

**Kenai Hydro, LLC**  
**Grant Lake/Falls Creek Hydroelectric Project**  
**Aquatics Technical Work Group Meeting**  
**Conference Call**  
**July 16, 2009, 1:30 pm – 2:15 pm AST**

**In Attendance**

Jenna Borovansky, Long View Associates  
(LVA)  
Mike Cooney, Friends of Cooper Landing  
Lynnda Kahn, U.S. Fish and Wildlife  
Service (USFWS)  
Jason Kent, HDR  
Jason Mouw, Alaska Department of Fish  
and Game (ADF&G)  
Paul McLarnon, HDR

John Morsell, Northern Ecological Services  
(NES)  
Doug Palmer, USFWS  
Amanda Prevel-Ramos, HDR  
Gary Prokosch, Alaska Department of  
Natural Resources (ADNR)  
Kim Sager, ADNR  
Brad Zubeck, Kenai Hydro, LLC (KHL)

**Meeting Summary**

**Agenda**

- Introductions
- Discussion of Habitat Memo and ADF&G Comments
- Review of Field Work Completed to Date
- Open Discussion and Review of Action Items

Paul McLarnon (HDR) and Brad Zubeck (KHL) welcomed meeting participants and previewed the agenda for the day. Jenna Borovansky (LVA) summarized the location on the website where Technical Workgroup (TWG) meeting notes and information can be found, and noted that the final notes (with changes based on comments received) for the May 19, 2009 TWG meeting had been posted to the website.

**Habitat Memo and ADF&G Comments**

Paul McLarnon (HDR) stated that as a follow-up to the May 19, 2009 TWG meeting, a Habitat Suitability Curve memo (dated 6/25/09) was distributed to the TWG via email on July 1, 2009 (Attachment 1). Comments were received from ADF&G on this memo on July 10, 2009 (Attachment 2). Subsequently, HDR worked with ADF&G to address these comments and Paul asked Jason Mouw to review ADF&G's comments for the group. Jason noted that after discussion of ADF&G's comments he is comfortable with HDR's field approach and feels that ADF&G and HDR are on the same page regarding methodology to be used. ADF&G has offered to accompany HDR in the field in mid to late-August to utilize the mini-piezometer to determine whether there is groundwater influence in Grant Creek. Jason Mouw reviewed the methodology for the group, and will provide a write-up about the proposed methodology via email.

## Field Work Completed to Date

Paul McLarnon reviewed the results of field work to date, as outlined in the memo distributed prior to the meeting (Attachment 3). He noted that high flows (almost at historic highs of 600 to 700 cfs last week) and the steep terrain have created challenging field conditions.

The group inquired as to the size and age of coho and Chinook recorded. Amanda Prevel-Ramos (HDR) noted that the sizes were about 30-45 mm, and suspected they were young of the year (YOY). Paul noted that the snorkeling observations were consistent with YOY findings, and that it did not appear that any fish were over-wintering (from casual observations to date).

Doug Palmer (USFWS) asked whether both gear types (minnow traps and electro-fishing) were used at all sites. Paul also clarified that a subsample of the lake minnow trapping sites were electro-fished when traps were removed, if the sites were not too deep.

Paul stated that samples in the lake would be taken at depth with gill nets during future sampling events, but this has not been done to date. He also noted that tributaries to Grant Lake in June have been turbid, and not many fish have been observed.

Doug Palmer asked if sculpins had been identified; he suspects they are either slimy or coast range sculpins. Paul stated that sculpins have not been identified to species, but that HDR can collect reference samples to identify the one or two sculpin species found in Grant Lake.

Mike Cooney noted that the written report does not reflect that juvenile sockeye were found in electrofishing efforts, as Paul mentioned during the call. Doug Palmer noted that the key on the sampling maps (Figure 1) could more indicate the gear types used at each sampling site. HDR will update the mid-season report to reflect these comments.

## Closing

Paul summarized upcoming field dates in July and August (and noted that these dates are also provided on the website). Brad Zubeck encouraged all TWG members to try to get out in the field with HDR to observe the field work.

Brad also noted that the draft communications protocol that will accompany KHL's request to the Traditional Licensing Process (TLP) is out via email and that KHL would appreciate comments from the TWG. He also reminded the TWG that the Pre-Application Document will be released in early August.

