Part 4 of 10 of Appendix L of Resource Report No. 3

APPENDIX L.4 2013 STREAM FISH SURVEY COMPLETIONS REPORT PERMIT SF2013-253 (USAKE-UR-SRZZZ-00-0006)

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Confidential

Alaska LNG

2013 Stream Fish Survey Completions Report

Permit SF2013-253

USAKE-UR-SRZZZ-00-0006

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AUTHORIZATION PAGE

ENDORSED BY: **DATE:** November 7, 2013

NAME: Kim Holmes

TITLE: Biologist/ GIS Specialist

ENDORSED BY: **DATE:** November 7, 2013

NAME: Wes Cornelison

TITLE: Technical Studies Manager

ENDORSED BY: **DATE:** November 7, 2013

NAME: Mike Gray

TITLE: Project Manager

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ABSTRACT

During the summer of 2013, Alaska Liquefied Natural Gas conducted stream fish and habitat surveys at 20 field targets between Point Thompson and Livengood, Alaska in support of Project permitting and regulatory compliance. Assessments of fish distribution and presence, habitat, and stream characteristics were conducted at each site.

Over half of the field sites selected through desktop analysis contained water at the time of survey, and nine sites were characterized as fish habitat. Six of these nine sites were characterized as optimal fish habitat based on stream channel features, water content, water quality parameters, streambed substrate, and aquatic habitat features.

A total of 755 fish were captured/observed, all north of the Brooks Range. Fish captured/observed include Arctic grayling (*Thymallus arcticus*), Dolly Varden (*Salvelinus malma malma*), ninespine stickleback (*Pungitius pungitius*), and round whitefish (*Prosopium cylindraceum*). These results provide a thorough and representative assessment of fish distribution and fish habitat for sites surveyed.

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ACRONYMS AND ABBREVIATIONS

ADF&G	Alaska Department of Fish and Game
AS	Alaska Statute
DO	dissolved oxygen
EFH	Essential Fish Habitat
FERC	Federal Energy Regulatory Commission
LNG	liquefied natural gas
µS/cm	microSiemens per centimeter
MLRA	Major Land Resource Area
mg/L	milligrams per liter
NEPA	National Environmental Policy Act
ORP	oxygen reduction potential
PLX	pipeline crossing
Project	Alaska LNG
QA/QC	quality assurance/quality control
U.S.	United States
USDA	U.S. Department of Agriculture

1.0 BACKGROUND

This 2013 Fish Completions Report summarizes the data collection methods and results of the 2013 project Alaska Liquefied Natural Gas (LNG; Project) fish study field surveys, as required by Alaska Department of Fish and Game (ADF&G), in compliance with Fish Resource Permit SF2013-253 issued to Wes Cornelison of URS Corporation on the 14th day of June, 2013. A total of 20 streams were surveyed, which included analysis of fish habitat, fish distribution and water chemistry in streams potentially impacted by the Project footprint.

The ADF&G Fish Resource Permit received to conduct the 2013 fish field studies is presented in **Appendix A**. Site maps, hardcopy field data forms, quality assurance/quality control (QA/QC) checklists, and photographs are presented in **Appendix B**. The 2013 Collections Report is presented in **Appendix C**. The *2013 Stream Fish Investigations Field Study Protocols and Execution Plan* is presented in **Appendix D**.

1.1 PROJECT DESCRIPTION

Please see Project Description at the beginning of this Resource Report.

1.2 STUDY AREA

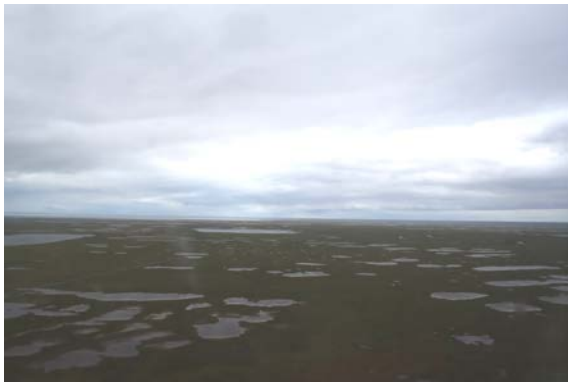
The study area for the 2013 stream fish survey includes the Project corridor from Point Thomson to Livengood (**Figure 1**). This area is included in the Northern Alaska and Interior Alaska Land Resource Regions (United States [U.S.] Department of Agriculture [USDA], 2004). Both regions experience seasonally long photoperiods, with continuous daylight/darkness above the Arctic Circle and near-continuous daylight/darkness below the Arctic Circle at the summer and winter solstices, respectively. Short, warm summers and long, cold winters characterize the subarctic continental climate (USDA, 2004). The temperature generally remains above freezing from June through mid-September in the Interior Alaska Region whereas freezing temperatures may occur in any month in the Northern Alaska Region. The average annual precipitation

ranges from less than 10 inches at valley bottoms and the coastal range to 40 inches at higher elevations. The average annual snowfall ranges from 45 to 100 inches (USDA, 2004).

The Land Resource Regions are subdivided into multiple Major Land Resource Areas (MLRAs) (USDA, 2004). The Northern Alaska region includes the Arctic Coastal Plain, Arctic Foothills and Northern Brooks Range Mountains MLRAs. Sampling sites were located in each of these MLRAs. All sampling sites in Interior Alaska are located within the Interior Alaska Highlands MLRA.

Fourteen field targets were surveyed in the Northern Alaska Region spanning three distinct MLRAs: from north to south, one site occurs within the Arctic Coastal Plain, 12 sites within the Arctic Foothills and one site within the Northern Brooks Range Mountains. Waterbodies within these MLURAs drain into the Arctic Ocean.

The Arctic Coastal Plain consists of level to gently rolling plains along the coast of the Arctic Ocean and is dotted by thousands of small to medium-sized lakes and interconnecting wetlands. The Arctic Foothills include broad, rounded hills and nearly level uplands at the base of the Brooks Range, the most northerly extension of the Rocky Mountains. The Northern Brooks Range Mountains include the high mountains and valleys on the northern side of the Brooks Range which drains into the Arctic Ocean drainage basin. Throughout all three MLRAs, most soils have permafrost within the profile, with exceptions on some steep slopes. The native vegetation on foothills and lowlands is arctic tundra with grasses, sedges, mosses, lichens, ericaceous shrubs, and willows. Mountainous areas are predominantly alpine tundra with dwarf scrub communities (USDA, 2004).



Site F51PP001. Arctic Coastal Plain.

Site F51PA009. Arctic Foothills.

Site F51PA013. Northern Brooks Range.

The area from the Brooks Range to Livengood is within the Interior Alaska Region. Six field targets were surveyed in this region within the Interior Alaska Highlands MLRA. This MLRA consists of extensive hills, low to moderately high mountains, and valleys between the Brooks Range and the Tanana River. Streams in this MLRA drain into the Bering Sea via the Yukon, Tanana, and Koyukuk Rivers (USDA, 2004). Permafrost is discontinuous within the soil profiles in the Interior Alaska Highlands MLRA (Ferrians, Jr., 1965; and Brown et al., 1997). Native vegetation ranges from boreal forests to alpine tundra. The southern Brooks Range is dominated by grasses, sedges, mosses, lichens, ericaceous shrubs, and willows. The low hills and mountains are a mix of alpine tundra and boreal forests. The basins are largely boreal forests with black spruce, paper birch, and quaking aspen (USDA, 2004).

Site F51AY002. Interior Alaska.

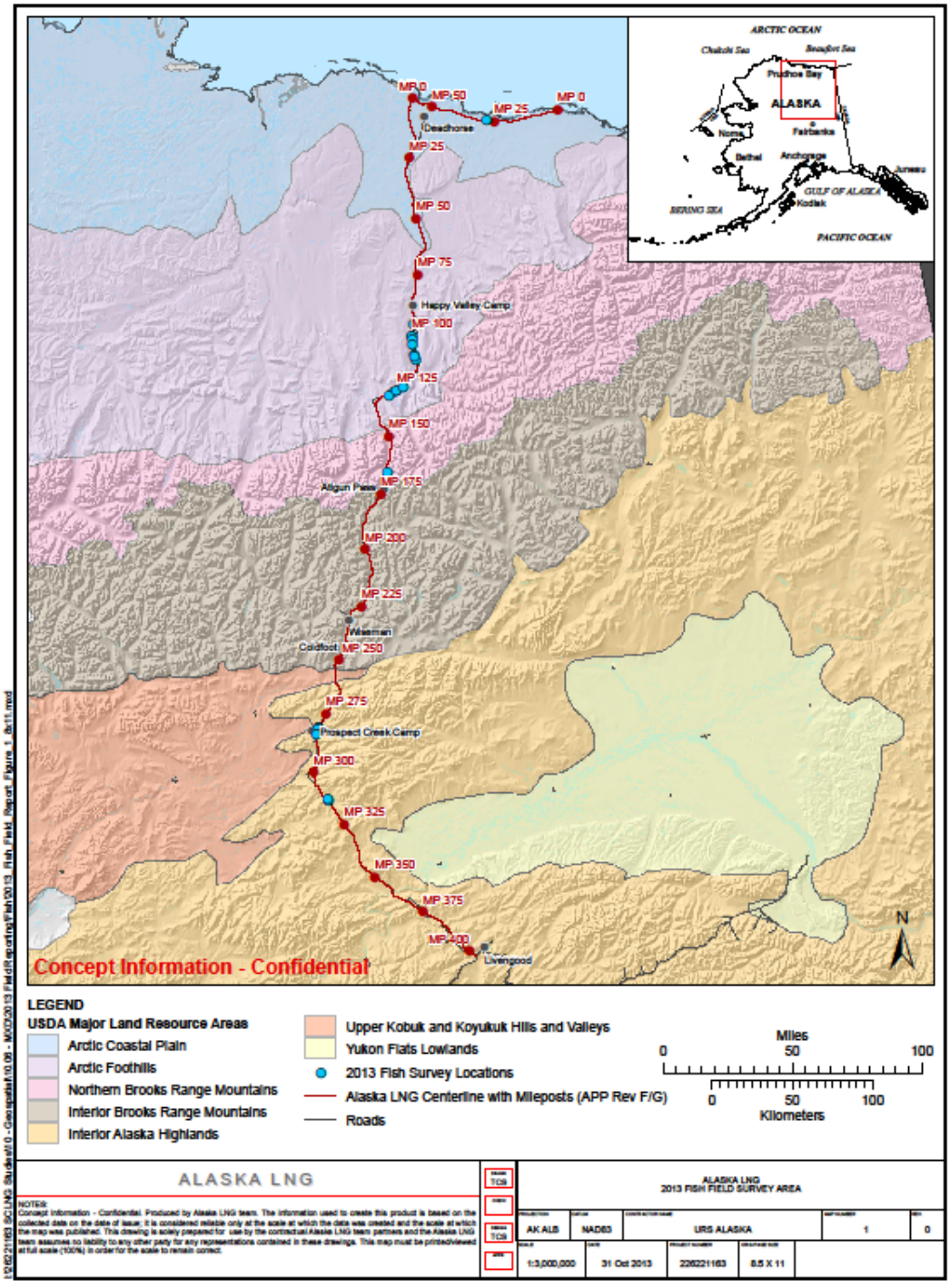


Figure 1. 2013 Summer Survey Area

1.3 SURVEY OBJECTIVES

The primary objective of the 2013 stream fish survey was to characterize fish habitat and presence in streams crossed by the Project. Field work focused on documenting fish presence and habitat features in wadeable streams, (i.e., streams small enough to be safely sampled without the use of a boat or specialized sampling equipment) where information was incomplete or unavailable.

Specific objectives of the 2013 stream fish survey were to:

- Conduct fish surveys to determine fish presence or absence;
- Document general fish habitat characteristics at crossing sites;
- Collect representative water quality parameters important to fish; and
- Describe streambed substrate, riparian vegetation, and stream channel morphology at each crossing site.

The data collected from the stream fish surveys will be used to support eventual Federal Energy Regulatory Commission (FERC) Resource Report development and Project permitting. The results of the 2013 stream fish survey will also assist in identifying streams for future sampling.

1.4 REGULATORY REQUIREMENTS

Results of this field survey will facilitate the evaluation of project-related direct, indirect and cumulative impacts under the National Environmental Policy Act (NEPA). The documentation of resident and anadromous fish streams within the Project corridor is required to establish ADF&G regulatory authority under Alaska Statute (AS) 16.05.841 and 871. All anadromous fish streams in the project area are also subject to the Essential Fish Habitat (EFH) provisions of the Magnuson-Stevens Fishery Conservation and Management Act.

1.4.1 Federal Energy Regulatory Commission

As the anticipated lead federal agency administering the NEPA process, FERC requires development of Resource Report 3 which describes existing fish, wildlife, and vegetation resources directly and indirectly affected by project development. Resource Report 3 includes analyses of anticipated impacts during construction and operation phases. The report also provides a description of proposed mitigation measures and documents all federal and state consultation occurring throughout the course of the project.

1.4.2 Essential Fish Habitat

Section 305(b)(1)(D) of the Magnuson-Stevens Fishery Conservation and Management Act requires federal agencies to consult with the National Marine Fisheries Service on all actions that may adversely affect EFH. The designated EFH along the Project route includes all freshwater rivers, streams, and lakes supporting anadromous fish. These waterbodies are identified in the Catalog of Waters Important to the Spawning, Rearing or Migration of Anadromous Fishes (Johnson and Daigneault, 2013a and 2013b). The National Marine Fisheries Service is required to make EFH Conservation Recommendations which may include measures to avoid and minimize adverse effects to EFH.

1.4.3 National Environmental Policy Act

NEPA is a federal law that was enacted in 1969 requiring federal agencies to evaluate the potential environmental impacts of a project or action. All fisheries and fish habitat data collected during the 2013 stream fish surveys will assist federal agencies in evaluating potential project impacts in accordance with NEPA. Literature and all field data will be incorporated into the environmental impact statement required by NEPA.

1.4.4 Alaska Department of Fish and Game Title 16

Activities affecting fish streams, such as gravel removal, temporary water withdrawal, utility line crossings, stream diversion, bank stabilization and blasting must be approved by the ADF&G Division of Habitat. Fish and fish habitat are protected under AS 16.05.841 and AS 16.05.871 and require prior notification to "use, divert, obstruct, pollute or change the natural flow or bed" of a specified stream. ADF&G ensures that the proposed activity provides the proper protection of fish and game prior to authorizing the activity. ADF&G requires permit approval for activities within or across fish streams when such activities could impact fish or fish habitat.

2.0 METHODS

2.1 OVERVIEW

Site F51PA006.

The 2013 stream fish surveys were conducted at wadeable streams potentially impacted by the Project footprint. FERC classifies waterbodies with a measured wetted width greater than 100-feet wide as major rivers, streams 10- to 100-feet wide as intermediate streams, and streams less than 10-feet wide as minor streams. Streams sampled in 2013 were intermediate and minor streams according to these classifications.

Stream surveys were conducted between July 26 and August 10, 2013 by field biologists who documented fish presence or absence at each survey site using a combination of standardized fish sampling techniques. Sampling methods included minnow traps, electrofishing, seines, fyke nets and visual observations. Field biologists also collected baseline water quality data and characterized existing fish habitat conditions at each stream crossing. All field data and observations were recorded on hardcopy datasheets, field logbooks, and electronic data forms. Data was uploaded to the Project SharePoint website, reviewed and analyzed, and then entered into an Oracle Geodatabase. This report provides survey results and a discussion of fish observed at each stream surveyed, part of the ADF&G requirements under Permit SF2013-253 (**Appendix A**).

For a detailed description of survey methods, refer to the 2013 Stream Fish Investigations, Field Study Protocols and Execution Plan included in Appendix D.

Fyke net and minnow traps set at F51PP001.

2.2 STREAM SELECTION AND PRIORITIZATION FOR FIELD SURVEY

Twenty streams were selected for the 2013 stream fish surveys based on the lack of historical documentation of fish distribution. The 2013 stream fish survey sites were sampled primarily to document the presence or absence of fish at the proposed crossing site, assess fish habitat conditions, and characterize stream channel characteristics (including presence of water and flow type).

Each survey site was given a unique ID name. This name was composed of the discipline and team number (e.g., fish team 51 = F51); the spread ID, in which the target was located (e.g., Prudhoe Bay to Point Thomson = PP); and a unique three digit number (e.g., 001). Spreads and number of survey sites in each section are described in **Table 1**.

Table 1. Project Spreads

Spread	Spread Name	Approximate Length (miles)	Fish Sites Surveyed in 2013
PP	Prudhoe Bay to Point Thomson	58	1
PA	Prudhoe Bay to Atigun Pass	172	13
AY	Atigun Pass to Yukon River	187	6
YL	Yukon River to Livengood	45	0

2.3 FISH SAMPLING STRATEGY

For each site, a fish sampling strategy was developed based on stream characteristics to ensure that the appropriate level of effort was made and the proper sampling techniques were applied. A range of gear types was used to ensure representative age class and fish species were surveyed (**Table 2**). Electrofishing was not conducted in waterbodies where adult salmonids were previously documented or observed.

Upon arriving at the site, field biologists performed visual observations in an effort to identify fish presence prior to deploying sampling gear. Angling was attempted next when practicable. Minnow traps were set in slow moving water, including sides of streams, in ponds, or near

Electrofishing at F51PP001.

Angling at F51PA007.

debris that created pools of water. Electrofishing was generally discouraged and only performed when other methods failed to capture fish. A beach seine was used in slow-velocity habitats, such as pools and near-shore environments. A fyke net was set when channels were wide enough and if water depth was wadeable but deep enough to allow fish passage into the net.

Table 2. Summary of Fish Sampling Gear Types

Gear Type Used	Life Stage Targeted	Habitat Type Targeted
Visual observation	All age classes	Pools, riffles and runs; near-shore bank habitats.
Backpack electrofisher	All age classes	Undercut banks, overhanging vegetation, large woody debris, submerged vegetation, riffle, run and pool habitats.
Minnow trap	Fry and juveniles	Undercut banks, overhanging vegetation, large woody debris; submerged vegetation, water velocity shelters, riffles and runs.
Angling	Adults and juveniles	Undercut banks, pools, riffles and runs.
Beach seine	Juveniles	Slow-water velocity habitats less than 4-feet deep. Pools and near-shore habitats.
Fyke nets	All age classes	River and stream channels less than 4-feet deep with slow water velocities.

2.3.1 Riparian Vegetation and Streambed Characterizations

Field biologists recorded information about the riparian vegetation along both stream banks for each site exhibiting channel characteristics. Riparian vegetation classes were recorded as independent spatially layered percentages based on an aerial view of grasses/sedges, shrubs and trees within a 5 meter zone from each bank's ordinary high-water level. Therefore, total vegetation percentages equal more than 100 percent due to canopy layer overlap. For example, a 10 square meter plot may contain tree leaves and branches in the top canopy layer covering 35 percent of the ground, shrub stems in the middle canopy layer covering 30 percent of the ground (independent of tree cover above), and grasses and sedges in the lowest canopy layering cover 80 percent of the ground (independent of the tree and shrub cover above).

Streambed substrate composition was characterized as a percentage of ground cover equaling 100 percent. The percentage of organic matter, silt, sand, gravel, cobble, and boulders covering the streambed were determined by visual observation, and recorded for each site.

General aquatic habitat characteristics recorded within each survey area included the presence of gravel bars, riffles, pools, undercut banks, large woody debris, overhanging vegetation, emergent vegetation, submerged vegetation, and contiguous wetlands.

Photographs of both banks, showing the upstream and downstream views of each centerline crossing, were taken and entered into the electronic data system. In some cases, supplemental photos were taken of habitat types and other notable features.

Site plan view and profile view sketches were made for each crossing. These were created to illustrate the stream position in relation to the pipeline crossing (PLX), stream width and depth,

and the location of fishing efforts. They also served to document the presence of riparian vegetation, overhanging banks, or any other distinctive habitat type located within the survey reach (**Appendix B**).

2.3.2 Water Chemistry

A multi-parameter water quality meter (YSI 556) and turbidimeter (YSI 2100/HACH 2500P) were used to measure water quality parameters. The field crew recorded water temperature (degrees Celsius), pH, dissolved oxygen (DO) (milligrams per liter [mg/L]), specific conductance (microSiemens per centimeter [µS/cm]), turbidity (Nephelometric Turbidity Unit), oxygen reduction potential (ORP), and specific conductance (µS/cm) at each site, while also noting water color, odor, and the presence or absence of sheen.

Temperature, specific conductance, pH, ORP, and DO were collected in-situ below the water surface along the edge of each stream. Turbidity measurements were acquired from water samples. Measurements were collected at PLX with the probe set vertically on the streambed. Sufficient time was allowed for all readings to stabilize prior to recording each parameter value on a hardcopy field form.

2.4 DATA COLLECTION

All fish captured were identified to species and measured to the nearest millimeter total length. If identification to species level was uncertain, identification stopped at genus. Fish were released near the point of capture once identified and measured.

Data was recorded on standardized hardcopy forms based on the collaborative exchange of information between the field scientists. Data was also recorded electronically using ArcPAD 10 on a Trimble GeoExplorer 6000 with an electronic data entry system.

Site photographs were collected using an Olympus Stylus Tough 6020 digital camera, and included habitat overviews, captured fish, oblique aerial photography, and features of special interest.

Site F51PA008.

2.4.1 Quality Assurance/Quality Control

The lead biologist (field crew chief) compared hardcopy forms and electronic data for each survey site and completed a fish studies field form QA/QC checklist to confirm that all essential field form elements were completed and within expected ranges. The QA/QC form also confirmed that all protocol deviations were adequately described in detail. Raw field data was then uploaded to the Project SharePoint website for post-field review and analysis. Final data is housed in an Oracle Geodatabase.

Precise geographic coordinates were independently collected by civil surveyors at all waterbody crossings. This data was processed separately to verify the accuracy of Global Positioning System coordinates collected by the field crew.

3.0 RESULTS AND ANALYSIS

3.1 OVERVIEW

The 2013 stream fish field surveys were conducted from late July through mid-August. All 20 sites originally identified for surveying were visited. All Fish Resource Permit conditions and stipulations were followed. Waterbodies characterized during the 2013 field season included active streams, dry channels, and wetland complexes. A reduced dataset was collected at sites having no discernible channels or banks or other hydrogeomorphic features indicative of fish habitat. These sites were classified as observation points since they were determined not to be waterbodies based on the FERC definition.

3.2 FISH SAMPLING RESULTS

The field crew attempted to catch fish at nine sites determined to exhibit fish habitat characteristics. **Table 3** summarizes the fish sampling methods and species captured at each site. **Figure 2** shows where fish were caught by stream targets in each MLRA.

Table 3. Fish Sampling Methods and Site Characteristics

ID	Fish Sampling Method(s) Used	Fish Captured	Total Fish Count
F51AY001	Minnow Traps	None	0
F51AY004	Minnow Traps	None	0
F51PA004	Angling Visual Observation	Arctic grayling; Ninespine stickleback	5
F51PA006	Visual observation	Round whitefish	4
F51PA007	Angling	Arctic grayling	4
F51PA008	Minnow Traps	Dolly Varden	2
F51PA009	Angling;	Arctic grayling	5
F51PA012	Electrofishing	None	0
F51PP001	Minnow Traps; Electrofishing; Fyke Net	Ninespine stickleback	735
Total			755

Fish were captured at six of the nine sites surveyed. A total of 755 fish were captured, representing four fish species. Ninespine stickleback (*Pungitius pungitius*) comprised the majority of fish captured (n=736). The remainder were Arctic grayling (*Thymallus arcticus*) (n=11), Dolly Varden (*Salvelinus malma malma*) (n=2), and round whitefish (*Prosopium cylindraceum*) (n=4). Additionally, two fish were observed but not positively identified. Field data sheets, photos, and site maps are presented in **Appendix B**. A fish sampling collections spreadsheet, completed in accordance with the ADF&G Title 16 Permit application requirements, is presented in **Appendix C**.

Round whitefish at F51PA006.

Dolly Varden at F51PA008.

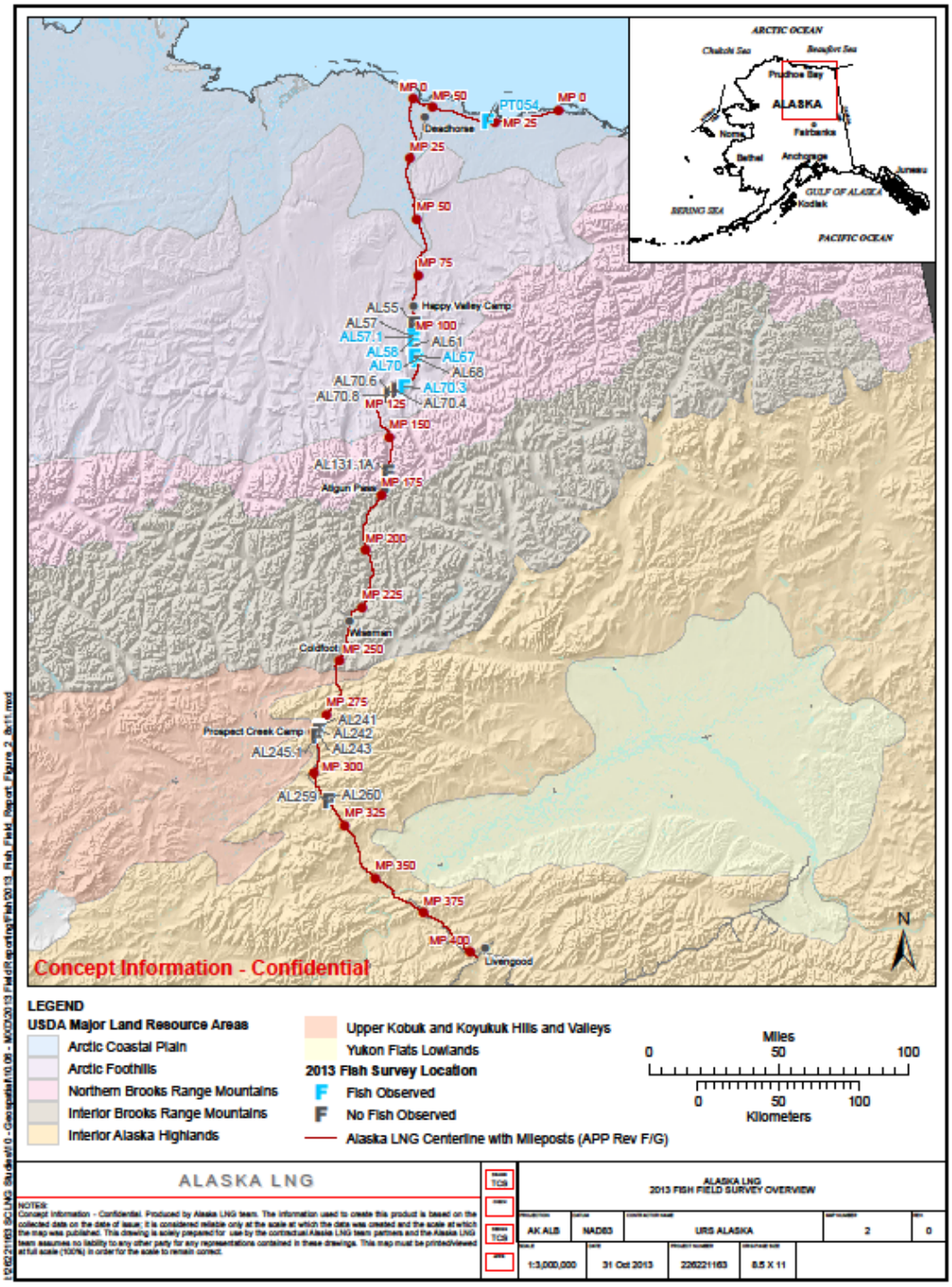


Figure 2. Fish Captured by Stream Target

3.3 FIELD SITE DESCRIPTIONS

Habitat was assessed at all field targets visited. At each site, the field crew recorded a site description, a stream profile diagram, and an analysis of physical and chemical attributes. A fishing effort was made at all streams having potential fish habitat, and descriptive field notes were recorded for each location.

Based on physical and chemical attributes documented for each site, fish habitat was characterized as optimal (n=6), sub-optimal (n=3), or absent (n=11) (**Table 4**). Optimal fish habitat was defined as habitat with well-defined channel characteristics, flowing water, and stabilized water quality parameters (**Table 5**). Sub-optimal fish habitat was defined as habitat with poorly defined channel characteristics, intermittent areas with flow, or unstable water parameters. Sites determined to contain no fish habitat were classified as absent. These sites were generally wetland complexes with poorly defined to no channel characteristics and minimal or no flow.

Aquatic habitat features greatly varied at these sites, such as streambed substrate, presence of riffles or pools, or vegetation presence in and around the stream channel. Water chemistry data was collected at each site determined to contain fish habitat, as well as other observations and measurements of water, such as assessments of color, odor, and turbidity.

Table 4. Field Site Summary

ID	Channel Features	Water Content	Substrate	Wetted Width (m)	Thalweg Depth (m)	Fish Habitat	Fish Species
F51AY001	Intermittent channel	Stagnant pools; Some flow	Organics (100%)	1.2	0.2	Sub-optimal	
F51AY002	None	Dry	N/A	N/A	N/A	Absent	
F51AY003	None	Dry	N/A	N/A	N/A	Absent	
F51AY004	Deeply incised channel	Shallow stream of flowing water	Sand (100%)	1	0.1	Sub-optimal	
F51AY005	None	Dry	N/A	N/A	N/A	Absent	
F51AY006	None	Dry	N/A	N/A	N/A	Absent	
F51PA001	None	Patches of water; No flow	N/A	N/A	N/A	Absent	
F51PA002	None	Patches of water; Some flow	N/A	N/A	N/A	Absent	
F51PA003	Thin shallow stream	Some flow	N/A	0.1	0.08	Absent	
F51PA004	Defined channel	Pools and riffles; flowing water	Organics (50%) Silt (20%) Sand (20%) Gravel (10%)	4.1	0.6	Optimal	Arctic grayling; Ninespine stickleback
F51PA005	None	Patches of water; No flow	N/A	N/A	N/A	Absent	
F51PA006	Split channel	Flowing water	Sand (20%) Gravel (70%) Cobble (10%)	Channel 1: 6.4 Channel 2: 4.6	Channel 1: 0.8 Channel 2: 0.9	Optimal	Round whitefish
F51PA007	Defined channel	Pools and riffles; flowing water	Sand (30%) Gravel (30%) Cobble (30%) Boulders (10%)	7.1	0.9	Optimal	Arctic grayling
F51PA008	Defined channel	Flowing water	Sand (5%) Gravel (10%) Cobble (70%) Boulders (15%)	1.2	0.3	Optimal	Dolly Varden
F51PA009	Defined channel	Flowing water	Gravel (10%) Cobble (75%) Boulders (15%)	8.2	0.4	Optimal	Arctic grayling
F51PA010	None	Patches of water; No flow	N/A	N/A	N/A	Absent	
F51PA011	Intermittent features	Patches of water; Some flow	N/A	N/A	N/A	Absent	
F51PA012	Poorly-defined grass lined channel	Intermittent water; Some flow	Organics (100%)	8.5	0.3	Sub-optimal	
F51PA013	Defined channel	Dry	Gravel (25%) Cobble (50%) Boulders (25%)	N/A	N/A	Absent	
F51PP001	Two defined channels	Flowing water	Organics (90%) Silt (5%) Sand (5%)	Channel 1: 2.4 Channel 2: 5.5	Channel 1: 0.2 Channel 2: 0.2	Optimal	Ninespine stickleback

N/A = Not Applicable m = meters

3.3.1 Arctic Coastal Plain

- **F51PP001** – Two channels at PLX. First channel is beaded stream flowing through tundra to lake downstream. Second channel flowing from upstream pond to lake downstream and connects to first channel downstream of PLX. Emergent plants, riffles and ponds observed. Fyke net and minnow traps left overnight; targeting species that may migrate through. Caught additional ninespine stickleback. A total of 735 ninespine stickleback captured.

