWh	640 MWh	$56,300

2. Costs of agency-recommended measures.

Interior, ADF&G and ADGC say that, if fry less than 60-mm long are documented in the reach, the size of the screening should be no less than 3/32 in. In not, they recommend 1/4-in screening. NMFS and ADF&G recommend a shunt pipeline and Howell-Bunger valve to provide flow continuation. Interior, ADGC and ADF&G recommend a regulated outlet at the diversion. NMFS, Interior, ADF&G an ADNR recommend flow monitoring and NMFS, Interior and ADF&G recommend biotic

monitoring. Interior and ADF&G recommend an environmental compliance monitor be on-site during construction. Table 10 shows the costs of these measures.

Table 11. Costs of measures proposed by Haida and recommended by resource agencies. (Source: Commission staff)

Measures	Total costs	Annual costs
Applicant's Proposal	$175,000	baseline
3/32-inch Mesh	$255,000	$19,200
1/4-inch Mesh	$250,000	$18,800
Shunt pipeline	$275,000	$19,300
Stream Gages	$30,000 [1]	$6,300
Regulated Outlet	$20,000 [2]	$1,500
Biotic Monitoring	$33,000 [3]	$10,900
ECM	$80,000 [4]	$11,700

[1] First year only with $4,000 annual O&M costs.
[2] First year only.
[3] For 5 years.
[4] First 2 years.

C. Power and economic benefits of the project

As we've said, Haida proposes to build the project in two phases. Phase 1 would have a total cost of $7,400,000. Because Congress has appropriated $3,000,000 to the project, the actual cost to Haida would be $4,400,000. Phase 2, which Haida estimates would be completed by the year 2025, consists of adding a 3.5 MW turbine, at a cost of $2,500,000. The project would then have a total output of 5 MW.

To calculate the economic benefits of the project, we considered the project as proposed by Haida. Then, we considered the project's economic benefits by including the environmental enhancement measures adopted by the staff.

We used Haida's estimated cost of energy to be that of the cost of diesel generation, which is 88 mills/kWh. We assumed Haida could get financing for the project at a 7 percent interest rate.

For Haida's proposal, we find the average annual energy generation to be about 6,380 MWh. We find the average generation to be 6,100 MWh with the minimum flows

recommended for the bypassed reach in the DEA and by ADNR; 5,950 for ADGC's recommended flows; and 5,740 MWh for Interior's, NMFS's and ADF&G's recommended flows. Table 13 shows the economic benefits from both Haida's and the various agency recommendations.

Table 12. Summary of the 30-year net annual benefits of the Reynolds Creek Project as proposed by Haida and with the agencies' recommended environmental measures. (Source: Commission staff)

Proposal	Annual cost	Annual benefit	Net annual benefits	
Haida	$574,000	$562,000	-$12,000	-2.0 mills/kWh
ADNR	$580,300 [1]	$537,400 [2]	-$42,900	-7.0 mills/kWh
Staff	$604,400 [3]	$537,400 [2]	-$67,000	-11.0 mills/kWh
ADGC	$611,900 [4]	$524,200 [2]	-$87,700	-14.7 mills/kWh
NMFS	$610,500 [5]	$505,700 [2]	-$104,800	-18.3 mills/kWh
Interior	$623,600 [6]	$505,700 [2]	-$117,900	-20.5 mills/kWh
ADF&G	$642,900 [7]	$505,700 [2]	-$137,200	-$23.9 mills/kWh

[1] Itemized costs are shown on table 10. Included are costs for stream gages.

[2] A reduction in annual benefit results from the cost of the recommended minimum flow regime. Costs for the minimum flow regimes are shown in table 9.

[3] Included are costs for stream gages, regulated outlet, biotic monitoring, and ECM.

[4] Included are costs for stream gages, regulated outlet, biotic monitoring and 3/32-in intake screen.

[5] Included are costs for stream gages, biotic monitoring, and shunt pipeline.

[6] Included are costs for stream gages, regulated outlet, biotic monitoring, ECM and 3/32-in intake screen.

[7] Included are costs for stream gages, regulated outlet, biotic monitoring, ECM, 3/32-in intake screen and shunt pipeline.

We note that the city of Hydaburg currently receives electricity from diesel fuel at a cost of about 88.0 cents per kWh, thus the development cost for the project is greater than the current cost of energy. Project economics, however, is only one of the many public interest factors that is considered in determining whether or not to issue a license. Developing the Reynolds Creek Project may be desirable for other reasons, such as to diversify the mix of energy sources in the area, to promote construction-related jobs in the area, and to provide a fixed-cost source of power. We are recommending that any license issued to Haida be conditioned to require Haida to file a finance plan with the Commission before starting any project construction or modification to the project facilities.

D. Diesel Fuel

After evaluating the economic benefits of the project, we looked at the environmental benefits of replacing diesel fuel with electricity generated from hydropower. Estimates were made of the amount of diesel fuel necessary if diesel generation was used to generate the 23,500 MWh (potential energy production of the proposed project). Estimates were also made of the amounts of pollutants-oxides of nitrogen, carbon monoxide, carbon dioxide, and unburned hydrocarbon that would be produced by burning that diesel fuel. The diesel power plants do not contain state-of-the-art emission control systems such as catalytic converters and low $_{Nox}$, but are efficiently operated. Table 12 shows the result of the analysis.

Table 13. Estimated annual amounts of diesel fuel and resulting pollutants from equivalent amounts of generation from a diesel-fired power plant. (Source: Commission staff)

Item	Amounts
Diesel Fuel Required per year (gallons)	1,600,000
Diesel Fuel required per year (tons)	5,200
Oxides of Nitrogen (tons)	66
Carbon Monoxide (tons)	132
Carbon Dioxide (tons)	16,100
Unburned Hydrocarbons (tons)	25
Note: Emissions calculations based on the following estimated engine emissions: $_{NOX}$-2.0 gr/BHP-hr., CO-4.0 gr./BHP-hr, CO_2-3.09 lb/lb fuel, U.C.-0.75 gr./BHP-hr.	

As requested by AP&T we calculated the total tons of air pollutants that would be emitted by diesel fuel to replace the lost generation associated with each minimum flow recommendation. These results are shown in table 13.

Table 14. Estimated annual tons of pollutants resulting from the use of diesel fuel to replace lost generation associated with the minimum flow recommendations. (Source: Commission staff)

Item	ADNR (10 cfs)	ADGC (12 cfs)	Interior, NMFS, ADF&G (variable)
Lost annual generation (MWh)	280	430	640
Nitrogen Oxides (annual tons)	5	8	11
Carbon Monoxide (annual tons)	1	2	2

Carbon Dioxide (annual tons)	226	347	517

Carbon dioxide is considered to be a prime contributor to global warming, and the oxides of nitrogen and unburned hydrocarbons are considered to be prime contributors to the production of acid rain and photo-chemical smog. Carbon monoxide is a poison. It was concluded that construction and operation of the Reynolds Creek Project would benefit air quality and the environment because the need for fossil-fueled generation would be avoided or minimized.

VII. COMPREHENSIVE DEVELOPMENT AND RECOMMENDED ALTERNATIVE

Sections 4(e) and 10(a)(1) of the FPA require the Commission to give equal consideration to all uses of the waterway on which a project is located. When the Commission reviews a proposed project, the environmental, recreational, fish and wildlife, and other non-developmental values of the involved waterway are balanced equally with its electrical energy and other developmental values. In determining whether, and under what conditions to license a project, the Commission must weigh the various economic and environmental tradeoffs involved in the decision. Accordingly, any license issued shall be best adapted to a comprehensive plan for improving or developing a waterway for all beneficial public uses.

We recommend the following measures that modify or add to those recommended by Haida, and that would significantly affect the economics of the project: (1) maintain a minimum flow of 10 cfs in the Reynolds Creek bypassed reach at an estimated annual cost of $24,600; (2) install continuous recording gages to monitor compliance with minimum flows at an estimated annual cost of $6,300; (3) install a regulated outlet at the diversion at an estimated annual cost of $1,500; (4) prepare and implement a biotic monitoring program at an estimated annual cost of $10,900; and (5) hire an ECM to monitor environmental compliance during construction at an estimated annual cost of $11,700. We do not recommend that Haida release the minimum flow regime recommended by NMFS, Interior, and ADF&G or install an intake screen to prevent entrainment of grayling; however, Interior has prescribed their minimum flow regime and an automated, self-cleaning screen under Section 18 of the FPA, making these conditions mandatory. We estimate the annual costs of Interior's prescribed flow regime and intake screen would be $56,300 and $19,200.

Based on our independent review of agency and public comments filed on this project and our review of the environmental and economic effects of the proposed project and its alternatives, we selected the proposed project, with staff's modified measures, as the preferred option. We recommend this option because: (1) issuance of an original license

for the Reynolds Creek Hydroelectric Project would allow Haida to generate renewable power and provide a dependable source of electrical energy to the community of Hydaburg, Alaska; (2) the project would initially replace diesel fuel consumption by 115,000 gallons per year during phase 1 and 1.6 million gallons per year during phase 2; (3) the development would avoid the need for an equivalent amount of diesel-powered facilities in Hydaburg, and help to conserve these nonrenewable resources and limit atmospheric pollution; and (4) the recommended environmental measures would protect water quality, fish, terrestrial, historic and cultural resources; and maintain multiple use and management of project lands and aesthetics within the project area. Accordingly, we believe that our alternative would be best adapted to a comprehensive plan for making use of the water power resources of the Reynolds Creek watershed, while concurrently protecting other natural resource values and uses.

We recognize that the economic benefit of our preferred option results in a net annual benefit that is negative; that is, the cost of project power would exceed the likely alternative by 14.1 mills/kWh (20.5 mills/kWh with Interior's mandatory intake screen and minimum flows). We make our recommendation, however, consistent with the Commission's policy of not basing the decision of license issuance solely on the basis of economic projections, but we consider all developmental and nondevelopmental values of a project.[25]

Therefore, we recommend that an original license should be issued for the Reynolds Creek Project. Our recommended measures for an original license are listed below.

Our recommended alternative contains several measures that modify or add to Haida's proposal. Below we discuss the measures that would affect the economics of the project because their costs are substantial.

Minimum flows in the bypassed reach

Haida's proposed minimum flow of 5 cfs would provide about 49, 48 and 4 percent of spawning, fry, and juvenile/adult habitat, respectively. As an applicant-proposed measure, the cost of this minimum flow was included as part of the baseline for this project.

ADGC's recommended 12-cfs minimum flow would provide about 84, 73, and 71.6 percent of spawning, fry, and juvenile/adult habitat in the bypassed reach, respectively.

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[25] See 82 FERC 61,030(1998).

These flows would cost Haida about $37,800 annually in lost power benefits, representing about 6.7 percent of the total current (1998) annual value of the project's power.

We find that the variable monthly flows (12 to 17 cfs) recommended by ADF&G, Interior, and NMFS would provide about 84 to 95.8 percent of spawning habitat, 73 to 80 percent of fry habitat, and 71.5 to 85.1 percent of juvenile/adult habitat, respectively. These flows would cost Haida about $56,300 annually in lost power benefits, representing about 10 percent of the total current annual value of the project's power.

The 10-cfs minimum flow recommended by staff and ADNR would provide about 80, 71, and 65.5 percent of spawning, fry, and juvenile/adult habitat, respectively. These flows would cost Haida about $24,600 annually in lost power benefits, representing about 4.3 percent of the total current annual value of the project's power.

While the minimum flows recommended by Interior, NMFS, and ADF&G would provide more habitat for all life stages, staff's recommended 10-cfs minimum flow would provide habitat adequate for the fishery at a cost of $31,700 less per year than the cost of these agencies' recommended flows. We conclude that the cost of these agencies' recommendations would have a substantial negative effect on the power benefits of the project and is not justified by the incremental benefits to the fishery. As such, their recommendations are inconsistent with our balancing under FPA Sections 4(e) and 10(a)(1) of beneficial public uses of the waterway. We also conclude that the incremental habitat benefit to be derived from ADGC's 12-cfs recommendation does not justify its cost.

Because the project would divert only 30 cfs during phase 1, flows in the bypassed reach would be greater (50 to 90 percent of the time depending on the month) than our recommended minimum flow of 10 cfs. During phase 2, when the project could divert 90 cfs, flows in the reach would be greater than 10 cfs about 10 percent of the time in all months except October. October flows in phase 2 could exceed 10 cfs about 30 percent of the time.

In addition, our recommended post-license monitoring, done in consultation with the agencies, would provide further assurances that any required minimum flow would be adequate to protect fish in the bypassed reach. If the monitoring results show that fish resources are not adequately protected, the Commission may modify the minimum flow requirements.

We estimate the annual cost of our recommended flow regime to be $24,600, and find that the benefit to fisheries in the bypassed reach would be worth the cost. We find that our recommended 10-cfs flow would provide substantially more habitat benefits at the

least cost of all other flow recommendations. We don't believe that additional habitat gains provided by agency-recommended flows would be justified given that the existing fishery is not used for sport, subsistence, or commercial purposes.

Monitoring requirements

We recommend that Haida prepare and implement a plan, in consultation with the NMFS, FWS, ADF&G, ADNR and USGS, to monitor compliance with the required minimum flow releases, Lake Mellen surface levels, and ramping rates. To monitor minimum flows, we recommend that Haida install a continuously recording stream gage immediately downstream of the diversion and immediately below the tailrace. Existing gaging equipment in both reaches could be incorporated into the plan. We would require Haida to provide monitoring records and data to ADF&G based on the ADF&G's requested schedule and media, and to other resource agencies within 30 days of receiving an agency's request. We estimate the annual cost of this monitoring to be $6,300 and find that the benefit of ensuring compliance with license provisions to protect aquatic resources in Reynolds Creek is worth the cost.

Biotic monitoring plan

We recommend that Haida prepare and implement a plan, in consultation with the NMFS, FWS and ADF&G, to conduct biotic monitoring for 5 consecutive years after phase 1 and 5 consecutive years after phase 2 would be fully operational to determine the effectiveness of our recommended aquatic protection, mitigation, and enhancement measures. The plan would provide for monitoring: (1) fish escapement counts of steelhead, pink salmon and chum salmon, and coho salmon during the periods March 1 to May 31, August 1 to September 21, and August 1 to November 30, respectively, of each monitoring year; (2) fish passage conditions in the channel between Lake Mellen and Rich's Pond and at the Lake Mellen inlet; (3) the margins of Lake Mellen for the stranding of grayling; and (4) fish in the bypassed reach. The plan would detail the study goals and the specific parameters that would be monitored to meet the established goals; and how the plan would be designed to isolate project-related effects. The plan would require Haida to prepare an annual monitoring report for the resource agencies by December 31 of each monitoring year, and conduct an annual meeting with resource agencies to review the monitoring results. By March 31 following the end of each monitoring year, Haida would file the annual monitoring report, a summary of the annual meeting with the resource agencies, and the agencies' comments on the meeting summary with the Commission.

If post-license monitoring, done in consultation with the NMFS, FWS, ADF&G and ADNR, shows that modifications to project operations or facilities are needed to protect

resources, the Commission may direct Haida to modify the operations or facilities. We estimate the annual cost of the biotic monitoring to be $10,900, and find that the benefits of this measure would be worth its cost.

Regulated outlet

We estimate the annual cost of a regulated outlet at the diversion, capable of remote operation, would be $1,500. Because of the importance of continuing flows to the anadromous reach at all times, including project shutdowns, we find that the benefit to sustaining the fish species is worth the cost.

We recommend that the regulated outlet have remote capability to ensure the release of instantaneous flows up to 50 cfs in the event of an outage, and flow reductions for periods when the inflow to Lake Mellen is less than any required minimum flow.

Environmental Compliance Monitor

An on-site ECM would assure that project construction would not adversely affect resources by enforcing compliance with the final ESCP, fuel and hazardous substances spill prevention plan, and other required measures, including holding annual meetings to assess the effectiveness of the plans. We estimate the annual cost to be $11,700 and find that the benefits of protecting environmental resources during construction would be worth the cost.