Jason Kent and Paul McLarnon reminded the group that the field visit and TWG meeting to develop instream flow methodology will be held September 22-24, 2009.

## Action Items

- J. Mouw to provide piezometer methodology to the TWG via email. [This methodology was posted to the Kenai Hydro website with the July 16, 2009 meeting information available to TWG members.]

- HDR to update the mid-season report to reflect suggestions and re-post updated summary on the website. [Updates included in Attachment 3.]

## **Attachments**

Attachment 1: HSC Memo

Attachment 2: ADF&G Comments on HSC Memo

Attachment 3: 2009 Mid-Season Field Update

## **Attachment 1: HSC Memo**

# Technical Memorandum



**Project Name:** Grant Creek Hydroelectric Project - Hydrology

**Task:** Instream Flow Study – Habitat Suitability Criteria

**Tech Memo Title:** 2009 Grant Creek Habitat Use/Selection: Data Collection

**To:** Grant Creek Instream Flow Technical Working Group (TWG)

**From:** HDR Alaska, Inc.

**Primary Authors:** Paul McLarnon (HDR) & Erin Cunningham (HDR)

**Date:** 06/25/09

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## Background

On May 19, 2009 the Instream Flow Technical Work Group for the proposed Grant Creek hydroelectric project met via teleconference to discuss several topics related instream flow methods and data needs. An action item resulting from this meeting was for HDR to provide the TWG with a technical memo describing reconnaissance fish habitat use data to be collected during the 2009 field season, hence, the purpose for this memorandum.

During the afore mentioned meeting it was noted that the complexities of having a proposed hydroelectric project in the system may not be conducive to using a hydrology-based method as the primary instream flow method and that the level of effort for the collection of habitat suitability criteria (HSC) data collection should match the scale of the proposed project and instream flow method. There was a concern that until the TWG has more information about actual fish use of aquatic habitats in the project area, that the collection of specific HSC data may be based on incorrect assumptions. It was suggested that non-traditional kinds of habitat characteristics such as intragravel flow or close juxtaposition of varying habitats are often more important than traditional measures of HSC such as depth and velocity.

The TWG felt that more site-specific information is needed before making a decision on most appropriate instream flow methodology and the necessary HSC parameters. The TWG further discussed that field data characterizing occupied habitats would allow for better professional judgments towards the development of an appropriate instream flow study. As a result, the TWG agreed that HDR will focus 2009 field data collection efforts on describing habitat characteristics in areas of high fish use.

## Methods

### ***Juvenile Rearing and Resident Fish - Habitat Selection***

A two-person field crew will conduct a minimum of two sampling events in 2009; each sampling event spanning over a two- to three-day period. The first sampling event occurred in late June and the second event will be scheduled for late summer.

The purpose of the late June data collection event was to provide insight into the species composition and relative abundance of juvenile rearing and resident fish within representative habitat units sampled in Grant Creek. The late summer event will occur during the period of maximum dispersal of fish into feeding habitats and expand the insight gained from the June sampling event

### *Sample Site Selection*

For juvenile rearing and resident fish, the two-person field crew will select sample sites based on the variety of habitats available with an emphasis on aquatic habitats that are anticipated to contain high densities of fish. The assumed higher-density target areas will include but not necessarily be limited to portions of the stream associated with large woody debris, side channels, back water areas, and pools. In an effort to include a representative subset of habitat available in Grant Creek, areas that may not be expected to contain high numbers of rearing juvenile fish (i.e., fast water in the main channel) will also be sampled. However, some habitat types may not be included in the 2009 surveys due to safety concerns (i.e., fast water with fallen trees that create sweepers/strainers immediately downstream).

### *Record Habitat Characteristics*

The field crew will characterize aquatic habitat units based on the United States Forest Service (USFS) aquatic habitat classification system for fish and aquatic stream surveys (USDA Forest Service, 2001). Aquatic habitat units will be recorded at the macro habitat level as a pool, beaver pond, and/or fastwater. The field crew will further describe the habitat unit by dividing it into one of eight possible meso-habitat units. For example, a pool would be classified as backwater, scour, or slough and fastwater would be classified as a glide, riffle, or cascade. It should be noted that a more comprehensive aquatic habitat characterization of Grant Creek will occur later once the flow conditions allow which, in order to maintain data continuity, will use the same habitat classification system.