3.3.2 Arctic Foothills

- **F51PA001** – Site is wetland complex, sandwiched between the Trans-Alaska Pipeline System and road (relatively flat stretch of road). Tall sedge/grass at PLX interspersed with birch and willow shrubs.
- **F51PA002** – Site is wetland complex that becomes more channelized downstream near culvert. Site sandwiched between the Trans-Alaska Pipeline System and road (in depression of rolling hills). Many impediments and discontinuous sections of water.
- **F51PA003** – Site is wetland complex. Site located in depression of rolling hills. Ponded water at culvert with small stream flowing through tall grass. Too shallow and narrow to electrofish or set minnow traps. No fish observed.

Site F51PA003.

- **F51PA004** – PLX at narrow section of stream, upstream of wider, slower moving section; overhanging vegetation, undercut banks, emergent and submerged vegetation, pools and riffles observed. Stream cuts through wetland complex. Ran beach seine through pool, fish observed fleeing from seine. Three Arctic grayling were hooked on line and one more visually observed; one stickleback was also observed.

Arctic grayling at F51PA004.

- **F51PA005** – Site is wetland complex nearby lake to the northwest and site stream F51PA004 to the south but no clear channel connecting to either.

- **F51PA006** – Stream splits and merges multiple times upstream and downstream; oxbows present. Overhanging vegetation, undercut banks, emergent and submerged vegetation, pools, riffles, sand and gravel bars observed. Stream split into two branches at PLX, fast flowing water and gravel substrate. Connecting channel slightly downstream; slower moving with sandy substrate. Four round whitefish were observed. Observed whitefish in connecting channel resting under overhanging vegetation; angled for fish but failed to hook.
- **F51PA007** – PLX at opening to pooled section; water has copper taint in pooled area. Overhanging vegetation, undercut banks, emergent and submerged vegetation, pools, and riffles observed. Grayling hooked with fly rod and a second one observed. Two additional unidentified fish were observed in the middle of a pond, likely ninespine stickleback.

Site F51PA007.

- **F51PA008** – Fast flowing stream with boulders creating small waterfalls, water has copper taint. A few wider areas with slower moving eddies downstream. Channel thickly lined with shrubs and shrub canopy covering stream in many areas. Overhanging vegetation, undercut banks, emergent and submerged vegetation, pools, and riffles observed. Baited minnow traps left overnight; two Dolly Varden were caught.
- **F51PA009** – Fast moving stream with large percentage of gravel, cobble and boulder substrate; little vegetation observed in channel. Undercut banks, riffles and pools observed. Five Arctic grayling were caught on hook and line.

Site F51PA009.

- **F51PA010** – Site is wetland complex between lakes. No clear channel connecting waterbodies observed. Water appears stained and stagnant.
- **F51PA011** – Site is wetland complex that has intermittent areas of channelized features. Intermittent areas of deep, ponded water with algae and surface water spread over a larger swath of land. Emergent vegetation present.

- **F51PA012** – Site is wetland complex with noticeable corridor of vegetation change (sedge/grass) connecting two waterbodies. Some water flow noticed near pond but water is intermittent downstream, may provide channel for fish between ponds when more water is present. Electrofished in areas with water and along edge of nearest pond. No fish captured or observed.

Site F51PA012.

3.3.3 Northern Brooks Range

- **F51PA013** – Dry at time of survey. Well-defined channel with rocky substrate. Five culverts at road.

3.3.4 Interior Alaska Highlands

- **F51AY001** – Poorly defined stream running through wetland complex; previously burned area. Many impediments diminishing fish habitat: stagnant pools with brown algae, patches of emergent grass, and fallen woody debris. Some flow observed but low DO reading, probably due to stagnant nature of stream. Walking conditions not conducive to electrofishing. Baited minnow traps left for several hours; no fish observed or captured.

Site F51AY001.

- **F51AY002** – Dry; no stream channel. Corridor of scrub-shrub vegetation community.
- **F51AY003** – Site is wetlands complex with water table near surface. No stream channel.
- **F51AY004** – Stream channel runs through thickly vegetated willow corridor. Deeply incised channel (1.6 meters) with shallow water depth (0.1 meter). Unstable water parameter conditions; ORP value continually vacillating between 48 and 108 millivolts. Overhanging vegetation, undercut banks, and sand bar observed. Walking conditions

Site F51AY004.

not conducive to electrofishing. Baited minnow traps left overnight. No fish captured or observed.

- **F51AY005** – Dry; no stream channel. Field of tussocks and scattered willows.
- **F51AY006** – Dry; no stream channel. Site in large swath of wetlands complex. High water table and pooled water nearby.

3.4 WATER QUALITY AND CHARACTERISTICS

The color, odor, presence of sheen, water temperature, pH level, DO content, conductivities, turbidity and ORP were recorded at the nine sites with potential fish habitat.

Water color was clear, with the exception of three sites observed to be yellow (F51PA008), copper (F51PA007), and tannic (F51AY001). Only one site, a stream with low flow and low dissolved oxygen, contained an odor (F51PA012). Sheen was not noticed at any field target.

The pH range was usually slightly acidic and ranged from 5.01 to 7.22. The range of DO measurements was from 3.56 to 10.65 mg/L. Turbidity ranged from 0.96 to 33.21 NTU. Ranges for all water quality parameters collected are listed in **Table 5**.

Table 5. Water Quality and Characteristics for Streams Surveyed for Fish

Feature ID	Fish Present	Color	Odor	Sheen	Water Temp. (°C)	pH	Dissolved Oxygen (mg/l)	Specific Conductance (µS/cm)	Ambient Conductance (µS/cm)	Turbidity (NTU)	Oxygen Reduction Potential (mV)
F51AY001	No	Tannic	None	No	11.06	5.19	3.56	54	0.073	14.53	165.7
F51AY004	No	Clear	None	No	6.75	5.48	10.48	88	0.135	3.58	45 – 108*
F51PA004	Yes	Clear	None	No	14.92	6.48	9.73	68	0.084	1.03	67.1
F51PA006	Yes	Clear	None	No	10.05	7.22	10.32	139	0.194	1.56	98.7
F51PA007	Yes	Copper	None	No	13.86	6.70	9.47	38	0.048	2.61	83.5
F51PA008	Yes	Yellow	None	No	13.27	6.92	9.53	59	0.075	2.09	62.3
F51PA009	Yes	Clear	None	No	11.38	5.01	9.81	39	0.053	0.96	182.3
F51PA012	No	Clear	Yes	No	16.03	5.19	6.57	39	0.048	33.21	84.0
F51PP001	Yes	Clear	None	None	8.82	5.98	10.65	98	0.142	4.42	115.4

Notes:
* ORP value continually vacillated between 48 and 108 millivolts

4.0 CONCLUSION

Twenty field targets were surveyed during the 2013 stream fish survey. Full assessments of habitat, water quality, stream characteristics, and fisheries were conducted at each site to the extent possible. Of the streams surveyed, nine sites were determined to have potential fish habitat. A total of 755 fish were captured at six of the nine sites where a fishing effort was made, including Arctic grayling, Dolly Varden, round whitefish, and ninespine stickleback.

5.0 REFERENCES

Alaska Department of Fish and Game (ADF&G). 2013. Fish Resource Permit # SF2013-253. 2013.

Brown, J., O.J. Ferrians, Jr., J.A. Heginbottom, and E.S. Melnikov, eds. 1997. Circum-Arctic map of permafrost and ground-ice conditions. U.S. Geological Survey in Cooperation with the Circum-Pacific Council for Energy and Mineral Resources. Circum-Pacific. Washington, DC. Map Series CP-45, scale 1:10,000,000, 1 sheet.

Ferrians, O.J., Jr. 1965. Permafrost map of Alaska in Miscellaneous Geologic Investigations. U.S. Geological Survey, Map I-445, scale 1:2,500,000.

Johnson, J., and M. Daigneault. Alaska Department of Fish and Game. 2013a. Catalog of waters important for spawning, rearing or migration of anadromous fishes – Arctic region, effective July 1, 2013. Special Publication Number 13-06. 128pp.

Johnson, J., and M. Daigneault. Alaska Department of Fish and Game. 2013b. Catalog of waters important for spawning, rearing or migration of anadromous fishes – Interior region, effective July 1, 2013. Special Publication Number 13-07. 145pp.

U.S. Department of Agriculture (USDA). 2004. Land Resource Regions and Major Land Resource Areas of Alaska. Natural Resources Conservation Service Alaska. Palmer, AK. 91pp.

6.0 APPENDICES

APPENDIX A: ALASKA DEPARTMENT OF FISH AND GAME - FISH RESOURCE PERMIT #SF2013-253

STATE OF ALASKA
DEPARTMENT OF FISH AND GAME

333 Raspberry Rd.
ANCHORAGE, ALASKA 99518

Permit #: **SF2013-253**

Expires: **9/30/2013**

Collections Report Due: **10/30/2013**

FISH RESOURCE PERMIT
(For Scientific/Educational Purposes)

This permit authorizes **Wes Cornelison** *(whose signature is required on page 2 for permit validation)*
person

of **URS Corporation** *agency or organization* **at** **700 G Street, Suite 500, Anchorage, AK 99501** *address*

to conduct the following activities **from** July 1, 2013 **to** September 30, 2013 in accordance with AS 16.05.930:

Purpose: To perform baseline fish presence studies in streams crossed by the proposed South Central LNG pipeline for the development of NEPA documentation and gas-line permitting.

Location: Streams along the proposed South Central LNG corridor from Livengood north to Prudhoe Bay, and then west to Point Thompson.

Species Collected: Local fish species

Method of Capture: Backpack electrofisher (**Stipulation #10**), beach seine, hook-and-line (**Stipulation #3**), fyke net, minnow trap

Final Disposition: Any number and species of fish captured in each sampling reach (**Stipulation #2**) may be identified, measured, and immediately released alive at the capture site.
≤2 individuals of each unknown species may be killed and saved for later identification.
All unintended mortalities must be recorded and returned to capture site waters.

-Continued on Back-

COLLECTIONS REPORT DUE October 30, 2013. The report, (using a data submission form furnished by ADF&G), shall include ***ALL*** species, numbers, dates, and locations of collection (datum/GPS coordinates in the decimal degrees format (dd.ddddd)) and disposition, and if applicable, sex, age, and breeding condition, and lengths and weights of fish handled. *It must also include the date/time the local biologist was contacted for final authorization to carry out collecting activities.* A completion report (abstract, background, methods, data, analysis), if not submitted with the collection report described above, must be submitted to the FRP program coordinator by: ***MARCH/2014***. Data from such reports are considered public information. The report shall also include other information as may be required under the permit stipulations section.

GENERAL CONDITIONS, EXCEPTIONS AND RESTRICTIONS

1. This permit must be carried by person(s) specified during approved activities who shall show it on request to persons authorized to enforce Alaska's fish and game laws. This permit is nontransferable and will be revoked or renewal denied by the Commissioner of Fish and Game if the permittee violates any of its conditions, exceptions or restrictions. No redelegation of authority may be allowed under this permit unless specifically noted.
2. No specimens taken under authority hereof may be sold or bartered. All specimens must be deposited in a public museum or a public scientific or educational institution unless otherwise stated herein. Subpermittees shall not retain possession of live animals or other specimens.
3. The permittee shall keep records of all activities conducted under authority of this permit, available for inspection at all reasonable hours upon request of any authorized state enforcement officer.
4. Permits will not be renewed until the department has received detailed reports, as specified above.
5. UNLESS SPECIFICALLY STATED HEREIN, THIS PERMIT DOES NOT AUTHORIZE the exportation of specimens or the taking of specimens in areas otherwise closed to hunting and fishing; without appropriate licenses required by state regulations; during closed seasons; or in any manner, by any means, at any time not permitted by those regulations.

Scott D. Ayers
Fish Resource Permit Coordinator
Division of Sport Fish

Larry Bogle
for Director
Division of Sport Fish

June 14, 2013
Date

SF2013-253 *continued (page 2 of 2)*

Authorized Personnel: The following persons may perform collecting activities under terms of this permit:

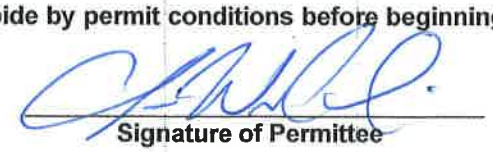
Bobby Beckman, Drake Burford, Leslie Davis, James Dietzman, Andrew DuComb, Mike Hauser, Kim Holmes, Kate Johnson, Cynthia Kirkham, Scott Konley, Adam McCullough, Paul Myercin, John O'Brien, Ryan Rapuzzi, Steve Rideout, Carissa Schudel, Maria Shepherd, Kayley Volper, Jon Wolf

Employees and volunteers under the direct supervision of, and in the presence of, one of the authorized personnel listed above may participate in collecting activities under terms of this permit.

Permit Stipulations:

1) The local Area Management Biologist (AMB), **John Burr** (459-7220; john.burr@alaska.gov) Yukon River; **Brendan Scanlon** (459-7268 or 460-7567; brendan.scanlon @alaska.gov) Northwest/Arctic, must be contacted for final authorization **prior** to you engaging in any collecting activities. *The time/date of this contact must be included in your collections report (using the "data submission form" furnished by ADF&G).* These AMB have the right to specify methods for collecting, as well as limiting the collections of any species by number, time and location.
2) One to three reaches of stream should be sampled per system the pipeline will cross. The dimensions of each sampled reach should be stream-width wide by 40 times the stream width.
3) A valid Alaska sport-fishing license must be in the possession of any individual using hook-and-line gear.
4) An instance of >10% unintended collecting mortality requires sampling at a site to cease and the AMB contacted.
5) Fyke/smolt traps must be checked and emptied regularly enough to prevent significant holding pen mortality (**Stipulation #4**).
6) Each piece of unattended sampling gear must be: 1) labeled with the permittee's name, telephone number, and permit number; 2) securely tied to substrate; 3) placed in a location where they will not be easily noticed (e.g. under cut banks, in pools away from roads or trails); 4) allowed to soak no more than twenty-four hours at a time; 5) located with GPS coordinates; and 6) accounted for/ removed at the conclusion of sampling.
7) Salmon eggs used as bait in traps must either be; sterilized commercial eggs or, if raw, be disinfected prior to use. A 10-minute soak in 1/100 Betadyne solution or some other iodophor disinfectant is adequate. Commercial eggs must be placed into a container that does not allow the fish to consume them (e.g., film canister with holes punched in it, plastic bag with slits cut in it).
8) Gloves, boots, and collecting gear should be decontaminated between streams to reduce the potential of pathogen transmission. A wash/rinse in 1/100 Betadyne solution is adequate. **Felt or absorbent soles on waders and wading boots are prohibited.**
9) If anadromous fish species new to permitted streams and rivers are found, the permit holder will work closely with ADF&G to see that information is included in the database for the *Catalog of Waters Important for Spawning, Rearing or Migration of Anadromous Fishes.* Anadromous fish include *Oncorhynchus spp.*, Arctic char, Dolly Varden, sheefish, smelts, lamprey, whitefish, and sturgeon. Please direct questions to J. Johnson, 267-2337 or j.johnson@alaska.gov
10) Electroshocking is currently discouraged, but not prohibited. Electroshockers may not be used in anadromous waters in the presence of adult salmonids including trout or char. In areas where other means of capture are not feasible, only one pass is allowed. All electroshocked fish should be monitored before release with mortalities or injuries reported on the data submission form. Crew Leaders must have proof of attending formal class/field training along and ten days of electroshocking experience while crew members should have formal training.
11) Please contact Tammy Davis, ADF&G Invasive Species Program (465-6183 or 1-877-INVASIV), and the nearest AMB (**Stipulation #1**) within 24 hours should you find an **Atlantic salmon** and/or other **non-native invasive aquatic species** during your sampling. If possible the organism should be killed, preserved by freezing or placing into 90% alcohol, and taken to the nearest ADF&G office. Please take a photo of the organism, as well as a photo of the organism in the environment in which it was observed, and note the location with a GPS or by describing it on a map with landmarks.
12) Alaskan wood frogs have been identified in the region you are planning to work. If time permits, please record any sightings with your fish report, along with photographs and GPS locations.
13) *A copy of this permit, including any amendments, must be made available at all field collection sites and project sites for inspection upon request by a representative of the department or a law enforcement officer.*
14) Issuance of this permit does not absolve the permittee from compliance with any and all other applicable federal, state, or local laws, regulations, ordinances including *securing permissions to trespass on controlled lands*.
15) A report of collecting activities, referenced to this fish resource permit number, must be submitted to the Alaska Department of Fish and Game, Division of Sport Fish HQ, 333 Raspberry Rd, Anchorage, AK 99518, Attention: Scott Ayers (267-2517; scott.ayers@alaska.gov , and to the AMB **(Stipulation #1)** within 30 days after the expiration of this permit. This report must summarize the number of fish captured by date, by location (provide GPS coordinates and datum), and by species, and the fate of those fish. Fish length, weight, sex, and age data should be included if collected. A completion report (abstract/background/methods /data/analysis), if not submitted with the collection report described above, must be submitted to the department within six months of the expiration of the permit. Data from such reports are considered public information. A report is required whether or not collecting activities were undertaken.

PERMIT VALIDATION requires permittee's signature agreeing to abide by permit conditions before beginning collecting activities:



Signature of Permittee

cc: John Burr, Division of Sport Fish, Fairbanks
Brendan Scanlon, Division of Sport Fish, Fairbanks
Bonnie Borba, Division of Commercial Fisheries, Fairbanks
Bill Morris, Division of Habitat, Fairbanks
Fish and Wildlife Protection, Fairbanks

STATE OF ALASKA
DEPARTMENT OF FISH AND GAME-SPORT FISH

333 Raspberry Road
ANCHORAGE, ALASKA 99518

FISH RESOURCE PERMIT AMENDMENT #1

Permit No. SF2013-253

Permit Issued To: **Wes Cornelison** *(signature required below for permit validation)*

This amendment of Fish Resource Permit SF2013-253:

1) *under* **Authorized Personnel;** *adds the following:*

Chris Baizaillon

All other conditions specified in Fish Resource Permit SF2013-253 remain in effect.

This amendment must be attached to the original permit.

Scott D. Ayers
Division of Sport Fish

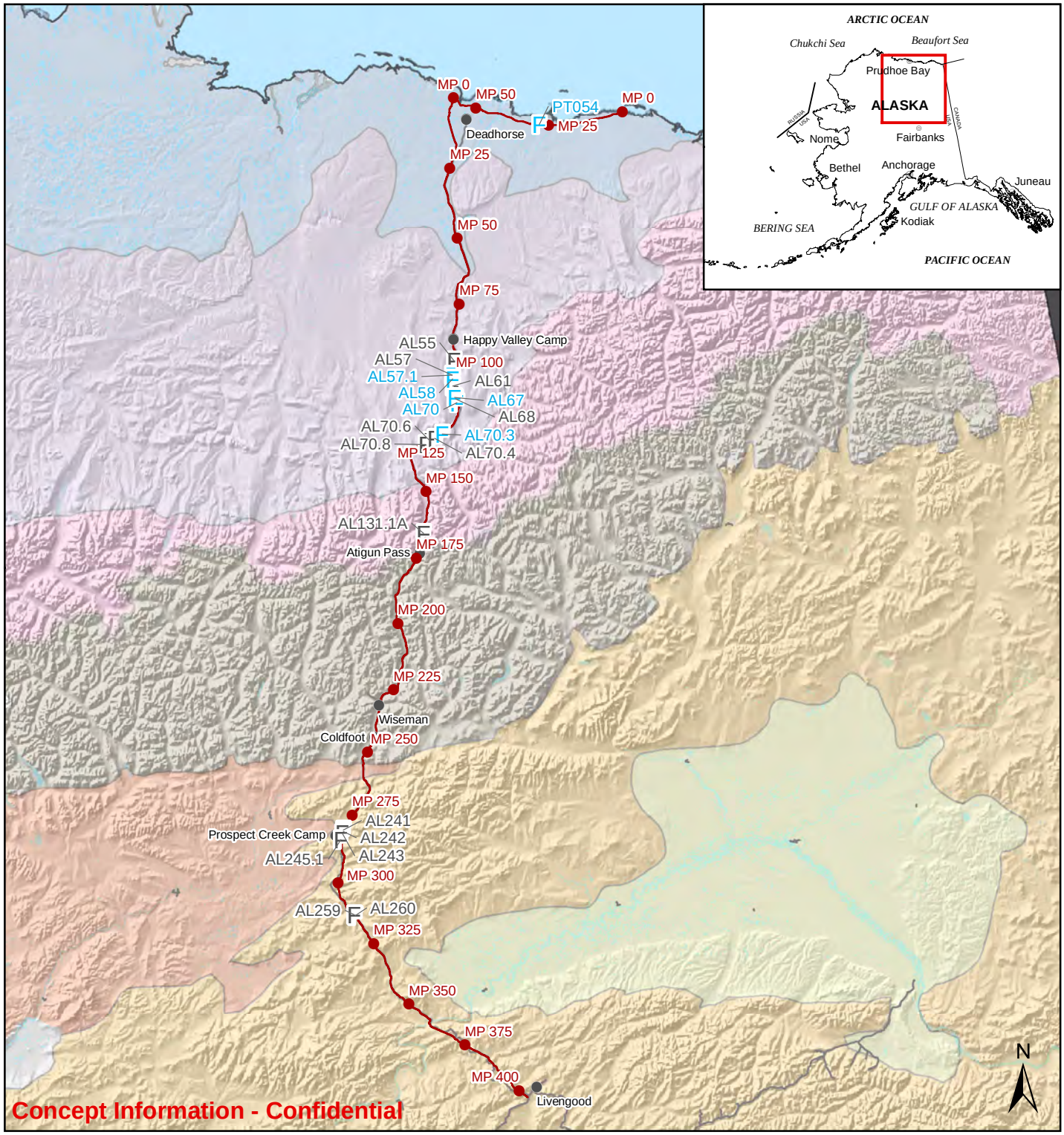
7-16-2013
Date

PERMIT AMENDMENT VALIDATION requires permittee's signature agreeing to abide by conditions of this permit amendment:

_____
Signature of Permittee

cc: John Burr, Division of Sport Fish, Fairbanks
Brendan Scanlon, Division of Sport Fish, Fairbanks
Bonnie Borba, Division of Commercial Fisheries, Fairbanks
Bill Morris, Division of Habitat, Fairbanks
Chris Grundman, Pipeline Coordinators Office, Anchorage
Fish and Wildlife Protection, Fairbanks

APPENDIX B: 2013 STREAM INVESTIGATION FIELD DATA, PHOTOS AND STUDY AREA MAPS



LEGEND

USDA Major Land Resource Areas

- Arctic Coastal Plain
- Arctic Foothills
- Northern Brooks Range Mountains
- Interior Brooks Range Mountains
- Interior Alaska Highlands
- Upper Kobuk and Koyukuk Hills and Valleys
- Yukon Flats Lowlands

2013 Fish Survey Location

- F — Fish Observed
- F — No Fish Observed
- Alaska LNG Centerline with Mileposts

Miles: 0, 50, 100

Kilometers: 0, 50, 100

ALASKA LNG

NOTES:
Concept Information - Confidential. Produced by Alaska LNG team. The information used to create this product is based on the collected data on the date of issue; it is considered reliable only at the scale at which the data was created and the scale at which the map was published. This drawing is solely prepared for use by the contractual Alaska LNG team partners and the Alaska LNG team assumes no liability to any other party for any representations contained in these drawings. This map must be printed/viewed at full scale (100%) in order for the scale to remain correct.

DRAWN	CHECK	DESIGN	APPR.
TCS		TCS	

ALASKA LNG
2013 FISH FIELD SURVEY OVERVIEW

PROJECTION	DATUM	CONTRACTOR NAME	MAP NUMBER	REV.
AK ALB	NAD83	URS ALASKA	2	B

SCALE	DATE	PROJECT NUMBER	ORIG.PAGE SIZE
1:3,000,000	20 Feb 2014	226221163	8.5 X 11

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STREAM FISH INVESTIGATION DATA FORM

SITE DESCRIPTION

Date: 7/26/13	Investigators: KH, AM, CB	Team No.: F51	Feature ID: F51PP001
Stream Name: Unknown	Stream ID: PT054	Stream listed in Anadromous Fish Catalog (Y/N): N	
Milepost: PT 28.5	Hwy Milepost: NA	TAPS Milepost: NA	
Latitude: 70° 09' 08.3162"	Longitude: 147° 25' 28.3915"		
Logbook No.: 1	Logbook Page No.: 15	Pic No(s): P_F51_0001 - 0009	
US @ CL Pic No.: P_F51_0001	DS @ CL Pic No.: P_F51_0002	RB to LB@ CL Pic No.: P_F51_0004	LB to RB@ CL Pic No.: P_F51_0003
Additional Pic No.:	Additional Pic No.:	Additional Pic No.:	Additional Pic No.:

PHYSICAL/ CHEMICAL ATTRIBUTES

Weather (Describe): Mostly Cloudy		Precipitation (Describe): Drizzle	
Water Temperature (°Δ*; 8.82°C	Air Temperature (°Δ*; 9	pH: 5.98	Dissolved Oxygen (mg/l): 10.65
Specific Conductance(µS/cm): 98	Turbidity (NTU): 4.42	Color: Clear	ORP (mV): 115.4
Ambient Conductance(µS/cm): 0.142	Odor: None	Sheen (Y/N): None	Last date of Calibration:
Wetted Width (m): ~~8 ft~~ 2.4 m	Thalweg Depth @ CL (m): ~~0"~~ 0.2		Large Woody Debris Count: None

Riparian Veg at 0-5 m at LB:
- 100 Grass/Sedge (%)
- Ø Shrubs (%)
- Ø Trees (%)
- NA Diameter DBH

Riparian Veg at 0-5 m at RB:
- 100 Grass/Sedge (%)
- Ø Shrubs (%)
- Ø Trees (%)
- NA Diameter DBH

Stream Substrate:
- 90 ~~100~~ Organics (%)
- 5 ~~0~~ Silt (%)
- 5 ~~0~~ Sand (%)
- Ø Gravel (%)
- Ø Cobble (%)
- Ø Boulders(%)

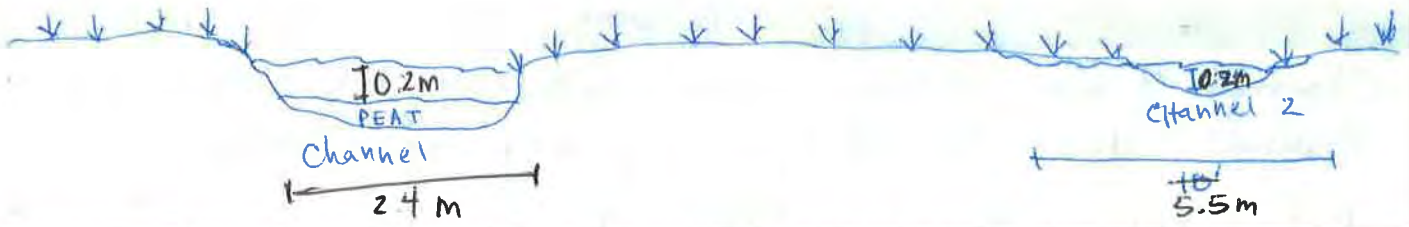
Aquatic Habitats

____ Sand Bar	____ Large Woody Debris
____ Mud Bar	____ Overhanging vegetation
____ Gravel Bar	____ Contiguous Wetlands
X Riffles	X Emergent Plants
X Pools	____ Submerged Plants
____ Undercut Banks	

Flow Type:
____ Perennial X Seasonal ____ Intermittent

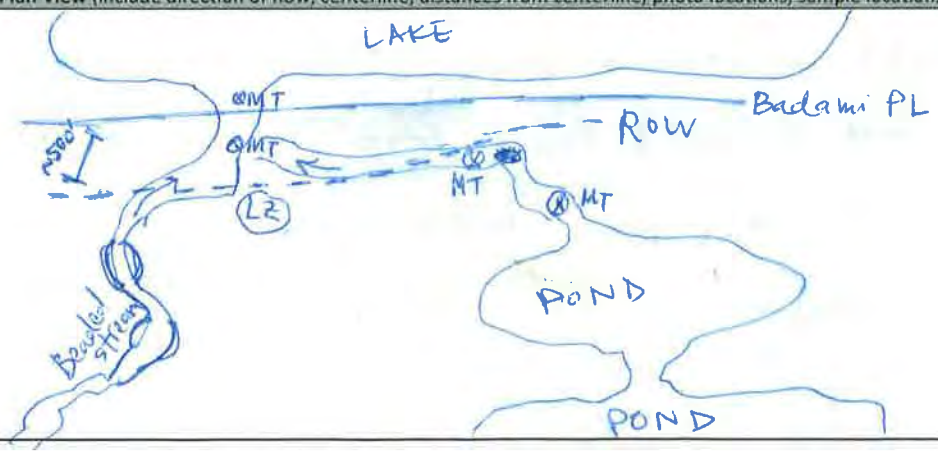
STREAM PROFILE: Cross Sectional at Crossing (include riparian vegetation, wetted width, water depth, substrate, and aquatic habitats)

NORTH:



STREAM PROFILE: Plan View (include direction of flow, centerline, distances from centerline, photo locations, sample locations by gear type and ROW)

NORTH:



STREAM FISH INVESTIGATION DATA FORM

METHODS ATTRIBUTES				
Minnow Traps (Y/N): Y	Hook and Line (Y/N): N	Beach Seine (Y/N): N	Fyke Net (Y/N): Y	Hoop Net (Y/N): N
No. of Minnow Traps Set: 4	Date & Time in: (mm/dd/yyyy)	Date &Time in: (mm/dd/yyyy)	Date & Time in: (mm/dd/yyyy) 7/25/13 1700	Date & Time in: (mm/dd/yyyy)
Date & Time in: (mm/dd/yyyy) 7/25/13 1545	No. of lines in water:	No. of passes:	Date & Time out: (mm/dd/yyyy) 7/26/13 1145	Date & Time out: (mm/dd/yyyy)
Date & Time out: (mm/dd/yyyy) 7/26 1145	Time lines in water:	Reach Length (m):		

ELECTROFISHING ATTRIBUTES				
EF (Y/N): Y	EF Start Time: 1615	EF End Time: 1635	EF Time (seconds): 114	EF Reach Length (m): 30 m
Duty Cycle: 25	Frequency (Hz) : 30	Waveform: Pulse	Sampling Efficiency (% of sample reach): 100	
Current (A): 0.7	Volts (V): 300	Power (W): 210	(amp x volts)	

FISH OBSERVATIONS

Gear Type	Species	Total Length (mm)	Life Stage (Juvenile or Adult)	Disposition (Dead or Alive)	Picture No.
EF	9spine stickleback	59	Adult	Alive	
EF	"	49	Juvenile	"	
EF	"	48	Juvenile	"	

NOTES (any additional information)

Observed 4 more sticklebacks while electrofishing but could not net. Observed sticklebacks while walking along stream banks.

Picked minnow traps & fyke nets on 7/26. About 62 sticklebacks caught in minnow traps (~50 in minnow trap by inlet from second channel). About ~~650~~ 665 caught in fyke net. All fish caught ninespine stickleback.

2 unintentional mortalities. 735 Fish caught/observed total

Field Crew Chief: _____ Field Scientist/Technician: _____

Technical Lead: _____

SCLNG Stream Fish Investigations Field Form
QA/QC Checklist

This form is to be completed before leaving the field site.

Feature ID: ES1PP001 FT # PT054 Date: 7-26-13

For all items not checked, please provide detailed explanation in the notes section of data form.

1. **Site Description**
   - ☒ Was ADF&G contacted before conducting any work in this area?
   - ☒ Site Description complete? (Every cell must have entry or N/A)
   - ☒ Were all photos taken and labeled correctly?
2. **Physical/Chemical Attributes**
   - ☒ Calibration performed prior to sampling?
   - ☒ Physical/Chemical attributes complete? (Every cell must have entry or N/A)
   - ☒ Water quality data within expected ranges?
     - ☐ pH: 4.0 – 10.0
     - ☐ NTU: 0 – 3000
     - ☐ DO (mg/L): 1.0 – 15.0
     - ☐ DO (% saturation): 75- 100
     - ☐ Temp.: 1.0 – 19.0
     - ☐ Specific Conductance: 20 - 1500
   - N/A If outside expected ranges, was sample re-taken?
   - ☒ Are units correct?
3. **Stream Profile**
   - ☒ Stream profile view sketch included?
   - ☒ Stream profile view captures water depth and wetted width?
   - ☒ Stream profile view captures where efforts were made to capture fish?
   - ☒ Plan view sketch included?
4. **Methods Attributes**
   - ☒ Methods attributes complete? (Every cell must have entry or N/A)
   - ☒ Were methods used adequate (explanation needed if no methods selected)?
5. **Electrofishing Attributes**
   - ☒ Electrofishing attributes complete? (Every cell must have entry or N/A)
   - ☒ Are units correct?
   - N/A Are spawning/rearing answers consistent with fish observations?