We do not recommend the following measures:

Intake screen

We do not recommend that Haida design and install an intake screen. In Section V.D.2, Aquatic Resources, we find that based on the available information, including the results of studies conducted in the project vicinity and documented known habits of grayling, downstream grayling movements out of Rich's Pond after the proposed project would be operational, whether the movements would be voluntary or involuntary, would not differ substantially from the likely very low, inconsequential downstream movements that presently occur. Because there would be no substantial difference in downstream movements, the Lake Mellen and Rich's Pond grayling populations would likely not decline due to the absence of an intake screen. We, therefore, conclude that there would be little benefit gained by installing an intake screen. This lack of any substantial amount of benefit does not justify our estimated annual cost of $19,200 to design and install an intake screen. Therefore, we make no recommendation for an intake screen. However, we do note that as a result of Interior's mandatory Section 18 fishway prescription for an automated, self-

cleaning intake screen, an intake screen matching Interior's prescription would be required by any license issued Haida for the project.

Because we do not recommend a fish screen, we do not recommend adoption of a corresponding recommendation to develop and implement a plan to evaluate the effectiveness of and maintain the fish screen.

Shunt pipeline for flow continuation

We do not recommend that Haida install a pipeline to provide continuation of required flows to the anadromous reach during powerhouse outages. Instead we recommend that these flows be released from the jet deflector, regulated diversion outlet, spillway or a combination of these features. The estimated lag time for flows from the diversion to the anadromous reach is 25 minutes. Jet deflectors could be used for continuation of any required minimum flows during the full period if the project has gone offline, or in the event of a maintenance outage at the powerhouse, flows could be provided from the diversion before the project is shut down. For penstock outages, the diversion outlet and/or spillway could provide the required minimum flows to the anadromous reach. Given flow attenuation, accrued runoff and the options already cited for flow continuation we don't believe that an annual cost of $19,300 for a shunt pipeline and Howell-Bunger or sleeve valve is warranted.

Mitigation fund

We do not recommend that Haida establish an escrow account at an estimated annual cost of $4,030, because we don't know the specific actions that would govern its use and it's not likely that any additional capital-intensive measures would become necessary in the future, especially in consideration of all of the environmental measures that we are already recommending. This EA recommends adequate environmental protections and mitigations based on existing knowledge, and the opportunity for the Commission to modify specific environmental measures based on post-license monitoring. For the above reasons, we don't believe that benefits from an escrow account would be worth its cost.

VIII. RECOMMENDATIONS OF FISH AND WILDLIFE AGENCIES

Under the provisions of the FPA, each hydroelectric license issued by the Commission shall include conditions based on the recommendations provided by federal and state fish and wildlife agencies for the protection, mitigation, and enhancement of fish and wildlife resources affected by the project. Section 10(j) of the FPA states that whenever the Commission finds that any fish and wildlife agency recommendation is

inconsistent with the purposes and the requirements of the FPA or other applicable law, the Commission and the agency shall attempt to resolve any such inconsistency, giving due weight to the agency's recommendations, expertise, and statutory responsibilities.

We believe that our recommendations contained in this FEA are consistent with those filed by the federal and state fish and wildlife agencies with three exceptions (table 16). These exceptions are NMFS and ADF&G's minimum flow recommendation, ADF&G's recommendation for an intake screen to prevent grayling entrainment, and ADF&G's recommendation to develop and implement a plan to evaluate the effectiveness of and maintain the intake screen. Recommendations subject to Section 10(j) are discussed below.

Under Section 10(j) of the FPA, in the DEA we made a preliminary determination that NMFS' recommendation for minimum flows in the bypassed reach, full minimum flows in the bypassed reach and below the tailrace when inflows to Lake Mellen fall below the required minimum, and a prohibition of daytime ramping may be inconsistent with the public interest standard of Section 4(e) and the comprehensive planning standard of Section 10(a) of the FPA. By letter dated October 22, 1999, NMFS disagreed that our recommendations would be adequate to protect fisheries at Reynolds Creek.

We made a preliminary determination that recommendations made by the ADF&G for minimum flows in the bypassed reach, full minimum flows in the bypassed reach and below the tailrace when inflows to Lake Mellen fall below the required minimum, a prohibition of daytime ramping, an intake screen, evaluation and maintenance of the fish screen, maximum lake elevation, a 5-NTU turbidity criteria, and continuation of biotic monitoring until the ADF&G is satisfied that the project does not adversely affect resources may be inconsistent with the public interest standard of Section 4(e), the comprehensive planning standard of Section 10(a), and the substantial evidence standard of Section 313 (b)

of the FPA.[26] By letter dated October 22, 1999, ADF&G disagreed that our recommendations would be adequate to protect aquatic resources at Reynolds Creek.

On December 16, 1999, we met with NMFS, FWS and ADF&G to attempt to resolve the Section 10(j) inconsistencies we had identified. At this meeting and subsequently by letters dated February 4 and 17, 2000, ADF&G and NMFS, respectively, agreed that: (1) the limited storage in Lake Mellen would not be sufficient to provide full continuation of minimum flows if inflows were below the required minimum; (2) an unregulated spillway with the same hydraulic properties as the natural lake outlet to the extent possible would adequately maintain Lake Mellen levels; and (3) a 1-in/hr daylight ramping rate from February 15 to May 31 to minimize stranding in the anadromous reach would be acceptable as long as its effectiveness was monitored. The ADF&G also agreed that a 25-NTU criterion for turbidity during construction and our recommended biotic monitoring plan, including monitoring for 5 consecutive years after phase 2 becomes operational, would adequately protect resources. By letter dated February 17, 2000, Interior/FWS concurred with ADF&G and NMFS recommendations on daylight ramping and minimum flows in the bypassed reach.

In the DEA, we did not adopt the agencies' recommendation for minimum flows for the bypassed reach because we believed that our recommended year-round 10-cfs minimum flow would provide nearly as much habitat for spawning and fry emergence at about half the annual cost ($24,600) of the agencies' recommended flows ($56,300). At the December 16, 1999, meeting and in their later comments, ADF&G provided us with more detailed information as to how they calculated their minimum flow recommendation, showing that it was exceeded nearly 100 percent of the time. ADF&G also stated that our analysis was based on a year-round analysis, and did not account for the high variability in the system and the importance of variable flows that mimic the natural hydrologic cycle (Poff 1996). NMFS and Interior provided similar arguments.

[26] In the DEA we incorrectly found that ADF&G's recommendation to limit firearm use during construction to defense of life or property was outside the scope of Section 10(j) of the FPA. By letter to ADF&G dated September 10, 1999, we informed the ADF&G of our error and that we recommend adoption of this measure as part of a wildlife protection plan. We incorrectly found in the DEA that establishing a mitigation fund was within the scope of Section 10(j), and also corrected our error in our September 10, 1999 letter to ADF&G. We also considered whether a mitigation fund adopted under Section 10(a) of the FPA was appropriate, but did not adopt the measure. We have corrected these two items in this FEA.

We re-evaluated the available WUA by month for each life stage with our recommended 10-cfs minimum flow. We found that while the minimum flows recommended by Interior, NMFS, and ADF&G would provide more habitat for all life stages, their recommended flows would significantly affect project economics and the incremental benefits to the resource would not be worth the added costs. Alternatively, our recommended 10-cfs minimum flow would provide habitat adequate for the fishery at a cost of $31,700 less per year than the cost of these agencies' recommended flows. We also found that 10 cfs would provide significantly greater habitat for all life stages in all months than the minimum flow of 5 cfs proposed by Haida. In addition, our recommended monitoring plan, to be developed in consultation with the agencies, would provide further assurances that fish resources are adequately protected. This monitoring would occur early in phase 1, when flows would exceed 10 cfs at least 50 percent of the time in all months, providing further resource protection until the effectiveness of our recommended minimum could be evaluated. Therefore, we conclude that 10 cfs represents the best balance between power and fisheries for the bypassed reach and we continue to recommend a minimum flow of 10 cfs for the bypassed reach. (As stated in Section, VII, Comprehensive Development and Recommended Alternative, Interior's prescription for minimum flows of 12 to 17 cfs under Section 18 of the FPA is mandatory.)

We made a preliminary determination not to adopt ADF&G's recommendation to install a fish screen at the intake because the annual cost would be $18,800 or $19,200, depending on mesh size, and the project would not significantly affect the existing loss of grayling through the lake's natural outlet. We found Haida's proposed trashrack would deter entrainment of all but emergent fry, and that grayling or fry that outmigrate or are carried downstream of Lake Mellen under existing conditions are lost to the grayling fishery. Because we did not initially recommend a fish screen, we did not recommend adoption of the corresponding recommendation to evaluate and maintain the fish screen.

By letter filed October 25, 1999, ADF&G disagreed with our finding by stating that entrainment risk would be high due to migration behavior and the attractiveness of the intake as a feeding, overwintering, and hiding area. By letter filed October 29, 1999, FWS argued that overwintering grayling would likely intentionally enter the intake and that any turbine mortality that would occur would add cumulatively to losses of grayling by other mortality factors.

At the December 16, 1999, meeting, ADF&G provided us with additional information regarding grayling sampling that occurred at the intake area and provided us with a case study of the Arbuckle Mountain Project (P-7178) in California where a screen design was utilized that meets ADF&G's criteria for the Reynolds Creek Project. After reviewing this information and all of the comments by ADF&G and FWS, we conclude that

based on the information before us and known habits of grayling, the rate of entrainment into the proposed intake would not be likely to exceed present rates of egress downstream out of Rich's Pond. Therefore, we do not recommend adoption of ADF&G's recommendation to install a screen at the intake because the benefits to grayling, which would be small, would not justify the cost of the screen. (As stated in Section, VII, Comprehensive Development and Recommended Alternative, Interior's prescription for an intake screen under Section 18 of the FPA is mandatory.)

Table 15 lists the federal and state recommendations subject to Section 10(j), and whether the recommendations are adopted under the staff alternative. Recommendations that we consider outside the scope of Section 10(j) have been considered under Section 10(a) of the FPA and are addressed in the specific resource section of this document.

Table 15. Summary of fish and wildlife agency recommendations. [27] (Source: Commission staff)

RECOMMENDATION	AGENCY (Recomm No.[1])	WITHIN SCOPE OF SECTION 10(j)	ANNUAL COST ($000)	CONCLUSION
1. Prohibit hunting, trapping, & fishing in project area during project construction.	Interior (1) ADF&G (19)	Yes	Minimal	Adopted as part of the F&W protection plan
2. During construction limit firearm use to defense of life or property.	ADF&G (19)	Yes	$0	Adopted as part of the F&W protection plan.
3. Include fish and wildlife agency stipulations and regulations into work standards and contracts. Terminate construction worker's employment for a violation of #1 and #2.	Interior (1) ADF&G (19)	No - not a specific measure to protect F&W	$0	Not adopted - Commission does not enforce employment contracts.

[27] Table 15 summarizes the agencies' Section 10(j) recommendations.

RECOMMENDATION	AGENCY (Recomm No.[1])	WITHIN SCOPE OF SECTION 10(j)	ANNUAL COST ($000)	CONCLUSION
4. Restrict in-water construction to between July 18 and August 7 in any one year, unless extended by approval of resource agencies.	Interior (2) NMFS (1) ADF&G (1)	Yes	$0	Adopted
5. Prepare plan to control erosion and prevent sedimentation.	Interior (3A) NMFS (2) ADF&G (3)	Yes	Minimal	Adopted - Commission would have final approval.
6. Prepare final fuel and hazardous substance spill plan for approval by resource agencies.	Interior (3D) ADF&G (12,14)	Yes	Minimal	Adopted - Commission would have final approval.
7. Provide an ECM and include list of qualifications and position description in plan to control erosion and fuel and hazardous substance spill plan.	Interior (3E) ADF&G (12 -1, 12-2)	No	Minimal	Adopted
8. Except for stream crossings, site corridors and clearings for the penstock and transmission line at least 100 horizontal ft away from all streams identified in ADF&G's *Catalog*.	ADF&G (2)	Yes	Minimal	Adopted - May be modified following consultation with resource agencies if needed for environment or engineering reasons.
9. Except for stream crossings, site penstock and transmission line corridors and clearing at least 66 ft from ordinary high water of Reynolds Creek and other anadromous streams.	NMFS (2)	Yes	Minimal	Adopted - 100-foot buffer required.
10. Site transmission line to follow existing road and leave maximum amount of forested stream buffers possible.	Interior (4)	Yes	Minimal	Adopted - included in ESCP requirements.

RECOMMENDATION	AGENCY (Recomm No.[1])	WITHIN SCOPE OF SECTION 10(j)	ANNUAL COST ($000)	CONCLUSION
11. Provide instantaneous flows below the powerhouse of 25 cfs for Dec-Apr; 50 cfs for May-Jun; 25 cfs for Jul-Sep; 40 cfs for Oct-Nov. (By letter dated 10/22/99, NMFS agreed with our alternative flows for Jul-Aug of 35 cfs and Sep-Nov of 40 cfs).	NMFS (4)	Yes	Minimal	Adopted
12. Provide instantaneous instream flows in the bypassed reach of 15 cfs for Jan; 12 cfs for Feb, Apr-Jun, and Oct-Nov; 17 cfs for Mar, Jul, and Aug; 14, 13 cfs for Sep, and cfs for Dec, or the natural inflow to Lake Mellen, whichever is less.	NMFS (5) ADF&G (9)	Yes	$56,300	Not adopted . Minimum flows of 10 cfs, or the inflow to Lake Mellen, whichever is less, are recommended as the best balance between power and fish in the bypassed reach.
13. Maintain downramping rates of 2 in/hr at night from Feb 16-May 31; 1 in/hr from Jun 1-Sep 15; 2 in/hr from Sep 16-Feb; and 1 in/hr daylight ramping Feb 16-May 31, with monitoring to ensure the effectiveness of daylight ramping between Feb 16 and May 31.	NMFS (6) ADF&G (10)	Yes	Indeter-minant	Adopted

RECOMMENDATION	AGENCY (Recomm No.[1])	WITHIN SCOPE OF SECTION 10(j)	ANNUAL COST ($000)	CONCLUSION
14. Maintain Lake Mellen surface levels at or above 874.5 fmsl from April 1 through June 15, and at or above 872.0 fmsl the remainder of the year. Construct a spillway with the same hydraulic properties as the natural spillway as much as possible.	ADF&G (6)	Yes	Minimal	Adopted
15. Incorporate a fail-safe, redundant backup system into the project design.	NMFS (7) ADF&G (4)	Yes	Minimal	Adopted
16. Plan to prevent bear conflicts during construction and operation.	Interior (3F) ADF&G (16)	Yes	Minimal	Adopted - as part of the F&W protection plan
17. Plan to minimize transmission line bird collisions and electrocutions	Interior (3G)	Yes	Minimal	Adopted
18. Monitor effectiveness of ESCP by sampling turbidity; if turbidity exceeds state standards cease construction until source of sediment is remedied.	NMFS (3)	Yes	Minimal	Adopted
19. Monitor effectiveness of ESCP.	Interior (3B) ADF&G (4)	Yes	Minimal	Adopted.
20. If turbidity exceeds state standards or is 25 NTU's higher below construction site than above, cease construction until source of sediment is remedied.	ADF&G (4)	Yes	Minimal	Adopted

RECOMMENDATION	AGENCY (Recomm No.[1])	WITHIN SCOPE OF SECTION 10(j)	ANNUAL COST ($000)	CONCLUSION
21. Prepare a plan to monitor the effectiveness of the ESCP and hazardous spill plan during project construction; hold an annual meeting to review the monitoring results and determine if modifications are needed or if monitoring can be terminated.	ADF&G (12- 3)	Yes	Minimal	Adopted
22. Continuously record instream flows in the bypassed and anadromous reaches and report data to resource agencies.	NMFS (6) Interior (3C) ADF&G (11-1)	Yes	$6,300	Adopted
23. Continuously record Lake Mellen stage and report data to ADF&G.	Interior (3C) ADF&G (11-2)	Yes	Minimal	Adopted
24. Report non-compliance periods exceeding 12 hours to the ADF&G, FWS, and NMFS.	NMFS (6) ADF&G (11-5)	Yes	Minimal	Adopted
25. Monitor ramping rates.	Interior (3C)	Yes	Minimal	Adopted
26. Construct a perched ledge, with at least a 10-foot drop from stage in the tailrace channel; provide plunge pool to allow jumping fish to land in water without injury.	ADF&G (5)	Yes	Minimal	Adopted.