The field team will also record micro-habitat characteristics observed within the stream segment sampled, such as the presence of cover (i.e., undercut banks, woody debris, overhanging vegetation, and/or large substrate). The team will characterize the depth

and flow characteristics (i.e., shallow fast, shallow slow, deep fast, and/or deep slow) observed within each area sampled and indicate the general location of the habitat unit suitable for sampling (i.e., stream margin, remnant channel off stream margin, entire stream width, etc.). Substrate at each habitat unit sampled and at each fish observation will also be recorded using the USFS methods. Other atypical habitat characteristics, such as the presence of upwelling groundwater or unusual underwater topography, will also be recorded. Observers will use professional judgment to provide a subjective statement of habitat value and reasons why fish are, or are not, present.

#### *Record Fish Presence/Habitat Use*

Snorkeling and electrofishing sampling methods will be used to determine species identification, lifestage, and the relative abundance. Snorkeling will be the primary method while electrofishing will primarily be used to confirm species identification. Locations of fish concentrations within the macro or micro-habitats sampled will be noted and subjectively linked to specific habitat characteristics, if possible.

#### ***Adult Spawning Salmon – Habitat Selection***

In an effort to characterize parameters that may influence spawning habitat selection for adult salmon in Grant Creek, a two-person field crew will conduct a minimum of two sampling events in 2009 to record various habitat parameters at spawning locations.

The first event is scheduled to occur during the peak of Chinook and sockeye spawning, which is presumed to be in mid to late August. (Chinooks may be somewhat earlier than sockeye – may need two sets of observations) The second event, which will target spawning coho salmon, will likely occur in November. The schedule will be influenced by observations recorded during the ongoing foot surveys to record spawning locations of adult migratory fish in Grant Creek. The foot surveys started in early June and will continue through the fall.

#### *Sample Site Selection*

Spawning locations for Chinook, sockeye, and coho salmon will be identified through direct observations of visible redds or aggregation of redds and/or the observation of actively spawning pairs. The field crew will target spawning areas previously identified through the ongoing foot surveys.

Where stream conditions allow (i.e., suitable velocity for safe access), the field crew will collect habitat parameters in relative proportion to the number of redds observed in those areas (i.e., more data will be collected from areas of observed high use relative to other areas).

### *Record Habitat Parameters by Species*

The field crew will record velocity, substrate, depth, and bed temperature in the vicinity of each redd sampled. Substrate with redd will be classified based on a Wolman classification system (Wolman 1954) and bed temperature will be recorded at a depth of 15 to 20 centimeters below the substrate. All spawning redds or aggregations of redds sampled will be recorded on a GPS. The location of each redd or aggregation of redds will be estimated within the stream channel. This will be done by dividing the stream channel into five equally-spaced "lanes" (i.e., left or right stream margin; left or right mid-channel; or middle channel). The location of the redd in relation to specific stream topography will be noted; for example "redd located on slope at downstream end of riffle" or "redd located in gravel pocket behind a boulder", etc.

### **Conclusion**

HDR will focus 2009 field efforts on characterizing fish use in what is perceived to be suitable habitat. Fish habitat use observations will be conducted at the reconnaissance level of effort, and the results are intended to be used by the TWG to make more informed decisions for formal HSC data collection methods or consideration of other kinds of evaluation criteria in the subsequent TWG meetings.

A summary of field data observations collected to date will be presented to the TWG at the September meeting. The results of the 2009 habitat use characterization study will be incorporated into a technical memorandum that will be distributed to the TWG in late 2009 or early 2010.

### **References**

- USDA Forest Service 2001. FSH2090 – *Aquatic Habitat Management Handbook R-10 Amendment 2090.21-2001-1*. Chapter 20 – Fish and Aquatic Stream Habitat Survey. 2001
- Wolman 1954. In USDA Forest Service 2001 FSH2090 – *Aquatic Habitat Management Handbook R-10 Amendment 2090.21-2001-1*. Chapter 20 – Fish and Aquatic Stream Habitat Survey. 2001

## **Attachment 2: ADF&G Comments on the HSC Memo**

**From:** Mouw, Jason E B (DFG) [mailto:jason.mouw@alaska.gov]  
**Sent:** Friday, July 10, 2009 2:16 PM  
**To:** Kent, Jason; McLarnon, Paul; Cunningham, Erin E.  
**Cc:** Ferguson, Jim M (DFG); Cappiello, Thomas A (DFG)  
**Subject:** RE: Grant Creek Instream Flow TWG Conference Call - July 17

Jason, Paul and Erin:

We have appreciated the opportunity to interact with you on your habitat assessment protocol and have read your memo sent the 1<sup>st</sup> of July. We offer the following comments for your consideration.