SCLNG Stream Fish Investigations Field Form
QA/QC Checklist

6. Fish Observations

- [x] Are all fish captured/observed recorded in the Fish Observation table?
- [x] Are units correct? (Fork Length (mm))
- [x] Were adequate photos taken of fish captured? (Take a photo if in doubt)
- [NO] Were any specimens preserved?

7. General

- [x] Feature ID and Field Target # are consistent on data forms, logbook entries, photos, and maps?
- [x] All additional data in logbook captured on data form and additional photos noted?
- [x] Were all additional comments on stream habitat, etc. recorded on data form?
- [NO] Was any gear missing/damaged for this survey or did you have any problems that should require resampling of this stream for an adequate survey effort?

By signing below, I verify that all field data for this site has been verified for accuracy and completeness.

X	X
Fisheries Biologist (print)	Signature
X	X Kim Holmes
Field Crew Chief (print)	Signature

P_F51_0001 F51PP001 PT054

P_F51_0002 F51PP001 PT054

P_F51_0003 F51PP001 PT054

P_F51_0004 F51PP001 PT054

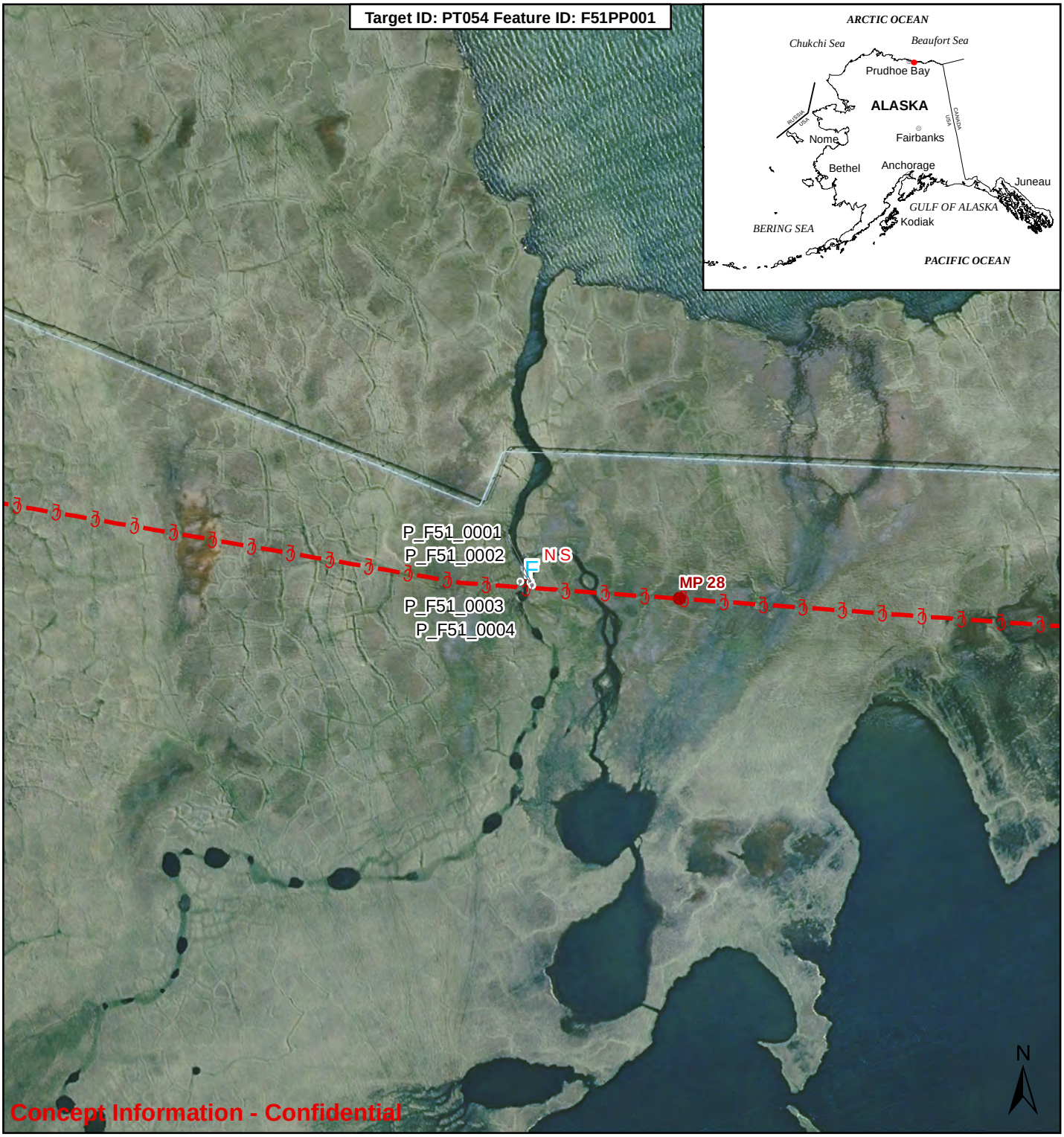
P_F51_0005 F51PP001 PT054

P_F51_0006 F51PP001 PT054

P_F51_0007 F51PP001 PT054

P_F51_0008 F51PP001 PT054

P_F51_0009 F51PP001 PT054



LEGEND

2013 Fish Survey Location

- F Fish Observed
- F No Fish Observed

Species Observed

- A G Arctic Grayling
- D V Dolly Varden
- N S Ninespine Stickleback
- R W Round Whitefish
- U Unknown

- Photo Point
- Alaska LNG Centerline with Mileposts

Feet: 0 200 400

Meters: 0 50 100

ALASKA LNG

NOTES:
Concept Information - Confidential. Produced by Alaska LNG team. The information used to create this product is based on the collected data on the date of issue; it is considered reliable only at the scale at which the data was created and the scale at which the map was published. This drawing is solely prepared for use by the contractual Alaska LNG team partners and the Alaska LNG team assumes no liability to any other party for any representations contained in these drawings. This map must be printed/viewed at full scale (100%) in order for the scale to remain correct.

DRAWN: TCS	ALASKA LNG 2013 FISH FIELD SURVEY LOCATIONS				
CHECK:	PROJECTION: AK ALB	DATUM: NAD83	CONTRACTOR NAME: URS ALASKA	MAP NUMBER:	REV.: B
DESIGN: TCS	SCALE: 1:2,750	DATE: 20 Feb 2014	PROJECT NUMBER: 226221163	ORIG.PAGE SIZE: 8.5 X 11	
APPR.:					

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STREAM FISH INVESTIGATION DATA FORM

SITE DESCRIPTION

Date: 8.1.13	Investigators: EH, VW, CB	Team No.: F51	Feature ID: F51PA001
Stream Name: Unknown	Stream ID: 70.4	Stream listed in Anadromous Fish Catalog (Y/N): N	
Milepost: 125.5	Hwy Milepost: 295.5	TAPS Milepost: 119.5	
Latitude: 68° 40' 38.7583"	Longitude: 149° 11' 03.9711"		
Logbook No.: 1	Logbook Page No.: 25	Pic No(s): P_F51_0010 - 0013	
US @ CL Pic No.: NA	DS @ CL Pic No.: NA	RB to LB@ CL Pic No.: NA	LB to RB@ CL Pic No.: NA
Additional Pic No.:	Additional Pic No.:	Additional Pic No.:	Additional Pic No.:

PHYSICAL/ CHEMICAL ATTRIBUTES

Weather (Describe): Sunny		Precipitation (Describe): None	
Water Temperature (°Δ*;	Air Temperature (°Δ*;	pH:	Dissolved Oxygen (mg/l):
Specific Conductance(µS/cm):	Turbidity (NTU):	Color:	ORP (mV):
Ambient Conductance(µS/cm):	Odor:	Sheen (Y/N):	Last date of Calibration:
Wetted Width (m):	Thalweg Depth @ CL (m):		Large Woody Debris Count:

Riparian Veg at 0-5 m at LB:
_____Grass/Sedge (%)
_____Shrubs (%)
_____Trees (%)
_____Diameter DBH

Riparian Veg at 0-5 m at RB:
_____Grass/Sedge (%)
_____Shrubs (%)
_____Trees (%)
_____Diameter DBH

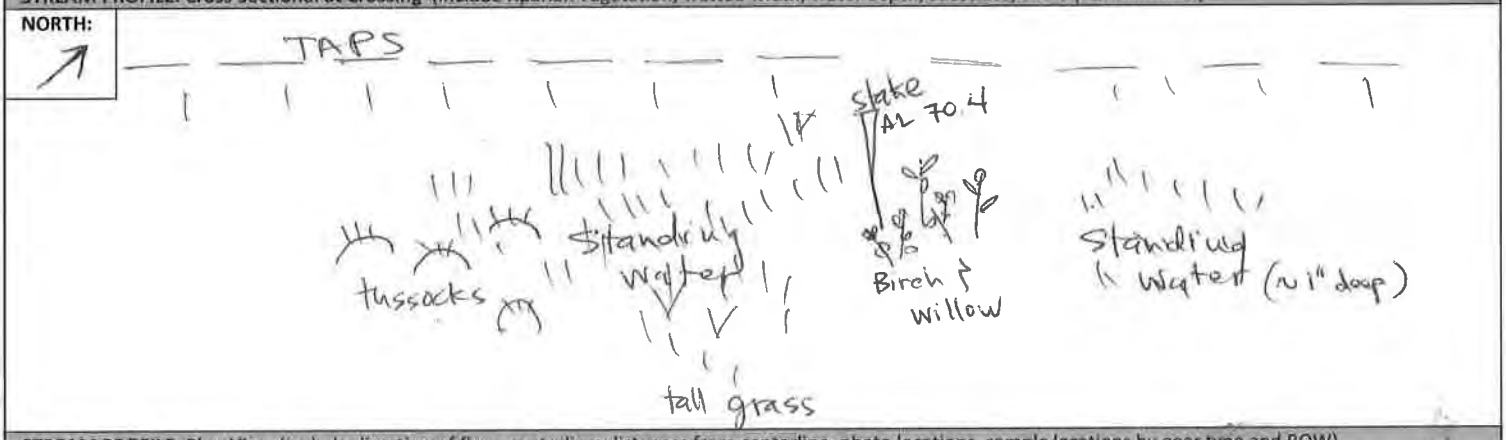
Flow Type:
_____Perennial _____Seasonal _____Intermittent

Stream Substrate:
_____Organics (%)
_____Silt (%)
_____Sand (%)
_____Gravel (%)
_____Cobble (%)
_____Boulders(%)

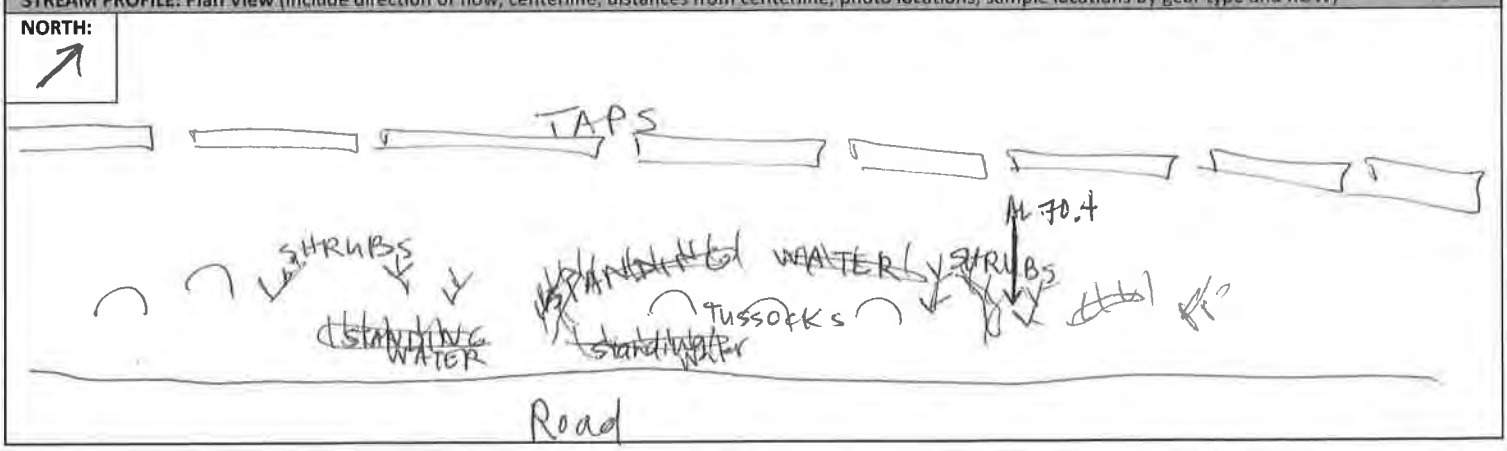
Aquatic Habitats
_____Sand Bar
_____Mud Bar
_____Gravel Bar
_____Riffles
_____Pools
_____Undercut Banks
_____Large Woody Debris
_____Overhanging vegetation
_____Contiguous Wetlands
_____Emergent Plants
_____Submerged Plants

NO STREAM

STREAM PROFILE: Cross Sectional at Crossing (include riparian vegetation, wetted width, water depth, substrate, and aquatic habitats)



STREAM PROFILE: Plan View (include direction of flow, centerline, distances from centerline, photo locations, sample locations by gear type and ROW)



STREAM FISH INVESTIGATION DATA FORM

METHODS ATTRIBUTES				
Minnow Traps (Y/N):	Hook and Line (Y/N):	Beach Seine (Y/N):	Fyke Net (Y/N):	Hoop Net (Y/N):
No. of Minnow Traps Set:	Date & Time in: (mm/dd/yyyy) N/A	Date &Time in: (mm/dd/yyyy)	Date & Time in: (mm/dd/yyyy)	Date & Time in: (mm/dd/yyyy)
Date & Time in: (mm/dd/yyyy)	No. of lines in water:	No. of passes:	Date & Time out: (mm/dd/yyyy)	Date & Time out: (mm/dd/yyyy)
Date & Time out: (mm/dd/yyyy)	Time lines in water:	Reach Length (m):		

ELECTROFISHING ATTRIBUTES				
EF (Y/N):	EF Start Time:	EF End Time:	EF Time (seconds):	EF Reach Length (m):
Duty Cycle:	Frequency (Hz) : N/A	Waveform:	Sampling Efficiency (% of sample reach):	
Current (A):	Volts (V):	Power (W):		(amp x volts)

FISH OBSERVATIONS

Gear Type	Species	Total Length (mm)	Life Stage (Juvenile or Adult)	Disposition (Dead or Alive)	Picture No.
		N/A			

NOTES (any additional information)

No defined channel. No flow

Patches of standing water ~1" deep

tussocks, tall grass interspersed w/ birch & willow shrubs

Site about 75-100' from Rd & 150-200' from TAPS

Relatively flat section of Rd.

Field Crew Chief: _____ Field Scientist/Technician: _____

Technical Lead: _____

SCLNG Stream Fish Investigations Field Form
QA/QC Checklist

This form is to be completed before leaving the field site.

Feature ID: FS1PA001 FT # 70.4 Date: 8.1.13

For all items not checked, please provide detailed explanation in the notes section of data form.

1. **Site Description**
   - ☒ Was ADF&G contacted before conducting any work in this area?
   - ☒ Site Description complete? (Every cell must have entry or N/A)
   - ☒ Were all photos taken and labeled correctly?
2. **Physical/Chemical Attributes**
   - ☒ Calibration performed prior to sampling?
   - ☒ Physical/Chemical attributes complete? (Every cell must have entry or N/A)
   - NA Water quality data within expected ranges?
     - NA pH: 4.0 – 10.0
     - ☐ NTU: 0 – 3000
     - ☐ DO (mg/L): 1.0 – 15.0
     - ☐ DO (% saturation): 75- 100
     - ☐ Temp.: 1.0 – 19.0
     - ☐ Specific Conductance: 20 - 1500
   - NA If outside expected ranges, was sample re-taken?
   - NA Are units correct?
3. **Stream Profile**
   - ☒ Stream profile view sketch included?
   - NA Stream profile view captures water depth and wetted width?
   - NA Stream profile view captures where efforts were made to capture fish?
   - ☒ Plan view sketch included?
4. **Methods Attributes**
   - ☒ Methods attributes complete? (Every cell must have entry or N/A)
   - ☒ Were methods used adequate (explanation needed if no methods selected)?
5. **Electrofishing Attributes**
   - NA Electrofishing attributes complete? (Every cell must have entry or N/A)
   - ☐ Are units correct?
   - ☐ Are spawning/rearing answers consistent with fish observations?

SCLNG Stream Fish Investigations Field Form
QA/QC Checklist

6. Fish Observations

- [NA] Are all fish captured/observed recorded in the Fish Observation table?
- [ ] Are units correct? (Fork Length (mm))
- [ ] Were adequate photos taken of fish captured? (Take a photo if in doubt)
- [ ] Were any specimens preserved?

7. General

- [Y] Feature ID and Field Target # are consistent on data forms, logbook entries, photos, and maps?
- [Y] All additional data in logbook captured on data form and additional photos noted?
- [Y] Were all additional comments on stream habitat, etc. recorded on data form?
- [NA] Was any gear missing/damaged for this survey or did you have any problems that should require resampling of this stream for an adequate survey effort?

By signing below, I verify that all field data for this site has been verified for accuracy and completeness.

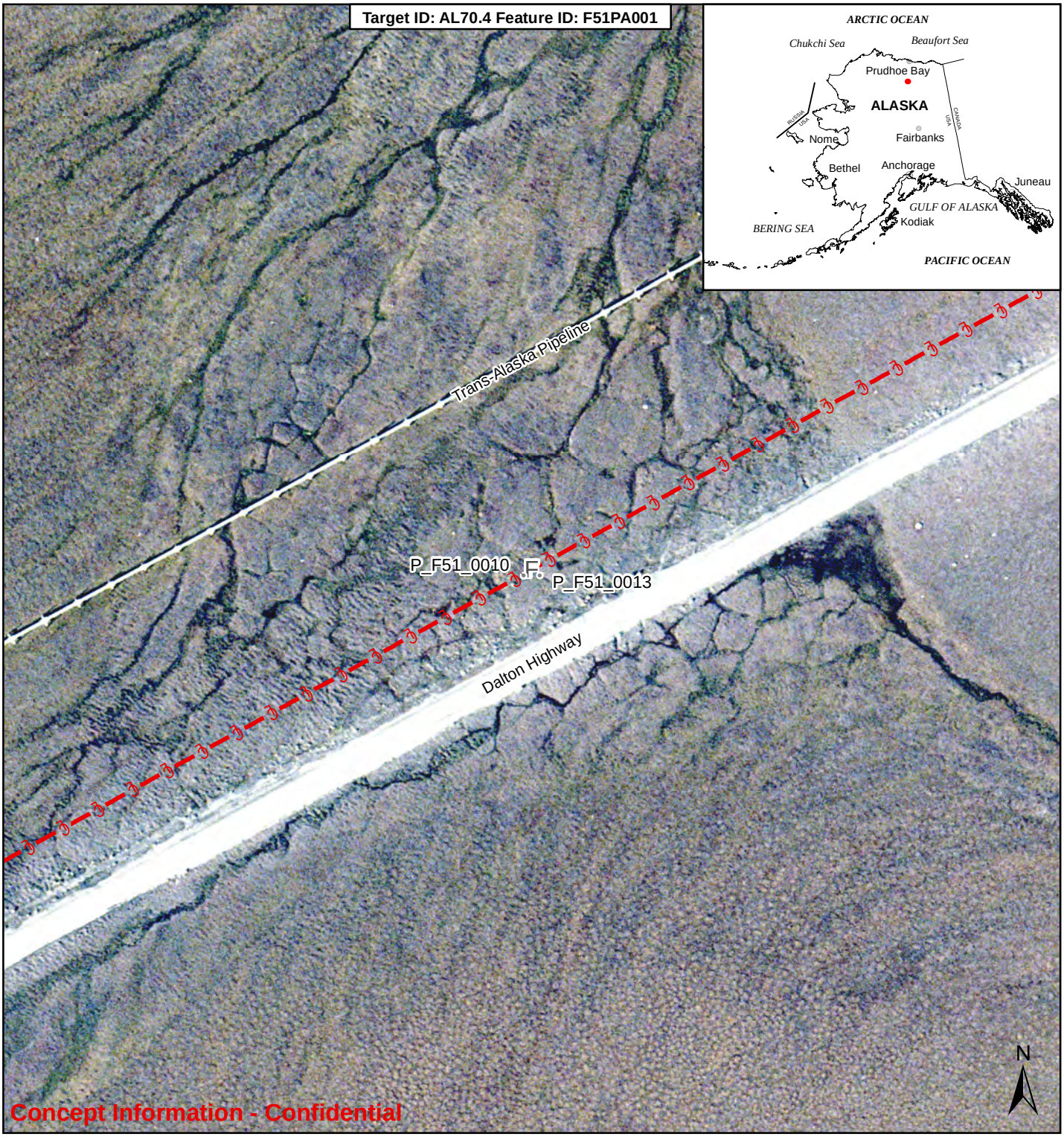
X	X
Fisheries Biologist (print)	Signature
X Kim Holmes	X
Field Crew Chief (print)	Signature

P_F51_0010 F51PA001 AL70.4

P_F51_0011 F51PA001 AL70.4

P_F51_0012 F51PA001 AL70.4

P_F51_0013 F51PA001 AL70.4



LEGEND

2013 Fish Survey Location

- F Fish Observed
- F No Fish Observed

Species Observed

- A G Arctic Grayling
- D V Dolly Varden
- N S Ninespine Stickleback
- R W Round Whitefish
- U Unknown

- Photo Point
- Alaska LNG Centerline with Mileposts

Feet: 0 200 400

Meters: 0 50 100

ALASKA LNG

NOTES:
Concept Information - Confidential. Produced by Alaska LNG team. The information used to create this product is based on the collected data on the date of issue; it is considered reliable only at the scale at which the data was created and the scale at which the map was published. This drawing is solely prepared for use by the contractual Alaska LNG team partners and the Alaska LNG team assumes no liability to any other party for any representations contained in these drawings. This map must be printed/viewed at full scale (100%) in order for the scale to remain correct.

DRAWN	CHECK	DESIGN	APPR.
TCS		TCS	

ALASKA LNG
2013 FISH FIELD SURVEY LOCATIONS

PROJECTION	DATUM	CONTRACTOR NAME	MAP NUMBER	REV.
AK ALB	NAD83	URS ALASKA		B

SCALE	DATE	PROJECT NUMBER	ORIG.PAGE SIZE
1:2,750	20 Feb 2014	226221163	8.5 X 11

I:\26221163 SCLNG Studies\10 - Geospatial\10.06 - MXD\2013 Field Reporting\Fish\2013_Fish_Field_Report_AppendixB_8x11.mxd

STREAM FISH INVESTIGATION DATA FORM

SITE DESCRIPTION

Date: 8-1-13	Investigators: KH, VW, CB	Team No.: F51	Feature ID: F51PA002
Stream Name: Unknown	Stream ID: AL070.6	Stream listed in Anadromous Fish Catalog (Y/N): N	
Milepost: 126.7	Hwy Milepost: 293.8	TAPS Milepost: 120.3	
Latitude: 68° 39' 59.9290"	Longitude: 149° 14' 26.7610"		
Logbook No.: 1	Logbook Page No.: 25	Pic No(s): P_F51_0014-0016	
US @ CL Pic No.: NA	DS @ CL Pic No.: NA	RB to LB@ CL Pic No.: NA	LB to RB@ CL Pic No.: NA
Additional Pic No.:	Additional Pic No.:	Additional Pic No.:	Additional Pic No.:

PHYSICAL/ CHEMICAL ATTRIBUTES

Weather (Describe): Sunny		Precipitation (Describe): None	
Water Temperature (°Δ*;	Air Temperature (°Δ*;	pH:	Dissolved Oxygen (mg/l):
Specific Conductance(µS/cm):	Turbidity (NTU):	Color:	ORP (mV):
Ambient Conductance(µS/cm):	Odor: NA	Sheen (Y/N):	Last date of Calibration:
Wetted Width (m):	Thalweg Depth @ CL (m):	Large Woody Debris Count:	

Riparian Veg at 0-5 m at LB:
_____Grass/Sedge (%)
_____Shrubs (%)
_____Trees (%)
_____Diameter DBH

Riparian Veg at 0-5 m at RB:
_____Grass/Sedge (%)
_____Shrubs (%)
_____Trees (%)
_____Diameter DBH

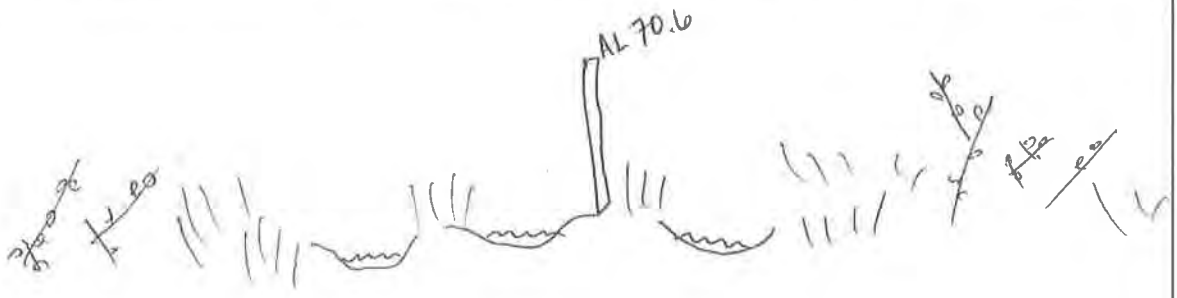
Stream Substrate:
_____Organics (%)
_____Silt (%)
_____Sand (%)
_____Gravel (%)
_____Cobble (%)
_____Boulders(%)

Aquatic Habitats
_____Sand Bar
_____Mud Bar
_____Gravel Bar
_____Riffles
_____Pools
_____Undercut Banks
_____Large Woody Debris
_____Overhanging vegetation
_____Contiguous Wetlands
_____Emergent Plants
_____Submerged Plants

Flow Type:
_____Perennial _____Seasonal _____Intermittent

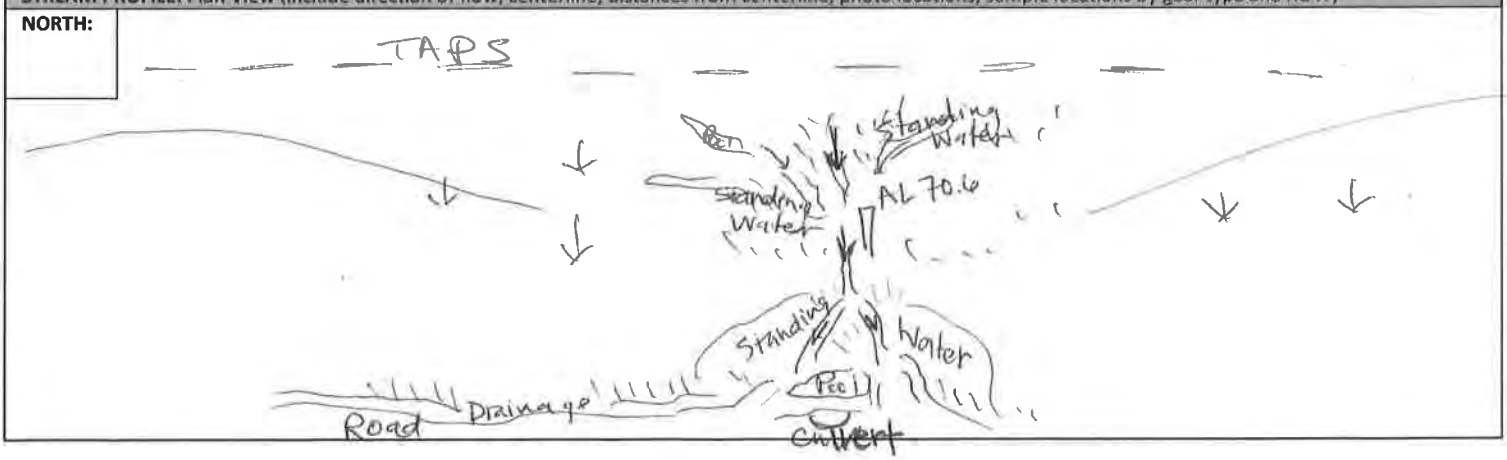
STREAM PROFILE: Cross Sectional at Crossing (include riparian vegetation, wetted width, water depth, substrate, and aquatic habitats)

NORTH:



STREAM PROFILE: Plan View (include direction of flow, centerline, distances from centerline, photo locations, sample locations by gear type and ROW)

NORTH:



STREAM FISH INVESTIGATION DATA FORM

METHODS ATTRIBUTES				
Minnow Traps (Y/N):	Hook and Line (Y/N):	Beach Seine (Y/N):	Fyke Net (Y/N):	Hoop Net (Y/N):
No. of Minnow Traps Set:	Date & Time in: (mm/dd/yyyy) N/A	Date &Time in: (mm/dd/yyyy)	Date & Time in: (mm/dd/yyyy)	Date & Time in: (mm/dd/yyyy)
Date & Time in: (mm/dd/yyyy)	No. of lines in water:	No. of passes:	Date & Time out: (mm/dd/yyyy)	Date & Time out: (mm/dd/yyyy)
Date & Time out: (mm/dd/yyyy)	Time lines in water:	Reach Length (m):		

ELECTROFISHING ATTRIBUTES				
EF (Y/N):	EF Start Time:	EF End Time:	EF Time (seconds):	EF Reach Length (m):
Duty Cycle:	Frequency (Hz): N/A	Waveform:	Sampling Efficiency (% of sample reach):	
Current (A):	Volts (V):	Power (W): (amp x volts)		

FISH OBSERVATIONS

Gear Type	Species	Total Length (mm)	Life Stage (Juvenile or Adult)	Disposition (Dead or Alive)	Picture No.
		N/A			

NOTES (any additional information)

Wetland drainage w/ some flow towards road.
Slight depression between rolling hills.
Many areas w/ water spottedly coming together with some pools - biggest about 10' in length 1-2' deep. Most depth ~0.5'-0.2". Culvert @ road.
No fish observed. Many obstructions & broken channels
Lots of emergent vegetation and some scrub-shrub (carex & birch)

Field Crew Chief: _____ Field Scientist/Technician: _____

Technical Lead: _____

SCLNG Stream Fish Investigations Field Form
QA/QC Checklist

This form is to be completed before leaving the field site.

Feature ID: FS1PA002 FT # 70-6 Date: 8-1-13

For all items not checked, please provide detailed explanation in the notes section of data form.

1. **Site Description**
   - [x] Was ADF&G contacted before conducting any work in this area?
   - [x] Site Description complete? (Every cell must have entry or N/A)
   - [x] Were all photos taken and labeled correctly?
2. **Physical/Chemical Attributes**
   - [x] Calibration performed prior to sampling?
   - [x] Physical/Chemical attributes complete? (Every cell must have entry or N/A)
   - [NA] Water quality data within expected ranges?
     - [NA] pH: 4.0 – 10.0
     - [ ] NTU: 0 – 3000
     - [ ] DO (mg/L): 1.0 – 15.0
     - [ ] DO (% saturation): 75- 100
     - [ ] Temp.: 1.0 – 19.0
     - [ ] Specific Conductance: 20 - 1500
   - [NA] If outside expected ranges, was sample re-taken?
   - [NA] Are units correct?
3. **Stream Profile**
   - [x] Stream profile view sketch included?
   - [NA] Stream profile view captures water depth and wetted width?
   - [NA] Stream profile view captures where efforts were made to capture fish?
   - [x] Plan view sketch included?
4. **Methods Attributes**
   - [x] Methods attributes complete? (Every cell must have entry or N/A)
   - [x] Were methods used adequate (explanation needed if no methods selected)?
5. **Electrofishing Attributes**
   - [NA] Electrofishing attributes complete? (Every cell must have entry or N/A)
   - [ ] Are units correct?
   - [ ] Are spawning/rearing answers consistent with fish observations?