RECOMMENDATION	AGENCY (Recomm No.[1])	WITHIN SCOPE OF SECTION 10(j)	ANNUAL COST ($000)	CONCLUSION
27. Install a fish screen at the intake designed to function at diversion flows from 5 to 90 cfs, with size, mesh, and approach velocity to be determined by the presence of grayling fry. Include an automatic cleaning system with maximum head differential of 0.1 ft to trigger cleaning.	ADF&G (7)	Yes	$19,200	Not adopted. Grayling egress from Rich's Pond would not significantly increase as a result of project operations. Benefits would not justify the cost.
28. Prepare and implement a biotic monitoring plan, to be approved by resource agencies, to address project effects on biological resources	ADF&G (13)	Yes	$10,900	Adopted - Commission would have final approval.
29. Monitor spawning and rearing habitat in the anadromous reach, and evaluate the need for flushing flows and other channel maintenance, or operational modifications to protect anadromous fish.	Interior (3H)	Yes	Included with #28	Adopted - as a requirement of the biotic monitoring plan.
30. Conduct fish escapement counts during Mar 1-May 31 for steelhead; Aug 1-Sep 21 for pink and chum salmon; and Aug 15-Nov 30 for coho salmon, and report data to the resource agencies.	NMFS (8) ADF&G (13-1)	Yes	Included with #28	Adopted - as a requirement of the biotic monitoring plan.
31. Hold annual meeting to review and evaluate monitoring results and make adjustments if needed.	ADF&G (13-1, 13-3)	Yes	Included with #28	Adopted - as a requirement of the biotic monitoring plan.

RECOMMENDATION	AGENCY (Recomm No.[1])	WITHIN SCOPE OF SECTION 10(j)	ANNUAL COST ($000)	CONCLUSION
32. If stream bank erosion occurs or juvenile grayling passage is adversely affected in the project area, immediately modify project operations to alleviate adverse conditions.	ADF&G (13-2)	Yes	Minimal - provided conditions were alleviated in a short time.	Adopted - as part of the biotic monitoring plan.
33. Conduct monitoring until ADF&G is confident that project operations do not have negative effects on adult salmon or grayling migration and production. (At the Section 10(j) meeting ADF&G stated that it was not their intent for ADF&G to have the final say as to when monitoring should cease, but that they are concerned that additional monitoring might be necessary.)	ADF&G (13-1, 13-2)	Yes	Included with #28	Adopted - Commission reserves the right to require additional monitoring if needed.
34. Initiate consultation for post-license plans at least 6 months before land-disturbing activities	ADF&G (3, 8, 11, 12, 13, 14, 15, 16, 18,)	No - not a specific measure to protect F&W	$0	Not Adopted - plans may vary in scope and length of time needed for consultation.
35. If agreement is not reached on post-license plans, Commission will halt project implementation	ADF&G (3, 8, 11, 12, 13, 14, 15, 16, 18,)	No - not a specific measure to protect F&W	$0	Not Adopted - licensee may still be in compliance with license
36. Establish a $50,000 interest bearing escrow account to mitigate for unforseen fish, wildlife, and water quality impacts. Expenditures for mitigation projects determined by resource agency council.	ADF&G (15)	No - not a specific measure to protect F&W.	$4,030	Not adopted - We recommend that Haida be required to file a financing plan prior to the start of construction.

RECOMMENDATION	AGENCY (Recomm No.[1])	WITHIN SCOPE OF SECTION 10(j)	ANNUAL COST ($000)	CONCLUSION
37. Develop a plan to minimize and mitigate aquatic impacts during channel construction between Lake Mellen and Rich's Pond; maintain or enhance grayling rearing habitat in the channel area.	ADF&G (13-2)	Yes	Minimal	Adopted - as part the ESCP and F&W mitigation plan.
38. Prepare plans for erosion control; spill prevention; monitoring for water quality, streamflows, lake elevation, ramping, and spawning/rearing habitat in anadromous reach; ECM; bear safety; and minimizing bird hazards in consultation with and for approval by resources agencies .	Interior (3)	Yes	Included with respective plan	Adopted - Commission has final approval.
39. Before start of phase 2, prepare operational and environmental monitoring plans to minimize impacts of phases 1. and 2 on fish and wildlife; for approval by resource agencies.	Interior (5)	Yes	Phase 2 costs not determined because they could be 25 years in the future	Adopted - Commission would have final approval. Phase 1 plans are included in this EA.
40. Before start of phase 2, prepare operational and environmental monitoring plans to minimize impacts of phases 1 and 2 on outdoor recreation; for approval by resource agencies.	Interior (5)	No- not a specific F&W measure	Phase 2 costs not determined because they could be 25 years in the future	Not Adopted - modified because we do not recommend a recreation plan for phase 1. Commission would have final approval on phase 2 plan.

RECOMMENDATION	AGENCY (Recomm No.[1])	WITHIN SCOPE OF SECTION 10(j)	ANNUAL COST ($000)	CONCLUSION
41. Prepare plan to evaluate the hydraulic and biological effectiveness of and maintain the perch-ledge tailrace for approval by resource agencies.	ADF&G (8)	Yes	Minimal	Adopted - Commission has final approval.
42. Develop and implement a plan to evaluate the hydraulic and biological effectiveness of and maintain the intake screen for approval by resource agencies.	ADF&G (8)	Yes	Minimal	Not adopted. We do not recommend that Haida install an intake screen.
43. Allow ADF&G representatives with credentials access to, through, and across project lands and works.	ADF&G (17)	No-Not a specific F&W measure	$0	Adopted - Advance notice required for safety and liability reasons
44. Prepare final aquatic habitat protection plan for approval by resource agencies.	ADF&G (18)	Yes	$0	Adopted - Measures to protect aquatic habitat are included in several plans. Commission has final approval.
45. Prepare final public access, and recreational enhancement plans for approval by resource agencies.	ADF&G (18)	No	$0	Not adopted - Public access and recreation plans not recommended.

[1] The recommendation numbers are from the following agencies' letters transmitting their Section 10(j) recommendations: NMFS letter dated February 9, 1999; Interior letter dated February 4, 1999; and ADF&G letter dated March 11, 1999.

X. CONSISTENCY WITH COMPREHENSIVE PLANS

Section 10(a)(2) of the FPA requires the Commission to consider the extent to which a project is consistent with federal or state comprehensive plans for improving, developing,

or conserving a waterway or waterways affected by the project. Accordingly, federal and state agencies have filed 22 comprehensive plans for Alaska. Of these, we identified and reviewed two plans [28] relevant to this project. No conflicts were found with these plans.

X. FINDING OF NO SIGNIFICANT IMPACT

We've prepared this environmental assessment for the project pursuant to the National Environmental Policy Act of 1969. Constructing the proposed project would have some unavoidable adverse impacts; some temporary, some permanent.

Temporary impacts would include short-term, localized erosion and sedimentation; and increased traffic, noise, and dust, which would temporarily displace wildlife, and detract from the area's scenic quality. Implementing the recommended plans for soil erosion and sedimentation control, fuel and hazardous spills, and scheduling instream construction should mitigate these impacts to minor levels.

Permanent impacts would include: the loss of about 2.5 acres of vegetation, including about 1 acre of wetlands, some riparian habitat, and a small number of old growth trees. Minor, long-term temperature changes in lower Reynolds Creek could lengthen the incubation time for salmonid eggs, but the effects should be minimal because of our recommended operational and biotic monitoring measures. Minor visual impacts would result from the transmission line. These impacts are expected to be minor because sensitive habitats would be avoided, there is an abundance of similar habitat in the area, exposure of project features to public view is very limited, and the transmission line would generally follow already disturbed areas, such as roads.

On the basis of this independent environmental analysis, issuing an original license for the project with our recommended environmental measures would not be a major federal action significantly affecting the quality of the human environment. Therefore, an environmental impact statement is not required.

XI. LITERATURE CITED

[28] The plans are the Alaska Outdoor Recreation Plan: 1991-1985, Alaska Department of Natural Resources, Division of Parks, 1981, Juneau, Alaska; and the North American Waterfowl Management Plan, U.S. Fish and Wildlife Service and Canadian Wildlife Service, 1986, Twin Cities, Minnesota.

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Appendix A

RESPONSE TO COMMENT LETTERS ON THE DRAFT ENVIRONMENTAL ASSESSMENT

STATE OF ALASKA

TONY KNOWLES, GOVERNOR

DEPARTMENT OF FISH AND GAME

HABITAT AND RESTORATION DIVISION
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October 22, 1999

Ms. Ann Miles, Chief
Licensing West Branch
Office of Hydropower Licensing
Federal Energy Regulatory Commission
888 First Street, NE
Washington, D. C. 20426

Dear Ms. Miles:

Re: Reynolds Creek Hydroelectric Project, FERC Project No. 11480 - Draft Environmental Assessment, Alaska Department of Fish and Game - Section 10(j) recommendations

Thank you for providing the Alaska Department of Fish and Game (ADF&G) the opportunity to comment and respond to your September 10, 1999 letter regarding our Federal Power Act (FPA) §10(j) final recommendations for license terms and conditions for the Reynolds Creek Hydroelectric Project, which are included in the September 9, 1999 National Environmental Policy Act (NEPA) draft environmental assessment (DEA). Your letter asks several questions: are the Federal Energy Regulatory Commission's (FERC or Commission) preliminary DEA mitigation measures acceptable to our agency; does ADF&G have additional evidence to support the department's mitigation recommendations of March 11, 1999; and do we have additional recommendations and supporting evidence? Following are our responses to your September 10, 1999 letter and comments on the September 9, 1999 DEA.

General Comments

ADF&G recommended terms and conditions on March 11, 1999 pursuant to §10(j) of the FPA. Since that time ADF&G has also participated in a review of the project pursuant to the Coast Zone Management Act (CZMA). The Alaska Division of Governmental Coordination (ADGC) in the Office of Management and Budget, Office of the Governor coordinated a consistency review of the Reynolds Creek project per the Alaska Coastal Management Program (ACMP). Under the ACMP, the public, the coastal resource

ADF&G 1: Agencies often have dual roles in the hydro process; i.e., ADF&G has responsibilities under ACMP and Section 10(j) of the FPA; and Interior and NMFS have responsibilities under

district, ADF&G, the Alaska Department of Natural Resources (ADNR), and the Alaska Department of Environmental Conservation (ADEC) were provided the opportunity to submit comments to the ADGC.[1] The ADGC then developed what is considered a floor series of conditions for ensuring the project would be acceptable under the baseline habitat standards. Agencies still retain the authority to individually require additional conditions exceeding those in the consistency.

Upon receiving the consistency determination, the applicant appealed the decision through two administrative levels. The first appeal was to Division directors. The subsequent elevation was to the Department Commissioners. At the conclusion of the second appeal, the state issued a commissioner-level Final Consistency Determination, certifying that the proposed project is consistent with the ACMP. The final July 23, 1999 determination of the administrative appeal process is enclosed. Upon receipt of the state appeal decision, the applicant filed a legal appeal which is tentatively scheduled for December 1999. Notwithstanding the pending judicial challenge to the state finding, it is our understanding FERC is bound to the terms of the commissioner-level state consistency determination. Therefore, we request FERC clarify why FERC is proposing DEA terms that do not, at a minimum, comply with the state's basic level of conditions for consistency. Secondly, we wish to emphasize that ACMP consistency stipulations are baselines conditions for achieving consistency with the ACMP. Other statutes and regulations, such as ADF&G's direct authorities under the Anadromous Fish Act (AS 16.05.870) and Fishway Act (AS 16.05.840), provide a basis for additional stipulations to provide for the protection of specific fish and wildlife resources, which can exceed those established by the ACMP consistency determination.

We interpret the DEA to treat some ACMP stipulations from the state consistency determination by the ADGC as if they were filed by an agency pursuant to §10(j) or 10(a) of the FPA. The DEA states in many locations that "ADGC recommends . . . ". Staff that authored the DEA indicated by e-mail that FERC "may find a [ACMP] condition is necessary, not necessary, or recommend some alternative." Staff added that "If an applicant or licensee disagrees with a CZMA condition, the state provides a process for the applicant to question the condition. This would occur independently from any Commission process and without our involvement." It seems as though FERC is unaware that the State's ACMP stipulations are mandatory conditions. Accordingly, ADF&G's understands that state and federal agency permits must be issued in a manner consistent with the State's final finding. Pursuant to §307(c)(1)(A) of the CZMA, "Federal agency activity within or outside the coastal zone that affects any land or water use or natural resource of the coastal zone shall be carried out in a manner which is consistent to the maximum extent practicable with the enforceable policies of approved State management programs."

[1] The DEA seems to indicate ADGC is a separate state resource agency. Pursuant to the ACMP, consistency finding stipulations pertaining to fish protection were submitted by ADF&G .

Sections 18 and 10(j) of the FPA and the Endangered Species Act. We try to identify any submission as closely as possible with the agency that submitted it and evaluate its environmental effects regardless of its category. In Section IV.E of the EA, we reference the ACMP authority and summarize the consistency conditions for the Reynolds Creek Project.

ADF&G 2: Commission staffs' EAs analyze environmental issues and make recommendations to the Commission based on our obligation under the FPA to balance developmental and non-developmental resources. Staff recommendations do not represent conditions imposed by the Commission. If a license is issued, it would address any legal matters regarding the CZMA conditions.

The DEA does not indicate what will become of the Secretary of Interior's February 4, 1999 draft prescriptions pursuant to §18 of the FPA, which were submitted by the U.S. Fish and Wildlife Service's (USFWS). Pursuant to American Rivers v. FERC (August 11, 1999), the Ninth Circuit Court of Appeals determined that "the Commission may not modify, reject, or reclassify any prescriptions submitted by the Secretaries under color of section 18."

ADF&G 3: Section IV.F. of the EA identifies FWS's prescriptions. A license, if issued, would address any legal matters regarding Section 18 prescriptions. Also see ADF&G comments 1 and 2.

Juvenile fishways appear to be legally required under §18 of the FPA and the CZMA. Normally we would assume it would be unnecessary for ADF&G to again address fish screening for the project. However, because we believe that the DEA inadequately considered all of the available information, we will again address these issues.

ADF&G Response to Questions in your September 10, 1999 Letter

1) **Is our provision to release the inflows to Lake Mellen, when less than any required minimum flows in the bypass reach and below the tailrace acceptable to you?**

ADF&G agrees with the DEA that instantaneous instream flow requirements in the anadromous reach below the tailrace should be those recommended by ADGC in table 8 on page 64. ADF&G coordinated with ADNR to develop this flow regime during the Reynolds Creek project ACMP review. It will is not be acceptable to ADF&G for the operator to allow flows in the bypass or anadromous reaches to become lower than the established instream flow requirements. Inflow to Lake Mellen would be minimal during winter and late summer low flow periods. However, duration curves (contained in the November 1997 license application) indicate that this situation is likely to be rare, even with the higher instream flow levels recommended by ADF&G. The operator must anticipate low inflows during the periods when they have occurred in the past, and should operate the project in a manner that maintains high pool stage during low inflow periods.

