GRANT LAKE HYDROELECTRIC PROJECT

SUMMARY OF 2010 FIELD INVESTIGATION

Major Discipline: **Water resources**
Study Name: **Hydrology**

1. Summary of field activities:
   The hydrology program did not include any specific field activities unique to hydrology. Field efforts were combined with other study programs. Key field collection efforts in 2010 are listed below:

   a. **Discharge measurement, Apr. 18, 2010**. During an early spring reconnaissance visit to report on the conditions of Grant Creek, discharge was measured at the former USGS gage station (GC210).
   b. **Install GC210 stream gage, survey GC210, GC200, USGS gage references, and measure discharge, Apr. 26-29, 2010.**
   c. **Measure discharge and download stream temperature data loggers, May 10-11, 2010.**
   d. **Staff gage observations associated with multiple field efforts, Apr. 27 - Jun. 3, 2010.**
   e. **Repair of GC210 data logger apparatus, installation of new GC210 staff gage, download and re-install GC210 data logger, Jun. 10, 2010.**
   f. **Survey and removal of GC210 stream gage and data logger, survey of GC200 vertical control, download stream temperature data loggers.**

2. Data Significance:
   Field measurements extended the period of baseline record for the time periods described above. No unusual hydrological events occurred.

Major Discipline: **Water Resources**
Study Name: **Grant Lake and Grant Creek Water Quality**

1. Summary of field activities:

   a. **Inspected Grant Lake thermistor string, June 3, 2010:** Removed for repair of winter damage.
   b. **Reinstallation of Grant lake thermistor string, July 1, 2010**.
   c. **Water quality sampling, June 16-17, 2010:** Collected field WQ data and water quality samples for lab analysis at two lake locations and three creek sites.

2. Data Significance:
   Field measurements extended the period of baseline record for the time periods described above. Measurements of most parameters were similar to 2009 measurements and typical of glacial drainages in south-central Alaska. There were some questions about the validity of 2009 dissolved oxygen measurements because of the unexpectedly low concentrations found in Grant Lake and Grant Creek. Measurements in June, 2010 were somewhat higher than in 2009 but still lower than might be anticipated in a turbulent stream. Special attention should be given to dissolved oxygen measurements during any future water quality sampling to confirm prior data and determine whether low dissolved oxygen is a natural characteristic of the Grant Creek watershed.

Major Discipline: **Aquatic Resources**
Study Name: **Salmon Spawning Distribution**

1. Summary of field activities:
   a. **Chinook salmon telemetry:** A total of 40 Lotek Telemetry tags were purchased. No tags were deployed and no field data were collected.

   b. **Foot surveys of Grant Creek**: Suspension of 2010 field study efforts occurred prior to the first scheduled foot survey. No field data were collected in the 2010 season.

Major Discipline: **Aquatic Resources**
Study Name: **Grant Creek Resident & Rearing Fish Distribution and Abundance**
Rearing Fish Use of Reach 5
Resident and Rearing Fish Use of Open Water Habitats

1. Summary of field activities:
   Two data collection events were completed in 2010. The field team collected field data for both studies (Rearing Fish Use in Reach 5 and Resident and Rearing Fish Use of Open Water Habitats in Reaches 1-4) concurrently. The first two events occurred May 24-28, 2010 and July 21-26, 2010. The third field event, scheduled for September 2010, was not completed due to the suspension of the 2010 field study efforts. Preliminary results of the May event are summarized in the PowerPoint file that was presented to the Instream Flow Technical Working Group (TWG) in June 2010.

Rearing Fish Use of Reach 5

During the May event, the team established four fixed-line rappel stations from which to access the river within Grant Creek's canyon and re-established the 2009 sample sites throughout the lower portion of Reach 5. The team set a total of 22 minnow traps in Reach 5 and conducted snorkel surveys at four of those sites. The team also conducted angling surveys in the canyon. No fish were captured or observed during the angling surveys. Minnow traps set in the canyon (accessed from the four fixed-line stations) captured Dolly Varden char and juvenile rainbow trout. The field team captured and/or observed primarily Dolly Varden and rainbow trout but also captured and/or observed juvenile Chinook, sockeye, and coho salmon, and sculpin throughout the lower portion of Reach 5. No juvenile salmon were observed at the rope access stations of Reach 5.