SCLNG Stream Fish Investigations Field Form
QA/QC Checklist

6. Fish Observations

- [x] NA Are all fish captured/observed recorded in the Fish Observation table?
- [ ] Are units correct? (Fork Length (mm))
- [ ] Were adequate photos taken of fish captured? (Take a photo if in doubt)
- [ ] Were any specimens preserved?

7. General

- [x] Feature ID and Field Target # are consistent on data forms, logbook entries, photos, and maps?
- [x] All additional data in logbook captured on data form and additional photos noted?
- [x] Were all additional comments on stream habitat, etc. recorded on data form?
- [x] NA Was any gear missing/damaged for this survey or did you have any problems that should require resampling of this stream for an adequate survey effort?

By signing below, I verify that all field data for this site has been verified for accuracy and completeness.

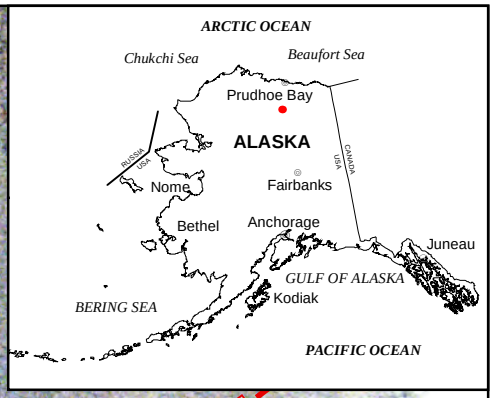
X	X
Fisheries Biologist (print)	Signature
X Kim Holmes	X
Field Crew Chief (print)	Signature

P_F51_0014 F51PA002 AL70.6

P_F51_0015 F51PA002 AL70.6

P_F51_0016 F51PA002 AL70.6

Target ID: AL70.6 Feature ID: F51PA002



Trans-Alaska Pipeline

P_F51_0015
P_F51_0014
P_F51_0016

Dalton Highway

MP 127

N

Concept Information - Confidential

LEGEND

2013 Fish Survey Location

- F Fish Observed
- F No Fish Observed

Species Observed

- A G Arctic Grayling
- D V Dolly Varden
- N S Ninespine Stickleback
- R W Round Whitefish
- U Unknown

- Photo Point
- Alaska LNG Centerline with Mileposts

Feet: 0 200 400

Meters: 0 50 100

ALASKA LNG

NOTES:
Concept Information - Confidential. Produced by Alaska LNG team. The information used to create this product is based on the collected data on the date of issue; it is considered reliable only at the scale at which the data was created and the scale at which the map was published. This drawing is solely prepared for use by the contractual Alaska LNG team partners and the Alaska LNG team assumes no liability to any other party for any representations contained in these drawings. This map must be printed/viewed at full scale (100%) in order for the scale to remain correct.

DRAWN: TCS	ALASKA LNG 2013 FISH FIELD SURVEY LOCATIONS				
CHECK:	PROJECTION: AK ALB	DATUM: NAD83	CONTRACTOR NAME: URS ALASKA	MAP NUMBER:	REV.: B
DESIGN: TCS	SCALE: 1:2,750	DATE: 20 Feb 2014	PROJECT NUMBER: 226221163	ORIG.PAGE SIZE: 8.5 X 11	
APPR.					

I:\26221163 SCLNG Studies\10 - Geospatial\10.06 - MXD\2013 Field Reporting\Fish\2013_Fish_Field_Report_AppendixB_8x11.mxd

STREAM FISH INVESTIGATION DATA FORM

SITE DESCRIPTION

Date: 8.1.13	Investigators: KH, VW, CB	Team No.: F51	Feature ID: F51PA003
Stream Name: Unknown	Stream ID: AL 70.8	Stream listed in Anadromous Fish Catalog (Y/N): N	
Milepost: 128.8	Hwy Milepost: 291.7	TAPS Milepost: 121.8	
Latitude: 68° 39' 04.0918"	Longitude: 149° 18' 22.9882"		
Logbook No.: 1	Logbook Page No.: 25	Pic No(s): P_F51_0017 - 0021	
US @ CL Pic No.: P_F51_0018	DS @ CL Pic No.: P_F51_0017	RB to LB@ CL Pic No.: P_F51_0020	LB to RB@ CL Pic No.: NA
Additional Pic No.: P_F51_0019	Additional Pic No.: P_F51_0021	Additional Pic No.: NA	Additional Pic No.: NA

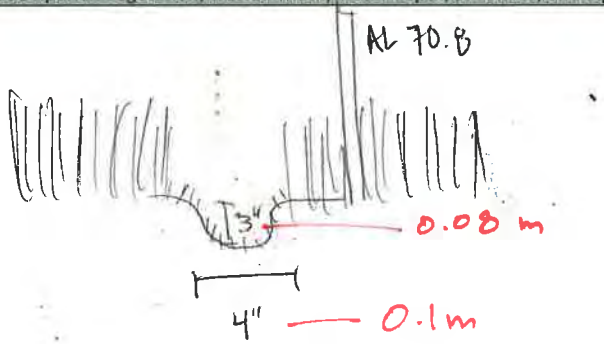
PHYSICAL/ CHEMICAL ATTRIBUTES

Weather (Describe): Sunny		Precipitation (Describe): None	
~~Water Temperature (°Δ*~~	Air Temperature (°Δ*	pH:	Dissolved Oxygen (mg/l):
Specific Conductance(µS/cm): N/A	Turbidity (NTU): TOO	Color: LITTLE	ORP (mV):
Ambient Conductance(µS/cm):	Odor:	Sheen (Y/N): WATER	Last date of Calibration:
Wetted Width (m):	Thalweg Depth @ CL (m):		Large Woody Debris Count:

Riparian Veg at 0-5 m at LB:	Riparian Veg at 0-5 m at RB:	Stream Substrate:	Aquatic Habitats	
100 Grass/Sedge (%)	100 Grass/Sedge (%)	100 Organics (%)	____ Sand Bar	____ Large Woody Debris
____ Shrubs (%)	____ Shrubs (%)	____ Silt (%)	____ Mud Bar	____ Overhanging vegetation
____ Trees (%)	____ Trees (%)	____ Sand (%)	____ Gravel Bar	____ Contiguous Wetlands
____ Diameter DBH	____ Diameter DBH	____ Gravel (%)	____ Riffles	X Emergent Plants
		____ Cobble (%)	____ Pools	X Submerged Plants
Flow Type:		____ Boulders(%)	____ Undercut Banks	
____ Perennial ____ Seasonal X Intermittent				

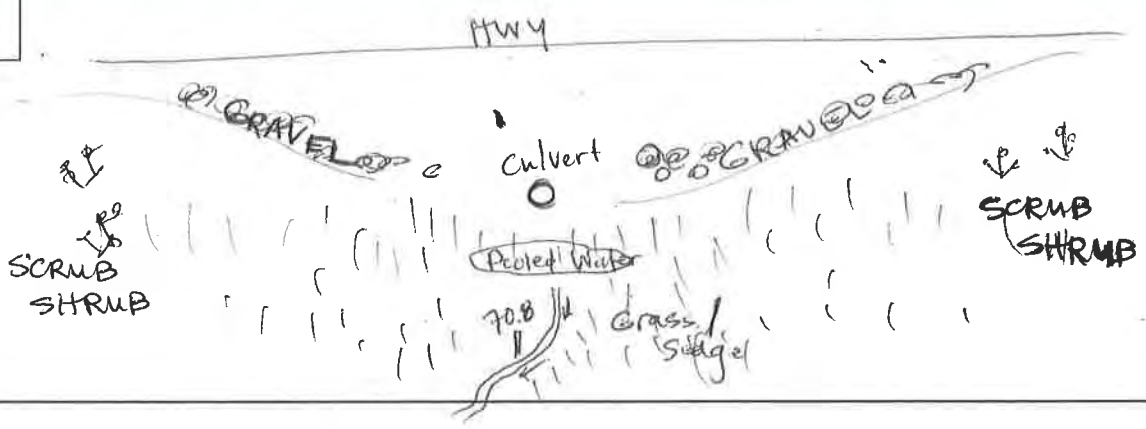
STREAM PROFILE: Cross Sectional at Crossing (include riparian vegetation, wetted width, water depth, substrate, and aquatic habitats)

NORTH: ↗



STREAM PROFILE: Plan View (include direction of flow, centerline, distances from centerline, photo locations, sample locations by gear type and ROW)

NORTH: ↖



STREAM FISH INVESTIGATION DATA FORM

METHODS ATTRIBUTES				
Minnow Traps (Y/N):	Hook and Line (Y/N):	Beach Seine (Y/N):	Fyke Net (Y/N):	Hoop Net (Y/N):
No. of Minnow Traps Set:	Date & Time in: (mm/dd/yyyy) N/A	Date &Time in: (mm/dd/yyyy)	Date & Time in: (mm/dd/yyyy)	Date & Time in: (mm/dd/yyyy)
Date & Time in: (mm/dd/yyyy)	No. of lines in water:	No. of passes:	Date & Time out: (mm/dd/yyyy)	Date & Time out: (mm/dd/yyyy)
Date & Time out: (mm/dd/yyyy)	Time lines in water:	Reach Length (m):		

ELECTROFISHING ATTRIBUTES				
EF (Y/N):	EF Start Time:	EF End Time: N/A	EF Time (seconds):	EF Reach Length (m):
Duty Cycle:	Frequency (Hz) :	Waveform:	Sampling Efficiency (% of sample reach):	
Current (A):	Volts (V):	Power (W): (amp x volts)		

FISH OBSERVATIONS

Gear Type	Species	Total Length (mm)	Life Stage (Juvenile or Adult)	Disposition (Dead or Alive)	Picture No.
		N/A			

NOTES (any additional information)

Culvert @ Rd. Depressional area between rolling hills. Very small stream emerges from pooled water by culvert. Flow to the northwest.

Stream to small for YSI meter, minnow traps or electrofisher (~4" wide & 3" deep)

Seems to extend further north w/ widened areas of marshy wetlands & standing water.

Observed eggs in standing water pool - possibly snail

Field Crew Chief: _____ Field Scientist/Technician: _____

Technical Lead: _____

SCLNG Stream Fish Investigations Field Form
QA/QC Checklist

This form is to be completed before leaving the field site.

Feature ID: F51PA003 FT # AL70.8 Date: 8.1.13

For all items not checked, please provide detailed explanation in the notes section of data form.

1. **Site Description**
   - ☒ Was ADF&G contacted before conducting any work in this area?
   - ☒ Site Description complete? (Every cell must have entry or N/A)
   - ☒ Were all photos taken and labeled correctly?
2. **Physical/Chemical Attributes**
   - ☒ Calibration performed prior to sampling?
   - ☒ Physical/Chemical attributes complete? (Every cell must have entry or N/A)
   - ☒ Water quality data within expected ranges?
     - ☒ pH: 4.0 – 10.0
     - ☐ NTU: 0 – 3000
     - ☐ DO (mg/L): 1.0 – 15.0
     - ☐ DO (% saturation): 75- 100
     - ☐ Temp.: 1.0 – 19.0
     - ☐ Specific Conductance: 20 - 1500
   - ☒ If outside expected ranges, was sample re-taken?
   - ☒ Are units correct?
3. **Stream Profile**
   - ☒ Stream profile view sketch included?
   - ☒ Stream profile view captures water depth and wetted width?
   - ☒ Stream profile view captures where efforts were made to capture fish?
   - ☒ Plan view sketch included?
4. **Methods Attributes**
   - ☒ Methods attributes complete? (Every cell must have entry or N/A)
   - ☒ Were methods used adequate (explanation needed if no methods selected)?
5. **Electrofishing Attributes**
   - ☒ Electrofishing attributes complete? (Every cell must have entry or N/A)
     - ☐ Are units correct?
     - ☐ Are spawning/rearing answers consistent with fish observations?

SCLNG Stream Fish Investigations Field Form
QA/QC Checklist

6. Fish Observations

- [NA] Are all fish captured/observed recorded in the Fish Observation table?
- [ ] Are units correct? (Fork Length (mm))
- [ ] Were adequate photos taken of fish captured? (Take a photo if in doubt)
- [ ] Were any specimens preserved?

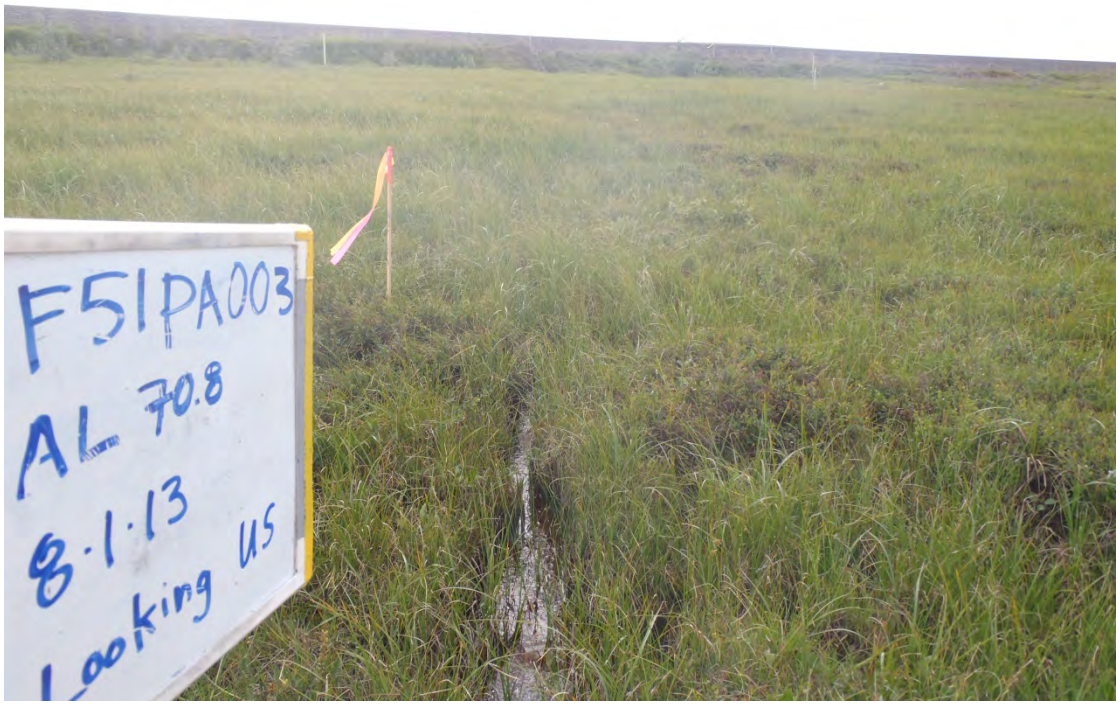
7. General

- [X] Feature ID and Field Target # are consistent on data forms, logbook entries, photos, and maps?
- [X] All additional data in logbook captured on data form and additional photos noted?
- [X] Were all additional comments on stream habitat, etc. recorded on data form?
- [NA] Was any gear missing/damaged for this survey or did you have any problems that should require resampling of this stream for an adequate survey effort?

By signing below, I verify that all field data for this site has been verified for accuracy and completeness.

X	X
Fisheries Biologist (print)	Signature
X Kim Holmes	X
Field Crew Chief (print)	Signature

P_F51_0017 F51PA003 AL70.8

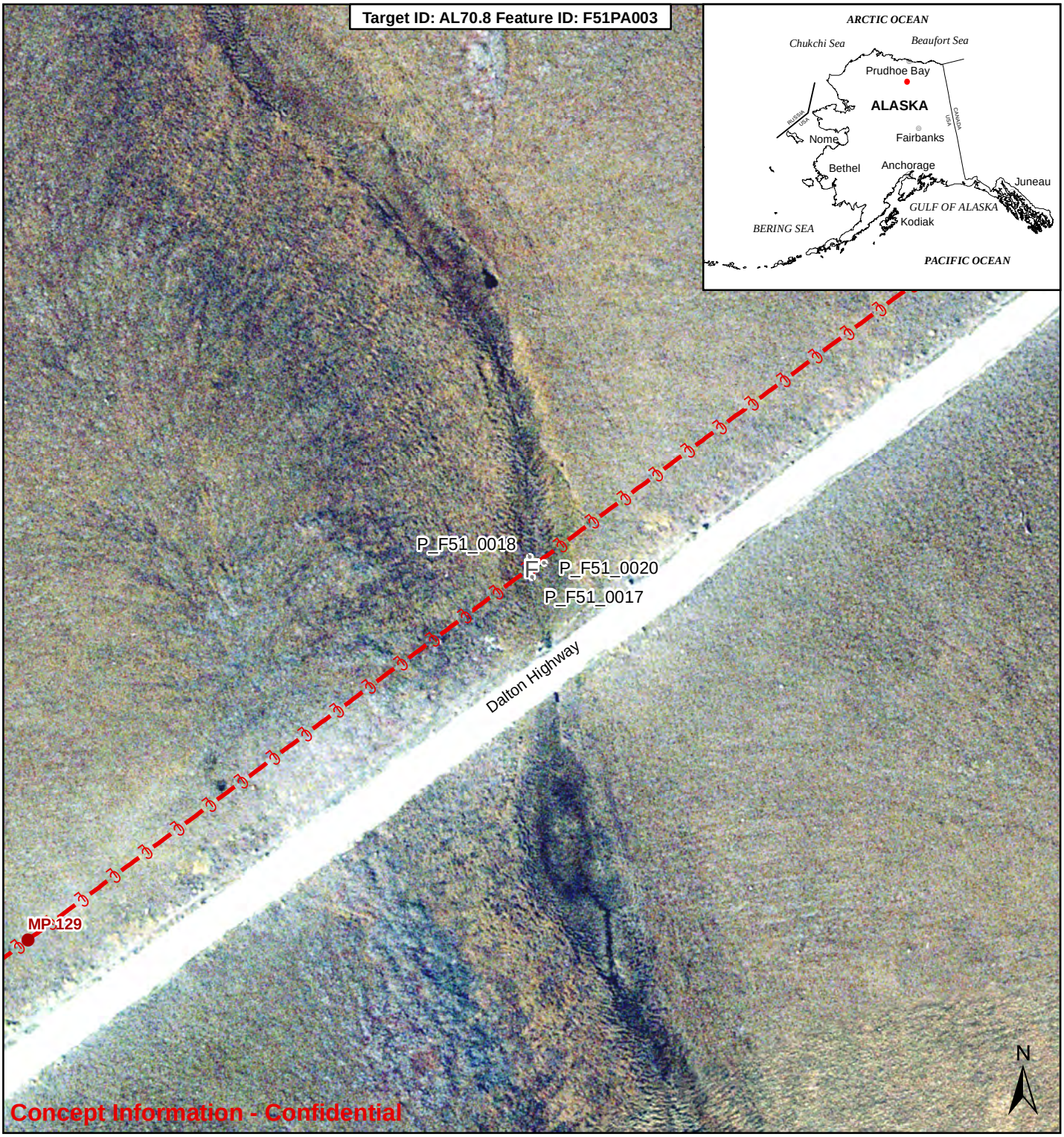


P_F51_0018 F51PA003 AL70.8

P_F51_0019 F51PA003 AL70.8

P_F51_0020 F51PA003 AL70.8

P_F51_0021 F51PA003 AL70.8



LEGEND

2013 Fish Survey Location

- F Fish Observed
- F No Fish Observed

Species Observed

- A G Arctic Grayling
- D V Dolly Varden
- N S Ninespine Stickleback
- R W Round Whitefish
- U Unknown

- Photo Point
- Alaska LNG Centerline with Mileposts

Feet: 0 200 400

Meters: 0 50 100

ALASKA LNG

NOTES:
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DRAWN: TCS	ALASKA LNG 2013 FISH FIELD SURVEY LOCATIONS				
CHECK:	PROJECTION: AK ALB	DATUM: NAD83	CONTRACTOR NAME: URS ALASKA	MAP NUMBER:	REV.: B
DESIGN: TCS	SCALE: 1:2,750	DATE: 20 Feb 2014	PROJECT NUMBER: 226221163	ORIG.PAGE SIZE: 8.5 X 11	
APPR.					

I:\26221163 SCLNG Studies\10 - Geospatial\10.06 - MXD\2013 Field Reporting\Fish\2013_Fish_Field_Report_AppendixB_8x11.mxd

STREAM FISH INVESTIGATION DATA FORM

SITE DESCRIPTION

Date: 8.3.13	Investigators: KH, VW, CB	Team No.: F51	Feature ID: F51PA004
Stream Name: Arthur Creek North Branch No. 2	Stream ID: AL57.1	Stream listed in Anadromous Fish Catalog (Y/N): N	
Milepost: 99.9	Hwy Milepost: 322.1	TAPS Milepost: 93.6	
Latitude: 68° 58' 34.9699"		Longitude: 148° 53' 21.6765"	
Logbook No.: 1	Logbook Page No.: 29-30	Pic No(s): P_F51_0022 - 0028	
US @ CL Pic No.: P_F51_0022	DS @ CL Pic No.: P_F51_0023	RB to LB@ CL Pic No.: P_F51_0024	LB to RB@ CL Pic No.: P_F51_0025
Additional Pic No.: P_F51_0026	Additional Pic No.: P_F51_0027	Additional Pic No.: P_F51_0028	Additional Pic No.: NA

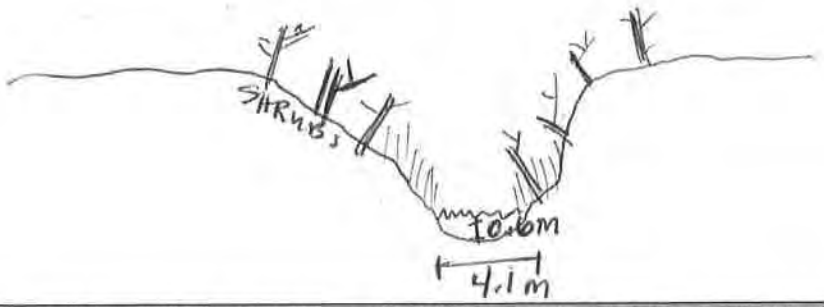
PHYSICAL/ CHEMICAL ATTRIBUTES

Weather (Describe): Sunny, scattered clouds		Precipitation (Describe): None	
Water Temperature (°Δ*; 14.92 °C	Air Temperature (°Δ*; 20°C	pH: ~~6.00~~ 6.48	Dissolved Oxygen (mg/l): 9.73
Specific Conductance(µS/cm): 68	Turbidity (NTU): 1.03	Color: Clear	ORP (mV): ~~787~~ 671
Ambient Conductance(µS/cm): 0.084	Odor: None	Sheen (Y/N): N	Last date of Calibration: 8.2.13
Wetted Width (m): ~~13.5FT~~ 4.1 m	Thalweg Depth @ CL (m): ~~1.05FT~~ 0.6 m		Large Woody Debris Count: NA

Riparian Veg at 0-5 m at LB:	Riparian Veg at 0-5 m at RB:	Stream Substrate:	Aquatic Habitats	
50 Grass/Sedge (%)	50 Grass/Sedge (%)	50 Organics (%)	___ Sand Bar	___ Large Woody Debris
50 Shrubs (%)	50 Shrubs (%)	20 Silt (%)	___ Mud Bar	X Overhanging vegetation
___ Trees (%)	___ Trees (%)	20 Sand (%)	___ Gravel Bar	X Contiguous Wetlands
___ Diameter DBH	___ Diameter DBH	10 Gravel (%)	X Riffles	X Emergent Plants
		___ Cobble (%)	X Pools	X Submerged Plants
Flow Type:		___ Boulders(%)	X Undercut Banks	
X Perennial ___ Seasonal ___ Intermittent				

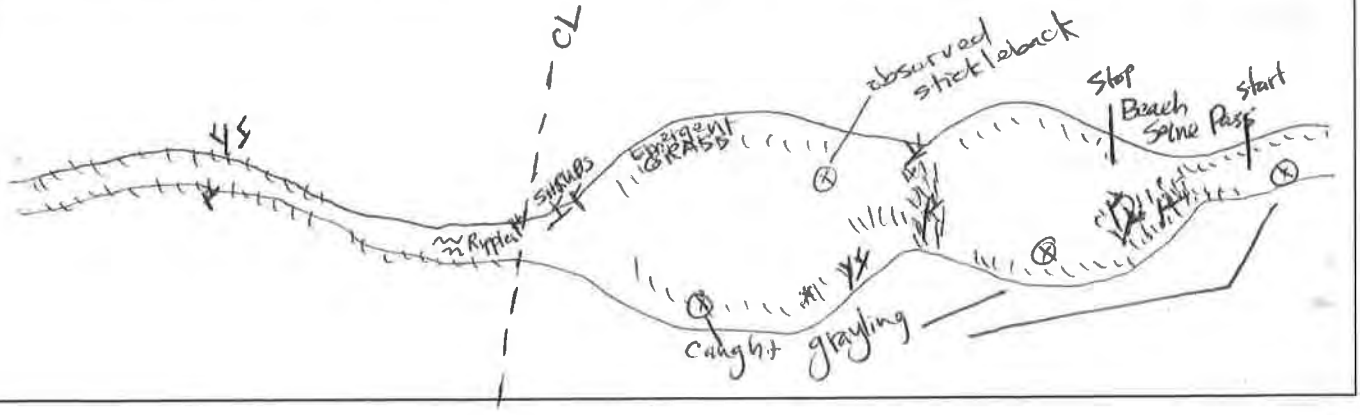
STREAM PROFILE: Cross Sectional at Crossing (include riparian vegetation, wetted width, water depth, substrate, and aquatic habitats)

NORTH: ↗



STREAM PROFILE: Plan View (include direction of flow, centerline, distances from centerline, photo locations, sample locations by gear type and ROW)

NORTH: ↑



STREAM FISH INVESTIGATION DATA FORM

METHODS ATTRIBUTES				
Minnow Traps (Y/N):	Hook and Line (Y/N): Y	Beach Seine (Y/N): Y	Fyke Net (Y/N):	Hoop Net (Y/N):
No. of Minnow Traps Set: N/A	Date & Time in: (mm/dd/yyyy) 8/3/2013	Date & Time in: (mm/dd/yyyy) 8/3/2013	Date & Time in: (mm/dd/yyyy)	Date & Time in: (mm/dd/yyyy)
Date & Time in: (mm/dd/yyyy)	No. of lines in water: 1	No. of passes: 1	Date & Time out: (mm/dd/yyyy) N/A	Date & Time out: (mm/dd/yyyy)
Date & Time out: (mm/dd/yyyy)	Time lines in water: 40	Reach Length (m): 20		

ELECTROFISHING ATTRIBUTES				
EF (Y/N):	EF Start Time:	EF End Time:	EF Time (seconds):	EF Reach Length (m):
Duty Cycle:	Frequency (Hz) : N/A	Waveform:	Sampling Efficiency (% of sample reach):	
Current (A):	Volts (V):	Power (W): (amp x volts)		

FISH OBSERVATIONS

Gear Type	Species	Total Length (mm)	Life Stage (Juvenile or Adult)	Disposition (Dead or Alive)	Picture No.
Angle	Grayling	256		Alive	
Angle	"	~225*		Alive	
Angle	"	~200*		Alive	
Observation	Grayling	~170		Alive	
Observation	Stickleback	~60		Alive	
		* caught on hook but escaped before measured			

NOTES (any additional information)

started beach seining. Fish observed. Seemed to just be pushing them upstream. Stopped to angle. At least 5 grayling observed. Had 2 online but escaped before measured. Measured one. Observed stickleback in submerged veg by water quality probe.

Nice habitat - pools & defined channel overgrown w/ veg in some places. Some gravel observed along banks but pretty mucky. Lots of emergent grass & overhanging shrubs along banks w/ some undercutting

Field Crew Chief: _____ Field Scientist/Technician: _____

Technical Lead: _____

Revision Date: 4/17/2013

SCLNG Stream Fish Investigations Field Form
QA/QC Checklist

This form is to be completed before leaving the field site.

Feature ID: F51PA004 FT # AL57.1 Date: 8.3.13

For all items not checked, please provide detailed explanation in the notes section of data form.

1. **Site Description**
   - ☒ Was ADF&G contacted before conducting any work in this area?
   - ☒ Site Description complete? (Every cell must have entry or N/A)
   - ☒ Were all photos taken and labeled correctly?
2. **Physical/Chemical Attributes**
   - ☒ Calibration performed prior to sampling?
   - ☒ Physical/Chemical attributes complete? (Every cell must have entry or N/A)
   - ☒ Water quality data within expected ranges?
     - ☒ pH: 4.0 – 10.0
     - ☒ NTU: 0 – 3000
     - ☒ DO (mg/L): 1.0 – 15.0
     - ☒ DO (% saturation): 75- 100
     - ☒ Temp.: 1.0 – 19.0
     - ☒ Specific Conductance: 20 - 1500
   - NA If outside expected ranges, was sample re-taken?
   - ☒ Are units correct?
3. **Stream Profile**
   - ☒ Stream profile view sketch included?
   - ☒ Stream profile view captures water depth and wetted width?
   - ☒ Stream profile view captures where efforts were made to capture fish?
   - ☐ Plan view sketch included?
4. **Methods Attributes**
   - ☒ Methods attributes complete? (Every cell must have entry or N/A)
   - ☒ Were methods used adequate (explanation needed if no methods selected)?
5. **Electrofishing Attributes**
   - NA Electrofishing attributes complete? (Every cell must have entry or N/A)
   - ☐ Are units correct?
   - ☐ Are spawning/rearing answers consistent with fish observations?

SCLNG Stream Fish Investigations Field Form
QA/QC Checklist

6. Fish Observations

- [X] Are all fish captured/observed recorded in the Fish Observation table?
- [X] Are units correct? (Fork Length (mm))
- [X] Were adequate photos taken of fish captured? (Take a photo if in doubt)
- [NO] Were any specimens preserved?

7. General

- [X] Feature ID and Field Target # are consistent on data forms, logbook entries, photos, and maps?
- [X] All additional data in logbook captured on data form and additional photos noted?
- [X] Were all additional comments on stream habitat, etc. recorded on data form?
- [NO] Was any gear missing/damaged for this survey or did you have any problems that should require resampling of this stream for an adequate survey effort?

By signing below, I verify that all field data for this site has been verified for accuracy and completeness.