ADF&G 4: In FEA Section V.D.2, we recommend that any required minimum flows be reduced to the natural inflow into Lake Mellen when inflow is less than the required minimum, in agreement with ADF&G's revised recommendation dated February 4, 2000.

During low inflow periods, the four feet of storage in Lake Mellen should only be used as a buffer in the event that Lake Mellen inflows decrease below mandatory instream flow requirements. It would be unacceptable for the project to remain in operation and draw down the reservoir for power generation but not have the ability to provide the mandatory instream flows. Temporary decreases in flow volume would directly and adversely affect the amount of aquatic habitat for rearing, impact spawning activity, and expose spawning redds to desiccation. Extreme low flows during winter conditions could freeze the entire stream, decimating fish populations.

2) **Is our minimum flow requirement for the bypassed reach acceptable to you?**

FERC staff did not adopt ADF&G's §10(j) recommendation, as follows, for monthly flows ranging from 12 to 17 cfs in the Reynolds Creek bypass reach.

January	15 cfs
February	12 cfs
March	17 cfs
April to June	12 cfs
July & August	17 cfs
September	13 cfs
October & November	12 cfs
December	14 cfs

The DEA's recommended terms and conditions for bypass instream flows are unacceptable to our agency. The DEA bases its preference for 10 cfs in the bypass reach on the results of a very rudimentary weighted usable area study conducted by the applicant's consultant. Additionally, the DEA examined the applicant's estimated annual flow duration curves to determine whether this instream flow would exceed inflow to Lake Mellen.

The "Instream Flow Incremental Methodology" (IFIM) study conducted by the applicant's consultant was actually only a very minimal application of the Physical Habitat Simulation System (PHABSIM) based on two sites with two transects at each site. No coordination was conducted with the resource agencies regarding habitat mapping, hydraulic models, transect site locations, number of transects, species/life stages of importance, or habitat suitability criteria (HSC). It is also not apparent that any quality control measures were taken to ensure that the hydraulic model(s) adequately predict weighted usable area (WUA) versus flow relationships in Reynolds Creek. Typically, the HSC portion of PHABSIM has the most significant impact on weighted-usable area/flow relationships. We were not provided an opportunity to review the HSCs or information regarding where HSCs for cutthroat trout were developed. It is also not evident whether or not the HSCs were based on actual fish observations. Predictions of WUA for Dolly Varden char were not calculated, although this species also occurs in the bypass reach and has a much different seasonal periodicity than cutthroat trout. Results for the cascade-step pool habitat type at site 2 are unreliable because model assumptions were violated for the one-dimensional hydraulic models[2] contained in PHABSIM. Therefore, FERC's conclusion that 10 cfs would provide only 4 percent less habitat during spawning and emergence sounds precise but is actually based on a very weak, incomplete, and tenuous analysis.

ADF&G 5: In FEA Section V.D.2, we discuss the minimum flow recommendations by ADF&G and other agencies. In Section VII of the FEA, we recommend a minimum flow of 10 cfs, along with a monitoring program, as the best balance between benefits to the fishery and the cost of lost generation from providing a minium flow.

It is not clear how the applicant determined that an additional 6 cfs would accrue in Reynolds Creek by the lower end of the reach. Is this an annual average? Instantaneous instream flow is the only time scale important to aquatic species. During a low-flow period 6 cfs will not enter Reynolds Creek from the basin. Rationale based on annual flows such as this do not provide an accurate comparison when predicting instream flows

[2] Water surface elevation models in PHABSIM include Stage Discharge Regression (STGQ), Manning's equation for independent cross sections (MANSQ), and Step-backwater (WSP).

or determining equipment needed to provide flow continuation during emergency shutdowns.

Maintaining adequate instream flows within Reynolds Creek is essential to preserving fish, wildlife and other associated values of this system, including water quality. ADF&G based its recommended bypass instream flows on an analysis of the hydrologic data available and on the needs of the species in the bypass reach, following a combination of a review of projected long-range hydrologic characteristics of this system, seasonal fish periodicity by life phase and an adaptation of Tennant (1975)[3]. Our monthly flow recommendations were established by selecting a desired qualitative habitat classification and multiplying the average monthly flow by the corresponding percentage or percentage range assigned to this classification and adjusting those values based on a review of mean monthly flows and duration analyses for each month or portions of a month. Annual, versus monthly and weekly or shorter term duration curves, are not useful for determining instream flow needs for various species/life stages.

ADF&G 5 continuing.

ADF&G developed its final §10(j) instream flow recommendations for Reynolds Creek by analyzing monthly duration data in combination with the flows that would be classified by Tennant (1975) as being capable of capable of sustaining conditions for aquatic life. We believe that USFWS may have erred in their interpretation of monthly duration curves or used annual curves when they recommended continuous instream flows of only 10 cfs for the Reynolds Creek bypass reach. The monthly duration curves provided in the November 1997 license application indicate that flows in Reynolds Creek are greater than 10 cfs 100% of the time during nearly all months in Reynolds Creek. Consequently, providing a flow of only 10 cfs would maintain an endless severe drought condition leading to severe impacts to aquatic life in the bypassed reach. Your staff's analysis of instream flows using the Tennant (1975) method (DEA page 58) confirmed this conclusion. Pursuant to §10(j) of the FPA, FERC's proposed 10 cfs instream flow would clearly not constitute "equal consideration" of power and non-power values per the Electric Consumers Protection Act of 1986. Survival of fish species in this reach is based on a long-term range of flow variability that if exceeded outside its upper and lower thresholds will likely lead to decimation of the population.

The unique and isolated stock of cutthroat trout and Dolly Varden char in the bypass reach will likely be extirpated if a 10 cfs constant flow is established. That flow regime does not mimic natural variability and is not within the range of long-term flow estimates. The DEA states that this flow regime appears reasonable considering "the value of maintaining a small number of fish for their genetic diversity when they are not valued for subsistence, sport, or commercial reasons"(DEA, pages 55 and 59). This statement had not been substantiated by any data for sport or subsistence use, nor has there been a status review to determine whether these stocks are: 1) substantially isolated from other populations; or 2) represent an important component of the "evolutionary

[3] Tennant, D. L. 1975. Instream flow regimes for fish, wildlife, recreation, and related environmental resources. U.S. Fish and Wildlife Service. Billings, Montana.

legacy" of the species. This statement also does not consider potential growth of fisheries in the project-affected area. Prince of Wales Island is one of the fastest growing areas in Alaska and sport fishing activity continues to increase. In Southeast Alaska, during the last 10 years (1987 through 1997), the number of anglers and the number of days fished increased by approximately 42 percent (ADF&G. 1998).[4] Thus, our concern is that the operation of the Reynolds Creek project does not compromise future recreational fishing opportunities.

Regarding a regulated versus an unregulated outlet at the diversion, we agree with FERC that post-license monitoring would be necessary to determine the extent of impacts, and whether protective measures are adequate for the resources. However, in the event that biotic monitoring indicates that instream flows are inadequate to protect fish populations in Reynolds Creek, a regulated outlet would be needed to adjust instream flows accordingly. We agree that a regulated outlet, capable of remote operation, is cost effective, and poses a minimal cost versus having to retrofit the project at a later time and possibly shut down power production at the same time. Case history reviews of lower 48 states hydroelectric projects requiring later retrofits are good examples of costs that could have easily been prevented during the initial construction (FERC 1991)[5].

ADF&G 5 continuing.

3) **Is our ramping rate of 1 in/hr during daylight hours from February 16 to May 31 acceptable to you?**

FERC staff did not adopt ADF&G's §10(j) recommendation for a prohibition of project flow fluctuation during daytime during the period from February 16 to May 31. For the following reasons FERC's proposed ramping rate requirement during this period is unacceptable to ADF&G.

The DEA and September 10, 1999 letter state that flow fluctuations would not expose substrate during the critical period for salmon fry from mid-April to mid-May. Since no habitat surveys or instream flow assessments were completed in the anadromous fish zone, there is no available data to determine whether decreased flow would expose substrate or other areas where fry might occur. The flow requirement of 25 cfs (December-April) is very near average low flows during this period, which range from 15 to 24 cfs. We believe that side channel and channel margin habitat, important for juvenile rearing, may be eliminated because of potential dewatering.

ADF&G 6: **In FEA Section V.D.2, we recommend that a 1 in/hr daylight rate be adopted from February 16 through May 31, with monitoring to determine its effectiveness, consistent with ADF&G's revised recommendation on February 4, 2000.**

In the spring, steelhead trout (eggs, emergent fry, young-of-the-year juveniles, juvenile migrants, and spawning adults), coho salmon (eggs, emergent fry, young-of-the-year juveniles, juvenile migrants), cutthroat trout (juveniles, spawning adults, eggs, and emergent fry), Dolly Varden char (emergent fry, juveniles, and adults), and pink and

[4] ADF&G. 1998. Harvest, Catch, and Participation in Alaska Sport Fisheries During 1997. Fishery Data Series No. 98-25.
[5] FERC. 1991. Summary report on minimum flow compliance. Office of Hydropower Licensing, Washington, D.C.

chum salmon (eggs and emergent fry) are in Reynolds Creek. ADF&G chose mid-February as the beginning of a window for no daytime project ramping because salmon fry begin to emerge from spawning redds in Southeast Alaska streams at this time. The DEA's assertion that mid-April to mid-May is the most critical period for Reynolds Creek fishes may be based on the period of juvenile salmon migration, but early emergence is just as critical. Eggs and emergent fry are the life stages most vulnerable to down ramping.

ADF&G 6 continued.

During the fry emergence period, daytime flow reductions are most critical. At night, juvenile salmonids leave the substrate and swim in the water column, but during daylight hours fry hiding among river cobbles are susceptible to stranding. Bradford *et al.* (1995)[6] found that significantly more subyearling juvenile coho salmon (average length 88 mm) and rainbow trout (average length 90 mm) are stranded during daylight than at night. Newly emerged fry, which are less than half these lengths, would be much more vulnerable to flow decreases and increases. One-inch per hour down-ramping may not protect newly-emerged salmon fry on the margins of Reynolds Creek. Thus, if our recommendation is not adopted, we recommend that the license include measures to test and evaluate the proposed ramping regime.

The DEA (page 114, paragraph 4) states that the recommended daytime ramping rates would prevent the project from load following when it is the primary source of power for the community. During phase 2, the project would be connected to a larger grid system in order to sell excess power. Other remote stand-alone hydroelectric project operators have turned to battery storage systems to handle electrical load fluctuations. On Annette Island in Southeast Alaska, Metlakatla Power and Light very successfully uses 1.4 MWh of battery storage to handle fluctuating loads from a sawmill and provide frequency control and spinning reserve. Their facility has nearly eliminated diesel generation and reduction in operating costs allowed a payback in less than 3 years (Division of Energy, Alaska Department of Community and Economic Development, personal communication). Pursuant to NEPA we recommend that FERC evaluate this alternative to reduce project ramping and its accompanying adverse impacts to juvenile fish and macroinvertebrate populations in Reynolds Creek.

The DEA also states that the interim ramping rates the agencies recommended (including ADF&G) are based on criteria developed by the Washington Department of Fish and Wildlife (Hunter 1992)[7] that apply to large to medium-size rivers. The applicant's consultant has also perpetuated this misinformation. Hunter (1992) states that "these criteria also serve as interim ramping rates criteria for facilities located on streams." No

[6] Bradford, M. J., G. C. Taylor, J. A. Allan and P. S. Higgins. 1995. An experimental study of the stranding of coho salmon and rainbow trout during rapid flow decreases under winter conditions. North American Journal of Fisheries Management. 15:473-479.

[7] Hunter, M. A. 1992. Hydropower flow fluctuations and salmonids: A review of the biological effects, mechanical causes, and options for mitigation. State of Washington Department of Fisheries, Technical Report Number 119. 46 pp.

factual basis has been provided by the applicant to support an exemption of the project from the ramping rate criteria we recommend.

4) Is our determination to use the state standard for turbidity increases that would stop construction acceptable to you?

FERC staff did not adopt ADF&G's §10(j) recommendation for a 5 NTU criteria for turbidity monitoring during construction of the proposed project. However, FERC's turbidity requirement is acceptable to ADF&G.

Alaska Water Quality Standards, 18 AAC Chapter 70, were amended and took effect on May 27, 1999. Thus, the latest criteria that must be followed in the Reynolds Creek watershed are 25 NTU in the creek above natural conditions and 5 NTU in the lakes above natural conditions. Criteria limiting turbidity for the growth and propagation of fish, shellfish, and other aquatic life and wildlife in fresh water are the same as for water supply or aquaculture (18 AAC 70.020(1)(C)).

The applicant expressed concern for maintaining turbidity levels of water at the diversion facility during the recommended inwater work window of July 18 to August 7, particularly during removal of the cofferdam. In order to minimize impacts of releases on downstream turbidity releases, a water-filled rubber dam or a steel frame "portadam" could be utilized rather than the proposed earth-filed cofferdam.

5) Is our unregulated spillway at the same elevation of the natural outlet of Lake Mellen acceptable to you?

No. FERC staff did not adopt ADF&G's §10(j) recommendation for maintaining lake levels at the proposed project. FERC's requirement could be acceptable to ADF&G if the wording were altered as proposed below.

ADF&G's §10(j) recommendation was interpreted to mean that we were advocating a regulated spillway. However, our primary goal was simply for the applicant to design the spillway of sufficient capacity to avoid significant increases in lake stage, which can be damaging to shoreline flora and fauna. Significant fluctuations in lake stage may cause a chronic degradation and loss of access to littoral zone habitat during drawdowns. In discussions with the applicant during the ACMP consultation, ADF&G, ADNR, and the applicant agreed to an alternative wording for the stipulation. We believe this alternative wording, as follows, would still be acceptable to all parties:

> *The applicant shall operate the project such that the Lake Mellen water surface elevation (stage) is at or above 872.0 feet elevation, except for the period of April 1-June 15, when the lake stage must be at or above 874.5 feet. The applicant shall design and construct the unregulated spillway to have hydraulic properties similar to the existing natural lake outlet as much as possible.*

ADF&G 7: We acknowledge your agreement with our recommendation that Haida maintain state standards for turbidity, and note the latest state turbidity standards for the proposed project waters.

ADF&G 8: We generally do not recommend detailed designs for construction measures, including what cofferdam type to use. A licensee selects the type of cofferdam, subject to review by the Commission's Regional Offices before allowing the licensee to start construction.

ADF&G- 9: In FEA Section V.D.2, we recommend that the spillway be constructed with the same hydraulic properties to the extent possible, as ADF&G recommends.

6) Is our determination not to install, evaluate, or maintain a fish screen at the intake acceptable to you?

No. FERC staff did not adopt ADF&G's §10(j) recommendation for fish screening at the intake. For the following reasons, FERC's position on not requiring a fish screen is unacceptable to ADF&G.

The DEA asserts that a fish screen would provide little or no benefit to grayling in the basin. The DEA draws this conclusion because of a belief that water velocity would be low at the trashrack entrance and because grayling have not become established in Reynolds Creek downstream of Rich's Pond. ADF&G believes that both juvenile and adult grayling would be subject to entrainment by the proposed intake in Rich's pond.

The DEA implies that since grayling "do not contribute to a downstream population" they would not be subject to entrainment. However, in addition to seasonal migratory behavior, entrainment risk is a function of habitat use. Grayling currently use the intake area and would be subject to entrainment if they come near the trashrack, thereby adversely impacting the grayling resource. Additionally, Rich's Pond will be backwatered by the diversion structure. The proposed intake would differ considerably from the existing natural outlet and would behave as an attraction to fish seeking feeding, overwintering, and hiding areas. Grayling use depth for cover and often establish stations in proximity to the bottom of pools (Mathias, et al. 1998)[8]. The proposed 2-inch trash rack openings would allow fish to enter the intake pipe where water velocity would then be much higher than the sustained swimming speed of grayling. At a hydroelectric development on the Chatanika River in Alaska, Schallock (1966)[9] observed grayling enter a lateral channel, becoming entrained in the power development, even though the grayling's burst swimming speed was greater than the water velocity within the intake entrance.