1. We recognize that placing an emphasis on assessing habitats that are the most heavily occupied by fish allows you to concentrate your efforts on what habitat parameters seem to be the most important to fish. However, habitat associations within occupied locations are only significant if they are absent in unoccupied locations. Hence, your sample sizes of locations with little to no fish use need equal emphasis and to be as numerous as those locations with higher occupancy. The only other alternative would be to sample the full distributions of all those variables with which fish associate for comparison with the occupied distribution. Since this would require immeasurably more field time, we encourage you to instead focus on assessing the distributions of fish by life stage, strategy and species.
2. Within the spawning locations measured, we encourage you to include measurements of ground and surface water exchange (vertical hydraulic gradient or VHG). Temperature, which you have included in your protocol, is an excellent tracer or indicator of the VHG when upwelling is present. Certain spawning strategies of species are known to center around upwelling, but others tend to associate with downwelling, which cannot be detected by measuring the temperature of the stream bed. Since the VHG does not often vary greatly at the micro habitat level, it does not require as many measurements as the other parameters you have already included. For example, you wouldn't need to measure VHG at each redd, only perhaps at each redd cluster or stream reach. As we have discussed, we will be happy to discuss mini-piezometer protocols with you for characterizing VHGs in Grant Creek.
3. The aquatic habitat classification system noted in your memo provides a good foundation for classifying habitats as a basis for stratified sampling but it does not include a complete classification of habitat units in the river. The main channel should be sampled in a structured way because unstructured sampling, or a focus on sampling pools, can lead to a misrepresentation of habitats available to fish. The topography of the stream bed adjusts to the way in which flow energy pulses through the system resulting in riffle-pool sequences. Fish are likely influenced by the energy gradient in this sequence and therefore select habitat according to their preferences. A full sequence is comprised of a riffle, run, pool, glide and tailout. Since the hydraulics are dramatically different in each of these topographical units, sampling in the main channel should be stratified to account for bed topography. This stratification also assists field crews to consistently identify habitat units.

I do not have the full distribution list for the instream flow TWG and would appreciate you forwarding this on to the group. Thanks for the opportunity to comment.

*Jason E.B. Mouw  
Division of Sport Fish - Research & Technical Services  
Alaska Department of Fish & Game  
333 Raspberry Rd. Anchorage, AK 99518  
phone: (907) 267-2179  
fax: (907) 267-2422*

## **Attachment 3: 2009 Mid-Season Field Update**

Kenai Hydro Project  
Instream Flow Technical Working Group  
Environmental Baseline Studies Mid-Season Update  
*Updated based on comments from Teleconference, July 16, 2009*

### **Introduction**

Field work involving the fisheries, water quality and hydrology studies began in late May. Steady progress has been made in all of the studies a brief summary of which is provided below and in the overview provided in Table 1. The Gorge Reach (i.e. Reach 5) has been unworkable due to high velocity flows that have resulted in unsafe conditions. Plans are to wait until flows recede and attempts will be made to access the Gorge Reach.

### **Optimal Habitat Survey**

An optimal habitat survey was conducted June 24-25. This effort targeted juvenile fish using snorkeling methods. A range of habitats were sampled the results of which will be presented to the TWG in a later meeting.

### **Adult Salmon Surveys**

To date four adult salmon surveys have been conducted. Foot surveys to enumerate spawning salmon occur every 10 days. As of July 12, 2009, no adult anadromous salmon have been observed. However, several adult rainbow trout have observed during the foot surveys. The water is generally high, fast, and turbulent. During the most recent foot survey turbidity increased significantly making it difficult to see fish in the water. This was likely due to increased glacial runoff and recent warm weather conditions.

### **Adult Resident Fish Surveys**

To date five surveys for adult resident fish have been conducted see Figure 1 for sample site locations. Resident fish surveys occur every 10 days. A total of 21 fish have been captured. Of those 21, four were Dolly Varden and 17 were rainbow trout. Rainbow trout ranged in size from 191 mm – 410 mm. The spawning condition of the rainbow trout was not able to be determined. Four rainbow trout that were caught had been previously caught and marked in an earlier sampling event. No fish were caught on the most recent survey on July 11, 2009, this is most likely due to the height and velocity of the water.