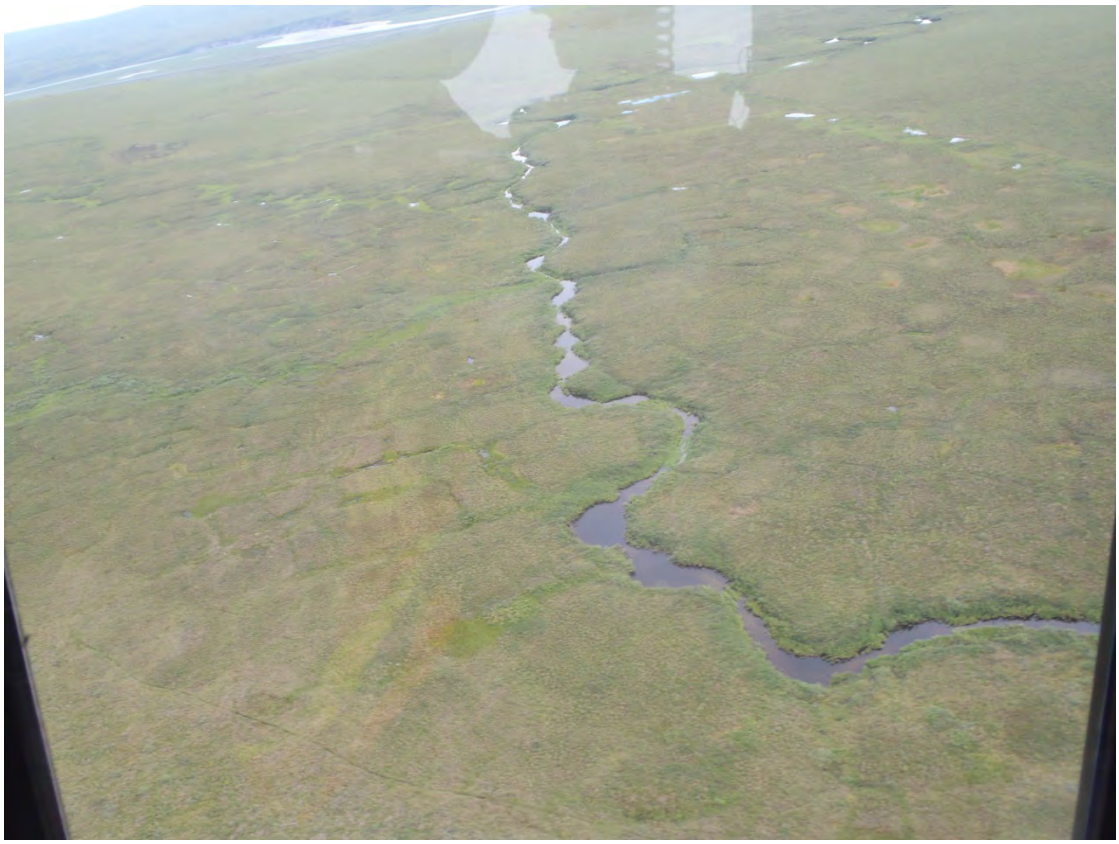
X	X
Fisheries Biologist (print)	Signature
X Kim Holmes	X
Field Crew Chief (print)	Signature

P_F51_0022 F51PA004 AL57.1

P_F51_0023 F51PA004 AL57.1

P_F51_0024 F51PA004 AL57.1

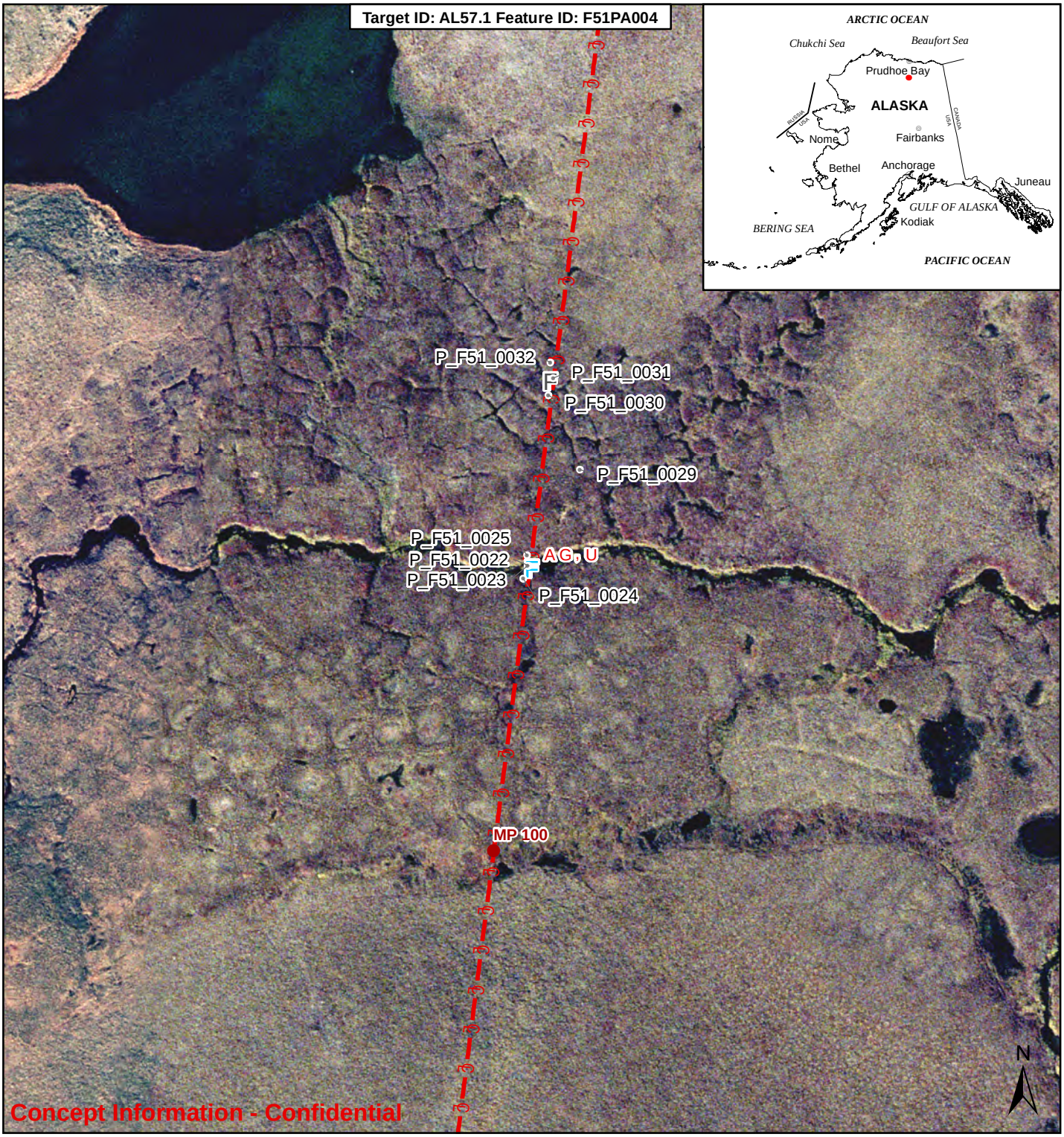
P_F51_0025 F51PA004 AL57.1



P_F51_0026 F51PA004 AL57.1

P_F51_0027 F51PA004 AL57.1

P_F51_0028 F51PA004 AL57.1



LEGEND

2013 Fish Survey Location

- F — Fish Observed
- F — No Fish Observed

Species Observed

- AG — Arctic Grayling
- DV — Dolly Varden
- NS — Ninespine Stickleback
- RW — Round Whitefish
- U — Unknown

- Photo Point
- Alaska LNG Centerline with Mileposts

Feet: 0 — 200 — 400

Meters: 0 — 50 — 100

ALASKA LNG

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DRAWN	CHECK	DESIGN	APPR.
TCS		TCS	

ALASKA LNG
2013 FISH FIELD SURVEY LOCATIONS

PROJECTION	DATUM	CONTRACTOR NAME	MAP NUMBER	REV.
AK ALB	NAD83	URS ALASKA		B

SCALE	DATE	PROJECT NUMBER	ORIG.PAGE SIZE
1:2,750	20 Feb 2014	226221163	8.5 X 11

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STREAM FISH INVESTIGATION DATA FORM

SITE DESCRIPTION

Date: 8.3.13	Investigators: BH, VW, CB	Team No.: F51	Feature ID: F51PA005
Stream Name: Arthur Creek North Branch No.1	Stream ID: AL57.0	Stream listed in Anadromous Fish Catalog (Y/N): N	
Milepost: 99.8	Hwy Milepost: 322.2	TAPS Milepost: 93.5	
Latitude: 68° 58' 37.8992"	Longitude: 148° 53' 20.1720"		
Logbook No.: 1	Logbook Page No.: 30	Pic No(s): P_F51_0029 - 0034	
US @ CL Pic No.:	DS @ CL Pic No.:	RB to LB@ CL Pic No.:	LB to RB@ CL Pic No.:
Additional Pic No.:	Additional Pic No.:	Additional Pic No.:	Additional Pic No.:

PHYSICAL/ CHEMICAL ATTRIBUTES

Weather (Describe): Sunny Partially cloudy		Precipitation (Describe): None	
Water Temperature (°C):	Air Temperature (°C):	pH:	Dissolved Oxygen (mg/l):
Specific Conductance(µS/cm):	Turbidity (NTU):	Color:	ORP (mV):
Ambient Conductance(µS/cm):	Odor:	Sheen (Y/N):	Last date of Calibration:
Wetted Width (m):	Thalweg Depth @ CL (m):		Large Woody Debris Count:

WETLAND

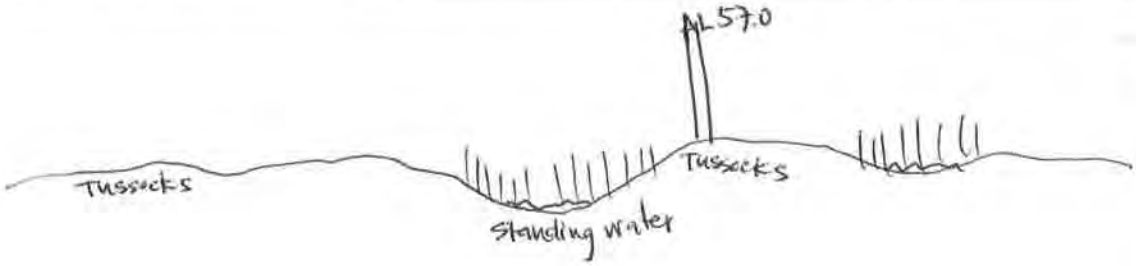
COMPLEX

Riparian Veg at 0-5 m at LB:	Riparian Veg at 0-5 m at RB:	Stream Substrate:	Aquatic Habitats	
_____Grass/Sedge (%)	_____Grass/Sedge (%)	_____Organics (%)	_____Sand Bar	_____Large Woody Debris
_____Shrubs (%)	_____Shrubs (%)	_____Silt (%)	X Mud Bar	_____Overhanging vegetation
_____Trees (%)	_____Trees (%)	_____Sand (%)	_____Gravel Bar	_____Contiguous Wetlands
_____Diameter DBH	_____Diameter DBH	_____Gravel (%)	_____Riffles	_____Emergent Plants
		_____Cobble (%)	_____Pools	_____Submerged Plants
		_____Boulders(%)	_____Undercut Banks	

Flow Type:
_____Perennial _____Seasonal _____Intermittent

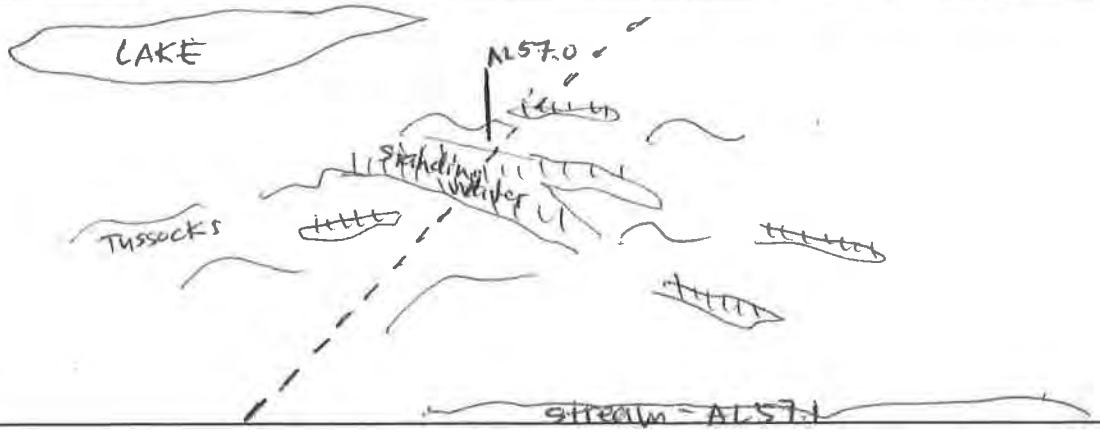
STREAM PROFILE: Cross Sectional at Crossing (include riparian vegetation, wetted width, water depth, substrate, and aquatic habitats)

NORTH:



STREAM PROFILE: Plan View (include direction of flow, centerline, distances from centerline, photo locations, sample locations by gear type and ROW)

NORTH:



STREAM FISH INVESTIGATION DATA FORM

METHODS ATTRIBUTES				
Minnow Traps (Y/N):	Hook and Line (Y/N):	Beach Seine (Y/N):	Fyke Net (Y/N):	Hoop Net (Y/N):
No. of Minnow Traps Set:	Date & Time in: (mm/dd/yyyy)	Date & Time in: (mm/dd/yyyy)	Date & Time in: (mm/dd/yyyy)	Date & Time in: (mm/dd/yyyy)
Date & Time in: (mm/dd/yyyy)	No. of lines in water:	No. of passes:	Date & Time out: (mm/dd/yyyy)	Date & Time out: (mm/dd/yyyy)
Date & Time out: (mm/dd/yyyy)	Time lines in water:	Reach Length (m):		

ELECTROFISHING ATTRIBUTES				
EF (Y/N):	EF Start Time:	EF End Time:	EF Time (seconds):	EF Reach Length (m):
Duty Cycle:	Frequency (Hz) :	Waveform:	Sampling Efficiency (% of sample reach):	
Current (A):	Volts (V):	Power (W):	(amp x volts)	

N/A

FISH OBSERVATIONS

Gear Type	Species	Total Length (mm)	Life Stage (Juvenile or Adult)	Disposition (Dead or Alive)	Picture No.

N/A

NOTES (any additional information)

Wetland Complex
Lake nearby to NW and stream (AL57.1) to south but no clear channel connecting either. Patches of standing water. No flow contiguous wetlands

Field Crew Chief: _____ Field Scientist/Technician: _____

Technical Lead: _____

Revision Date: 4/17/2013

SCLNG Stream Fish Investigations Field Form
QA/QC Checklist

This form is to be completed before leaving the field site.

Feature ID: FSIPA005 FT # AL57.0 Date: 8.3.13

For all items not checked, please provide detailed explanation in the notes section of data form.

1. **Site Description**
   - ☒ Was ADF&G contacted before conducting any work in this area?
   - ☒ Site Description complete? (Every cell must have entry or N/A)
   - ☒ Were all photos taken and labeled correctly?
2. **Physical/Chemical Attributes**
   - ☒ Calibration performed prior to sampling?
   - ☒ Physical/Chemical attributes complete? (Every cell must have entry or N/A)
   - NA Water quality data within expected ranges?
     - NA pH: 4.0 – 10.0
     - ☐ NTU: 0 – 3000
     - ☐ DO (mg/L): 1.0 – 15.0
     - ☐ DO (% saturation): 75- 100
     - ☐ Temp.: 1.0 – 19.0
     - ☐ Specific Conductance: 20 - 1500
   - ☐ If outside expected ranges, was sample re-taken?
   - ☐ Are units correct?
3. **Stream Profile**
   - ☒ Stream profile view sketch included?
   - NA Stream profile view captures water depth and wetted width?
   - NA Stream profile view captures where efforts were made to capture fish?
   - ☒ Plan view sketch included?
4. **Methods Attributes**
   - ☒ Methods attributes complete? (Every cell must have entry or N/A)
   - ☒ Were methods used adequate (explanation needed if no methods selected)?
5. **Electrofishing Attributes**
   - NA Electrofishing attributes complete? (Every cell must have entry or N/A)
     - ☐ Are units correct?
     - ☐ Are spawning/rearing answers consistent with fish observations?

SCLNG Stream Fish Investigations Field Form
QA/QC Checklist

6. Fish Observations

- ☒ NA Are all fish captured/observed recorded in the Fish Observation table?
- ☐ Are units correct? (Fork Length (mm))
- ☐ Were adequate photos taken of fish captured? (Take a photo if in doubt)
- ☐ Were any specimens preserved?

7. General

- ☒ Feature ID and Field Target # are consistent on data forms, logbook entries, photos, and maps?
- ☒ All additional data in logbook captured on data form and additional photos noted?
- ☒ Were all additional comments on stream habitat, etc. recorded on data form?
- ☒ NO Was any gear missing/damaged for this survey or did you have any problems that should require resampling of this stream for an adequate survey effort?

By signing below, I verify that all field data for this site has been verified for accuracy and completeness.

X	X
Fisheries Biologist (print)	Signature
X Kim Holmes	X
Field Crew Chief (print)	Signature

P_F51_0029 F51PA005 AL57

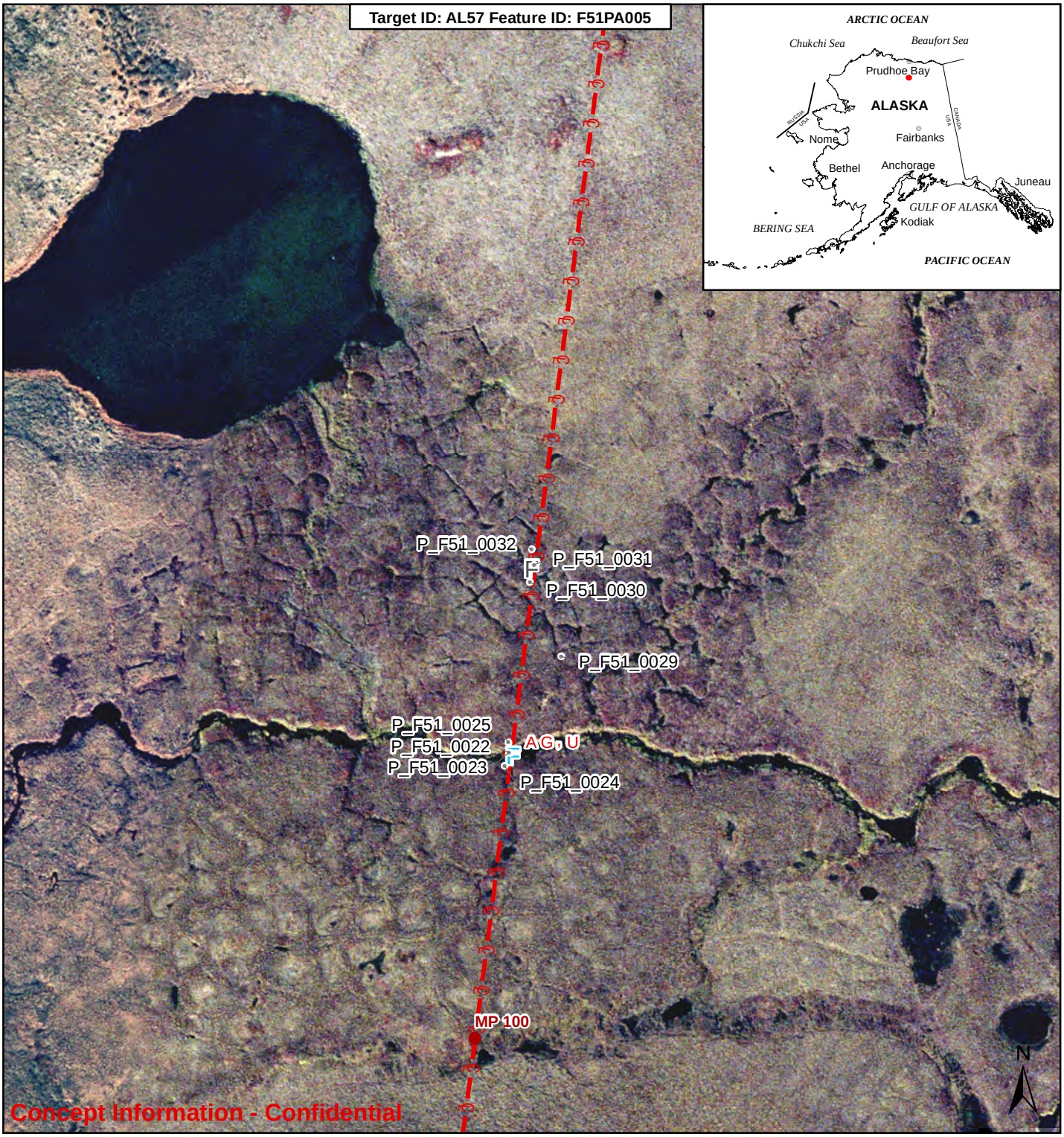
P_F51_0030 F51PA005 AL57

P_F51_0031 F51PA005 AL57

P_F51_0032 F51PA005 AL57

P_F51_0033 F51PA005 AL57

P_F51_0034 F51PA005 AL57



LEGEND

2013 Fish Survey Location

- F — Fish Observed
- F — No Fish Observed

Species Observed

- A G — Arctic Grayling
- D V — Dolly Varden
- N S — Ninespine Stickleback
- R W — Round Whitefish
- U — Unknown

- Photo Point
- Alaska LNG Centerline with Mileposts

Feet: 0 — 200 — 400

Meters: 0 — 50 — 100

ALASKA LNG

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DRAWN	CHECK	DESIGN	APPR.
TCS		TCS	

ALASKA LNG
2013 FISH FIELD SURVEY LOCATIONS

PROJECTION	DATUM	CONTRACTOR NAME	MAP NUMBER	REV.
AK ALB	NAD83	URS ALASKA		B

SCALE	DATE	PROJECT NUMBER	ORIG.PAGE SIZE
1:2,750	20 Feb 2014	226221163	8.5 X 11

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STREAM FISH INVESTIGATION DATA FORM

SITE DESCRIPTION

Date: 8.4.13	Investigators: KH, VW, CB	Team No.: F51	Feature ID: F51PA006
Stream Name: Oksrukuyik Creek	Stream ID: AL70	Stream listed in Anadromous Fish Catalog (Y/N): N	
Milepost: 109.4	Hwy Milepost: 312	TAPS Milepost: 103.3	
Latitude: 68° 50' 37.0301"		Longitude: 148° 51' 35.3557"	
Logbook No.: 1	Logbook Page No.: 31-32	Pic No(s): P_F51_0035 - 0042	
US @ CL Pic No.: P_F51_0035	DS @ CL Pic No.: P_F51_0036	RB to LB@ CL Pic No.: P_F51_0037	LB to RB@ CL Pic No.: P_F51_0038
Additional Pic No.: P_F51_0039	Additional Pic No.: P_F51_0040	Additional Pic No.: P_F51_0041	Additional Pic No.: P_F51_0042

PHYSICAL/ CHEMICAL ATTRIBUTES

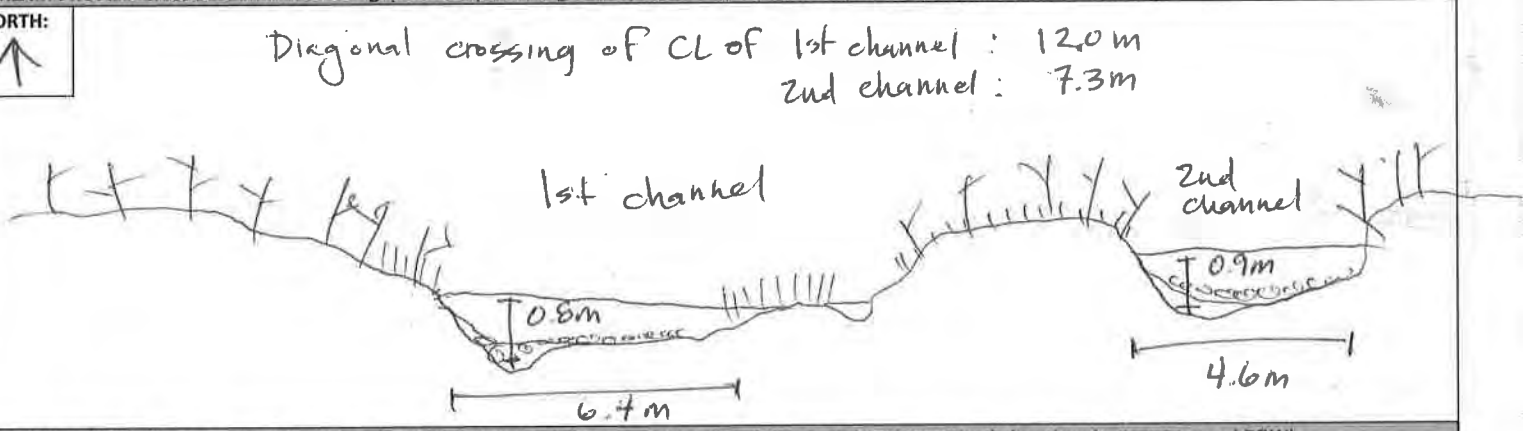
Weather (Describe): Sunny		Precipitation (Describe): None	
Water Temperature (°Δ*; 10.05	Air Temperature (°Δ*; 20	pH: 7.22	Dissolved Oxygen (mg/l): 10.32
Specific Conductance(µS/cm): 139	Turbidity (NTU): 1.56	Color: Clear	ORP (mV): 98.7
Ambient Conductance(µS/cm): 0.194	Odor: none	Sheen (Y/N): None	Last date of Calibration: 8-2-13
Wetted Width (m): ~~21 ft~~ 6.4m	Thalweg Depth @ CL (m): ~~2.6 ft~~ 0.8m		Large Woody Debris Count: NA

D: 39.3
2nd
W: 15.1
D: 23.8
T: 2.8

Riparian Veg at 0-5 m at LB:	Riparian Veg at 0-5 m at RB:	Stream Substrate:	Aquatic Habitats	
30 Grass/Sedge (%)	30 Grass/Sedge (%)	____ Organics (%)	X Sand Bar	____ Large Woody Debris
70 Shrubs (%)	70 Shrubs (%)	____ Silt (%)	____ Mud Bar	X Overhanging vegetation
____ Trees (%)	____ Trees (%)	20 Sand (%)	X Gravel Bar	X Contiguous Wetlands
____ Diameter DBH	____ Diameter DBH	70 Gravel (%)	X Riffles	X Emergent Plants
Flow Type:		10 Cobble (%)	X Pools	X Submerged Plants
X Perennial ____ Seasonal ____ Intermittent		____ Boulders(%)	X Undercut Banks	

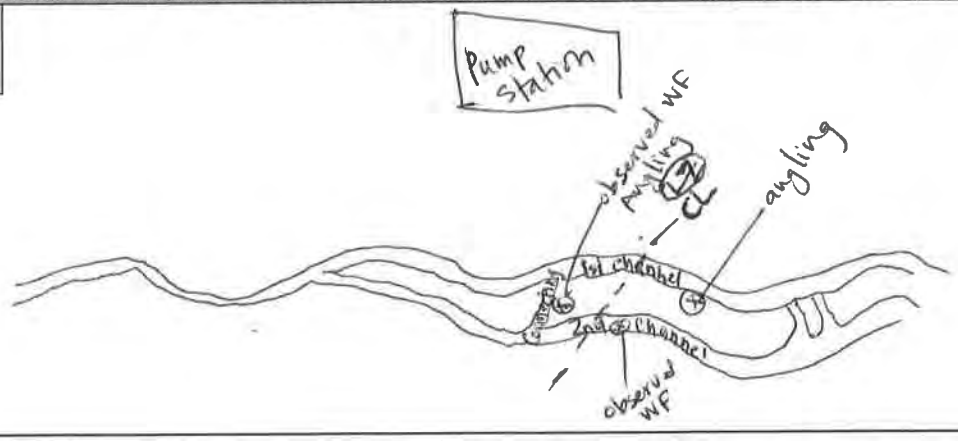
STREAM PROFILE: Cross Sectional at Crossing (include riparian vegetation, wetted width, water depth, substrate, and aquatic habitats)

NORTH: ↑



STREAM PROFILE: Plan View (include direction of flow, centerline, distances from centerline, photo locations, sample locations by gear type and ROW)

NORTH: ↓



STREAM FISH INVESTIGATION DATA FORM

METHODS ATTRIBUTES				
Minnow Traps (Y/N):	Hook and Line (Y/N): Y	Beach Seine (Y/N):	Fyke Net (Y/N):	Hoop Net (Y/N):
No. of Minnow Traps Set: NA	Date & Time in: ~~08/04/2013~~ 1230 ~~40 minutes~~	Date & Time in (mm/dd/yyyy): NA	Date & Time in: (mm/dd/yyyy)	Date & Time in: (mm/dd/yyyy)
Date & Time in: (mm/dd/yyyy)	No. of lines in water: 1	No. of passes:	Date & Time out: (mm/dd/yyyy) N	Date & Time out: (mm/dd/yyyy)
Date & Time out: (mm/dd/yyyy)	Time lines in water: 40 ~~30~~	Reach Length (m):		

ELECTROFISHING ATTRIBUTES				
EF (Y/N):	EF Start Time:	EF End Time:	EF Time (seconds):	EF Reach Length (m):
Duty Cycle:	Frequency (Hz):	Waveform: NA	Sampling Efficiency (% of sample reach):	
Current (A):	Volts (V):	Power (W): (amp x volts)		

FISH OBSERVATIONS

Gear Type	Species	Total Length (mm)	Life Stage (Juvenile or Adult)	Disposition (Dead or Alive)	Picture No.
Observation	~~Round~~ Whitefish	20" 508 mm	Adult	Alive	
Observation	Whitefish	" "	"	"	
Observation	Whitefish	18" 457 mm	"	"	
Observation	Whitefish	" "	"	"	

NOTES (any additional information)

Observed 3 whitefish in connecting channel and up second channel
Observed minnow - no identification. Whitefish look like Round Whitefish from shore.
No further fishing effort since sensitive species observed. ↓ took photo
Tried angling for measurement but fish not biting.
Observed fourth whitefish.
Channels merge & separate upstream and down
Main channels have mostly gravel/cobble substrate and connecting
Channel has silt/sand/organic substrate w/emerging shrub
some emergent grass & undercut banks in both channels
& gravel bars & riffles w/ deeper thalweg along east bank

Field Crew Chief: _____ Field Scientist/Technician: _____

Technical Lead: _____

SCLNG Stream Fish Investigations Field Form
QA/QC Checklist

This form is to be completed before leaving the field site.

Feature ID: FSIPA006 FT # AL70 Date: 8.4.13

For all items not checked, please provide detailed explanation in the notes section of data form.

1. **Site Description**
   - ☒ Was ADF&G contacted before conducting any work in this area?
   - ☒ Site Description complete? (Every cell must have entry or N/A)
   - ☒ Were all photos taken and labeled correctly?
2. **Physical/Chemical Attributes**
   - ☒ Calibration performed prior to sampling?
   - ☒ Physical/Chemical attributes complete? (Every cell must have entry or N/A)
   - ☒ Water quality data within expected ranges?
     - ☒ pH: 4.0 – 10.0
     - ☒ NTU: 0 – 3000
     - ☒ DO (mg/L): 1.0 – 15.0
     - ☒ DO (% saturation): 75- 100
     - ☒ Temp.: 1.0 – 19.0
     - ☒ Specific Conductance: 20 - 1500
   - ☒ N/A If outside expected ranges, was sample re-taken?
   - ☒ Are units correct?
3. **Stream Profile**
   - ☒ Stream profile view sketch included?
   - ☒ Stream profile view captures water depth and wetted width?
   - ☒ Stream profile view captures where efforts were made to capture fish?
   - ☒ Plan view sketch included?
4. **Methods Attributes**
   - ☒ Methods attributes complete? (Every cell must have entry or N/A)
   - ☒ Were methods used adequate (explanation needed if no methods selected)?
5. **Electrofishing Attributes**
   - ☒ N/A Electrofishing attributes complete? (Every cell must have entry or N/A)
   - ☐ Are units correct?
   - ☐ Are spawning/rearing answers consistent with fish observations?

SCLNG Stream Fish Investigations Field Form
QA/QC Checklist

6. Fish Observations

- [x] Are all fish captured/observed recorded in the Fish Observation table?
- [x] Are units correct? (Fork Length (mm))
- [x] Were adequate photos taken of fish captured? (Take a photo if in doubt)
- [NO] Were any specimens preserved?

7. General

- [x] Feature ID and Field Target # are consistent on data forms, logbook entries, photos, and maps?
- [x] All additional data in logbook captured on data form and additional photos noted?
- [x] Were all additional comments on stream habitat, etc. recorded on data form?
- [NO] Was any gear missing/damaged for this survey or did you have any problems that should require resampling of this stream for an adequate survey effort?

By signing below, I verify that all field data for this site has been verified for accuracy and completeness.

X	X
Fisheries Biologist (print)	Signature
X Kim Holmes	X
Field Crew Chief (print)	Signature

P_F51_0035 F51PA006 AL70

P_F51_0035 F51PA006 AL70

P_F51_0037 F51PA006 AL70

P_F51_0038 F51PA006 AL70

P_F51_0039 F51PA006 AL70

P_F51_0040 F51PA006 AL70

P_F51_0041 F51PA006 AL70

P_F51_0041 F51PA006 AL70

Target ID: AL70 Feature ID: F51PA006

P_F51_0038
P_F51_0041
P_F51_0040
RW
P_F51_0036
P_F51_0035
P_F51_0037

N

Concept Information - Confidential

LEGEND

2013 Fish Survey Location

- F Fish Observed
- F No Fish Observed

Species Observed

- A G Arctic Grayling
- D V Dolly Varden
- N S Ninespine Stickleback
- R W Round Whitefish
- U Unknown

- Photo Point
- Alaska LNG Centerline with Mileposts

Feet
0 200 400
0 50 100
Meters

ALASKA LNG

NOTES:
Concept Information - Confidential. Produced by Alaska LNG team. The information used to create this product is based on the collected data on the date of issue; it is considered reliable only at the scale at which the data was created and the scale at which the map was published. This drawing is solely prepared for use by the contractual Alaska LNG team partners and the Alaska LNG team assumes no liability to any other party for any representations contained in these drawings. This map must be printed/viewed at full scale (100%) in order for the scale to remain correct.