We have also not concluded that grayling are absent from Reynolds Creek. Very little fish sampling has been conducted in the Reynolds Creek watershed, particularly upper Reynolds Creek and Rich's Pond. On several occasions, we believe the applicant's consultant used unreliable techniques (or improperly analyzed the available data) to inaccurately determine the status of fish populations in the watershed.[10] For example, during a brief ADF&G site visit to Rich's Pond on June 26, 1999, several grayling were captured in a short period of time using rod and reel capture techniques in the intake site. One fish was captured in the outlet stream just above the first falls. Fingerling-sized

[8] Mathias, K. L., A. R. Langston, and R. J. Zemlak. 1998. A summary report of the Table River surveys 1996 status report. Peace/Williston Fish and Wildlife Compensation Program Report No. 180. 62pp plus appendices.
[9] Shallock, E. W. 1966. Grayling life history related to a hydroelectric development on the Chatanika River in interior Alaska. MS thesis, University of Alaska-Fairbanks.
[10] The applicant's consultant erroneously concluded that the Reynolds Creek did not provide habitat for Dolly Varden char and coho salmon and that Summit Lake did not have a grayling population.

ADF&G 10: Based on the available information and known habits of grayling, we do not believe that the rate of egress downstream out of Rich's Pond via the intake would exceed that which currently occurs through the existing, natural outlets.

ADF&G 11: We disagree that the intake structure would be attractive to the grayling as a place to feed, overwinter, or take cover. The intake would not provide a hospitable area for aquatic insects, the main diet of grayling. Overwintering grayling would not seek the high velocities of the intake while overwintering, and overwintering juveniles and adults would be able to outswim the pull of the flow through the trashrack if they would swim very close by. The high velocity area of the intake, especially the intake pipe, would not be attractive as a hiding area, especially when there are more suitable natural hiding areas close by. With a 2-inch trashrack, we acknowledge that inevitably, at least some grayling would become entrained within an unscreened intake regardless of whether or not they would be able to outswim the pull of the intake. For example, there could be an unforeseen behavioral tendency that would influence the entrainment rate, or the grayling could be diseased or injured, which could hamper the fish's ability to outswim the pull of the intake. It is not clear, based on the information you provided, what the case was on the Chatanika River in Alaska. See ADF&G 10.

ADF&G 12: We acknowledge your concern with the amount and technique of the grayling studies in the watershed. However, this information has been acquired through an extensive alternative licensing process to which ADF&G has been a party.

grayling were also observed by the applicant's consultant in Rich's Pond during spring-early summer 1996.

Sampling to determine juvenile fish passage facility requirements usually requires that traps be fished continuously during the seasons when fish might be entrained (Office of Technology Assessment 1995)[11]. Sampling at the intake site was inadequate to characterize grayling habitat use in Rich's Pond. No sampling has been conducted during the period when grayling fry would likely be detected, soon after emergence in late summer. The period that fry-size grayling may occupy Rich's Pond may be brief, but critical if the fish are subject to entrainment by a water diversion. Without additional sampling of the intake site it is impossible to determine that a diversion with no fish screening will maintain the grayling fishery. Because the natural behavior of grayling is to seek cover, the unscreened intake will likely entrain and subject all sizes of fish in Rich's Pond to turbine mortality.

We continue to recommend that fish screening that meets the criteria specified in our March 11, 1999 terms and conditions, along with monitoring and evaluation of the facilities, be included as license measures to protect grayling in the Reynolds Creek drainage from impacts associated with operation of the proposed project.

ADF&G 13: Haida has observed grayling fry in the watershed in June and July, suggesting that emergence is in early summer as opposed to late summer. Sampling done in Rich's Pond in early summer revealed no fry were present. Although we agree that inevitably, some entrainment into the unscreened intake would occur, we do not believe that the entrainment rate would exceed present rates of egress downstream out of Rich's Pond, which appear to be low. We estimate the cost of monitoring entrainment when the project is operating to be about $70,000 to $80,000, around the same as the added cost of installing the 3/32" screen the agencies recommended. Refer to FEA Sections V.D.2 and VII.

7) **Is our determination to put a 5-year time limit on biotic monitoring acceptable to you?**

No. The DEA rejected ADF&G's recommendation that monitoring continue until ADF&G is confident that project operation, under the with-project flow regime, does not have negative effects on adult salmon migration and production. For the following reasons, FERC's 5-year time limit on biotic monitoring is unacceptable to ADF&G.

ADF&G recommended that monitoring potentially continue longer than five years because five years of monitoring may not be adequate to document trends in fish populations resulting from stream conditions affected by project development. Resident Dolly Varden and cutthroat trout are slow growing fish that may not reach reproductive age for up to eight years. Recruitment failure of year classes may not be measurable without longer-term sampling. Additionally, instream flow conditions will change measurably when Phase 2 of the project is developed, requiring additional monitoring to detect any population changes.

ADF&G 14: We have modified our recommendation to include a second 5-year monitoring period after the implementation of phase 2.

In the ACMP review, ADF&G and the applicant developed language for this stipulation that would be adequate to detect population changes, and which would still provide assurance to the applicant that sampling would not be unnecessarily prolonged. The July 23, 1999 consistency finding states that monitoring shall "continue for at least a 5-year period after the first phase of the project becomes operational. If Phase 2 or different

[11] Office of Technology Assessment. 1995. Fish Passage Technologies: Protection at Hydropower Facilities

project operations are implemented that modify the flow regime established in Phase 1, continued studies will be required for up to an additional 5 years after the second phase or new flow operations are implemented."

Additionally, to determine if ramping rates are adequate the applicant agreed to "conduct a monitoring program approved by the DFG and ADNR to determine the effect of ramping on fish populations and habitat. At the conclusion of the monitoring program, ADF&G and ADNR will use the results to determine if modification of this stipulation is necessary."

ADF&G 14 continued

8) ~~Are there any other measures that you'd agree to that would accomplish the~~ objectives of your original recommendation?

As explained above, we recommend that license articles for the spillway design and bio-monitoring contain the elements listed in ADGC's July 23, 1999 CZM consistency finding. The language for these stipulations was reached during negotiations with the applicant. We believe that the wording of these two stipulations will be adequate to protect aquatic habitat and should still be agreeable to the applicant.

ADF&G 15: If a license is issued, we would consider ADF&G language for license articles.

9) Is there additional evidence to support your recommendations or to demonstrate that they are consistent with the FPA?

In addition to the measures discussed above, we believe that FERC should reconsider two other terms and conditions that ADF&G recommended.

Flow continuation, DEA page 66 to 68: Even brief interruptions in flow can significantly affect lotic fish production, as a result of juvenile fish stranding, spawning interruption, and predation. Therefore, pursuant to §10(j) of the FPA, ADF&G recommended:

> *Provide fail-safe and redundant backup provisions in project design and operation to ensure that instantaneous instream flows are provided during routine maintenance periods, during emergency project shutdowns, and interruptions in the power grid. The facilities must have the capacity for indefinite flow continuation. Project design and operations shall include remote monitoring and operation of all project components.*

ADF&G recommended this wording after discussing the applicant's proposal to use flow deflectors for flow continuation with National Marine Fisheries Service (NMFS) fish passage engineers in Portland, Oregon. The DEA's analysis confirms that flow deflectors would not provide instantaneous instream flows equal to the required minimum flows. When the flow deflectors are in place, flows would be reduced to the minimum turbine capacity of only 5 cfs. A reduced flow incident could be lengthy if Lake Mellen is not operated near full pool at the time an equipment failure or emergency situation occurs.

ADF&G 16: In FEA Section V.D.2, we consider ADF&G's recommendation for flow continuation via a shunt pipeline equipped with a Howell-Bunger valve, but conclude that a combination of the jet deflector and regulated outlet releases would provide adequate protection at a significantly less cost.

During phase 2 with the project operating at capacity, this worst case scenario would very likely occur.

Additionally, the North Tributary does not supply an adequate amount of water to ensure that the mainstem Reynolds Creek flow volumes are adequately maintained. Thus, 100 percent of the anadromous fish zone would be adversely affected during a shutdown, not 60 percent as reported in the DEA. Again, the applicant's predicted 6 cfs accretion flow is an annual average that would not be available if a load rejection occurs during a low-flow period.

We agree with the DEA's recommendation that the required instream flows to the bypass and anadromous reaches be released throughout any outage. However, a regulated outlet at the diversion sized for the anadromous reach flows would still entail considerable lag time for water to move through the bypass reach. The NMFS engineers recommend that a Howell-Bunger valve be installed to provide fail-safe instantaneous instream flows to the anadromous reach. Thus, we recommend that FERC reconsider its approach to this important issue and recommend installation of equipment that is capable of maintaining instantaneous flows in the Reynolds Creek anadromous reach, such as a Howell-Bunger valve.

ADF&G 16 continued.

Escrow account: The DEA and your letter state that the establishment of a mitigation fund is not within the scope of §10(j) or 10(a) of the FPA. Our rationale for the trust fund was that funding should be readily available if there are unforeseen events that impact fish and wildlife resources as a result of the project that cannot be otherwise mitigated by changing project operations. Escrow mitigation accounts have precedent on FERC licenses. FERC required an escrow account for several Alaska projects, including Power Creek Hydroelectric Project (FERC No. 11243, Article 407) and Terror Lake (FERC No. 2743). In the Power Creek EA, FERC agreed with the resource agencies that "... establishing a fish and wildlife mitigation fund is necessary to mitigate for any unexpected impacts." An applicant's ability to fund mitigation has no bearing on the need for an escrow account and it was not a factor at the Power Creek project. The fund allows for a response when there is a need for mitigation, without concern for an applicant's immediate ability or willingness to pay for the response.

ADF&G 17: Each project has its own set of circumstances. For this project, we recommend that Haida be required to submit a financial plan prior to the start of construction. See FEA Section V.D.2 for a discussion of this recommendation.

While Reynolds Creek consultation began over 6 years ago, it is our belief that very little environmental baseline information was collected during this time. This lack of detailed environmental study resulted from a change in licensing status, changes in contractors, and changes in project design. Until January 1999, the applicant was seeking benefits pursuant to the Public Utilities Policy Act (PURPA). Thus, fish and wildlife agency conditions would have been mandatory under PURPA and as a result issues such as fish entrainment and project ramping rates were not well studied.

ADF&G 18: As stated in FEA Section IV.G., the Commission granted Haida's request to withdraw from seeking PURPA benefits, also cancelling the mandatory conditioning authority of agencies that accompanies PURPA benefits received by a licensee.

When contractors were changed and the Reynolds Creek project was substantially modified midway through the process, there was very little continuity in licensing studies. The first agent for the applicant focused much of its assessment on the upper

lakes area, which under the current proposal will not be affected by the proposed development. Consultation was also infrequent and not adequate to work through various licensing issues. Although the applicant prepared environmental assessment (APEA) process was to be followed during consultation, the applicant for the Reynolds Creek project exhibited little or no interest in collaborative consultation. In fact, on July 7, 1999, NMFS[12] protested that the terms of the communication protocol had been disregarded by the applicant and requested that the APEA process for Reynolds Creek be suspended entirely (enclosure).

We believe that Reynolds Creek fish resources could be adversely impacted as a result of some the measures rejected in the DEA. For example, although FERC decided on a constant flow regime of only 10 cfs, the DEA conveys a considerable amount of ambiguity in its analysis. The ADF&G and NMFS analyses, the DEA's Tennant analysis, and the applicant's cursory IFIM all determined that higher flows are needed to adequately maintain resident salmonids in the bypass reach. In addition, the hydrologic record for Reynolds Creek is based on very few years of data. Projects based on insufficient hydrologic records may inadequately protect aquatic resources and could provide misleading economic analyses from which major decision are made. There are also serious concerns whether the bypass reach gains or loses water before it reaches the proposed tailrace. The DEA's recommendation not to require fish screening at the diversion was based on questionable logic and very little data. Very little fish sampling and no entrainment studies were conducted at the proposed intake site. The DEA uses no site specific data to challenge ADF&G's ramping rate recommendation. As a result of this project's inadequate consultation, lack of baseline studies, and FERC's precedent for including mitigation trust funds in licenses at other projects, we strongly recommend that a mitigation escrow account be established for this project.

Thank you for the opportunity to respond to the mitigation measures recommended in the DEA and provide our §10(j) recommendations. We request that the above §10(j) issues we discussed, including flow continuation, escrow account, and cofferdam construction, be addressed at a §10(j) meeting. We would not be available for such a meeting until late November or early December. We suggest the meeting be held in Juneau. If you have any questions regarding this letter or wish to set up a meeting with the department please contact me at 907-465-4289.

Sincerely,

Clayton R. Hawkes

Clayton Hawkes
Hydroelectric Project Review Coordinator

Enclosure

[12] July 7, 1999 letter from Steven Pennoyer, the Alaska Regional Administrator of NMFS, to Carol Sampson, Director of the Office of Hydropower Licensing (Enclosed).

ADF&G 19: The APEA process is a pre-filing process that provides an opportunity for entities proposing and affected by hydro project licensing to work collaboratively and attempt to reach agreement regarding environmental measures appropriate for the project prior to the applicant's filing of an application and EA. In approving an alternative process for a project, the Commission anticipates that all key participants will commit a significant amount of effort and consultation time. However, all collaborative efforts will not result in settlement agreements.

STATE OF ALASKA

ORIGINAL

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October 22, 1999

99 NOV -1 11:19

Mr. David P. Boergers, Secretary
Federal Energy Regulatory Commission
888 First Street, N.E.
Washington, D.C. 20426

Dear Mr. Boergers:

SUBJECT: REYNOLDS CREEK HYDROELECTRIC PROJECT
State ID No. AK 9902-06JJ
Comments on FERC Draft Environmental Assessment

The Division of Governmental Coordination (DGC) received a copy of the Reynolds Creek Hydro Draft Environmental Assessment on September 23, 1999. We have reviewed the document, and have some concerns relative to the FERC's recommendations.

The Alaska Coastal Management Program consistency review for the Reynolds Creek project was initiated on February 4, 1999. The ACMP is a networked program, meaning that during the consistency review process, the State resource agencies (Alaska Departments of Fish and Game, Environmental Conservation, and Natural Resources) and DGC evaluate a proposed project against State coastal program standards and develop stipulations necessary to ensure the project is consistent with those standards. DGC coordinates the State's review for projects requiring federal permits.

Following Haida Corporation's elevation of the regional-level decision, first to the resource agency directors and then to the commissioners, a commissioner-level final consistency determination for the Reynolds Creek project was issued on July 23, 1999. The commissioner-level determination contained stipulations which the commissioners of

ADGC 1: See ADF&G 1.

the three departments determined are necessary for the project to meet the standards of the ACMP (attached). As such, it is misleading for the DEA to label coastal program comments having come from "ADGC", as they actually reflect a combined State position.

We are concerned about the following disparities between stipulations contained in the ACMP commissioner-level final consistency determination and the DEA's staff recommendations:

1. Fish Screening. (Page 6, Stipulation 7 of the ACMP determination, Page 77 of the DEA). The risk of entrainment/impingement to juvenile grayling is not mitigated by the installation of a trashrack covering the intake structure as suggested by the applicant. Haida Corporation has not provided the necessary sampling information for the State to determine that a 3/32" screening device is not necessary. The intake structure, as proposed without a 3/32" mesh screen, does not maintain or enhance fish habitat (per ACMP comments and rationale contained in the consistency determination), thus rendering that portion of the project inconsistent with the Habitats standard (6 AAC 80.130).