In July, the team established one additional fixed-rope station to gain access to Grant Creek at the base of the falls. During the July event, the team set a total of 28 minnow traps, conducted snorkel surveys at eight sites, and conducted angling surveys throughout Reach 5. Species presence throughout Reach 5 in July was generally similar to that in May; however, no juvenile sockeye salmon were observed, and multiple adult rainbow trout were both captured and observed in July.

Resident and Rearing Fish Use of Open Water Habitats

In May, the team established new sample sites throughout Reaches 1-4, including in the tertiary channel, and re-established a number of sites sampled in 2009. The team also recorded additional habitat information at 2009 sample locations so that results from the 2009 minnow trap and snorkel surveys could potentially be compared.

During the May event, the team set 21 minnow traps at sample sites throughout Reaches 1-4. The team conducted snorkel, seine, and hand net surveys at select sites. The team captured and/or observed juvenile Chinook, sockeye, and coho salmon, Dolly Varden char, rainbow trout, and sculpin from Reaches 1-4 in May.

In July, the team set a total of 23 minnow traps and conducted snorkel surveys at eight sites throughout Reaches 1-4. Although these data have not been analyzed, preliminary review indicates that species presence was similar to that observed in May; however, no juvenile sockeye salmon were observed or captured in July.

2. <u>Data Significance:</u>

Reach 5 investigations indicated that juvenile rainbow trout and Dolly Varden were present in the rope access portion of the canyon reach. The high velocity would likely prevent young fish from accessing Reach 5 from downstream suggesting that spawning

of these species likely occurred in Reach 5. Adult rainbow trout were captured by angling at some of the rope access sites indicating that older trout utilize Reach 5. No juvenile salmon were observed at the rope access sites; consequently, no conclusions can be drawn regarding salmon spawning in upstream areas. The distribution of fish in Reaches 1-4 was similar to prior years. Detailed analysis of habitat use has not been conducted.

Major Discipline: **Aquatic Resources**
Study Name: **Resident & Rearing Fish Distribution and Abundance**
Rainbow Trout Spawning and Distribution in Grant Creek

1. Summary of field activities:
   The field team conducted a total of seven angling surveys to target rainbow trout spawning and distribution in Grant Creek from May 12 - June 16, 2010. All data were collected using a handheld mobile data collection unit (Archer) and uploaded into the geospatial database. Preliminary results of the rainbow trout surveys are summarized in the PowerPoint file that was presented to the Instream Flow TWG.

   Thirty-eight adult and subadult rainbow trout were captured with no recaptures of tagged fish. Mark-and-recapture population estimates were not possible because of the lack of recaptures and the small capture numbers. Some of the males were in spawning condition, and at least one female appeared to be spawned out. Reproductive condition of the fish progressed through the spawning period.

2. Data Significance:
   The progression of reproductive condition and the presence of ripe males suggest that rainbow trout spawning occurred in Grant Creek in 2010. The experience in 2010 indicates that angling is not an adequate capture technique for use in population estimates.

Major Discipline: **Aquatic Resources**
Study Name: **Aquatic Habitat Mapping**

1. Summary of field activities:
   A video of Grant Creek was opportunistically shot from helicopter. No other field data were collected.

Major Discipline: **Aquatic Resources**
Study Name: **Instream Flow**

1. Summary of field activities:
   Two data collection events were completed. The first event occurred April 27-28, 2010 and targeted low-flow river conditions. Data collection included the placement and setup of 18 transects as well as the collection of cross section geometries, substrate, cover, stage zero flow, transect photos and water surface elevation, and discharge data.

   The second event occurred May 10-11, 2010 and targeted mid-flow river conditions. Data collection included velocity and depth (full channel), water surface elevation, discharge, transect photos, and additional substrate and cover.

2. Data Significance:
   The work conducted in 2010 represents completion of physical data measurement required for instream flow modeling at low- and mid-flow conditions.

Major Discipline: **Wildlife Resources**
Study Name: **Breeding Bird Surveys**

1. Summary of field activities:
   Point-count surveys for breeding landbirds and shorebirds were conducted in the study area on June 19 and 20, 2010. A total of 20 point-counts were conducted in the study area. As described in the Draft Terrestrial Resources Study Plan, the survey area included the Grant Lake outlet area, the project access road and transmission line alignment, and the powerhouse and penstock. The point counts were conducted based on an established protocol as described in the Alaska Landbird Monitoring System. Point count locations were selected along the survey area corridor based on representative habitat types from aerial photography. Sample points were mapped in the office and when possible were located at least 400 m apart.