DRAWN	CHECK	DESIGN	APPR.
TCS		TCS	

ALASKA LNG
2013 FISH FIELD SURVEY LOCATIONS

PROJECTION	DATUM	CONTRACTOR NAME	MAP NUMBER	REV.
AK ALB	NAD83	URS ALASKA		B

SCALE	DATE	PROJECT NUMBER	ORIG.PAGE SIZE
1:2,750	20 Feb 2014	226221163	8.5 X 11

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STREAM FISH INVESTIGATION DATA FORM

SITE DESCRIPTION

Date: 8/4/13	Investigators: KH, VW, CB	Team No.: F51	Feature ID: F51PA007
Stream Name: Rudy Creek North Branch	Stream ID: AL67	Stream listed in Anadromous Fish Catalog (Y/N): N	
Milepost: 107.4	Hwy Milepost: 314	TAPS Milepost: 99.8	
Latitude: 68° 52' 08.8643"	Longitude: 148° 52' 51.3983"		
Logbook No.: 1	Logbook Page No.: 31	Pic No(s): P_F51_0043-0049	
US @ CL Pic No.: P_F51_0043	DS @ CL Pic No.: P_F51_0044	RB to LB@ CL Pic No.: P_F51_0045	LB to RB@ CL Pic No.: P_F51_0046
Additional Pic No.: P_F51_0047	Additional Pic No.: P_F51_0048	Additional Pic No.: P_F51_0049	Additional Pic No.:

PHYSICAL/ CHEMICAL ATTRIBUTES

Weather (Describe): Sunny Partly Cloudy SW wind		Precipitation (Describe): None	
Water Temperature (°Δ*; 13.86	Air Temperature (°Δ*; 20	pH: 6.70	Dissolved Oxygen (mg/l): 9.47
Specific Conductance(µS/cm): 38	Turbidity (NTU): 2.61	Color: Copper	ORP (mV): 83.5
Ambient Conductance(µS/cm): 0.048	Odor: None	Sheen (Y/N): N	Last date of Calibration: 8-2-13
Wetted Width (m): ~~23.3'~~ 7.1m	Thalweg Depth @ CL (m): ~~3.1'~~ 0.9m		Large Woody Debris Count: None

Riparian Veg at 0-5 m at LB:
- 90 Grass/Sedge (%)
- 10 Shrubs (%)
- _____ Trees (%)
- _____ Diameter DBH

Riparian Veg at 0-5 m at RB:
- 50 Grass/Sedge (%)
- 50 Shrubs (%)
- _____ Trees (%)
- _____ Diameter DBH

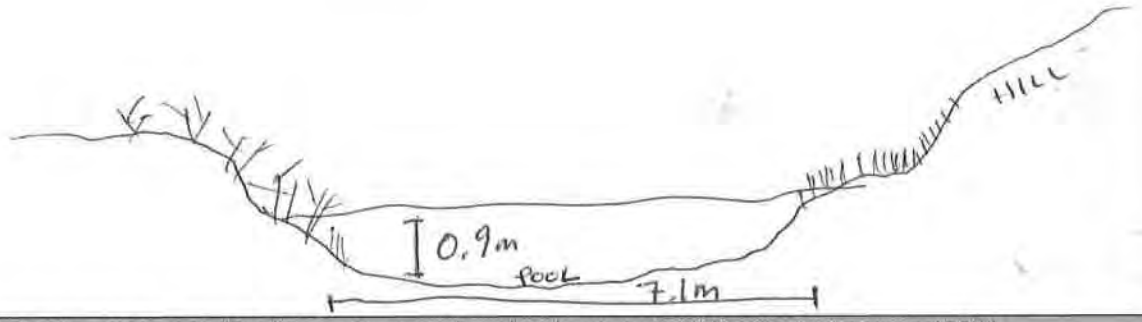
Flow Type:
X Perennial _____ Seasonal _____ Intermittent

Stream Substrate:
- _____ Organics (%)
- _____ Silt (%)
- ~~10~~ 30 Sand (%)
- ~~60~~ 30 Gravel (%)
- ~~20~~ 30 Cobble (%)
- 10 Boulders(%)

Aquatic Habitats
- _____ Sand Bar
- _____ Mud Bar
- _____ Gravel Bar
- X Riffles
- X Pools
- X Undercut Banks
- _____ Large Woody Debris
- X Overhanging vegetation
- _____ Contiguous Wetlands
- X Emergent Plants
- X Submerged Plants

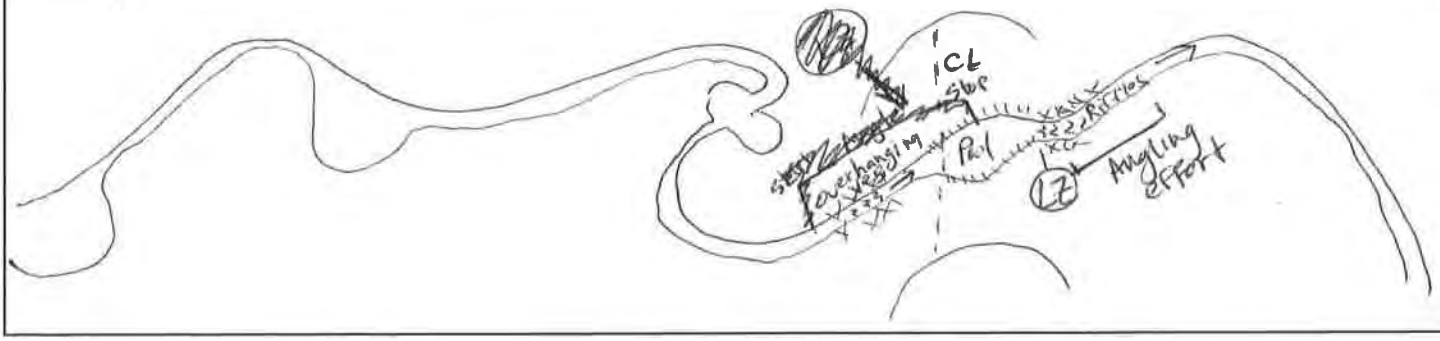
STREAM PROFILE: Cross Sectional at Crossing (include riparian vegetation, wetted width, water depth, substrate, and aquatic habitats)

NORTH: →



STREAM PROFILE: Plan View (include direction of flow, centerline, distances from centerline, photo locations, sample locations by gear type and ROW)

NORTH: ↑



STREAM FISH INVESTIGATION DATA FORM

METHODS ATTRIBUTES				
Minnow Traps (Y/N):	Hook and Line (Y/N): Y	Beach Seine (Y/N):	Fyke Net (Y/N):	Hoop Net (Y/N):
No. of Minnow Traps Set: N/A	Date & Time in: (mm/dd/yyyy) 8/14/13 1430 ~20m	Date &Time in: (mm/dd/yyyy)	Date & Time in: (mm/dd/yyyy) N/A	Date & Time in: (mm/dd/yyyy)
Date & Time in: (mm/dd/yyyy)	No. of lines in water: 1	No. of passes:	Date & Time out: (mm/dd/yyyy)	Date & Time out: (mm/dd/yyyy)
Date & Time out: (mm/dd/yyyy)	Time lines in water: 20 m	Reach Length (m):		

ELECTROFISHING ATTRIBUTES				
EF (Y/N):	EF Start Time:	EF End Time:	EF Time (seconds):	EF Reach Length (m):
Duty Cycle:	Frequency (Hz) : N/A	Waveform:	Sampling Efficiency (% of sample reach):	
Current (A):	Volts (V):	Power (W): (amp x volts)		

FISH OBSERVATIONS					
Gear Type	Species	Total Length (mm)	Life Stage (Juvenile or Adult)	Disposition (Dead or Alive)	Picture No.
Angle	Grayling	7" ~178 mm			
Observation	Grayling	"			
Observation	Unknown	60 mm			
Observation	Unknown	"			

NOTES (any additional information)

Centerline crosses stream slightly downstream of opening of pool

Smaller channel upstream > downstream w/riffles & overhanging shrubs

Pool ~60' long w/more grass on left bank. About 5' deep max

Hooked grayling w/flyrod but escaped before measured

Observed another grayling and quick glance at unidentified fish-DS in channel

Lots of boulders & cobbles in substrate

pool flanked by small hill on north side

Observed small (~60 mm) fish in pool going after leaves on surface

Field Crew Chief: _____ Field Scientist/Technician: _____

Technical Lead: _____

SCLNG Stream Fish Investigations Field Form
QA/QC Checklist

This form is to be completed before leaving the field site.

Feature ID: FSIPA007 FT # AL67 Date: 8/4/13

For all items not checked, please provide detailed explanation in the notes section of data form.

1. **Site Description**
   - [x] Was ADF&G contacted before conducting any work in this area?
   - [x] Site Description complete? (Every cell must have entry or N/A)
   - [x] Were all photos taken and labeled correctly?
2. **Physical/Chemical Attributes**
   - [x] Calibration performed prior to sampling?
   - [x] Physical/Chemical attributes complete? (Every cell must have entry or N/A)
   - [x] Water quality data within expected ranges?
     - [x] pH: 4.0 – 10.0
     - [x] NTU: 0 – 3000
     - [x] DO (mg/L): 1.0 – 15.0
     - [x] DO (% saturation): 75- 100
     - [x] Temp.: 1.0 – 19.0
     - [x] Specific Conductance: 20 - 1500
   - [NA] If outside expected ranges, was sample re-taken?
   - [x] Are units correct?
3. **Stream Profile**
   - [x] Stream profile view sketch included?
   - [x] Stream profile view captures water depth and wetted width?
   - [x] Stream profile view captures where efforts were made to capture fish?
   - [x] Plan view sketch included?
4. **Methods Attributes**
   - [x] Methods attributes complete? (Every cell must have entry or N/A)
   - [x] Were methods used adequate (explanation needed if no methods selected)?
5. **Electrofishing Attributes**
   - [NA] Electrofishing attributes complete? (Every cell must have entry or N/A)
   - [ ] Are units correct?
   - [ ] Are spawning/rearing answers consistent with fish observations?

SCLNG Stream Fish Investigations Field Form
QA/QC Checklist

6. Fish Observations

- [x] Are all fish captured/observed recorded in the Fish Observation table?
- [x] Are units correct? (Fork Length (mm))
- [x] Were adequate photos taken of fish captured? (Take a photo if in doubt)
- [N/A] Were any specimens preserved?

7. General

- [x] Feature ID and Field Target # are consistent on data forms, logbook entries, photos, and maps?
- [x] All additional data in logbook captured on data form and additional photos noted?
- [x] Were all additional comments on stream habitat, etc. recorded on data form?
- [N/A] Was any gear missing/damaged for this survey or did you have any problems that should require resampling of this stream for an adequate survey effort?

By signing below, I verify that all field data for this site has been verified for accuracy and completeness.

X	X
Fisheries Biologist (print)	Signature
X Kim Holmes	X
Field Crew Chief (print)	Signature

P_F51_0043 F51PA007 AL67

P_F51_0044 F51PA007 AL67

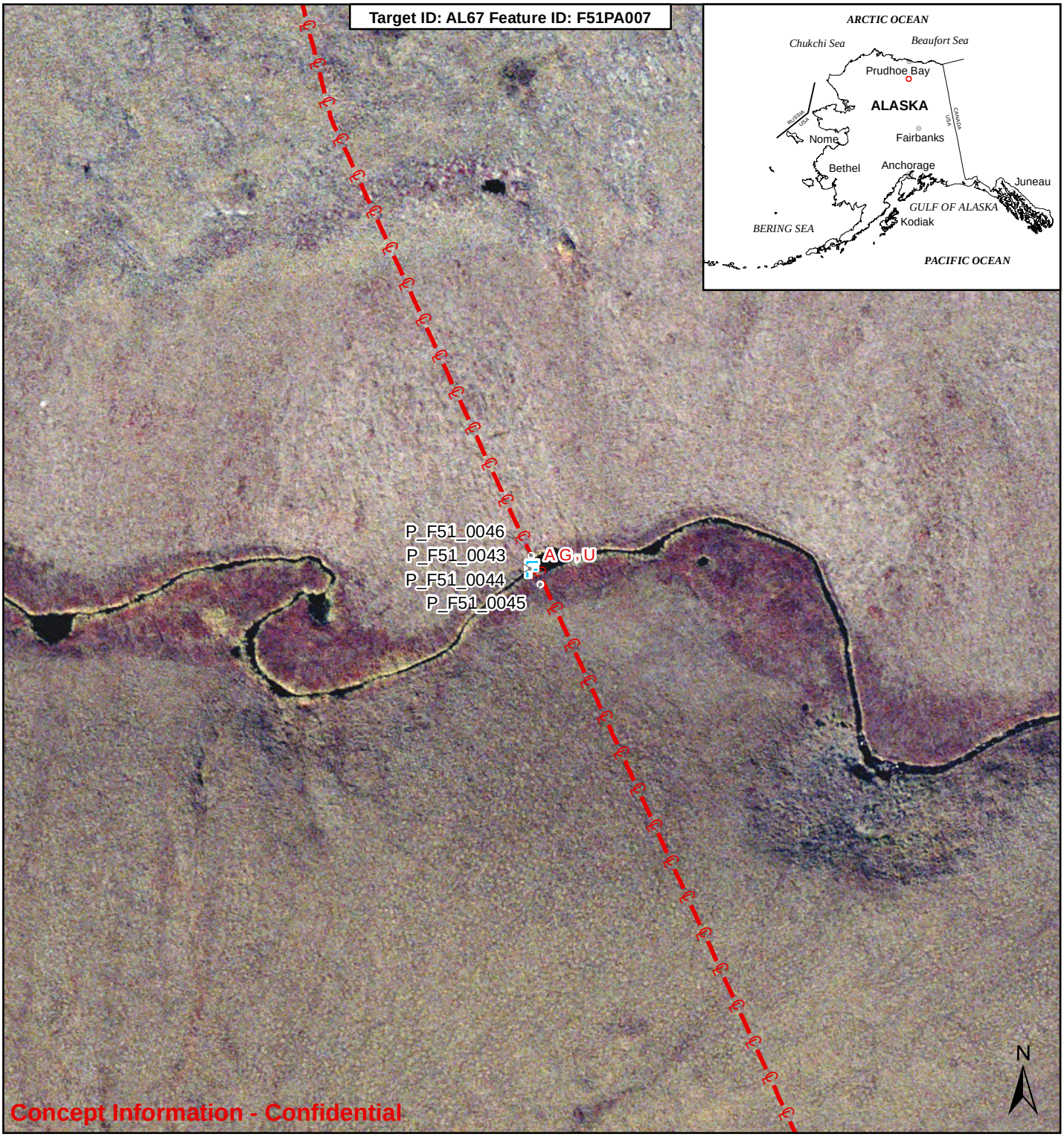
P_F51_0045 F51PA007 AL67

P_F51_0046 F51PA007 AL67

P_F51_0047 F51PA007 AL67

P_F51_0048 F51PA007 AL67

P_F51_0049 F51PA007 AL67



LEGEND

2013 Fish Survey Location

- F Fish Observed
- F No Fish Observed

Species Observed

- A G Arctic Grayling
- D V Dolly Varden
- N S Ninespine Stickleback
- R W Round Whitefish
- U Unknown

- Photo Point
- Alaska LNG Centerline with Mileposts

Feet: 0 200 400

Meters: 0 50 100

ALASKA LNG

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DRAWN	TCS
CHECK	
DESIGN	TCS
APPR.	

ALASKA LNG
2013 FISH FIELD SURVEY LOCATIONS

PROJECTION	DATUM	CONTRACTOR NAME	MAP NUMBER	REV.
AK ALB	NAD83	URS ALASKA		B

SCALE	DATE	PROJECT NUMBER	ORIG.PAGE SIZE
1:2,750	20 Feb 2014	226221163	8.5 X 11

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STREAM FISH INVESTIGATION DATA FORM

SITE DESCRIPTION

Date: 8/4/13	Investigators: KH, VW, CB	Team No.: F51	Feature ID: F51PA008
Stream Name: Arthur Creek South Branch	Stream ID: AL58	Stream listed in Anadromous Fish Catalog (Y/N): N	
Milepost: 103.5	Hwy Milepost: 318.2	TAPS Milepost: 96.9	
Latitude: 68° 57' 29.4841"	Longitude: 148° 53' 33.1350"		
Logbook No.: 1	Logbook Page No.: 31	Pic No(s): P_F51_0050 -0054 & 0068-0070	
US @ CL Pic No.: P_F51_0050	DS @ CL Pic No.: P_F51_0051	RB to LB@ CL Pic No.: P_F51_0052	LB to RB@ CL Pic No.: P_F51_0053
Additional Pic No.: P_F51_0054	Additional Pic No.: P_F51_0068	Additional Pic No.: P_F51_0069	Additional Pic No.: P_F51_0070

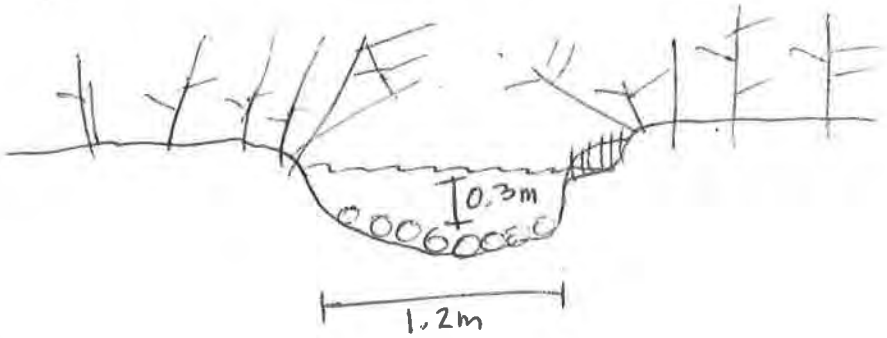
PHYSICAL/ CHEMICAL ATTRIBUTES

Weather (Describe): mostly cloudy		Precipitation (Describe): none	
Water Temperature (°Δ*; 13.27	Air Temperature (°Δ*; 20	pH: 6.92	Dissolved Oxygen (mg/l): 9.53
Specific Conductance(µS/cm): 59	Turbidity (NTU): 2.09	Color: Yellow tint	ORP (mV): 62.3
Ambient Conductance(µS/cm): 0.075	Odor: None	Sheen (Y/N): N	Last date of Calibration: 8-2-13
Wetted Width (m): ~~3.8m~~ 1.2m	Thalweg Depth @ CL (m): ~~1.0m~~ 0.3m		Large Woody Debris Count: NA

Riparian Veg at 0-5 m at LB:	Riparian Veg at 0-5 m at RB:	Stream Substrate:	Aquatic Habitats	
20 Grass/Sedge (%)	20 Grass/Sedge (%)	____ Organics (%)	____ Sand Bar	____ Large Woody Debris
80 Shrubs (%)	80 Shrubs (%)	____ Silt (%)	____ Mud Bar	X Overhanging vegetation
____ Trees (%)	____ Trees (%)	5 Sand (%)	____ Gravel Bar	____ Contiguous Wetlands
____ Diameter DBH	____ Diameter DBH	10 Gravel (%)	X Riffles	X Emergent Plants
		70 Cobble (%)	X Pools	X Submerged Plants
Flow Type:		15 Boulders(%)	X Undercut Banks	
X Perennial ____ Seasonal ____ Intermittent				

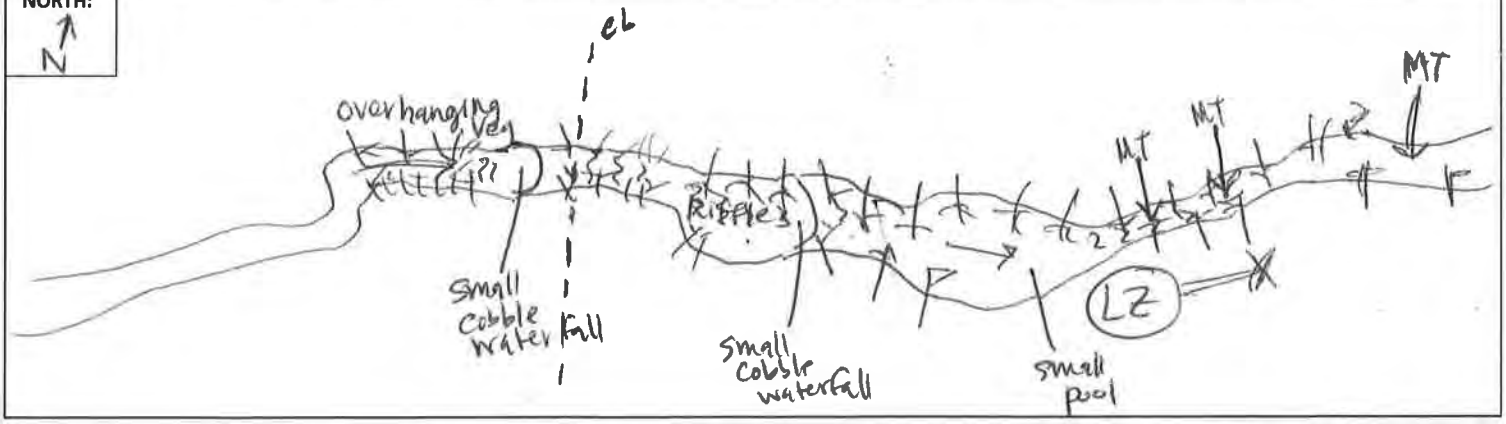
STREAM PROFILE: Cross Sectional at Crossing (include riparian vegetation, wetted width, water depth, substrate, and aquatic habitats)

NORTH:



STREAM PROFILE: Plan View (include direction of flow, centerline, distances from centerline, photo locations, sample locations by gear type and ROW)

NORTH: N



STREAM FISH INVESTIGATION DATA FORM

METHODS ATTRIBUTES				
Minnow Traps (Y/N): Y	Hook and Line (Y/N):	Beach Seine (Y/N):	Fyke Net (Y/N):	Hoop Net (Y/N):
No. of Minnow Traps Set: 3	Date & Time in: (mm/dd/yyyy)	Date &Time in: (mm/dd/yyyy) N/A	Date & Time in: (mm/dd/yyyy)	Date & Time in: (mm/dd/yyyy)
Date & Time in: (mm/dd/yyyy) 8/14/13 1555	No. of lines in water:	No. of passes:	Date & Time out: (mm/dd/yyyy)	Date & Time out: (mm/dd/yyyy)
Date & Time out: (mm/dd/yyyy) 8/15/13 1410	Time lines in water:	Reach Length (m):		

ELECTROFISHING ATTRIBUTES				
EF (Y/N):	~~EF Start Time:~~	EF End Time:	EF Time (seconds):	EF Reach Length (m):
Duty Cycle:	Frequency (Hz) :	Waveform: N/A	Sampling Efficiency (% of sample reach):	
Current (A):	~~Volts (V):~~	Power (W):		(amp x volts)

FISH OBSERVATIONS

Gear Type	Species	Total Length (mm)	Life Stage (Juvenile or Adult)	Disposition (Dead or Alive)	Picture No.
Minnow Trap	~~Arctic Char~~ Dolly Varden	159	Juvenile	Alive	P-FS1-0069
Minnow Trap	~~Arctic char~~ Dolly Varden	103	Juvenile	Alive	P-FS1-0070

NOTES (any additional information)

Light too low for good observation. Set minnow traps to fish overnight

Fast moving stream w/ cobble substrate. Boulders making small waterfalls @ CL

Some wider areas w/ slower moving eddys

Channel lined w/ shrubs & overgrown over stream

Returned on 8/15 to pick traps - 2 arctic char

Something tore up flagging on minnow traps

Field Crew Chief: _____ Field Scientist/Technician: _____

Technical Lead: _____

SCLNG Stream Fish Investigations Field Form
QA/QC Checklist

This form is to be completed before leaving the field site.

Feature ID: F51PA008 FT # AL58 Date: 8.4.13

For all items not checked, please provide detailed explanation in the notes section of data form.

1. **Site Description**
   - ☒ Was ADF&G contacted before conducting any work in this area?
   - ☒ Site Description complete? (Every cell must have entry or N/A)
   - ☒ Were all photos taken and labeled correctly?
2. **Physical/Chemical Attributes**
   - ☒ Calibration performed prior to sampling?
   - ☒ Physical/Chemical attributes complete? (Every cell must have entry or N/A)
   - ☒ Water quality data within expected ranges?
     - ☒ pH: 4.0 – 10.0
     - ☒ NTU: 0 – 3000
     - ☒ DO (mg/L): 1.0 – 15.0
     - ☒ DO (% saturation): 75- 100
     - ☒ Temp.: 1.0 – 19.0
     - ☒ Specific Conductance: 20 - 1500
   - ☒ If outside expected ranges, was sample re-taken?
   - ☒ Are units correct?
3. **Stream Profile**
   - ☒ Stream profile view sketch included?
   - ☒ Stream profile view captures water depth and wetted width?
   - ☒ Stream profile view captures where efforts were made to capture fish?
   - ☒ Plan view sketch included?
4. **Methods Attributes**
   - ☒ Methods attributes complete? (Every cell must have entry or N/A)
   - ☒ Were methods used adequate (explanation needed if no methods selected)?
5. **Electrofishing Attributes**
   - ☒ Electrofishing attributes complete? (Every cell must have entry or N/A)
   - ☐ Are units correct?
   - ☐ Are spawning/rearing answers consistent with fish observations?

SCLNG Stream Fish Investigations Field Form
QA/QC Checklist

6. Fish Observations

- [ ] Are all fish captured/observed recorded in the Fish Observation table?
- [ ] Are units correct? (Fork Length (mm))
- [ ] Were adequate photos taken of fish captured? (Take a photo if in doubt)
- [ ] Were any specimens preserved?

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- [ ] Feature ID and Field Target # are consistent on data forms, logbook entries, photos, and maps?
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- [ ] Were all additional comments on stream habitat, etc. recorded on data form?
- [ ] Was any gear missing/damaged for this survey or did you have any problems that should require resampling of this stream for an adequate survey effort?

By signing below, I verify that all field data for this site has been verified for accuracy and completeness.

X	X
Fisheries Biologist (print)	Signature
X Kim Holmes	X
Field Crew Chief (print)	Signature

P_F51_0050 F51PA008 AL58

P_F51_0051 F51PA008 AL58

P_F51_0052 F51PA008 AL58

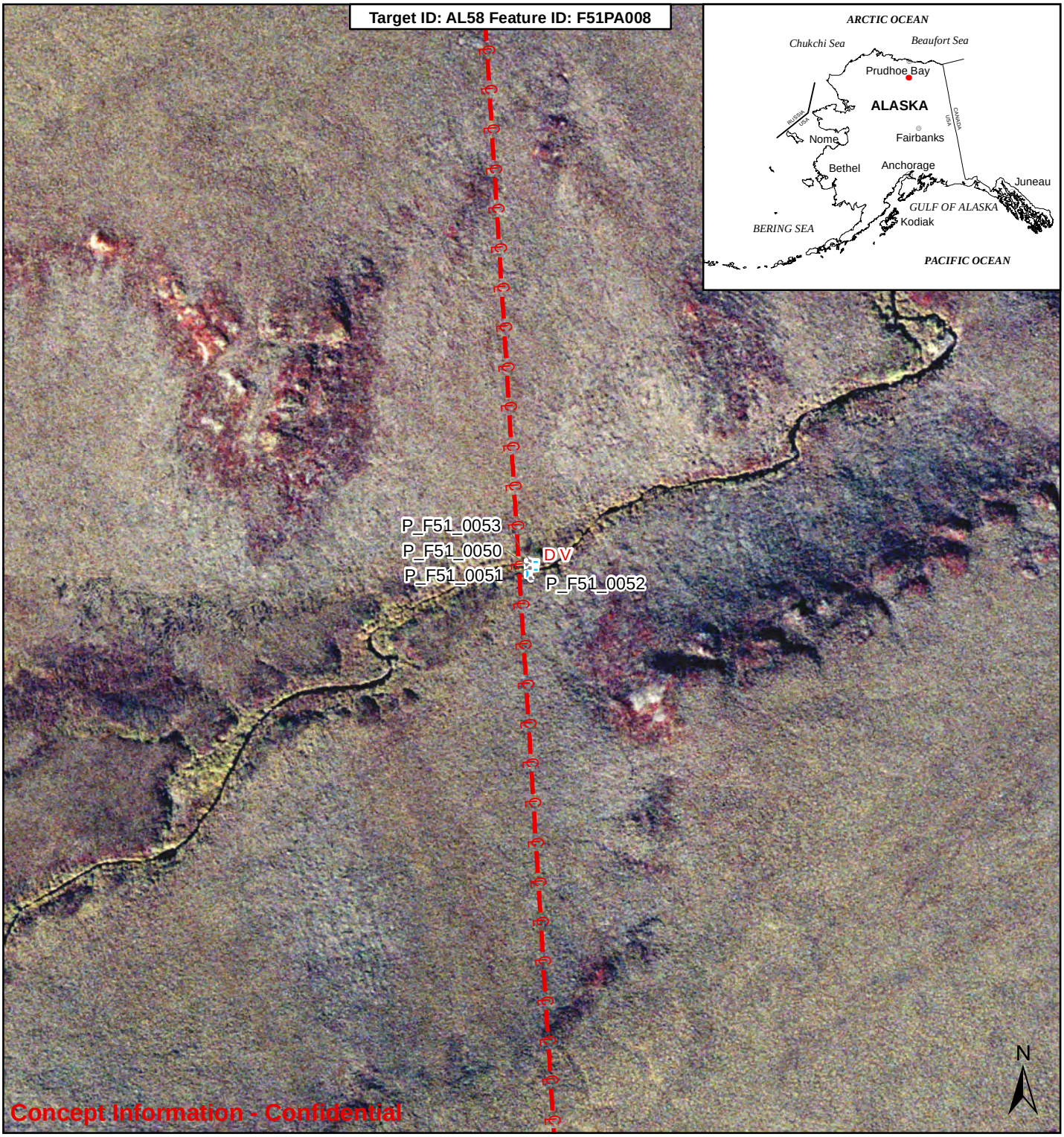
P_F51_0053 F51PA008 AL58

P_F51_0054 F51PA008 AL58

P_F51_0068 F51PA008 AL58

P_F51_0069 F51PA008 AL58

P_F51_0070 F51PA008 AL58



LEGEND

2013 Fish Survey Location

- F Fish Observed
- F No Fish Observed

Species Observed

- AG Arctic Grayling
- DV Dolly Varden
- NS Ninespine Stickleback
- RW Round Whitefish
- U Unknown

- Photo Point
- Alaska LNG Centerline with Mileposts

Feet: 0 200 400

Meters: 0 50 100

ALASKA LNG

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DRAWN: TCS	ALASKA LNG 2013 FISH FIELD SURVEY LOCATIONS				
CHECK:	PROJECTION: AK ALB	DATUM: NAD83	CONTRACTOR NAME: URS ALASKA	MAP NUMBER:	REV.: B
DESIGN: TCS	SCALE: 1:2,750	DATE: 20 Feb 2014	PROJECT NUMBER: 226221163	ORIG.PAGE SIZE: 8.5 X 11	
APPR.					