2. Minimum flows – bypass reach. (Page 8, Stipulation 8 of the ACMP determination, Page 51 of the DEA). The annual flow duration curve provided in the FERC application indicates flows ranging from approximately 12 to 340 cubic feet per second. The State agreed to accept a flow level of 12 cfs even though 12 cfs is among the lowest flows that naturally occur in the system at any given time. Absent studies by the applicant regarding the effects of reduced instream flows on the fishery resources in Reynolds Creek, the State cannot find a flow level of 10 cfs consistent with the Habitats standard.

The FERC license cannot be issued with requirements less stringent than the conditions listed in the ACMP consistency determination, as our concurrence with Haida Corporation's consistency certification was based on the fact that these conditions would be in place. In effect, we object to the licensing of the Reynolds Creek project unless all stipulations listed in the commissioner-level consistency determination are incorporated into the project, either through an amended application or the federal authorization matching state consistency requirements. Please note that State permits will also require the stipulations contained in the consistency determination.

If you have questions, I can be reached at (907) 465-8800.

Sincerely,

Patrick Galvin
Director

ADGC 1 continued.

ADGC 2: **In FEA Sections V.B.2 and VII, we conclude that a screen at the intake is not supported by the record for this project. See our response to ADF&G-10.**

ADGC 3: **In FEA Section V.D.2, we recommend that the Commission require Haida to provide a 10-cfs minimum flow as the best balance between the needs of the fishery and the value of lost power generation from providing a minimum flow.**

ADCG 4: **Our EA's analyze environmental issues and make recommendations to the Commission based on our obligation under the FPA to balance developmental and non-developmental resources. Staff recommendations do not represent conditions imposed by the Commission. If a license is issued, it would contain the Commission's conditions for the project.**

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September 15, 1999

David P. Boergers, Secretary
Federal Energy Regulatory Commission
888 First Street, NE
Washington, DC 20426

Re: Project No. 11480-001, Alaska
Reynolds Creek Hydroelectric Project
Haida Corporation

Comments on Draft Environmental Assessment dated September 9, 1999

Dear Mr. Boergers:

Background:

Alaska Power & Telephone Company agrees with the FERC when it finds that the project will not constitute a major federal action. However, we feel the need to comment specifically on the effect of the required instream flow in the bypass reach.

As we understand the record, there are very few fish that reside in the bypass reach. We further understand that these fish are not valued for subsistence, sport, or commercial reasons[1]. We are aware that some of the agencies have stated that these fish may represent a resource in that they may contribute to genetic diversity. This is based upon the possibility that this population was isolated when the glaciers receded following the last ice age. As FERC staff correctly points out[2], no evidence has been presented that shows this assertion is anything more than speculation on the part of the agency.

Thus, the recommendation made by FERC to increase the instream flow in the bypass reach from the 5 cfs proposed by Haida to 10 cfs is questionable. This staff recommendation probably can be characterized as a "Solomon Approach" to resolving the various recommendations of the agencies and the findings of the various studies. It is in this regard that we wish to furnish additional information for consideration.

The agencies making these recommendations have a primary responsibility to protect fish and their habitat. In their zeal to fulfill their mission they have recommended conditions that will have this renewable and non-polluting resource developed in a manner that does not utilize the water resource to its fullest extent consistent with the FPA. They have

[1] Page 49 of the DEA
[2] Page 51 of the DEA

made a policy decision that reaches far beyond their agency mission. If their recommendations are not properly balanced in accordance with the FPA by FERC, these agencies will have inadvertently denied the world the full use of a non-polluting and renewable waterpower resource. We believe that the reduction in air emissions by replacing fossil-fueled generation with sustainable and non-polluting hydropower is a separate and distinct beneficial public use and must be considered equally and separately by FERC when determining whether, and under what condition, to license a project.

Specific Comment:

Increasing the instream flow in the bypass reach has the effect of reducing the power potential of the project over the recommended term of the license. FERC estimates that this loss of annual energy generation is 280 MWh[3]. Over a 50-year term of the license this loss of energy will total 14,000 MWh. This will result in a reduction in the amount of fossil-fueled energy displaced by the proposed hydropower project. The resulting air emissions associated with this additional fossil-fueled generation is estimated at 233 tons per year or 11,732 tons over a 50-year license term. We developed our estimate using AP-42, Section 3.3-2, issued by the Environmental Protection Agency in April 1993 (attached). This is the reference that is used by the EPA and the industry to estimate emissions from diesel engines similar to those presently in use in Hydaburg and throughout rural Alaska.

Now that we have established the resultant additional air emissions associated with the decision to require a 10 cfs[4] instream flow in the bypass reach, we must put a value and consider the effect upon the environment in accordance with FPA:

Sections 4(e) and 10 (a) 1 of the Federal Power Act require the Commission to give equal consideration to all uses of the waterway on which the project is located. When the Commission reviews a proposed project, the environmental, recreation, fish and wildlife, and other non-development values of the involved waterway are balanced equally with its electrical energy and other developmental values. In determining whether, and under what conditions, to license a project, the Commission must weigh the various economic and environmental tradeoffs involved in the decision. Accordingly, any license issued shall be best adapted to a comprehensive plan for improving or developing a waterway for all beneficial public uses.[5]

We are not aware of staff considering in any depth or associating any economic value with the beneficial public use (i.e. specifically reducing the air emissions associated with the use of fossil fuels) of this waterway by the issuance of a license. Further, we believe the FERC staff erred when it did not specifically consider this beneficial impact when developing its finding in regards to the instream flow in the bypass reach.

[3] Page 93, Table 9 of the DEA
[4] The 10 cfs recommended by staff is 5 cfs more than that proposed by Haida.
[5] Pgae 96 and 97 of DEA

APT 1: Before recommending an instream flow for the project, we would consider both the power and nonpower aspects. The power aspects include the non-polluting renewable aspects of the project.

APT 2: We have used your estimate of emissions in the FEA.

APT 3: We considered the emissions released by the various instream flow alternatives but did not attempt to put an economic value on that or any nonpower value (fish, recreation, wildlife). At this time we consider nonpower resources qualitatively when recommending what conditions are in the public's interest. However, your estimate will be in the record of this proceeding.

We believe that increasing the instream flows in the bypass reach to 10 cfs will create 11,732 tons of additional air emissions. We do not believe this is warranted given the few fish that reside in that reach. We are aware of the bio-diversity argument made by the agency and point out that no facts are on record supporting this assertion. We are aware that additional air emissions will be released into the atmosphere and these emissions have an adverse effect upon the environment. Hundreds of billions of dollars is spent each year in the U.S. alone to try and control air pollution when before us is a decision that will increase air pollution but save a few fish that have little documented value[6].

APT 4: Thank you for your comments.

The National Hydrogen Association has made estimates of the damages caused by the use of fossil fuels. The damage is equal to 3.35 cents per kilowatt-hour[7]. Using this as a estimate, the 14,000,000 kilowatt-hours of lost energy over the life of the license caused by increasing the instream flow required in the bypass reach from 5 cfs to 10 cfs is equal to a cost or damage to the environment of $ 469,000. We wish this impact to be separately and distinctly considered as a beneficial public use of the waterway when FERC performs its balancing in accordance with the FPA.

General Information:

We believe that sustainable development is a goal that we, as the most advanced species on earth, will need to adhere to in the future as the demands of our advancing civilization continue to place more stress on our natural environment. Over ten years ago the Brundtland Commission proposed the following definition: *development is sustainable if it meets the needs of the present generation without diminishing the ability of future generations to meet their own needs.*[i] The Southeast Alaska Conservation Council also has a definition: *It is renewable, it is equitable, and it is digestible*[ii].

The global population has tripled in this century. Biomass and food consumption has reached 40 percent of the entire land-based output of photosynthesis. No one is sure if man can continue to increase this number. Fossil and mineral resource consumption is depleting stocks in hundreds of years that took tens of thousands, or millions, of years to accumulate[iii]. This consumption is now affecting the air we breathe and all aspects of the environment of earth.

It occurs to us that any type of renewable resource that can be utilized by mankind should be encouraged and made a priority by the policy makers. This is especially true when the use of that resource has side benefits that not only reduce the depletion of the non-renewable resource, but also reduce the other negative aspects of consuming the non-renewable, such as air or water pollution. Another side benefit is the cost to society of transporting a resource from where it is manufactured or extracted to the point where it is

[6] Page 49 & 51 of DEA
[7] J.Pangborn,et.al., "Domestic Uses of Hydrogen", 1st World Confer. Page 107

consumed. It would appear that small hydro development in Alaska meets many, if not all, of the requirements of sustainable development.

Please note that even fairly modest hydroelectric projects can make a difference. The fossil-fueled generators now used in Alaska produce emissions of about 1.59 pounds per kW-hr[8]. Over a 50-year license term for a small hydroelectric project, even a small 5-megawatt diesel plant produces 1,741,050 tons of emissions and releases them into the atmosphere that surrounds earth. Ten years ago the Exxon Valdez spilled almost eleven million gallons of oil into Prince Williams Sound. The total weight of the oil spilled was 40,700 tons. The Valdez spill represents only 2% of the weight created by the operation of a small fossil fuel generator that can be replaced by non-polluting, renewable small hydroelectric projects.

Thank you for this opportunity to comment.

Sincerely,

Robert S. Grimm, President
Alaska Power & Telephone Co.

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[i] Bruntland Commission , World Commission on Environment and Development, *Our Common Future*, Oxford University Press, Oxford, 1987.

[ii] Southeast Alaska Conservation Council http://www.seacc.org/pages/SUSTAIN.HTM. It is renewable. It uses resources no faster than they can be replenished. In general, natural capital is conserved rather than depleted. It is equitable. It is equitable among people and across generations. The future is not sacrificed for the present. It is digestible. The by-products of production are re-usable, recyclable, or biodegradable.

[iii] William C. Clark, at the Kennedy School of Government, Harvard University, [The world] physical stage is rapidly changing. It holds twice as many people as it did in 1950: fours times what it did in 1850. World trade has increased more than 20-fold over the last century; energy use more than 100-fold. This increasing magnitude of human activity has brought about an increasing scale and complexity of interactions among humans, their technologies, and their environment. What were once local incidents of pollution shared throughout a common watershed or air basin now involve multiple nations—witness the concern for acid deposition in Europe and North America. What were once acute episodes of relatively reversible damage now affect multiple generations—witness debates over disposal of chemical and radioactive wastes. What were once straightforward questions of ecological preservation versus economic growth now reflect complex linkages—witness the feedback among energy and crop production, deforestation and climate change that are evident in studies of the atmospheric

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[8] Emissions data from AP-42, Section 3.4, EPA

greenhouse effect. What once was a relatively well-behaved world of smooth and predictable trends increasingly reveals a propensity for abrupt and unexpected change—witness the surprise and consternation of scientists and people alike confronted with the appearance of the Antarctic ozone hole..

	Prediction of Air Emissions					
	Stationary Diesel Fuel Engines					
	AP-42, Section 3.4, EPA, April 1993					
	Annual Amount of Generation (kw-hr)					280,000
	Pollutant	g/kw-hr		Grams	Lbs	Tons
	NO	14		4,083,333	9,001	5
	CO	3.2		933,333	2,057	1
	SO2	2.46		717,500	1,582	1
	CO2	703		205,041,667	451,984	226
	TOC1 (as CH4)	0.43		125,417	276	0
	Particulate Emissions					
	Solids	0.29		84,583	186	0
	Condensables	0.0329		9,596	21	0
				210,995,429	465,108	233
	Total Amount of Generation (kw-hr) over term of License					14,000,000
	Under 600 Kw engines	Term=	50			
	Pollutant	g/kw-hr		Grams	Lbs	Tons
	NO	18.8		274,166,667	604,359	302
	CO	4.06		59,208,333	130,516	65
	SO2	1.25		18,229,167	40,183	20
	CO2	704		10,268,666,667	22,631,327	11,316
	TOC1 (as CH4)	0.28		4,083,333	9,001	5
	Particulate Emissions					
	Solids	1.5		21,875,000	48,220	24
	Condensables	0.03		437,500	964	0
				10,644,666,667	23,464,571	11,732

TABLE 3.3-2. (METRIC UNITS) EMISSION FACTORS FOR UNCONTROLLED GASOLINE AND DIESEL INDUSTRIAL ENGINES[a]
(Source Classification Codes)

Pollutant [Rating][b]	Gasoline Fuel (SCC 20200301, 20300301)		Diesel Fuel (SCC 20200102, 20300101)	
	[grams/kW-hr] (power output)	[ng/J] (fuel input)	[grams/kW-hr] (power output)	[ng/J] (fuel input)
NO_x [D]	6.92	699	12.8	1,896
CO [D]	267	26,947	4.06	410
SO_x [D]	0.359	36	1.25	126
Particulate [D]	0.439	44	1.34	135
CO_2 [B][c]	661	66,787	704	71,065
Aldehydes [D]	0.30	29	0.28	28
Hydrocarbons				
Exhaust [D]	8.96	905	1.50	152
Evaporative [E]	0.40	41	0.00	0.00
Crankcase [E]	2.95	298	0.03	2.71
Refueling [E]	0.66	66	0.00	0.00

[a] Data based on uncontrolled levels for each fuel from References 1, 3 and 6.
[b] "D" and "E" rated emission factors are most appropriate when applied to a population of industrial engines rather than to an individual power plant, due to the aggregate nature of the emissions data.
[c] Based on assumed 100 percent conversion of carbon in fuel to CO_2, with 87 weight percent carbon in diesel, 86 weight percent carbon in gasoline, average brake specific fuel consumption of 7000 Btu/hp-hr, diesel heating value of 19300 Btu/lb, and gasoline heating value of 20900 Btu/lb.

ORIGINAL

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Southwest Alaska Ecological Services
3000 Vintage Blvd., Suite 201
Juneau, Alaska 99801-7100

October 25, 1999

SEARD/ESO/JFO/KSO

Mr. David P. Boergers, Secretary
Federal Energy Regulatory Commission
888 First Street, NE
Washington, D.C. 20426

Re: Reynolds Creek Hydroelectric Project, FERC No. 11480
Draft Environmental Assessment

Dear Mr. Boergers:

The U.S. Fish and Wildlife Service has reviewed the draft environmental assessment (DEA) for the subject project. The following comments are for your use in preparing the final environmental assessment (FEA).

GENERAL COMMENTS

The DEA does a good job summarizing the many issues associated with this project, and the positions of the various agencies, the applicant, and Federal Energy Regulatory Commission (Commission) staff. The Service's most recent views on the project were reflected in the Department of Interior's (Department) February 4, 1999 letter to you, which contained recommended terms and conditions, and mandatory fishway prescriptions.

The Commission's intent regarding the Department's mandatory fishway prescriptions is unclear in the DEA. Although the Department's prescriptions are listed on pages 27 and 28, the text through the remainder of the DEA refers to both the Department's recommendations and mandatory prescriptions as "recommendations", and does not appear to recognize the fundamental difference between the two. For example, the Department's prescription for flows in the bypassed reach is described at the top of page 53 as a recommendation. This treatment is typical. We recommend that the FEA refer to mandatory prescriptions as such, throughout the document.

The Commission's recommended alternative does not adopt, or adopts modified versions of, some of the Department's mandatory prescriptions, such as intake screening, an unregulated outlet at the diversion structure, monthly lake level limits, instream flows below the powerhouse, and others. In some cases, the Commission staff's analyses offer reasonable alternatives that would provide greater protection to the fish resources in Reynolds Creek than the Department's prescriptions.

As a result of these analyses, and re-evaluation of the available data, the Service will recommend that the Department modify some of its prescriptions, to make them more consistent with the Commission's recommended alternative, or with analyses and recommendations of the Alaska Department of Fish and Game (ADF&G).

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DOI 1: Section IV.F. of the EA identifies FWS's prescriptions. Commission staffs' EAs consider the environmental effects of submissions from all entities, without regard to whether they were submitted as recommendations or prescriptions. Staff recommendations do not establish conditions for a project. Project conditions are conveyed in a license, if one is issued for a project. Also see ADF&G 3.