Point counts were conducted between 0500 and 1000 hours to coincide with peak singing activity in breeding males. Point-count locations were accessed on foot using a GPS receiver to locate pre-selected point-count locations. Some of the office-based point-count locations were modified in the field due to rough terrain or an inaccessible location. If the location was modified, a new GPS point was taken. The point-counts were conducted in standard 10-minute intervals at each point-count location. All species observed either visually or aurally were recorded during each count, and when possible, the land cover type and behavior of each bird were documented. Observations were categorized into estimated distance categories to allow a presentation of bird densities. Observations were categorized into distance-estimated categories of <50 m or >50 m as measured horizontally from the observers. In addition, species were documented based on the time interval at which they were detected (0-3 minutes; 3-5 minutes; and 5-10 minutes). Birds that were not actively using the point-count area but were flying over were also recorded. General habitat types were recorded for each point-count location. Data were recorded on a standardized data sheet, and photos of the habitat at each point location were taken. Incidental sightings of shorebirds, birds of conservation concern, or nest sites that were observed in transit between survey points were documented.

The following bird species were identified during the breeding bird surveys: fox sparrow, Lincoln's sparrow, dark-eyed junco, common redpoll, pine grosbeak, pine siskin, golden-crowned kinglet, ruby-crowned kinglet, orange -crowned warbler, Townsend's warbler, Wilson's warbler, yellow warbler, yellow-rumped warbler, American robin, hermit thrush, Swainson's thrush, varied thrush, northern waterthrush, brown creeper, black-capped chickadee, boreal chickadee, hairy woodpecker, gray jay, and black-billed magpie.

2. Departures from study plan:
Based on discussions with Mary Ann Benoit, USFS Seward Ranger District Wildlife Biologist and Marty Bray, Chugach National Forest Biologist, the draft study plan methods related to breeding landbird and shorebird surveys were modified as follows:

Survey Timing Window – The draft study plan states that point-count surveys will be conducted in early June 2010. Mary Ann Benoit recommended waiting until mid-June to conduct the surveys because the study area is at a higher elevation and songbirds arrive later to this area.

Point Count Survey Methods – The draft study plan states that point-count survey observations will be categorized into distance-estimated categories (e.g., 0-50 m, 50-100 m, 100-200 m) using visual estimation or a laser rangefinder. Based on the Alaska

Landbird Monitoring System protocol that the USFS uses to conduct breeding bird surveys in the Chugach National Forest, the distance-estimation observations were modified into the following distance and time interval categories: 0-3 minutes (<50 m or >50 m); 3-5 minutes (<50 m or >50 m); and 5-10 minutes (<50 m or >50 m).

Major Discipline: **Wildlife Resources**
Study Name: **Goshawk Surveys**

1. Summary of field activities:
   Two broadcast acoustical surveys were conducted for the northern goshawk (*Accipiter gentilis*), a USFS Species of Special Interest. The ground-based survey for nests and territories was conducted along all proposed linear Project facilities (access road/transmission line, powerhouse, intake and penstock). The surveys methods were based on the Broadcast Acoustical Survey Method as detailed in the USFS Survey Methodology for Northern Goshawks in the Pacific Southwest Region.

   Using aerial photography in an office-based exercise, calling stations were located every 200 m along linear Project facilities for a total of 32 calling stations. Pre-selected calling stations were found in the field using a GPS receiver. Two separate survey events were conducted: the first survey occurred June 15, 16 and 19, and the second survey occurred on June 28. The late June survey only included the alignment from the tower intake to the powerhouse (Call stations 24-32). The survey route on the second goshawk survey was shortened because of redesign of the access road alignment. Therefore, the surveyors were not able to complete the second survey. At each calling station, the surveyors used a broadcast speaker amplifier to broadcast a recording of an adult northern goshawk alarm call and wail call three times. This three-call sequence was completed twice at each call station. After the last sequence, the surveyors walked to the next station, listening and watching for goshawk signs and presence along the way. The food-delivery call was not used as indicated in the USFS methodology for northern goshawks. The broadcast speaker was tested in the field and was found to be audible at least 200 m from the source as long as there was no wind or moving water noise nearby. This protocol requires two years of complete surveys.

   Nogoshawk responses (vocal or non-vocal) were detected during the June surveys, and no nests or goshawk territories were detected. There were no confirmed sightings of goshawks in the study area.