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STREAM FISH INVESTIGATION DATA FORM

SITE DESCRIPTION			
Date: 8.5.13	Investigators: KH, VW, CB	Team No.: FS1	Feature ID: FS1PA009
Stream Name: Headwater Trib to Sag River	Stream ID: AL70.3	Stream listed in Anadromous Fish Catalog (Y/N): N	
Milepost: 122.2	Hwy Milepost: 298.8	TAPS Milepost: 115.8	
Latitude: 68° 41' 43.8524"	Longitude: 148° 04' 46.4005"		
Logbook No.: 1	Logbook Page No.: 33	Pic No(s): P_FS1_0055 - 0061	
US @ CL Pic No.: P_FS1_0055	DS @ CL Pic No.: P_FS1_0056	RB to LB@ CL Pic No.: P_FS1_0057	LB to RB@ CL Pic No.: P_FS1_0058
Additional Pic No.: P_FS1_0059	Additional Pic No.: P_FS1_0060	Additional Pic No.: P_FS1_0061	Additional Pic No.:

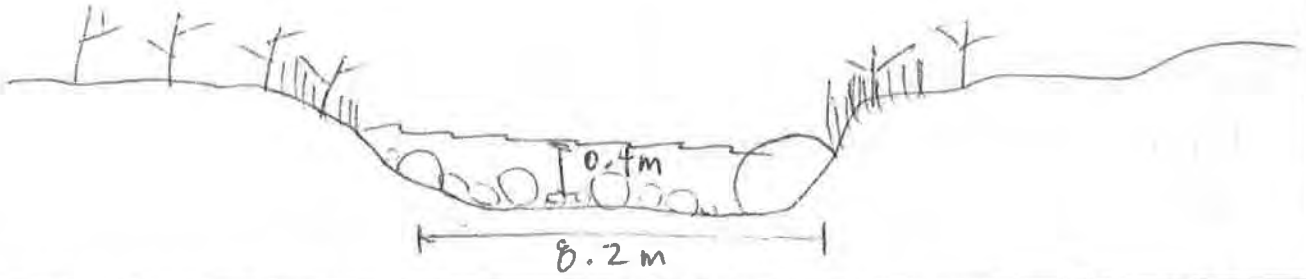
PHYSICAL/ CHEMICAL ATTRIBUTES			
Weather (Describe): Mostly cloudy	Precipitation (Describe): 5.01 Drizzle		
Water Temperature (°Δ*; 11.38	Air Temperature (°Δ*; 20	pH: ~~4.97~~ 11	Dissolved Oxygen (mg/l): 9.81
Specific Conductance(µS/cm): 39	Turbidity (NTU): 0.96	Color: clear	ORP (mV): 182.3
Ambient Conductance(µS/cm): 0.053	Odor: None	Sheen (Y/N): N	Last date of Calibration: 8.2.13
Wetted Width (m): ~~20.16~~ 8.2m	Thalweg Depth @ CL (m): ~~1.27~~ 0.4m	Large Woody Debris Count: None	

Riparian Veg at 0-5 m at LB:	Riparian Veg at 0-5 m at RB:	Stream Substrate:	Aquatic Habitats	
50 Grass/Sedge (%)	70 Grass/Sedge (%)	____ Organics (%)	____ Sand Bar	____ Large Woody Debris
50 Shrubs (%)	30 Shrubs (%)	____ Silt (%)	____ Mud Bar	____ Overhanging vegetation
____ Trees (%)	____ Trees (%)	____ Sand (%)	____ Gravel Bar	____ Contiguous Wetlands
____ Diameter DBH	____ Diameter DBH	10 Gravel (%)	X Riffles	____ Emergent Plants
		75 Cobble (%)	X Pools	____ Submerged Plants
		15 Boulders(%)	X Undercut Banks	

Flow Type: X Perennial ____ Seasonal ____ Intermittent

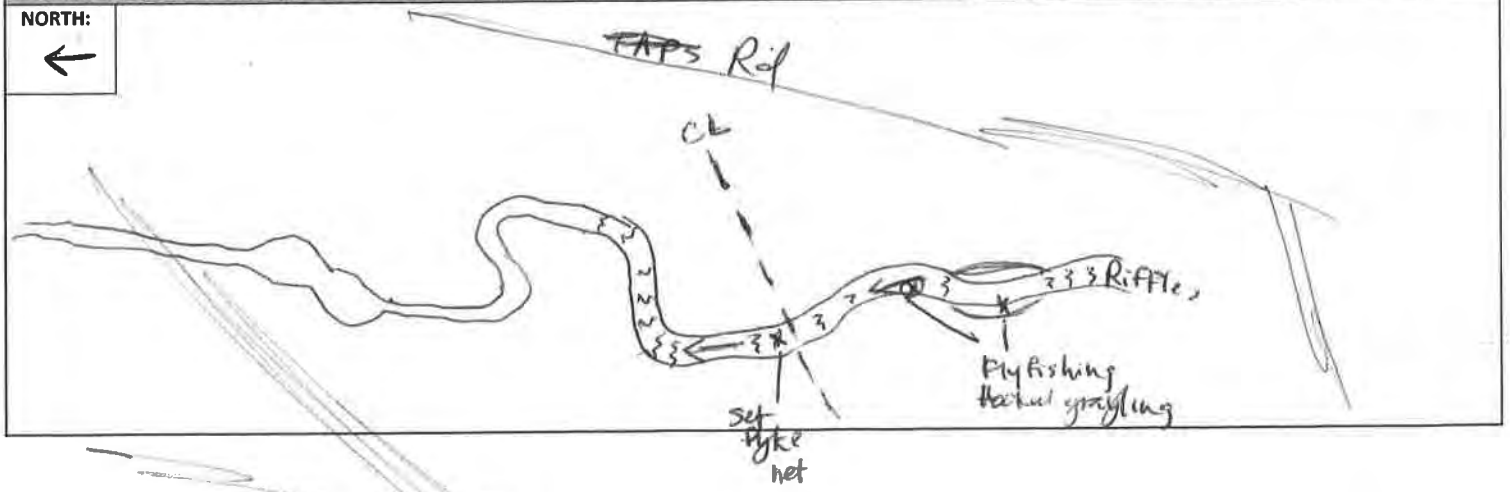
STREAM PROFILE: Cross Sectional at Crossing (include riparian vegetation, wetted width, water depth, substrate, and aquatic habitats)

NORTH: ←



STREAM PROFILE: Plan View (include direction of flow, centerline, distances from centerline, photo locations, sample locations by gear type and ROW)

NORTH: ←



~~Rd~~ Taps

STREAM FISH INVESTIGATION DATA FORM

METHODS ATTRIBUTES				
Minnow Traps (Y/N):	Hook and Line (Y/N): Y	Beach Seine (Y/N):	Fyke Net (Y/N): Y	Hoop Net (Y/N):
No. of Minnow Traps Set: N/A	Date & Time in: 8/15/13 1000-1130	Date &Time in: (mm/dd/yyyy) N/A	Date & Time in: (mm/dd/yyyy) 8/15/13 0945	Date & Time in: (mm/dd/yyyy)
Date & Time in: (mm/dd/yyyy)	No. of lines in water: 2	No. of passes:	Date & Time out: (mm/dd/yyyy) 8/15/13 1045	Date & Time out: (mm/dd/yyyy) N/A
Date & Time out: (mm/dd/yyyy)	Time lines in water: 50	Reach Length (m):	No Fish	

ELECTROFISHING ATTRIBUTES				
EF (Y/N):	EF Start Time:	EF End Time:	EF Time (seconds):	EF Reach Length (m):
Duty Cycle:	Frequency (Hz): N	Waveform: N/A	Sampling Efficiency (% of sample reach):	
Current (A):	Volts (V):	Power (W):		(amp x volts)

FISH OBSERVATIONS

Gear Type	Species	Total Length (mm)	Life Stage (Juvenile or Adult)	Disposition (Dead or Alive)	Picture No.
Angle	Grayling	~~7"~~ ~~185~~ 180			
"	"	135	Juvenile	Alive	
"	"	~~8"~~ ~~230~~ 205		Alive	
"	"	~~9"~~ ~~255~~ 230		Alive	
"	"	235			

NOTES (any additional information)

Large cobble & boulder substrate.
Not much veg in channel - some algae - grass/shrub lined banks
Lots of riffles some wider areas w/ slower moving eddys
Pretty fast flow
Juvenile & large grayling observed while fishing
Birds feeding on caribou guts from hunters near Rd

Field Crew Chief: _____ Field Scientist/Technician: _____

Technical Lead: _____

SCLNG Stream Fish Investigations Field Form
QA/QC Checklist

This form is to be completed before leaving the field site.

Feature ID: FS1PA009 FT # AL70 3 Date: 8-5-13

For all items not checked, please provide detailed explanation in the notes section of data form.

1. **Site Description**
   - ☒ Was ADF&G contacted before conducting any work in this area?
   - ☒ Site Description complete? (Every cell must have entry or N/A)
   - ☒ Were all photos taken and labeled correctly?
2. **Physical/Chemical Attributes**
   - ☒ Calibration performed prior to sampling?
   - ☒ Physical/Chemical attributes complete? (Every cell must have entry or N/A)
   - ☒ Water quality data within expected ranges?
     - ☒ pH: 4.0 – 10.0
     - ☒ NTU: 0 – 3000
     - ☒ DO (mg/L): 1.0 – 15.0
     - ☒ DO (% saturation): 75- 100
     - ☒ Temp.: 1.0 – 19.0
     - ☒ Specific Conductance: 20 - 1500
   - ☒ NA If outside expected ranges, was sample re-taken?
   - ☒ Are units correct?
3. **Stream Profile**
   - ☒ Stream profile view sketch included?
   - ☒ Stream profile view captures water depth and wetted width?
   - ☒ Stream profile view captures where efforts were made to capture fish?
   - ☒ Plan view sketch included?
4. **Methods Attributes**
   - ☒ Methods attributes complete? (Every cell must have entry or N/A)
   - ☒ Were methods used adequate (explanation needed if no methods selected)?
5. **Electrofishing Attributes**
   - ☒ NA Electrofishing attributes complete? (Every cell must have entry or N/A)
   - ☐ Are units correct?
   - ☐ Are spawning/rearing answers consistent with fish observations?

SCLNG Stream Fish Investigations Field Form
QA/QC Checklist

6. Fish Observations

- [X] Are all fish captured/observed recorded in the Fish Observation table?
- [X] Are units correct? (Fork Length (mm))
- [X] Were adequate photos taken of fish captured? (Take a photo if in doubt)
- [NO] Were any specimens preserved?

7. General

- [X] Feature ID and Field Target # are consistent on data forms, logbook entries, photos, and maps?
- [X] All additional data in logbook captured on data form and additional photos noted?
- [X] Were all additional comments on stream habitat, etc. recorded on data form?
- [NO] Was any gear missing/damaged for this survey or did you have any problems that should require resampling of this stream for an adequate survey effort?

By signing below, I verify that all field data for this site has been verified for accuracy and completeness.

X	X
Fisheries Biologist (print)	Signature
X Kim Holmes	X
Field Crew Chief (print)	Signature

P_F51_0055 F51PA009 AL70.3

P_F51_0056 F51PA009 AL70.3

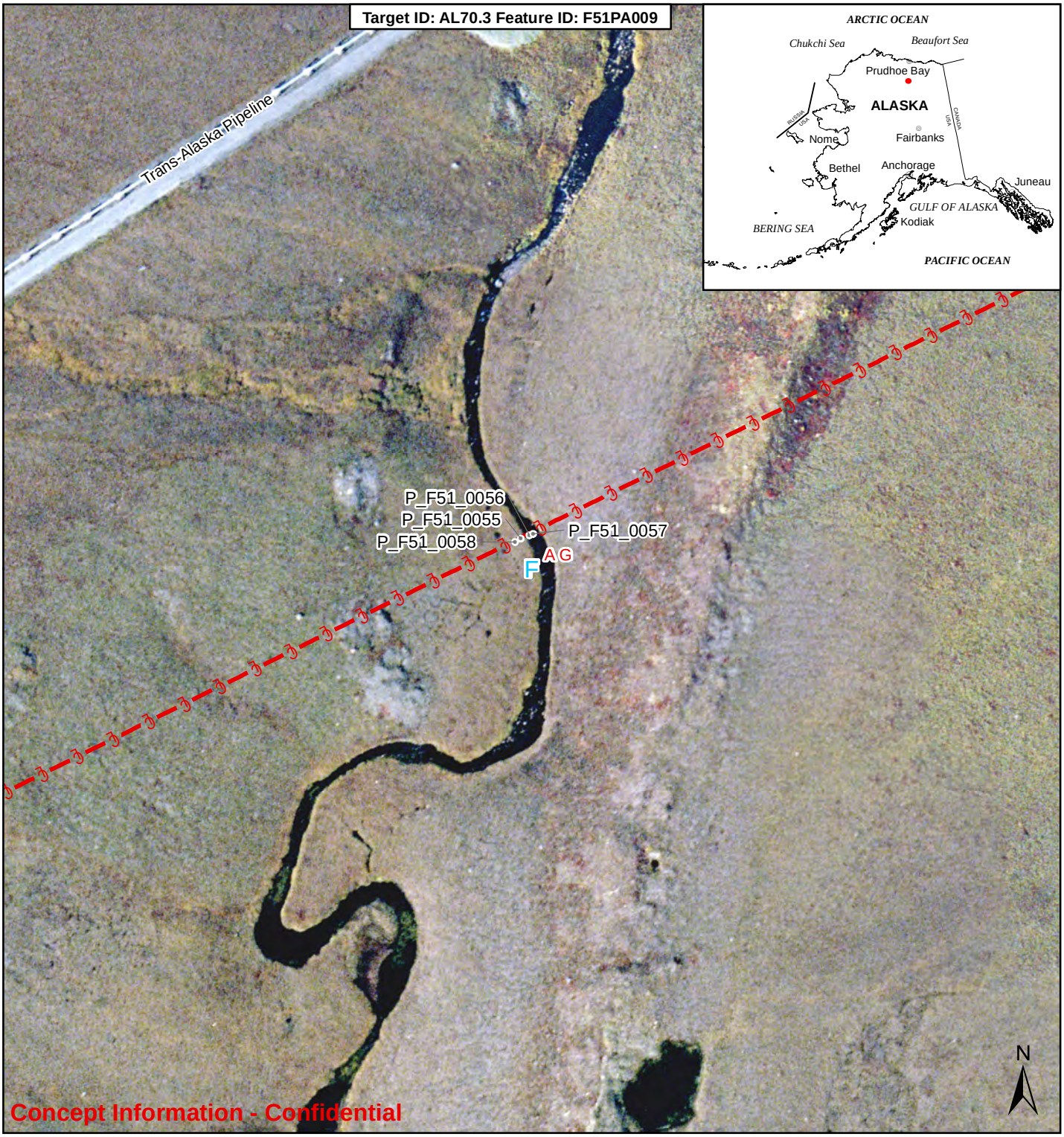
P_F51_0057 F51PA009 AL70.3

P_F51_0058 F51PA009 AL70.3

P_F51_0059 F51PA009 AL70.3

P_F51_0060 F51PA009 AL70.3

P_F51_0061 F51PA009 AL70.3



LEGEND

2013 Fish Survey Location

- F — Fish Observed
- F — No Fish Observed

Species Observed

- A G — Arctic Grayling
- D V — Dolly Varden
- N S — Ninespine Stickleback
- R W — Round Whitefish
- U — Unknown

- Photo Point
- Alaska LNG Centerline with Mileposts

Feet: 0 — 200 — 400

Meters: 0 — 50 — 100

ALASKA LNG

NOTES:
Concept Information - Confidential. Produced by Alaska LNG team. The information used to create this product is based on the collected data on the date of issue; it is considered reliable only at the scale at which the data was created and the scale at which the map was published. This drawing is solely prepared for use by the contractual Alaska LNG team partners and the Alaska LNG team assumes no liability to any other party for any representations contained in these drawings. This map must be printed/viewed at full scale (100%) in order for the scale to remain correct.

DRAWN	CHECK	DESIGN	APPR.
TCS		TCS	

ALASKA LNG
2013 FISH FIELD SURVEY LOCATIONS

PROJECTION	DATUM	CONTRACTOR NAME	MAP NUMBER	REV.
AK ALB	NAD83	URS ALASKA		B

SCALE	DATE	PROJECT NUMBER	ORIG.PAGE SIZE
1:2,750	20 Feb 2014	226221163	8.5 X 11

I:\226221163 SCLNG Studies\10 - Geospatial\10.06 - MXD\2013 Field Reporting\Fish\2013_Fish_Field_Report_AppendixB_8x11.mxd

STREAM FISH INVESTIGATION DATA FORM

SITE DESCRIPTION

Date: 8-5-13	Investigators: KH, VW, CB	Team No.: FS1	Feature ID: FS1DA010
Stream Name: Rudy Creek South Branch	Stream ID: AL68	Stream listed in Anadromous Fish Catalog (Y/N): N	
Milepost: 107.4	Hwy Milepost: 314.1	TAPS Milepost: 1008	
Latitude: 68° 51' 43.2776"	Longitude: 148° 52' 25.5368"		
Logbook No.: 1	Logbook Page No.: 33	Pic No(s): P_FS1_0062-0067	
US @ CL Pic No.: 1	DS @ CL Pic No.: 2	RB to LB@ CL Pic No.:	LB to RB@ CL Pic No.:
Additional Pic No.: NW@CL-0062	Additional Pic No.: SE@CL-0063	Additional Pic No.: E@site-0064	Additional Pic No.: W@site-0065

PHYSICAL/ CHEMICAL ATTRIBUTES

Weather (Describe): Mostly Cloudy		Precipitation (Describe): None	
Water Temperature (°Δ*;	Air Temperature (°Δ*;	pH:	Dissolved Oxygen (mg/l):
Specific Conductance(µS/cm):	Turbidity (NTU):	Color:	ORP (mV):
Ambient Conductance(µS/cm):	Odor:	Sheen (Y/N):	Last date of Calibration:
Wetted Width (m):	Thalweg Depth @ CL (m):	Large Woody Debris Count:	

Riparian Veg at 0-5 m at LB:	Riparian Veg at 0-5 m at RB:	Stream Substrate:	Aquatic Habitats	
_____Grass/Sedge (%)	_____Grass/Sedge (%)	_____Organics (%)	_____Sand Bar	_____Large Woody Debris
_____Shrubs (%)	_____Shrubs (%)	_____Silt (%)	_____Mud Bar	_____Overhanging vegetation
_____Trees (%)	_____Trees (%)	_____Sand (%)	_____Gravel Bar	_____Contiguous Wetlands
_____Diameter DBH	_____Diameter DBH	_____Gravel (%)	_____Riffles	_____Emergent Plants
		_____Cobble (%)	_____Pools	_____Submerged Plants
		_____Boulders(%)	_____Undercut Banks	

WETLAND COMPLEX

Flow Type:

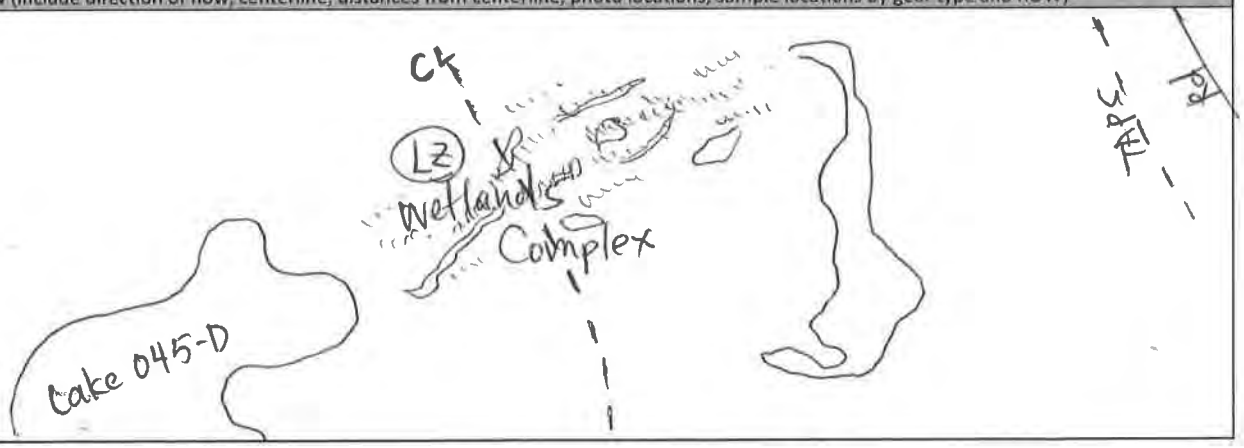
_____Perennial _____Seasonal __X__Intermittent

STREAM PROFILE: Cross Sectional at Crossing (include riparian vegetation, wetted width, water depth, substrate, and aquatic habitats)

NORTH: →

STREAM PROFILE: Plan View (include direction of flow, centerline, distances from centerline, photo locations, sample locations by gear type and ROW)

NORTH: ↑



STREAM FISH INVESTIGATION DATA FORM

METHODS ATTRIBUTES				
Minnow Traps (Y/N):	Hook and Line (Y/N):	Beach Seine (Y/N):	Fyke Net (Y/N):	Hoop Net (Y/N):
No. of Minnow Traps Set:	Date & Time in: (mm/dd/yyyy) N	Date & Time in: (mm/dd/yyyy)	Date & Time in: (mm/dd/yyyy)	Date & Time in: (mm/dd/yyyy)
Date & Time in: (mm/dd/yyyy)	No. of lines in water:	No. of passes:	Date & Time out: (mm/dd/yyyy)	Date & Time out: (mm/dd/yyyy)
Date & Time out: (mm/dd/yyyy)	Time lines in water:	Reach Length (m):		

ELECTROFISHING ATTRIBUTES				
EF (Y/N):	EF Start Time:	EF End Time:	EF Time (seconds):	EF Reach Length (m):
Duty Cycle:	Frequency (Hz) :	Waveform: N/A	Sampling Efficiency (% of sample reach):	
Current (A):	Volts (V):	Power (W):		(amp x volts)

FISH OBSERVATIONS

Gear Type	Species	Total Length (mm)	Life Stage (Juvenile or Adult)	Disposition (Dead or Alive)	Picture No.
		N/A			

NOTES (any additional information)

Wetland complex. Intermittent areas w/ water
Water is pretty stained & stagnant
Lots of salmon berries in area

Intermittently there may be enough water to connect 2 lakes but no clear channel. No flow. No gibbles or rocks

Field Crew Chief: _____ Field Scientist/Technician: _____

Technical Lead: _____

SCLNG Stream Fish Investigations Field Form
QA/QC Checklist

This form is to be completed before leaving the field site.

Feature ID: F51PA010 FT # ML68 Date: 8.5.13

For all items not checked, please provide detailed explanation in the notes section of data form.

1. **Site Description**
   - ☒ Was ADF&G contacted before conducting any work in this area?
   - ☒ Site Description complete? (Every cell must have entry or N/A)
   - ☒ Were all photos taken and labeled correctly?
2. **Physical/Chemical Attributes**
   - ☒ Calibration performed prior to sampling?
   - ☒ Physical/Chemical attributes complete? (Every cell must have entry or N/A)
   - ☒ Water quality data within expected ranges?
     - ☒ pH: 4.0 – 10.0
     - ☐ NTU: 0 – 3000
     - ☐ DO (mg/L): 1.0 – 15.0
     - ☐ DO (% saturation): 75- 100
     - ☐ Temp.: 1.0 – 19.0
     - ☐ Specific Conductance: 20 - 1500
   - ☒ If outside expected ranges, was sample re-taken?
   - ☐ Are units correct?
3. **Stream Profile**
   - ☒ Stream profile view sketch included?
   - ☒ Stream profile view captures water depth and wetted width?
   - ☒ Stream profile view captures where efforts were made to capture fish?
   - ☒ Plan view sketch included?
4. **Methods Attributes**
   - ☒ Methods attributes complete? (Every cell must have entry or N/A)
   - ☒ Were methods used adequate (explanation needed if no methods selected)?
5. **Electrofishing Attributes**
   - ☒ Electrofishing attributes complete? (Every cell must have entry or N/A)
   - ☐ Are units correct?
   - ☐ Are spawning/rearing answers consistent with fish observations?

SCLNG Stream Fish Investigations Field Form
QA/QC Checklist

6. Fish Observations

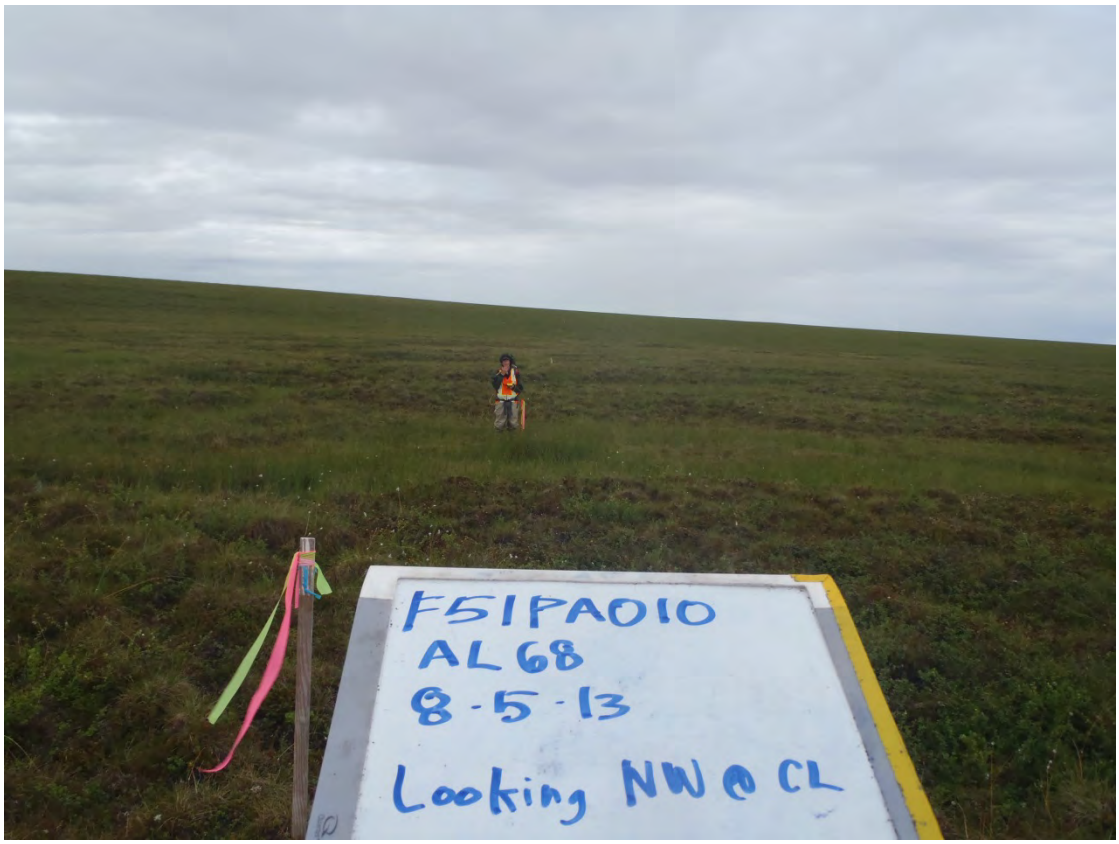
- [NA] Are all fish captured/observed recorded in the Fish Observation table?
- [ ] Are units correct? (Fork Length (mm))
- [ ] Were adequate photos taken of fish captured? (Take a photo if in doubt)
- [ ] Were any specimens preserved?

7. General

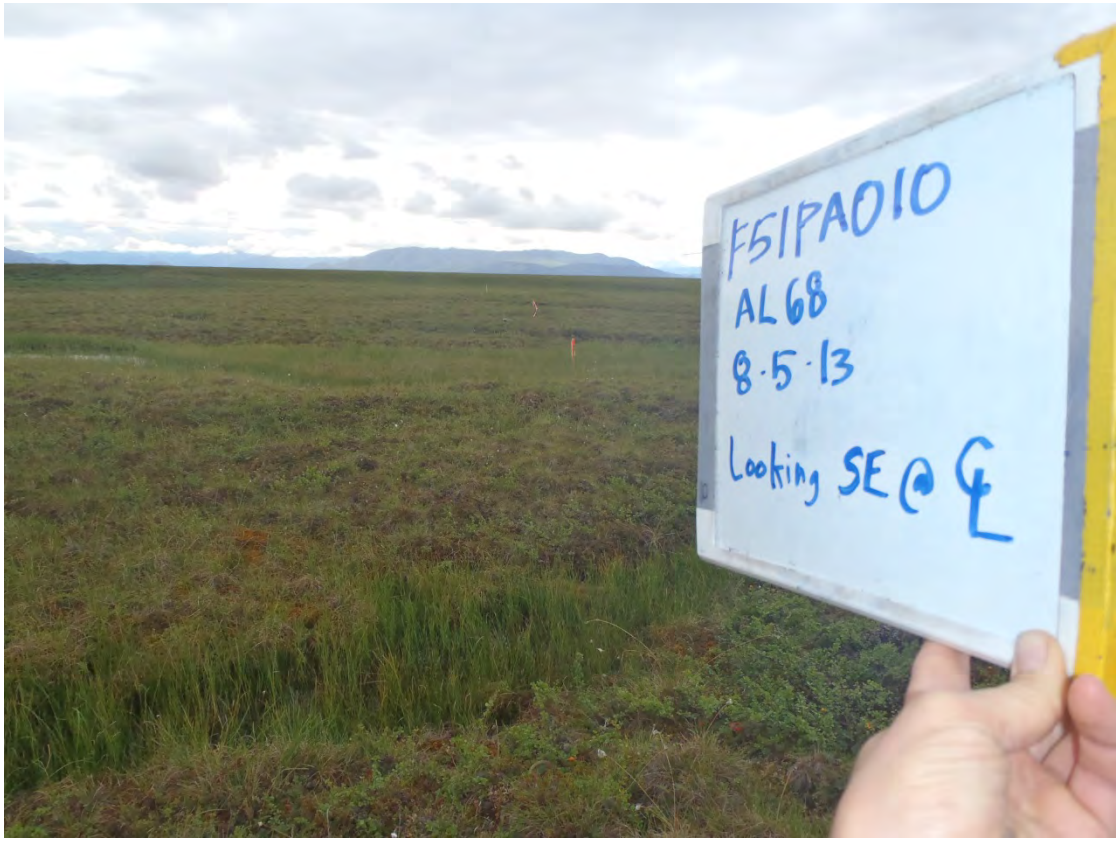
- [ ] Feature ID and Field Target # are consistent on data forms, logbook entries, photos, and maps?
- [X] All additional data in logbook captured on data form and additional photos noted?
- [X] Were all additional comments on stream habitat, etc. recorded on data form?
- [NO] Was any gear missing/damaged for this survey or did you have any problems that should require resampling of this stream for an adequate survey effort?

By signing below, I verify that all field data for this site has been verified for accuracy and completeness.