### **Juvenile Fish Surveys**

Two minnow trapping surveys have been conducted in Grant Creek; opportunistic electrofishing was conducted in at least two minnow trap sites per reach to account for possible gear bias in species recruitment to traps. During the first sampling event minnow traps were set in Reaches 1-4 while the second survey event trapped Reaches 1-5, with traps only set in the lower end of Reach 5, see Figure 1. Reach 6 was trapped opportunistically during the Grant Lake sampling event, the results of which produced only three spine sticklebacks. The first minnow trap survey captured a combination of Chinook salmon, coho salmon, Dolly Varden, rainbow trout, and sculpin (~65-90mm). The second survey captured mostly Dolly Varden and significantly fewer rainbow trout, sculpin, Chinook salmon, coho salmon than the first survey. A few threespine stickleback (~50 mm) were also captured, whereas they were not captured in the first survey. Electrofishing at minnow trap sites during both events confirmed presence of juvenile sockeye salmon fry (~30-50 mm). Fork length of salmonids captured during surveys for juvenile fish in Grant Creek was: ~30-50 mm for Chinook salmon, ~35-50 mm for coho salmon, ~70-160 mm for Dolly Varden, ~30-50 mm for sockeye salmon, and ~45-110 mm for rainbow trout. Total length of non-salmonids captured was ~65-90mm for sculpin and ~50-55 mm for threespine stickleback .

### **Lake Survey**

One survey of Grant Lake has been conducted. Grant Lake was sampled with a variety of methods including minnow traps, gill nets, and electrofishing, see Figure 2. The dominant fish species in the minnow traps were threespine stickleback. However, threespine stickleback were only captured in the front lobe of the lake. In the back lobe of the lake and in the tributary streams feeding Grant Lake, no fish were captured in minnow traps. Electrofishing occurred in the tributaries feeding Grant Lake around the minnow trapping sites which produced only a few sculpin. Gill netting occurred at five locations around Grant Lake. All gill nets were set at the surface and placed perpendicular to the shore. No fish were captured in any of the gill nets.

### **Hydrology**

Continuous stream gages have been installed in Grant Creek and Falls Creek. On Grant Creek a gage was established at the old USGS gage location, Figure 1. On Falls Creek the gage was established just downstream from the rail road and highway bridges. The historical gage location on Falls Creek could not be found so the new gage was located in what was determined to be the best location.

Instantaneous flows were collected at both gage locations upon installation. A second set of flow data was collected at each station approximately 10 days later. Instantaneous flows are scheduled to be collected again in late June, during which time flow data will be collected to determine if there is any measureable flow loss or accretion associated within the Gorge Reach and other areas of Grant Creek.