2. Departures from study plan:
   Based on discussions with Mary Ann Benoit, USFS Seward Ranger District Wildlife Biologist, the study plan methods were modified to include ground-based surveys for northern goshawk nests and territories instead of an aerial survey for raptor nests. The USFS conducted an aerial survey for bald eagle nests that included the Grant Lake study area on May 7, 2010 Therefore, the USFS did not feel it was necessary for HDR biologists to conduct an aerial raptor nest survey as indicated in the draft study plan.

Major Discipline: **Wildlife Resources**
Study Name: **Waterbird Surveys**

1. Summary of field activities:
   Boat-based, intense area searches for waterbird broods and nesting habitat were conducted during June and July 2010 on Grant Lake. In addition, a foot survey of Grant Creek was conducted in mid-July 2010 to identify harlequin duck broods and other waterbirds. A total of four boat-based surveys were conducted on Grant Lake (6/23/2010, 7/9/2010, 7/16/2010, and 7/23/2010) and one foot survey of Grant Creek was conducted on 7/12/2010.

   Waterbird Breeding and Brood-Rearing Surveys - Boat-based, intense area surveys were conducted along the entire nearshore habitat of Grant Lake in late June and mid-July 2010 to search for waterbird nests and broods. The survey was conducted by two observers motoring slowly along the lakeshore, documenting waterbirds and other wildlife observed. No effort was made to search for nest sites (except potential loon nesting habitat) since broods were already on the lake during the June 23 survey. Additionally, the nesting waterbirds documented on Grant Lake were mainly tree-nesting species that nest in cavities and standing dead trees. Therefore nest searches along the entire shoreline were not conducted. However, areas with potential for loon nesting habitat (marshy habitat, emergent vegetation, and islands), which was limited to a few isolated areas on Grant Lake, were searched.

   Potential waterbird nesting habitat and broods were documented along the shoreline. The following information was recorded for each brood observed: species, location, number of ducklings and adults, approximate age of brood, behavior, and distance from shoreline. Beaver lodge locations and status (active versus inactive) were documented with GPS during the waterbird surveys. In addition, a spotting scope was used to search for mountain goats and Dall sheep on the slopes above Grant Lake.

Waterbirds identified during the surveys were mallard, Barrow's goldeneye, common goldeneye, harlequin duck, common merganser, red-breasted merganser, common loon, pacific loon, herring gull, solitary sandpiper, and spotted sandpiper.

Harlequin Duck Survey - A foot survey of Grant Creek (below the falls to the outlet) was conducted on July 12 to identify harlequin duck broods and other waterbirds using Grant Creek. For each harlequin duck observation, the following data were recorded: total number of birds in the group; numbers of pairs, males, and females; number of young; the birds' location (i.e., in the water, creek banks, flying); and a brief description of the creek habitat where the bird or birds was documented. GPS locations of all harlequin duck observations were recorded. Other notable species such as common and red-breasted mergansers were counted, but locations were not recorded.

No harlequin ducks were seen during the survey on Grant Creek. Other birds identified during the harlequin duck survey were red-breasted merganser, American dipper, belted kingfisher, and bald eagle.

2. Departures from study plan:
   Based on discussions with Mary Ann Benoit, USFS Seward Ranger District Wildlife Biologist and Lynnda Kahn, USFWS Kenai Field Office Fish and Wildlife Biologist, the Terrestrial Resources Draft Study Plan section related to waterbird surveys was modified as follows:

   Survey Timing and Duration - The draft study plan states that boat-based, intense area surveys would be conducted in mid to late June to search for waterbird nests, and brood-rearing surveys would be conducted in mid-July. Based on comments from Lynnda Kahn, additional effort was placed on conducting brood surveys in July rather than searching for nests in June because nests are difficult to find. Therefore, three surveys were conducted for waterbird broods in July rather that one survey in mid-July as stated in the draft study plan.

   Survey Methods – The draft study plan states that nest searches would be conducted along the shoreline. However, during the first survey event in late June, broods were already on the lake. Additionally, waterbird species documented on Grant Lake are mainly tree-nesting species (goldeneyes and mergansers) that nest in cavities and standing dead trees. Therefore, nest searches along the entire shoreline were not conducted. However, areas with potential for loon nesting habitat (marshy habitat and small islands), which was limited to a few isolated areas on Grant Lake, were searched.

The Terrestrial Resources Draft Study Plan included a winter survey of the outlet area of Grant Lake in February or early March 2011 to document waterbird use and the amount of open water habitat available. This survey has not been completed.