We do not anticipate that all discrepancies between the Commission's recommendation and the Department's mandatory prescriptions will be resolved by modification of the Department's prescriptions. Where such discrepancies remain, the FEA should clarify how the prescriptions will be accomodated.

SPECIFIC COMMENTS

Several different flow regimes have been recommended or prescribed for the bypassed reach (pages 51-61). We concur with the Commission staff's conclusion that a regulated outlet would better allow for modification of flows in the future, as flow needs change. It would also allow for seasonal or monthly flow variations, as recommended by ADF&G, to better mimic the natural hydrograph. A regulated outlet would also allow testing of various flow regimes, as may be desireable prior to implementation of Phase 2.

The Service's recommendation, and the Department's subsequent prescription, of 10 cubic feet per second, year-round, was based on agreements made early in the consultation process, before the potential significance of the reproductively isolated populations of cutthroat trout and Dolly Varden char were recognized.

The Commission staff's analysis points out that the flows prescribed by the Department would provide only "poor to fair or degrading" aquatic conditions, according to the "Montana Method" (page 58). Both the Commission staff and ADF&G have noted flaws in the instream flow analysis by the applicant, reducing its reliability. The Service believes that the flows proposed by ADF&G, which vary by month based on the natural hydrograph, are more defensible and would better protect the isolated fish populations. More complete flow and habitat modeling after implementation of Phase 1 construction would help better define fish population needs. We therefore recommend adoption of ADF&G's flow proposal, at this time, followed by additional instream flow modeling after project construction. We anticipate modification of the Department's prescription on this matter.

The Commission staff concludes that an intake screen is not necessary to preclude entrainment of grayling because the fish have dispersed through the Reynolds Creek system downstream from Lake Margo to Rich's Pond, but do not appear to contribute to a population below Rich's Pond (pages 77-79 and 112). The Service fears, however, that a submerged intake, as proposed, will differ fundamentally from existing natural outlets, which flow from the surface. Grayling are known to seek deep water for overwintering, and are likely to intentionally enter the hydropower intake, unless physically excluded. We do not believe that a trash rack with 2-inch clear spacing will exclude juvenile and/or adult grayling.

Water velocity at the intake (which is expected to be less than the swimming speed of all but the youngest grayling) is largely irrelevant if fish intentionally enter the intake. This potential source of mortality is likely to be additive to existing mortality factors, and is entirely avoidable with appropriate screening. Remotely operated, air-burst cleaning systems are available to insure proper functioning of the intake. We anticipate that an intake screen will remain a mandatory fishway prescription, to provide access to secure overwintering habitat in Rich's Pond.

The Service shares the Commission staff's concern that instream flows below the tailrace would not be maintained in the event of project shutdown (pages 67-68). While releases at the diversion dam might be the simplest method, the time lag between powerhouse shutdown and flows reaching the anadromous section is a concern. Evaluation of this time lag, and further discussion of ADF&G's proposal for a bypass valve at the powerhouse is warranted.

DOI 2: **In FEA Sections VII, we recommend that Haida install a regulated outlet.**

DOI 3: **In FEA Section VII, we recommend a minimum flow requirement of 10 cfs, combined with post-license monitoring program, as the best balance between benefits to the fishery and the loss of power generation from releasing a minimum flow.**

DOI 4: **Sections V.D.2. and VII, respectively, of the FEA contain our revised analysis and conclusions. We agree that the hydraulics of the proposed intake would differ fundamentally from the existing natural outlets, but disagree that overwintering grayling would be likely to intentionally enter the intake.**

DOI 5: **In the FEA, we look at the alternative of licensing the project with Haida's proposed screen and monitoring grayling entrainment through the screen once the project is operating. Refer to sections V.D.2 and VII of the FEA.**

The applicant is reportedly investigating alternative cofferdam types to limit sedimentation during in-water work (page 76). We suggest evaluation of designs by Portadam, Inc. (107 Drivers Lane, Laurel Springs, NJ, 08021, phone 609-784-2200). 6

We note that the text of the Department's intake screen prescription on page 27 is missing a significant portion of the original language. Appendix B, listing the Department's recommendations, is also missing from the DEA, although appendices containing the recommendations of the other agencies are included. 7

We understand that the ADF&G has, or will, request a meeting to resolve outstanding issues regarding their recommendations, pursuant to section 10(j) of the Federal Power Act. The Service would like to participate in this meeting, in order to help insure that any modifications to the Department's fishway prescriptions reflect those discussions. We anticipate that the Department's modified prescriptions would be provided to the Commission a few weeks after that meeting. 8

Thank you for the opportunity to provide these comments. If you have any questions, please contact Steve Brockmann in our Ketchikan Suboffice at (907) 225-9691.

Sincerely,

Teresa A.N. Woods

Teresa A.N. Woods
Field Supervisor

cc: ADFG, Kenai
ADF&G, Anchorage (Attn. Christopher Estes)
ADF&G, Douglas (Attn: Clayton Hawkes)
NMFS, Juneau (Attn: Andy Grossman)
FWS, Kln
FWS, Jno

DOI 6: See ADF&G 8.

DOI 7: In the DEA we attached appendices of the agencies original language for recommendations and conditions. Because of the size of this document and the availability of the agencies' letters on the Commission's web site, however, we eliminated the appendices from this FEA. The Commission's web site is http://www.ferc.fed.us/online/rims.htm [please call (202) 208-2222 for assistance].

DOI 8: This meeting was held on December 16, 1999, with FWS's participation.

ORIGINAL

October 22, 1999

99 OCT 28 PM 3:22

FEDERAL ENERGY REGULATORY COMMISSION

HDR

Mr. David P. Boergers, Secretary
Federal Energy Regulatory Commission
888 First Street NE, Room A-1
Washington, D.C. 20426

Re: Reynolds Creek Hydroelectric Project
FERC Project No. 11480
Comments on the FERC Draft Environmental Assessment

Dear Mr. Boergers:

On behalf of the Haida Corporation, enclosed for filing are an original and eight copies of the Applicant's comments on the FERC Draft Environmental Assessment issued on September 9, 1999, for the above-referenced project.

If you have any questions regarding these comments, please let me know.

Sincerely,

HDR ENGINEERING, INC.

M.V. Stimac

Michael V. Stimac, P.E.
Manager, Licensing and Environmental Services

Enclosure

cc: Robert Hamilton, Haida Corporation
Cynthia Pickering Christianson, Esq.
Donald Clarke, WBKQ
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REYNOLDS CREEK HYDROELECTRIC PROJECT
FERC PROJECT NO. 11480

Applicant's Comments on
FERC Draft Environmental Assessment
Issued September 9, 1999

INTRODUCTION

The comments provided below focus on Sections V (Environmental Analysis), VI (Developmental Analysis), and VII (Comprehensive Development and Recommended Alternative). They also apply to those statements presented earlier in the Draft Environmental Assessment (DEA) where the FERC staff has summarized their conclusions/requirements on the various topics addressed in Sections V, VI, and VII. Also, where appropriate, we reference the stipulations contained in the Commissioner-Level Final Consistency Determination (CLFCD) which was issued by the Alaska Division of Governmental Coordination (ADGC) on July 23, 1999. The stipulations were determined via the Alaska Coastal Management Program (ACMP) process and, except for Stipulations 7 (intake screen) and 8 (flows in the bypass reach), represent agreements reached between Haida Corporation (the Applicant) and the agencies involved. The Applicant filed an appeal of Stipulations 7 and 8 on August 20, 1999, in the Superior Court for the State of Alaska.

SPECIFIC COMMENTS

Lake Mellen Water Surface Levels

The DEA states on Page 13 that the Applicant proposes the following two environmental measures regarding Lake Mellen water surface levels:

"Maintain Lake Mellen surface elevation above 874.5 feet during April and May to ensure that grayling have normal access to potential spawning areas."

"Maintain the surface elevation of Lake Mellen between 876 and 874 feet during the remainder of the year, under normal hydrologic conditions and power demand. Under extreme conditions, lake level may be drawn as low as 872 feet."

Similar statements are made elsewhere in the DEA (e.g., Page 61). In this regard, the DEA is in error—the Applicant has never proposed limiting the Lake Mellen water surface elevation to 874 feet MSL or above except during extreme hydrologic and/or power demand conditions. On Page 27, the DEA correctly states that this lake level restriction is derived from a Section 18 fishway prescription by the U.S. Fish and Wildlife Service contained in their February 4, 1999 letter.

In its April 20, 1999, response to FERC regarding the U.S. Fish and Wildlife Service prescription, the Applicant stated the following:

HDR 1: Haida's proposed operation in section III.A.3. of the EA has been corrected.

"Based on the agency consultation conducted prior to submittal of the Application for License, the Applicant has proposed to operate the project to maintain the minimum lake level at or above 872 feet MSL, except during April and May when the minimum lake level will be raised to 874.5 feet MSL to ensure grayling migration above Lake Mellen. The agencies did not suggest a preference for a higher lake level at any time during the consultation. Therefore, the Applicant does not understand the FWS Prescription No. 2 indicating a preference for a higher minimum lake level. Furthermore, the FWS has not provided any fishway-related justification for Prescription No. 2.

The Applicant strongly opposes the FWS Prescription No. 2. The Applicant's proposal and the project economics have always been based on a minimum Lake Mellen level of 872 feet MSL except during April and May. The Applicant has proposed development of a small amount of storage in Lake Mellen to provide the ability to maintain generation during a brief cold spell during the winter months. These cold spells are relatively common, and can last for a couple of weeks. The prescription proposed by the FWS to allow full use of the available storage only when the accumulated precipitation is less than 50% of normal will likely prevent the Applicant from using the storage to meet loads during these cold spells, because:

- *Once the cold spell starts, the basin freezes up, so the precipitation prior to the cold spell has little influence on the flows during the cold spell;*
- *During the winter when the cold spells occur, much of the precipitation is in the form of snow and does not immediately contribute to the streamflow;*
- *Accumulated precipitation less than 50% of normal is an extremely rare event once the duration of accumulation exceeds a few weeks."*

On Pages 61-64, the DEA provides FERC staff's environmental analysis of the Lake Mellen water surface level fluctuations. It characterizes the U.S. Fish and Wildlife Service's environmental measures as recommendations rather than Section 18 prescriptions. As noted in our April 20, 1999, comments, the Applicant does not see any fishway-related justification for the U.S. Fish and Wildlife Service's environmental measures, and we agree that they should be recommendations rather than prescriptions. Grayling access to spawning grounds above Lake Mellen is adequately protected by raising the minimum lake level to 874.5 feet MSL from April 1 to June 15, and grayling movement between Lake Mellen and Rich's Pond is adequately provided by the proposed channel between those water bodies.

Nevertheless, the Applicant believes that the FERC staff's analysis is flawed, and disagrees with adoption of the U.S. Fish and Wildlife Service's "recommendations" regarding restricting the minimum lake level to 874.0 feet MSL except during adverse conditions. The DEA states that the basis for restricting the minimum lake level is to prevent degrading littoral zone habitat. The fact of the matter is that the Lake Mellen shoreline is rocky and very steep, and there isn't a significant amount of littoral zone habitat. Grayling will not be adversely affected by the Applicant's proposal, nor will they be benefited by proposed environmental measure. The proposed Lake Mellen water level restriction will add complexity and expense to the operational monitoring without any corresponding environmental benefit.

Furthermore, the Applicant reiterates its disagreement with the definition of low precipitation as 50% of normal for the year to date, for the reasons noted in our April 20, 1999, comments

HDR 2: **Section IV.G. of the EA identifies and summarizes FWS's prescriptions. Commission staffs' EAs consider the environmental effects of submissions from all entities, without regard to their status as recommendations or conditions. See ADF&G 3.**

HDR 3: **In FEA Section V.D.2, we reevaluate the effects of Lake Mellen water levels and make a revised recommendation consistent with Haida's proposed operation of Lake Mellen.**

(quoted above). The FERC staff have apparently tried to accommodate our concerns by allowing the lower minimum lake level during the December-March period to be triggered by low precipitation or extreme power demand. However, that provides little relief, because normal power demands during periods of low runoff will require use of the full reservoir storage. If a threshold is necessary, the Applicant suggests that is be based on low inflows to Lake Mellen rather that low precipitation—a three-day average inflow less than 50% of the long-term average would be appropriate. Note that the Applicant's proposed monitoring program will include calculation of the inflows to Lake Mellen based on measured lake levels and releases.

The environmental measures include a requirement for the Applicant to develop a plan for outlining thresholds for when Lake Mellen may be drawn below elevation 874.0 feet MSL. If FERC staff accept the Applicant's position that restricting the minimum lake level to elevation 874 feet MSL is unnecessary, then that environmental measure can be removed.

On Page 110, the DEA states "If post-license monitoring...indicates that alternative lake levels would protect fish in the bypassed reach, the Commission may modify any required lake levels." This should refer to fish in Lake Mellen, not fish in the bypassed reach.

Finally, the Applicant has reached agreement on this matter with the Alaska state agencies as noted in Stipulation 6 of the CLFCD.

HDR 3 continued.

Flow and Lake Level Monitoring

The DEA states that the recommended environmental measures include a requirement for the Applicant to monitor compliance with required streamflows, lake levels, and ramping rates. The Applicant does not disagree with that requirement except that on Page 109 it appears that the FERC staff intends to require inflows to the bypassed reach to be measured by a stream gage immediately below the diversion. The diversion will be immediately above a very steep section of stream channel, and it is unlikely that a normal stream gage can be installed there—it would be dangerous to maintain and the accuracy would be doubtful. The Applicant proposes to monitor the flows into the bypassed reach by 1) measuring the flow in the instream flow release pipe with a flow meter, and 2) calculating the spillway flow based on the lake level and spillway geometry.

HDR 4: We expect that exact gage location and installation would be determined after consultation with the USGS. We recommend that that a minimum flow of 10 cfs be required from the diversion, and that the releases be monitored in accordance with a plan developed in consultation with the resource agencies.

Bypass Reach Instream Flow Requirement

On Page 59, the DEA states that the FERC staff analysis of the bypass reach IFR includes consideration of *"the value of maintaining a small number of fish for their genetic diversity, when they are not valued for subsistence, sport, or commercial reasons"*. The Applicant believes that the FERC staff's analysis of this factor is flawed. Other than this one statement, the DEA does not consider the fact that there are very few fish and very little suitable habitat in the bypass reach. Instead, the staff analysis of the bypass reach IFR is based primarily on the hydrology and on maximizing the minimal amount of suitable habitat. Furthermore, the DEA states on Page 60 that *"Nothing has been presented to show that cutthroat trout above the anadromous barrier represents a unique subspecies, or contributes to the genetic diversity or the anadromous population below the barrier"*. The Applicant questions how FERC staff can

HDR 5: In FEA Section VII, we recommend a minimum flow release of 10 cfs.

determine that the cost of $25,000 per year is justifiable considering the small number of fish, lack of evidence of genetic importance, and lack of utilization of the fishery.

The Applicant maintains that its proposed IFR of 5 cfs will adequately fill the pools in the bypass reach, will provide for movement of fish between the pools, and may actually enhance the limited fishery resource in the bypass reach.

Regulated Outlet at the Diversion/Flow Continuation

The DEA recommends two environmental measures related to installation of a regulated outlet at the diversion. These are summarized on Pages 19 and 20 as follows:

"Install a regulated outlet at the diversion, capable of remote operation, and sized to provide the full range of flows required below the diversion, including any additional flows required below the tailrace.

During power outages for any reason maintain required minimum flow volumes below the tailrace at all time using jet deflectors, spill at the diversion, or the outlet in the diversion."

