GOAT LAKE HYDRO

- Goat Lake Hydro. – 4.0 MW
  - Located 6.5 Miles NE of Skagway
  - Constructed in 1996-1997; Storage Project – Alpine Lake
  - Has FERC License No. 11077
  - 2nd Low Impact Hydro Institute Certified Project in Alaska
  - 5.5 Years to Permit and License
  - $18 Million to Permit and Construct (including Sub Cable)
  - Cable – 35 kV, 3-Phase Submarine
    - Skagway To Haines; laid in 1998
  - No Recreation Mitigation for this Non-Recreation Site
  - Maintain 8.5 cfs in Falls during summers for tourism
  - Has generated 305,342,525 kWh (as of December 2014)
  - Has saved 21.8 Million Gallons of Diesel since start-up (as of December 2014); based on 14kwh/gal, equivalent to $54.5 Million at $2.50 per gallon
## GOAT LAKE HYDRO

### Goat Lake

### Powerhouse

### Distribution Line

**Voltage**: 34.5 kV  
**Length**: 4,528 feet  
**Type**: Overhead on wooden poles

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### Table: Project Details

<table>
<thead>
<tr>
<th><strong>Name of Project</strong></th>
<th>Goat Lake Hydroelectric Project, FERC Project No. 11077</th>
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</table>
| **Project Location** | Sections 10, 11, 14, 15, and 16, T 27 S, R 60 E, CH 4 5 mi N of  
Northeast of Skagway, Alaska, located in Southeast Alaska. Approximate latitude 59 degrees, 32’ and longitude 135 degrees 11’. |
| **Intake** | Submerged weirs were screen at elevation 2730. |
| **Reservoir** |  
**Name**: Goat Lake  
**Surface Elevation**: 2925 (elevation as referenced in Commission correspondence of March 28, 1997)  
**Surface Area**: 204 Acres  
**Storage Capacity**: 64,600 acre feet  
**Operation**: The net storage will be utilized by siphoning the reservoir down 40 feet to a minimum elevation of 2885. |
| **Siphon** | A 18-foot-long, 36-inch-diameter HDPE pressure and 82-foot-long, 26-inch-diameter 8810 steel pipe with a vacuum pump assembly |
| **Catchbasin** | 8-foot-high by 37-foot-long concrete retaining wall at approximate elevation 2885, compound 0.014 acre feet of water. |
| **Pumpback House** | Pump assembly to pump reservoir flows back to the lake for regulated storage. A 6-foot 40-foot tower will house four pumps of various horsepower. A 640-foot-long 16-inch-diameter HDPE pipe extends from the pump house to Goat Lake. |
| ** Valve House** | A 6-foot by 20-foot valve house connected with the siphon via a 30-inch-diameter HDPE pressure. |
| **Penstock** | Total Length: 6375 feet  
**Diameter and Type**: 36-inch HDPE for 704 feet  
20-inch HDPE for 909 feet  
24-inch Steel for 4,915 feet |
| **Powerhouse** | **Size**: 36-foot by 48-foot by 24-foot high  
**Number of Units**: One  
**Type of Turbine**: Horizontal Twin Jet Paddle  
**Turbine Rating**: 6000 HP  
**Flow**: 32 cfs  
**Head**: 2449  
**Friction Loss**: 94  
**Net**: 2356  
**Power**: 6000 HP  
**Voltage**: 4160 |  
**Voltage**: 4160 |
| **Distribution Line** | **Voltage**: 34.5 kV  
**Length**: 4,528 feet  
**Type**: Overhead on wooden poles |
| **At Res**: | Road from Haines Highway to the powerhouse |

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*960 psi static pressure*
Goat Lake Hydro

FERC Process

- **FERC Process, Community Involvement, & Environmental Considerations**

The Federal Energy Regulatory Commission (FERC) process began in 1991 with a license being issued in 1996. This project required a FERC license because federal lands are involved. During the licensing process AP&T had public and agency scoping meetings at critical junctures to discuss project design and to hear comments and concerns. Concerns generally fall into three categories for hydroelectric projects in Alaska: (1) economics to the local community (will it lower my rates, provide jobs, etc.); (2) environmental impacts; and, (3) visual impacts.

- **Economics**: Getting off of diesel generation stabilized Skagway and Haines electric rates, ultimately lowering their rates by reducing price fluctuations. Having four hydroelectric projects in the Skagway-Haines electric grid has required more full and part-time employees. By stabilizing the electric rates, the local economy can prosper because the cost of electricity is cheaper.
Environmental Impacts:

- Environmental Impacts: During licensing, local hunters were concerned about impacts to mountain goats in the general area of Goat Lake. Studies showed that there were not large numbers of mountain goats in the vicinity of Goat Lake. Construction was timed however to avoid the kidding season as much as possible.

- The lake was stocked with grayling in 1994 by the Alaska Department of Fish & Game, the same year we filed a license application to FERC. After conducting population and habitat surveys from 2001-2007, the grayling were found to have access to the main spawning stream regardless of the lake elevation during the spawning period in June and July. Further studies were discontinued per agency approval.

Anadromous fish do not get closer than several miles downstream of the project tailrace due to a barrier falls in the Skagway River. The penstock offers adequate measures to allow wildlife to move over or under it along its length. No species were considered to be impacted by the construction and operation of this project.

Transmission line poles were configured to protect raptors from electrocution.

The land manager, U.S. Forest Service, chose to keep the project area a primitive recreation area and therefore did not require recreational mitigation.