Major Discipline: **Wildlife Resources**
Study Name: **Terrestrial Mammals**

1. Summary of field activities:
   The only specific survey conducted for mammals in the study area was a bat survey to document roosting of little brown bats (*Myotis lucifugus*) in an abandoned historic cabin on the west side of Grant Lake. While no other specific surveys were conducted, all incidental observations of wildlife observed during other field studies were documented.

2. Departures from study plan:
   The draft study plan states that a bear den emergence aerial survey will be conducted in early to mid-May 2010 as bears are leaving their dens in the spring (before snow melts and leaves emerge in the area). Based on discussions with Mary Ann Benoit, USFS Seward Ranger District Wildlife Biologist, no aerial bear denning survey were conducted in the Grant Lake area because the USFS was planning to fly the Grant Lake area on May 6 as part of its annual survey for bald eagle nests and trumpeter swans in the area. Bald eagle nests were observed but there were no trumpeter swans in the area. She said she would have the pilot fly the Grant Lake study area to search for bear dens and bald eagle nests. She provided HDR with the shapefiles and findings to use in determining Project effects on bears.

   Karen O'Leary, USFS, commented that bats have been reported to roost in the historic cabin on the west end of Grant Lake. She requested that a bat survey of this cabin be conducted if water level changes could affect the cabin.

   Incidental observations of terrestrial mammals observed during 2010 wildlife studies in the Project area were documented by all field crews. Incidental wildlife observations were compiled on a data sheet for the 2010 field season and include the following information for each observation: date/time, species, location, number of individuals, habitat, sex and age (if possible), and behavior.

   Biologists conducted a bat survey of the historic cabin on July 23, 2010 based on standard USFS bat survey protocols for abandoned buildings and mine sites. A high powered flashlight was used to search the cracks and crevices of the cabin and crews searched for bat signs (guano and carcasses). The roof of the cabin was falling in and

there were no bat signs in the cabin. Photos were taken of the inside and outside of the cabin.

Major Discipline: **Botanical Resources**
Study Name: **General Vegetation Type Mapping**

1. Summary of field activities:
   No field data were collected. There are no new data for this task, although some existing data have been included as a layer in the GIS database, i.e., USFS Cover Type (1968 - 1973).

Major Discipline: **Botanical Resources**
Study Name: **Sensitive Plant Survey and Invasive Plant Survey**

1. Summary of field activities:
   No field data were collected. There are no new data for this task, although a request (no response yet) for information on sensitive plants in the Project vicinity was made to the Alaska Natural Heritage Program at ENRI, UAA.

Major Discipline: **Botanical Resources**
Study Name: **Wetland Mapping**

1. Summary of field activities:
   Wetlands field verification was completed during June 24-26, 2010. The area west of the Vagt Lake access alignment and at the facilities area were surveyed. Representative wetland types and upland areas were sampled. In all, 44 sampling plots were made at representative wetland types, streams, and upland areas. Paper data forms and maps with notations have been scanned. GIS data have been loaded into the geodatabase.

Major Discipline: **Recreation and Visual Resources**
Study Name: **Recreation and Visual Resources Surveys**

1. Summary of field activities:
   On June 2 and 3, 2010 a field investigation of trails and other recreation features in the Project vicinity was conducted. Areas visited included the Vagt Lake Trail, the north shore of Grant Creek, the Grant Lake Portage Trail, and the flagged proposed commemorative INHT alignment beginning at Crown Point Road. Waypoints were collected and observations made of recreational activity and potential viewpoints. The

June scoping meeting at Moose Pass was attended by a recreation specialist who interviewed a number of public attendees and agency representatives. Information was collected from the public/Moose Pass residents (recorded on maps) regarding views, trails, and recreational uses.

2. Departures from study plan:
   The originally envisioned opportunity for open-house-style time at and around the June scoping meeting was not feasible. Therefore, the investigator was not able to ask many direct questions of attendees. However, some good information was obtained from a couple of attendees.

   Beginning at the June scoping meeting and continuing through coordination and meetings with the USFS and other agencies, INHT issues quickly grew to be much bigger than envisioned. This was due to the potential conflict of public uses between Project development and the proposed route of the commemorative INHT.

Major Discipline: **Cultural Resources**
Study Name: **Cultural Resources Survey and Section 106 Consultation**

1. Summary of field activities:
   No field data was collected.

   A meeting to initiate Section 106 consultation was held on June 24, 2010. Notes from this meeting are available.