The Applicant has proposed to install an unregulated outlet at the diversion sized to pass the bypass reach IFR and to use the jet deflectors to provide flow continuation below the powerhouse. Flow continuation by the jet deflectors would be possible under all conditions except a forced outage that requires shutting off flow in the penstock.
Our understanding of the FERC staff's analysis leading to the recommendation for a regulated outlet is as follows:

1. When a forced outage occurs, the turbine flow will drop to 5 cfs, and Lake Mellen may be below the spillway crest so that flow over the spillway may not provide additional flow for several days or weeks (Page 67).
2. A flow of at least 23 cfs is required below the powerhouse to maintain a wetted streambed below the powerhouse and, therefore, a flow of only 5 cfs could harm anadromous fish below the powerhouse (Pages 67-68).
3. The cost of a regulated outlet would be fairly low (estimated in the DEA to be $20,000) (Pages 105 and 110).
4. A regulated outlet would allow releasing only the bypass reach IFR at all reservoir levels, whereas the Applicant's proposed unregulated outlet would release more flow than the bypassed reach IFR whenever Lake Mellen is above El 872 feet MSL (Pages 60-61).

The Applicant does not agree with the FERC staff's recommendation for a regulated outlet, and believes the analysis is flawed as follows:

1. The assumption that the turbine flow will drop to 5 cfs when the deflectors are activated is incorrect. The turbine flow is controlled by the needle valves, not the jet deflectors, so activation of the jet deflectors will not change the turbine flow at all. If the dam is spilling when the outage occurs, the needle valves will be slowly closed during an outage to a minimum flow to save wear on the deflectors, but this will not reduce flows in the

HDR 5 continued.

HDR 6: In FEA Section V.D.2, we recommend that Haida provide flow continuation through the jet deflector, regulated diversion outlet, spillway or any combination of these as a less expensive, but adequate, means of flow continuation compared to the agency-proposed shunt pipeline equipped with a Howell-Bunger valve. We continue to recommend a regulated outlet at the diversion because of the wide range of minimum flow levels to be provided during outages.

anadromous reach. If the dam is not spilling, the needle valves will not be operated, so the flow in the anadromous reach will not be affected.

2. The cost of a regulated outlet as proposed by the FERC staff will be much more than $20,000. Because of the low head at the diversion, a valve sized to pass 50 cfs under all reservoir conditions will need to be relatively large, and therefore quite expensive. In addition, there would be substantial cost associated with providing power to the valve, energy dissipation, and a secure enclosure for the operator. The Applicant estimates that the total cost of providing the regulated outlet would be more than $100,000.
3. Releasing flows intended for the anadromous reach at the diversion could be detrimental to fish in the bypass reach. With the regulated outlet proposed by the FERC staff, it would be possible for flow in the bypass reach to initially be the minimum flow, and then very suddenly the flow could increase to 50 cfs. Such an event could flush fish from the bypass reach.
4. As noted above, the only circumstances when the jet deflectors could not provide flow continuation are 1) failure of the jet deflectors, or 2) other circumstances that require shutting off flow in the penstock. The Applicant believes those circumstances have a low probability of occurrence. During Phase 1, lack of spill will also have a low probability of occurrence (about 1% initially, but increasing to perhaps 10-20% as loads and project utilization increase). Both of these events would have to occur simultaneously for the regulated outlet proposed by the FERC staff to be beneficial. Therefore, during Phase 1, there is an extremely low probability of the regulated outlet being beneficial.
   Flow continuation during Phase 2 is an issue that can be addressed when Phase 2 is proposed. The Applicant believes that installation of a separate bypass valve at the powerhouse as part of the Phase 2 construction would be preferable to a regulated outlet at the diversion.
5. Because of the difficult access to the site and relatively harsh climatic setting, the Applicant has proposed a low-maintenance, passive diversion structure in order to achieve an acceptable level of reliability. The regulated outlet proposed by the FERC staff is contrary to that goal.
6. If the FERC staff considers it important, it is possible to use passive float-operated methods of releasing just the bypass reach IFR to avoid the over-release proposed by the Applicant.

HDR 6 continuing.

Project Phasing

Regarding the discussion of project phasing on pages 34-36, as has been stated in earlier correspondence, the Applicant believes that Phase 2 should only address aquatic effects because changes associated with Phase 2 will be limited to expansion of the powerhouse to accommodate the addition of the second generating unit, the installation of a short run of penstock, and any flow modifications related to the second unit's operation. Based on the analysis presented in this DEA regarding wildlife and recreation, there does not appear to be justification for requiring operational and environmental monitoring plans addressing wildlife and outdoor recreation for Phase 2 implementation.

HDR 7: Phase 2 would significantly alter flows to Reynolds Creek and drawdowns for Lake Mellen, and effects to aquatic resources may impact wildlife and recreation. The demand for recreation is expected to increase as the population on Prince of Wales increases, and Lake Mellen is unique in that it supports a self-sustaining population of grayling.

Environmental Compliance Monitor (ECM)

As has been stated in earlier correspondence (and as noted on pages 39 and 40), the Applicant does not believe that an ECM is needed for all on-site construction work. Those activities of

HDR 8: Because of the remoteness of the area and the diversity of fish and wildlife and their habitats that could be

critical importance to the agencies should be identified. The Applicant would ensure that the agencies would be notified of the timing of those activities so that the ECM could be present. Once the project becomes operational and the ECM is no longer present, annual meetings could be held to assess the effectiveness of any monitoring that is being conducted. However, we agree, as noted on page 40, that the Applicant should not fund annual inspections and meetings. Further, the Applicant continues to maintain that funding the ECM should not be the Applicant's responsibility.

adversely affected through noncompliance, we recommend that an ECM be present during construction.

Ramping Flows Below the Tailrace

The February 16 – May 31 ramping prescription on page 111 is unnecessarily complex. The Applicant has reached agreement with the ADGC in the CLFCD and feels that the ramping issue is more than adequately covered by this agreement. Stipulation 9 states:

The applicant shall operate the project such that decreases in the water surface level in the anadromous reach of Reynolds Creek below the tailrace do not exceed the following rates:

June 1 to September 15	*1 inch per hour*
September 16 to May 31	*2 inches per hour*

The applicant shall conduct a monitoring program approved by the DFG and DNR to determine the effect of ramping on fish populations and habitat. At the conclusion of the monitoring program, DFG and DNR will use the results to determine if modifications of this stipulation are necessary.

HDR 9: In FEA Section V.D.2, we revise our earlier recommendation to allow daylight ramping of 1 in/hr from February 4 through May 31, as long as there is post-license monitoring.

Water Quality

On page 111 of the DEA, the FERC recommends the following measure: *"Cease all construction activities if a violation of water quality standards is detected, until the problem is identified and remedied."* The Applicant does not agree with this requirement as it should not be necessary to stop all construction activities if a water quality violation occurs in a specific location. For example, if there is a water quality violation at Lake Mellen when construction was simultaneously occurring at the powerhouse and the transmission line corridor, it would be unreasonable to halt transmission line construction which may be miles away from Lake Mellen. Those activities located upstream and/or contributing directly to the violation should be stopped, but activities having no impact on water quality should be allowed to continue.

HDR 10: In FEA Section V.D.2, we revise our recommendation to require construction in the immediate area to cease if a violation occurs.

Monitoring

Stipulation 14 of the CLFCD provides very detailed monitoring requirements for the project. To avoid conflicting requirements, the Alaska and FERC monitoring requirements should be consistent.

HDR 11: We recommend plans for various items be developed in consultation with resource agencies and submitted to the Commission for approval.

NATURAL HERITAGE INSTITUTE
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November 1, 1999

Honorable David P. Boergers
Secretary,
Federal Energy Regulatory Commission
888 First Street, N.E., Rm. 1A
Washington, D.C. 20426

Re: Haida Corporation, Reynolds Creek Hydroelectric Project (No. 11480-001)

Dear Secretary Cashell:

American Rivers submits these comments on the Draft Environmental Assessment (DEA). We make this submittal in response to the Notice of Availability," 64 Fed. Reg. 50080 (Sept. 15, 1999).

CZMA Consistency

Under authority of the Coastal Zone Management Act (CZMA) section 307(c)(3)(A), 16 U.S.C. § 1456(c)(3)(A), the Alaska Division of Governmental Coordination (ADGC) timely determined that the project will be consistent with the Alaska Coastal Management Program. This concurrence includes fifteen conditions for project design and operation. The DEA treats the conditions as recommendations and modifies or rejects many. *See*, e.g., DEA, p. 108, rejecting ADGC's minimum flow schedule in the bypass reach. This triage is unlawful.

ADGC determined that this project will be consistent with its coastal program if all of the conditions are met, not otherwise. The CZMA does not authorize the licensing agency to reject or even modify conditions that the State includes in a timely CZMA concurrence. "No license or permit shall be granted by the Federal agency until the state or its designated agency has concurred with the applicant's certification...." 16 U.S.C. § 1456(c)(3)(A). Although we are not aware of controlling case law under CZMA, we submit that the Clean Water Act section 401(a) provides useful guidance. Under that other statute, a license may issue only if the State issues a water quality certification, and the courts have now resolved that the Commission has no authority to reject conditions that the State determines are necessary to

NIH 1: See our response to ADF&G 2.

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
P.O. Box 21668
Juneau, Alaska 99802-1668
October 22, 1999

Ms. Ann F. Miles, Chief
Licensing West Branch
Office of Hydropower Licensing
Federal Energy Regulatory Commission
888 First Street, NE
Washington, D.C. 20426

RE: Reynolds Creek Hydroelectric Project, FERC No 11480
Response to Draft Environmental Assessment and Section 10(j) Recommendations.

Dear Ms. Miles:

We have reviewed your letter of September 10, 1999 and the draft environmental assessment (DEA) for the Reynolds Creek Hydroelectric Project. We appreciate the Federal Energy Regulatory Commission's (FERC) efforts to address resource concerns while seeking appropriate and consistent implementation of the Federal Power Act (FPA). We believe that FERC is hampered in this regard by not having reliable baseline information upon which to pursue an independent impact analysis.

Instream Flow Recommendations

In our letter of February 9, 1999, we recommended terms and conditions for this project pursuant to Section 10(j) of the Federal Power Act. We recommended minimum instream flows below the powerhouse and for the bypass reach. We concur with FERC's recommended instream flows below the powerhouse to assure access by salmon, steelhead, and cutthroat trout to traditional spawning and rearing areas at or above the following discharge rates in cubic feet per second (cfs).

Our instream flow recommendation for the bypass reach, measured as instantaneous discharge, would be provided to the Reynolds Creek bypass reach at flows at or above the following discharge rates:

NMFS 1: In FEA Section VII, we recommend a minimum flow of 10 cfs as the best balance between benefits to the fishery and the value of lost generation from providing a minimum flow.

January	15 cfs
February	12 cfs
March	17 cfs
April to June	12 cfs
July and August	17 cfs
October and November	12 cfs
December	14 cfs

The National Marine Fisheries Service (NMFS) concurs with the Alaska Department of Fish and Game that bypass discharge rates for the month of September should be at least 13 cfs.

FERC believes that Lake Mellen may not have sufficient inflow to provide our requested instream flows through the bypass reach. FERC proposes to provide the "required minimum flows or the instantaneous inflows to Lake Mellen, whichever is less, for both the bypassed reach and the reach below the tailrace." FERC proposes to have 10 cfs, instantaneous discharge, released to the bypass reach at all times. FERC asks, "Is our provision to release the inflows to Lake Mellen, when less than any required minimum flows in the bypassed reach and below the tailrace, acceptable to you?" and, "Is our minimum flow requirement for the bypassed reach acceptable to you?"

We believe that FERC's proposed minimum flows are insufficient to maintain habitats, protect eggs and larva in spawning areas, and provide access to spawning and rearing areas for fish populations within the bypass reach. We believe that studies cited to support these provisions were not conducted by the applicant according to necessary standards and protocols.

We concur with the Alaska Department of Fish and Game that periods in which the required instream flows would exceed the seasonal inflows and storage capacity would be rare. Instream flow requirements during low inflow periods would likely be accommodated by maintaining a maximum reservoir capacity in anticipation of diminished inflow.

By placing no requirement above the minimum inflow, the applicant could continue to draw down Lake Mellen through power generation exacerbating impending low flow conditions. The result could be general dewatering resulting in strandings of adult fish and desiccation or freezing of eggs and larva.

NMFS concurs with FERC's observation that the applicant's use of instream flow incremental methodology/ physical habitat simulation system (IFIM/PHABSIM)is inadequate to support discharge recommendations (DEA, p. 57). Likewise, we have little faith in the weighed usable area (WUA) estimates based on the applicant's IFIM/PHABSIM results (DEA, p. 57). NMFS noted a lack

NMFS 1 continued.

NMFS 2: **In FEA Sections V.D.2 and VII, we recommend that any minimum flow requirements be reduced to the natural inflow of Lake Mellen when the inflows to the lake are less than any required minimum. Our recommendation is consistent with NMFS's revised recommendation.**

NMFS 3: **See DOI-3.**

NMFS 4: **See NMFS 2.**

of coordination of project information in our letter of July 7, 1999 (Pennoyer to Sampson). FERC uses the applicant's results to make a determination that 10 cfs would provide only 4 percent less habitat during spawning and emergence. We do not believe that this determination is supported by technically valid data. We are also concerned about assumptions posed by the applicant that an additional 6 cfs accrues within the bypass reach (DEA, p. 59). Hydrological data is far to limited to support such an assumption.

We are likewise concerned about the implications of FERC's recommended flows as presented in Table 7 (DEA, p. 58). Staff discharge recommendations would result in "poor or minimum" to "fair or degrading" conditions for spawning, emergence, and primary growth activities for cutthroat trout and Dolly Varden char. We believe that this is unacceptable.

The DEA cites the justification that minimum flow recommendations of 10 cfs appear reasonable considering "the value of maintaining a small number of fish for their genetic diversity when they are not valued for subsistence, sport, or commercial reasons" (DEA, p. 55 and 59). We believe that projects such as this should not eliminate critical fish habitats or populations where viable options exist to protect such resources. Furthermore, Prince of Wales Island is experiencing one of the fastest growing populations within the State of Alaska, and increasing demands on sport fishery resources will likely occur in areas that now appear to be remote.

NMFS 4 continuing.

Ramping Rates

In our Section 10(j) terms and conditions, we recommended that fluctuations in discharge ramping rates should not exceed the following rates for the seasonal periods indicated:

> February 16 to May 31: 2 inches per hour maximum at night.
> June 1 to September 15: 1 inch per hour maximum.
> September 16 to February: 2 inches per hour maximum.
>
> In addition, no ramping would occur from February 16 to May 31 during daylight hours (one hour before sunrise to one hour after sunset).

FERC believes that our recommended rates may be inconsistent with public interest standards (Section 4(e)) and comprehensive planning standards (Section 10(a))because they do not allow for daytime load-following (peaking) operations. Your recommendation would provide a daytime ramping rate of 1 in/hr from February 16 to May 31.

NMFS 5: In FEA Section V.D.2, we rcommend ramping rates consistent with NMFS's revised ramping recommendation.

We concur with ADFG regarding the increased vulnerability of juvenile salmonids to down-ramping during daylight hours. Juvenile salmon seek refuge from predators in side channels and cobbles at the stream's edge where they are subject to fatal stranding during down-ramping events.

We recommend that battery storage, auxiliary power, or future load supplementation (when Hydaburg is connected to a Prince of Wales Island grid) be analyzed as an option to higher impact operational regimes.

We appreciate the opportunity to comment on the DEA and your recommended changes to our terms and conditions. We appreciate your efforts to coordinate with us on this project. Our contact for this action is Andrew Grossman, (907) 586-7358.

Sincerely,

P. Michael Payne
Assistant Regional Administrator
for Habitat Conservation

Enclosure: 8copies for FERC

cc: Nan Allen, FERC, Washington, D.C.
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NMFS 5 continued.

NMFS 6: We evaluate hydropower projects and recommend measures to protect, mitigate, or enhance environmental resources affected by the project. Hydro licenses do not specify alternative energy sources, if needed to supplement power.