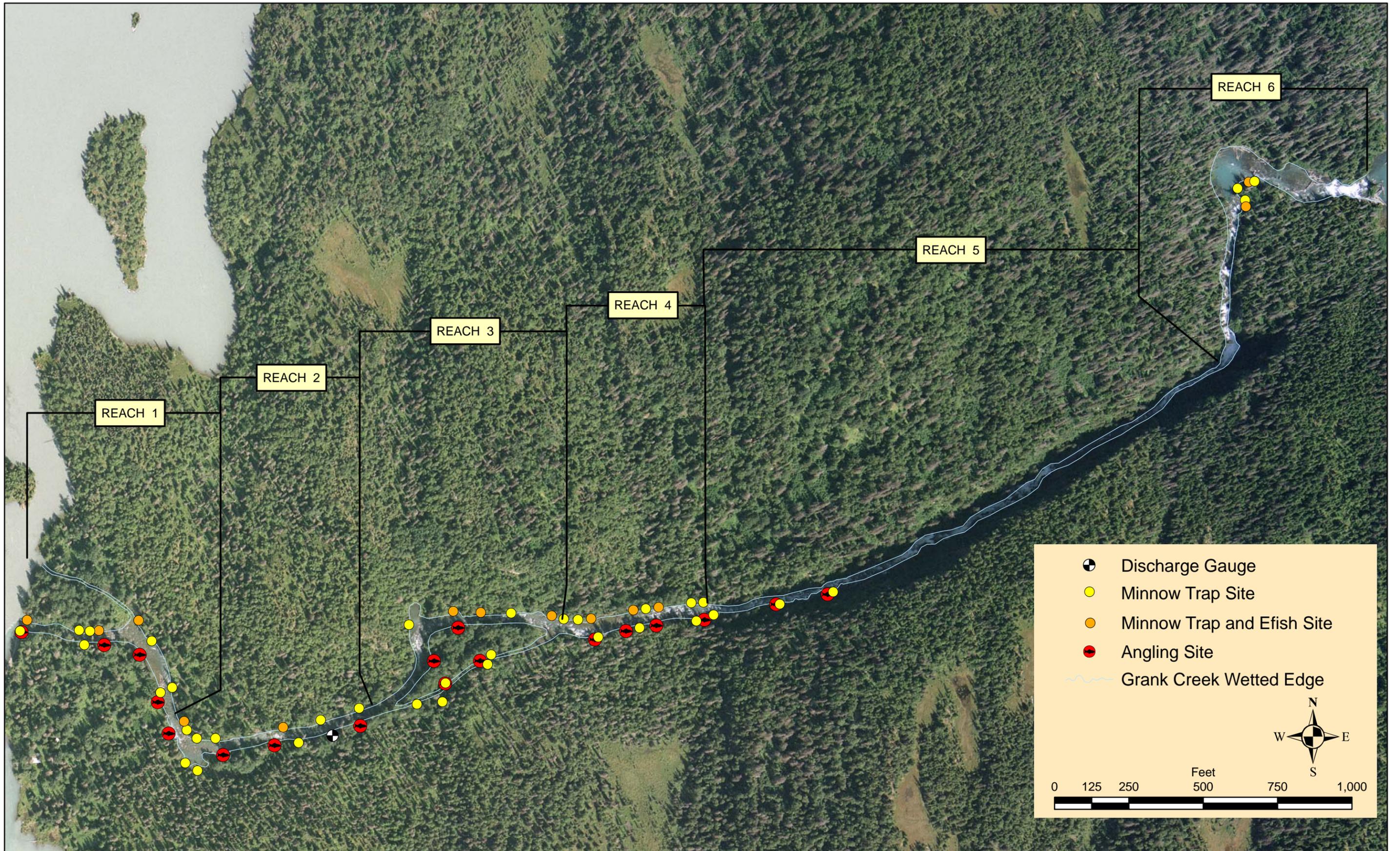
### **Water Quality**

In early June water quality samples were collected from Grant Lake, Grant Creek and Falls Creek. A thermistor string was installed in southern portion of the Lake in approximately 100 ft of water. The thermistor string is measuring temperature on an hourly basis at 10 ft. depth intervals. Temperature data loggers were also installed at four locations in Grant Creek including the area of stream adjacent to proposed powerhouse location along with riffle and pool habitats.

Table 1. Overview of Sampling Events.

Date	Mobilize/ train /recon	Fisheries / Instream Flow						Water Quality				Hydrology	
		Resident Fish (Angling)	Juvenile Fish (Minnow Trapping)	Adult Salmon (Foot Surveys)	Snorkel recon	Grant Lake (Gill Net & Minnow Trap)	Optimal Habitat	Grant Lake	Grant Creek	Falls Creek	Install Gant Lake Thermistor	Install Continous Gages Flow & Temp	Flow Measurement
27-May	X												
28-May	X												
29-May	X												
30-May													
31-May		X											
1-Jun		X											
2-Jun					X								
3-Jun													
4-Jun													
5-Jun													
6-Jun													
7-Jun							X			X			
8-Jun								X			X	X	X
9-Jun			X								X	X	X
10-Jun		X	X										
11-Jun													
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15-Jun						X							
16-Jun						X							
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8-Jul			X										
9-Jul		X	X	X									
10-Jul			X										
11-Jul													
12-Jul													
13-Jul													
14-Jul													
15-Jul													
16-Jul													
17-Jul													
Number of sampling events*		5	2	4	1	1	1	1	1	1	1	1	3

\*Some events had a duration of more than one day.