LIHI Certification

- **Low Impact Hydro Institute (LIHI) Certification**: The Low Impact Hydropower Institute (LIHI) is a non-profit 501(c)(3) organization that established a Low Impact Hydropower Certification Program in 1999 to certify hydropower facilities with impacts that are low compared to other hydropower facilities based on objective environmental criteria. The Certification Program’s goals are to reduce the environmental impacts of hydropower generation, and to create a credible and accepted standard for consumers to use in evaluating hydropower. For a hydropower facility to be certified as low impact, objective certification criteria must be met in the following eight areas:
  1. river flows
  2. water quality
  3. fish passage and protection
  4. watershed protection
  5. threatened and endangered species protection
  6. cultural resource protection
  7. recreation
  8. Facilities recommended for removal

A hydropower facility meeting the eight certification criteria will be certified as a Low Impact Hydropower facility, and will be able to use this certification when marketing power to consumers.
LIHI Certification Cont.

The LIHI Board is made up of:
1. members of the Appalachian Mountain Club
2. Natural Resources Defense Council
3. Union of Concerned Scientists
4. Nature Conservancy
5. representatives of the hydropower industry

Goat Lake Hydro was first certified by LIHI in 2007 and received Certification No. 000026. AP&T chose to do this to gain the “green” label that otherwise has not been afforded hydropower and to obtain e-credits. Each certification is good for 5 years, at which point the project must be recertified. Initial evaluation fee for first time certification was $1,500 (has since changed) and recertification’s every 5 years are $2,000. Annual fee for Goat Lake Hydro is $1,000. Every 5 years the applicant must provide certification that the project remains as it was in its original certification, including the previously mentioned environmental criteria. [http://lowmpacelakehydro.org/](http://lowmpacelakehydro.org/)

Other AP&T Hydro Projects

- Black Bear Lake Hydro: This 4.5 MW project is located on Prince of Wales Island in Southeast Alaska and received the first LIHI Certification in Alaska; Certification No. 000022.
- Black Bear Lake Hydro – 4.5 MW
  - Located on Prince of Wales Island
  - FERC License No. 10440
  - Constructed in 1994-1995;
  - Storage Project—Alpine Lake
  - 5 Years to Permit and License
  - $13 Million to Permit and Construct
  - Has Generated 407,000,000 kWh (as of Sept. 15)
  - Has Off-set 25,857,143 Gallons of Diesel Fuel Since Start-up (as of Sept. 15);
  - Off-site Mitigation for Recreation Due to Remote Location
Other AP&T Hydro Projects

- South Fork Hydro – 2.0 MW
  - Impoundment El. 770, surface acres: 0.25, reservoir kept at spill or within inches of spill
  - Received Non-Jurisdictional Determination from FERC – 2 Years to permit through state
    - Studies were conducted during the permitting phase
  - Non-Jurisdictional Determination from FERC:
    - Not in Navigable Waters
    - Doesn’t affect Interstate Commerce
    - Does not use water from a Government Dam
    - Is Not On Lands Managed By The United States
  - $4.5 Million To Permit and Construct
    - $1,896,932 Energy Cost Reduction Grant Program
    - $1,645,868 Loan from State
    - $957,200 AP&T
  - Has Generated 58,000,000 kWh since start-up (spring 2006 - 2015)
PROJECTS (cont.)

- Dewey Lakes Hydro. – 943 kW
  - Located just east of downtown Skagway
  - FERC License No. 1051
  - Constructed 1902, run-of-river Project
  - Received new 30-Year license from FERC 2007
  - Reservoir El. 480, constructed 1902, surface acres: 2.7, 5-foot maximum drawdown, 990 acre feet of storage
  - Lower Dewey Lake, El. 480, dam constructed 1908, surface acres: 32.84
  - AP&T purchased the Skagway utilities in 1957 and had to immediately file to relicense the project.

Dewey Lakes Hydro
PROJECTS (cont.)

- Kasidaya Creek Hydro: 3.0 MW
  - Located 3.0 Miles south of Skagway
  - Has FERC License No. 11588
  - Constructed in 2006 – 2008; run-of-river project
  - Cable: 35 kV, 3-Phase Submarine
    - Skagway To Haines; laid in 1998
  - Impoundment El. 550, surface acres: 0.33
  - FERC – 6 years to permit and license
  - 3,500 feet of penstock, 250-foot buried transmission line to the submarine cable vault
  - Estimated $10 Million to permit and construct
  - Visual impacts largest concern
  - Construction essentially completed Nov. 2008
  - 2.5 Years to complete construction
PROJECTS (cont.)

- Lutak Hydro – 250 kW
  - Located northeast of Haines
  - Has no FERC license
  - Run-of-river
  - Acquired by AP&T in 2002

- Falls Creek Hydro – 800 Kw
  - Located in Gustavus
  - FERC No. 11659
  - Run-of-river
  - Acquired by AP&T in 2014

Summary of Alaska Power & Telephone’s (AP&T)
Hydro Experience

- AP&T has:
  - 58 years of providing electricity to Alaskans
  - invested in and uses the latest technology to operate efficiently to reduce costs
  - built two storage and two run-of-river hydroelectric projects with more planned throughout Alaska and operates a total of seven hydroelectric projects in Alaska; construction to start on number eight in 2016
  - gone from generating with about 95% diesel and 5% renewable energy (hydropower) for all the communities we serve to approximately 75% renewable energy today
  - AP&T has more hydroelectric projects on line, under construction, and in the planning stages than any other investor-owned utility in Alaska.