REACH 1

REACH 2

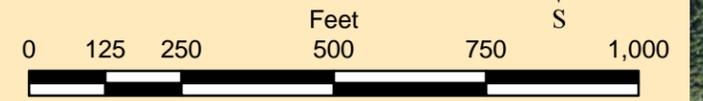
REACH 3

REACH 4

REACH 5

REACH 6

- ⊕ Discharge Gauge
- Minnow Trap Site
- Minnow Trap and Efish Site
- Angling Site
- ~ Grank Creek Wetted Edge



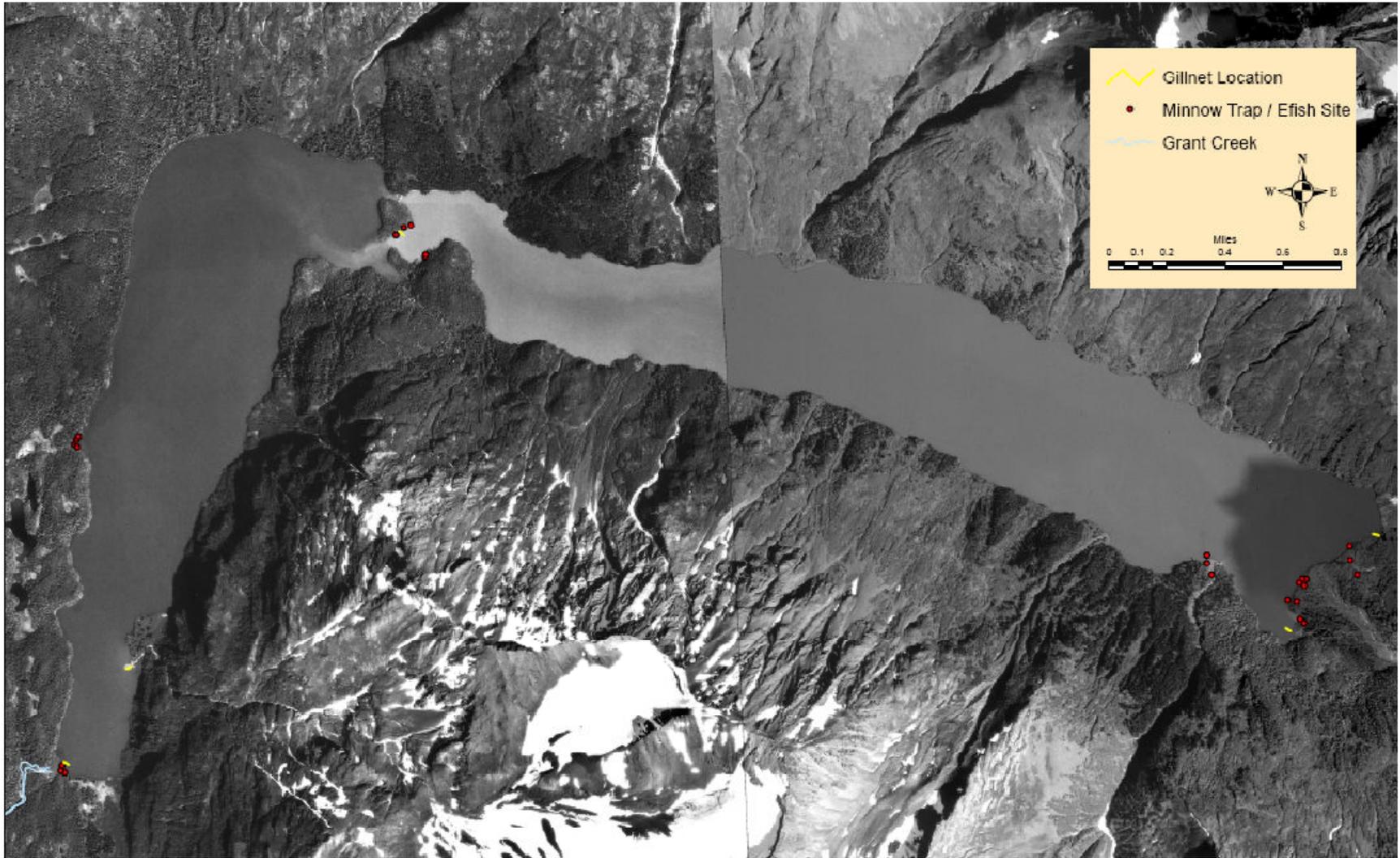


Figure 2 Grant Lake Sample Locations