X	X
Fisheries Biologist (print)	Signature
X Kim Holmes	X
Field Crew Chief (print)	Signature



P_F51_0062 F51PA010 AL68



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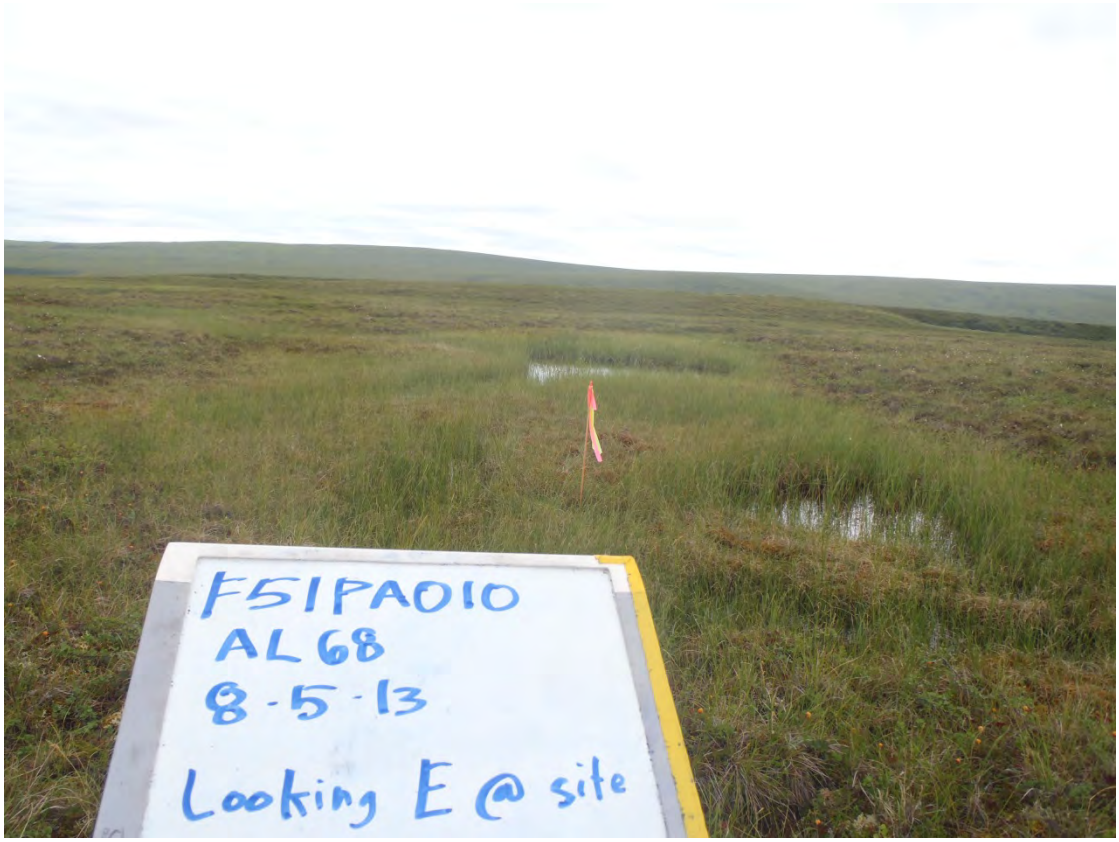
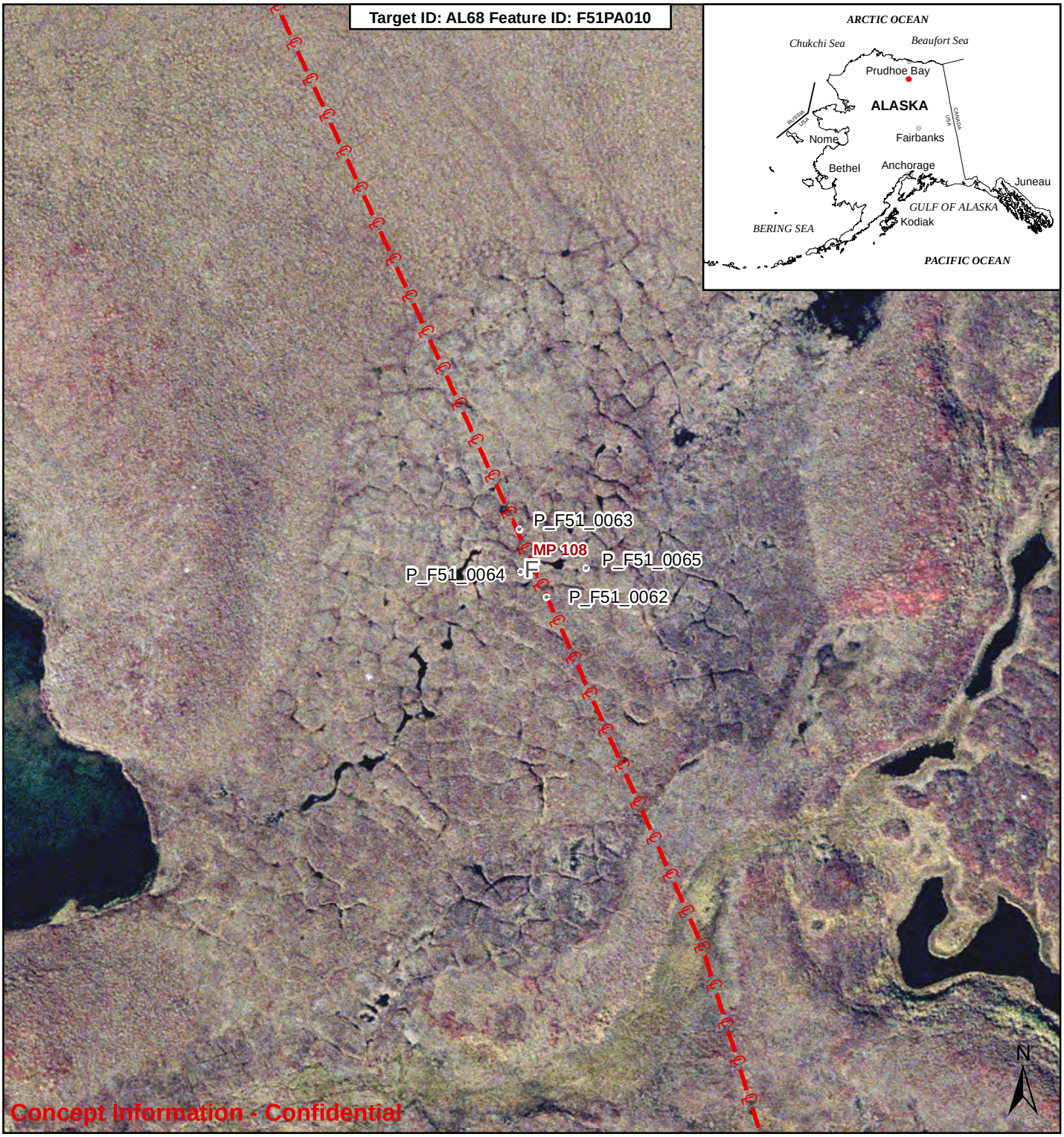


P_F51_0064 F51PA010 AL68

P_F51_0065 F51PA010 AL68

P_F51_0066 F51PA010 AL68

P_F51_0067 F51PA010 AL68



LEGEND

2013 Fish Survey Location

- F — Fish Observed
- F — No Fish Observed

Species Observed

- AG — Arctic Grayling
- DV — Dolly Varden
- NS — Ninespine Stickleback
- RW — Round Whitefish
- U — Unknown

- Photo Point
- Alaska LNG Centerline with Mileposts

Feet: 0 — 200 — 400

Meters: 0 — 50 — 100

ALASKA LNG

NOTES:
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DRAWN: TCS	ALASKA LNG 2013 FISH FIELD SURVEY LOCATIONS				
CHECK:	PROJECTION: AK ALB	DATUM: NAD83	CONTRACTOR NAME: URS ALASKA	MAP NUMBER:	REV.: B
DESIGN: TCS	SCALE: 1:2,750	DATE: 20 Feb 2014	PROJECT NUMBER: 226221163	ORIG.PAGE SIZE: 8.5 X 11	
APPR.:					

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STREAM FISH INVESTIGATION DATA FORM

SITE DESCRIPTION

Date: 8-5-13	Investigators: KH, VW, CB	Team No.: F51	Feature ID: FS1PA011
Stream Name: Unnamed Trib to Sag River	Stream ID: AL61	Stream listed in Anadromous Fish Catalog (Y/N): N	
Milepost: 103.5	Hwy Milepost: 318.2	TAPS Milepost: 96.9	
Latitude: 68° 55' 31.0403	Longitude: 148° 53' 50.3548"		
Logbook No.: 1	Logbook Page No.: 34	Pic No(s): P_FS1_0071 - 0076	
US @ CL Pic No.:	DS @ CL Pic No.:	RB to LB@ CL Pic No.:	LB to RB@ CL Pic No.:
Additional Pic No.: P_FS1_0071	Additional Pic No.: P_FS1_0072	Additional Pic No.: P_FS1_0073	Additional Pic No.: P_FS1_0074

PHYSICAL/ CHEMICAL ATTRIBUTES

Weather (Describe): Partly cloudy		Precipitation (Describe): None	
Water Temperature (°Δ*;	Air Temperature (°Δ*;	pH:	Dissolved Oxygen (mg/l):
Specific Conductance(µS/cm):	Turbidity (NTU):	Color:	ORP (mV):
Ambient Conductance(µS/cm):	Odor:	Sheen (Y/N):	Last date of Calibration:
Wetted Width (m):	Thalweg Depth @ CL (m):	Large Woody Debris Count:	

Riparian Veg at 0-5 m at LB:
_____Grass/Sedge (%)
_____Shrubs (%)
_____Trees (%)
_____Diameter DBH

Riparian Veg at 0-5 m at RB:
_____Grass/Sedge (%)
_____Shrubs (%)
_____Trees (%)
_____Diameter DBH

Stream Substrate:
N/A Organics (%)
_____Silt (%)
_____Sand (%)
_____Gravel (%)
_____Cobble (%)
_____Boulders (%)

Aquatic Habitats
_____Sand Bar
_____Mud Bar
_____Gravel Bar
_____Riffles
_____Pools
_____Undercut Banks
_____Large Woody Debris
_____Overhanging vegetation
_____Contiguous Wetlands
_____Emergent Plants
_____Submerged Plants

Flow Type:
_____Perennial _____Seasonal __X__Intermittent

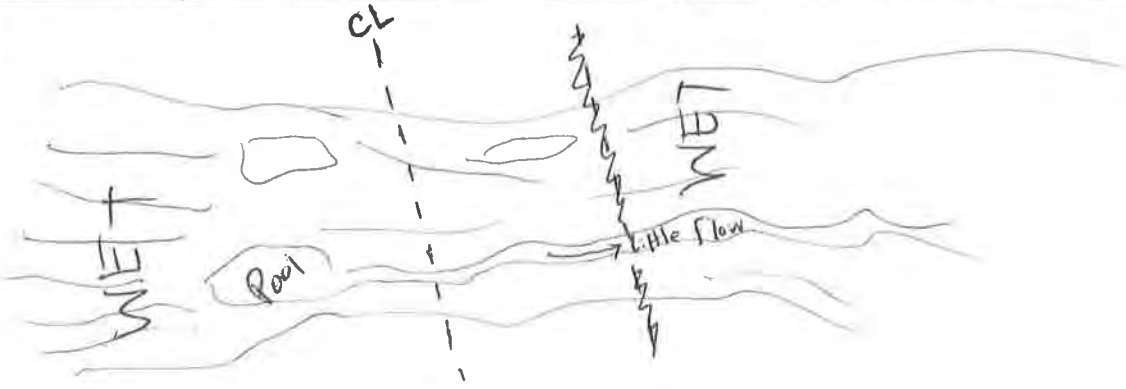
Wetland

STREAM PROFILE: Cross Sectional at Crossing (include riparian vegetation, wetted width, water depth, substrate, and aquatic habitats)

NORTH: →

STREAM PROFILE: Plan View (include direction of flow, centerline, distances from centerline, photo locations, sample locations by gear type and ROW)

NORTH: ↑



STREAM FISH INVESTIGATION DATA FORM

METHODS ATTRIBUTES				
Minnow Traps (Y/N):	Hook and Line (Y/N):	Beach Seine (Y/N):	Fyke Net (Y/N):	Hoop Net (Y/N):
No. of Minnow Traps Set:	Date & Time in: (mm/dd/yyyy) N	Date &Time in: (mm/dd/yyyy)	Date & Time in: (mm/dd/yyyy)	Date & Time in: (mm/dd/yyyy)
Date & Time in: (mm/dd/yyyy)	No. of lines in water:	No. of passes: A	Date & Time out: (mm/dd/yyyy)	Date & Time out: (mm/dd/yyyy)
Date & Time out: (mm/dd/yyyy)	Time lines in water:	Reach Length (m):		

ELECTROFISHING ATTRIBUTES				
EF (Y/N):	EF Start Time:	EF End Time:	EF Time (seconds):	EF Reach Length (m):
Duty Cycle:	Frequency (Hz) :	Waveform:	Sampling Efficiency (% of sample reach):	
Current (A):	Volts (V):	Power (W): (amp x volts)		

FISH OBSERVATIONS

Gear Type	Species	Total Length (mm)	Life Stage (Juvenile or Adult)	Disposition (Dead or Alive)	Picture No.
		N/A			

NOTES (any additional information)

Welland complex. lots of water throughout whole area

Water comes enough together for some flow for a short ways to the east then opens up again for no flow

A couple of areas w/ deeper pooled water. Algae growing.

No clear channel. Lots of emergent sedge / grass

blueberries & salmonberries.

Field Crew Chief: _____ Field Scientist/Technician: _____

Technical Lead: _____

SCLNG Stream Fish Investigations Field Form
QA/QC Checklist

This form is to be completed before leaving the field site.

Feature ID: F51PA011 FT # AL161 Date: 8-5-13

For all items not checked, please provide detailed explanation in the notes section of data form.

1. **Site Description**
   - ☒ Was ADF&G contacted before conducting any work in this area?
   - ☒ Site Description complete? (Every cell must have entry or N/A)
   - ☒ Were all photos taken and labeled correctly?
2. **Physical/Chemical Attributes**
   - ☒ Calibration performed prior to sampling?
   - ☒ Physical/Chemical attributes complete? (Every cell must have entry or N/A)
   - ☒ Water quality data within expected ranges?
     - ☒ pH: 4.0 – 10.0
     - ☐ NTU: 0 – 3000
     - ☐ DO (mg/L): 1.0 – 15.0
     - ☐ DO (% saturation): 75- 100
     - ☐ Temp.: 1.0 – 19.0
     - ☐ Specific Conductance: 20 - 1500
   - ☒ If outside expected ranges, was sample re-taken?
   - ☐ Are units correct?
3. **Stream Profile**
   - ☒ Stream profile view sketch included?
   - ☒ Stream profile view captures water depth and wetted width?
   - ☒ Stream profile view captures where efforts were made to capture fish?
   - ☒ Plan view sketch included?
4. **Methods Attributes**
   - ☒ Methods attributes complete? (Every cell must have entry or N/A)
   - ☒ Were methods used adequate (explanation needed if no methods selected)?
5. **Electrofishing Attributes**
   - ☒ Electrofishing attributes complete? (Every cell must have entry or N/A)
   - ☐ Are units correct?
   - ☐ Are spawning/rearing answers consistent with fish observations?

SCLNG Stream Fish Investigations Field Form
QA/QC Checklist

6. Fish Observations

- [N/A] Are all fish captured/observed recorded in the Fish Observation table?
- [ ] Are units correct? (Fork Length (mm))
- [ ] Were adequate photos taken of fish captured? (Take a photo if in doubt)
- [ ] Were any specimens preserved?

7. General

- [✓] Feature ID and Field Target # are consistent on data forms, logbook entries, photos, and maps?
- [✓] All additional data in logbook captured on data form and additional photos noted?
- [✓] Were all additional comments on stream habitat, etc. recorded on data form?
- [NO] Was any gear missing/damaged for this survey or did you have any problems that should require resampling of this stream for an adequate survey effort?

By signing below, I verify that all field data for this site has been verified for accuracy and completeness.

X	X
Fisheries Biologist (print)	Signature
X Kim Holmes	X
Field Crew Chief (print)	Signature

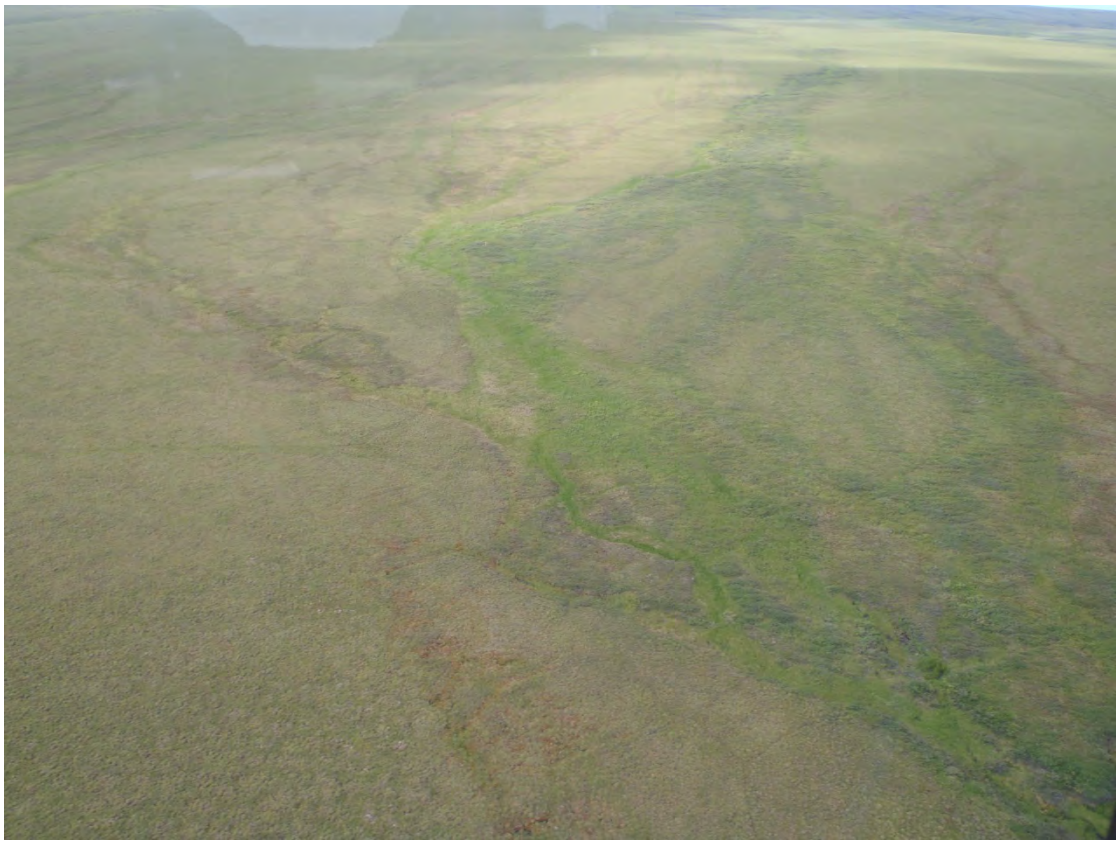
P_F51_0071 F51PA011 AL61

P_F51_0072 F51PA011 AL61

P_F51_0073 F51PA011 AL61

P_F51_0074 F51PA011 AL61

P_F51_0075 F51PA011 AL61



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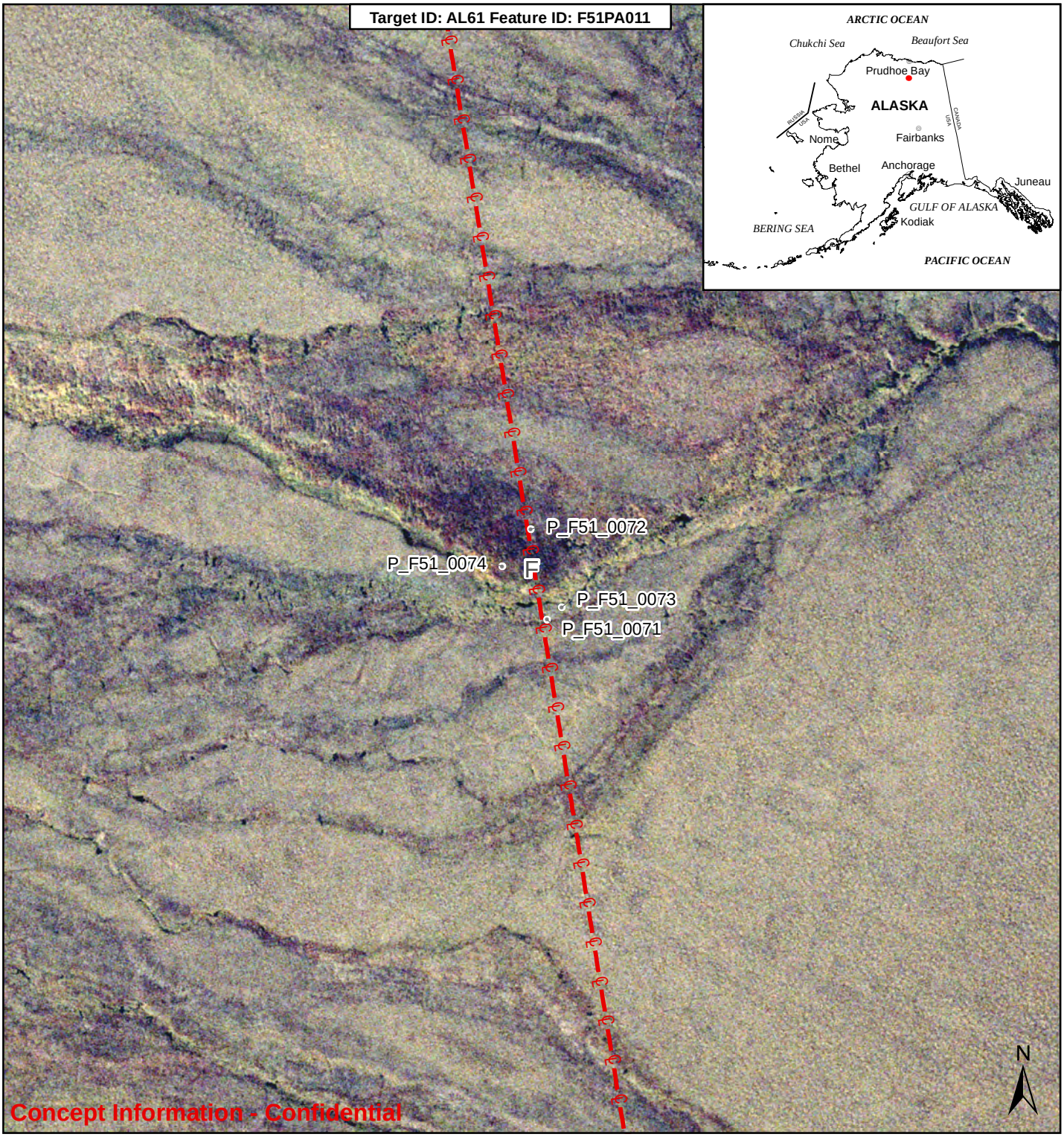

LEGEND

2013 Fish Survey Location

- F — Fish Observed
- F — No Fish Observed

Species Observed

- A G — Arctic Grayling
- D V — Dolly Varden
- N S — Ninespine Stickleback
- R W — Round Whitefish
- U — Unknown

- Photo Point
- Alaska LNG Centerline with Mileposts

Feet: 0 — 200 — 400

Meters: 0 — 50 — 100

ALASKA LNG

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DRAWN	CHECK	DESIGN	APPR.
TCS		TCS	

ALASKA LNG
2013 FISH FIELD SURVEY LOCATIONS

PROJECTION	DATUM	CONTRACTOR NAME	MAP NUMBER	REV.
AK ALB	NAD83	URS ALASKA		B

SCALE	DATE	PROJECT NUMBER	ORIG.PAGE SIZE
1:2,750	20 Feb 2014	226221163	8.5 X 11

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STREAM FISH INVESTIGATION DATA FORM

SITE DESCRIPTION

Date: 8/5/13	Investigators: KH, VW, CR	Team No.: F51	Feature ID: F51PA012
Stream Name: Lori Creek	Stream ID: AL55	Stream listed in Anadromous Fish Catalog (Y/N): N	
Milepost: 94.7	Hwy Milepost: 326.9	TAPS Milepost: 87.8	
Latitude: 69° 02' 44.0429	Longitude: 148° 51' 13.5737"		
Logbook No.: 1	Logbook Page No.: 34	Pic No(s): P_F51_0077 - 0083	
US @ CL Pic No.:	DS @ CL Pic No.:	RB to LB@ CL Pic No.:	LB to RB@ CL Pic No.:
Additional Pic No.: NW@CL P_F51_0077	Additional Pic No.: SE@CL P_F51_0078	Additional Pic No.: W@site P_F51_0079	Additional Pic No.: E@site P_F51_0080

PHYSICAL/ CHEMICAL ATTRIBUTES

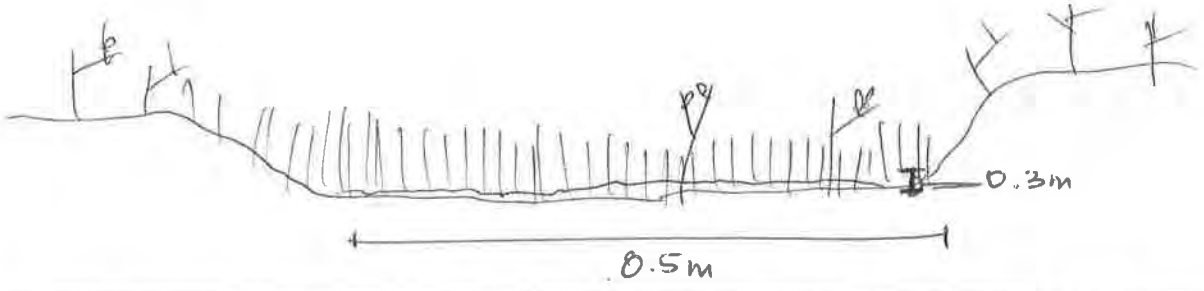
Weather (Describe): cloudy	Precipitation (Describe): NONE		
Water Temperature (°C): 16.03	Air Temperature (°C): 20	pH: 5.19	Dissolved Oxygen (mg/l): ~~6.57~~ 6.57
Specific Conductance(µS/cm): 39	Turbidity (NTU): 33.21	Color: Clear	ORP (mV): ~~87.1~~ 84.0
Ambient Conductance(µS/cm): 0.048	Odor: slight odor from stagnant water	Sheen (Y/N): N	Last date of Calibration: 8-2-13
Wetted Width (m): ~~2877~~ 8.5m	Thalweg Depth @ CL (m): ~~1070~~ 0.3m	Large Woody Debris Count: NA	

Riparian Veg at 0-5 m at LB:	Riparian Veg at 0-5 m at RB:	Stream Substrate:	Aquatic Habitats	
60 Grass/Sedge (%)	70 Grass/Sedge (%)	100 Organics (%)	____ Sand Bar	____ Large Woody Debris
40 Shrubs (%)	30 Shrubs (%)	____ Silt (%)	____ Mud Bar	____ Overhanging vegetation
____ Trees (%)	____ Trees (%)	____ Sand (%)	____ Gravel Bar	X Contiguous Wetlands
____ Diameter DBH	____ Diameter DBH	____ Gravel (%)	____ Riffles	X Emergent Plants
		____ Cobble (%)	____ Pools	____ Submerged Plants
		____ Boulders(%)	____ Undercut Banks	

Flow Type: ____ Perennial X Seasonal X Intermittent

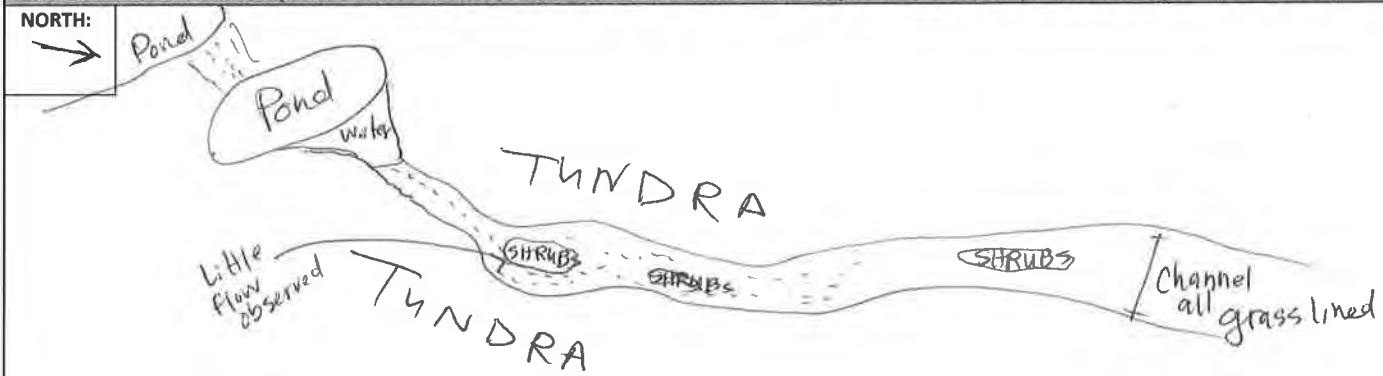
STREAM PROFILE: Cross Sectional at Crossing (include riparian vegetation, wetted width, water depth, substrate, and aquatic habitats)

NORTH: →



STREAM PROFILE: Plan View (include direction of flow, centerline, distances from centerline, photo locations, sample locations by gear type and ROW)

NORTH: →



STREAM FISH INVESTIGATION DATA FORM

METHODS ATTRIBUTES				
Minnow Traps (Y/N):	Hook and Line (Y/N):	Beach Seine (Y/N):	Fyke Net (Y/N):	Hoop Net (Y/N):
No. of Minnow Traps Set: N/A	Date & Time in: (mm/dd/yyyy)	Date &Time in: (mm/dd/yyyy) N/A	Date & Time in: (mm/dd/yyyy)	Date & Time in: (mm/dd/yyyy)
Date & Time in: (mm/dd/yyyy)	No. of lines in water:	No. of passes:	Date & Time out: (mm/dd/yyyy)	Date & Time out: (mm/dd/yyyy)
Date & Time out: (mm/dd/yyyy)	Time lines in water:	Reach Length (m):		

ELECTROFISHING ATTRIBUTES				
EF (Y/N): Y	EF Start Time: 1520	EF End Time: 1530	EF Time (seconds): 153	EF Reach Length (m): 30
Duty Cycle: 25	Frequency (Hz): 30	Waveform: Pulse DC	Sampling Efficiency (% of sample reach): 100	
Current (A): 0.9 - 2.4	Volts (V): 300 - 500	Power (W): 270 - 1200 (amp x volts)		

FISH OBSERVATIONS

Gear Type	Species	Total Length (mm)	Life Stage (Juvenile or Adult)	Disposition (Dead or Alive)	Picture No.
		NO FISH			

NOTES (any additional information)

Resampled for water quality due to low DO% - probably due to little flow
Channel defined by veg change.

Surrounding area scrub shrub wetlands.

Stream channel - filled w/ sedge and grass and color change

No gravel or cobble - organic substrate

Whole area generally wet w/ small areas w/ flow but not enough water to set minnow traps and too grassy for effective electrofishing.

Did electrofish sides of nearby pond - no fish

Possibly fish use stream to move between lakes seasonally

Sampled nearby lake for bathymetry - No fish caught

Field Crew Chief: _____ Field Scientist/Technician: _____

Technical Lead: _____

Revision Date: 4/17/2013

SCLNG Stream Fish Investigations Field Form
QA/QC Checklist

This form is to be completed before leaving the field site.

Feature ID: FS1PA012 FT # ML55 Date: 8-5-13

For all items not checked, please provide detailed explanation in the notes section of data form.

1. **Site Description**
   - ☒ Was ADF&G contacted before conducting any work in this area?
   - ☒ Site Description complete? (Every cell must have entry or N/A)
   - ☒ Were all photos taken and labeled correctly?
2. **Physical/Chemical Attributes**
   - ☒ Calibration performed prior to sampling?
   - ☒ Physical/Chemical attributes complete? (Every cell must have entry or N/A)
   - ☐ Water quality data within expected ranges?
     - ☒ pH: 4.0 – 10.0
     - ☒ NTU: 0 – 3000
     - ☒ DO (mg/L): 1.0 – 15.0
     - ☒ DO (% saturation): 75- 100 No 66.7% — Little to No Flow
     - ☒ Temp.: 1.0 – 19.0
     - ☒ Specific Conductance: 20 - 1500
   - ☒ If outside expected ranges, was sample re-taken?
   - ☒ Are units correct?
3. **Stream Profile**
   - ☒ Stream profile view sketch included?
   - ☒ Stream profile view captures water depth and wetted width?
   - ☒ Stream profile view captures where efforts were made to capture fish?
   - ☒ Plan view sketch included?
4. **Methods Attributes**
   - ☒ Methods attributes complete? (Every cell must have entry or N/A)
   - ☒ Were methods used adequate (explanation needed if no methods selected)?
5. **Electrofishing Attributes**
   - ☒ Electrofishing attributes complete? (Every cell must have entry or N/A)
   - ☒ Are units correct?
   - N/A Are spawning/rearing answers consistent with fish observations?

SCLNG Stream Fish Investigations Field Form
QA/QC Checklist

6. Fish Observations

- N/A Are all fish captured/observed recorded in the Fish Observation table?
- ☐ Are units correct? (Fork Length (mm))
- ☐ Were adequate photos taken of fish captured? (Take a photo if in doubt)
- ☐ Were any specimens preserved?

7. General

- ☐ Feature ID and Field Target # are consistent on data forms, logbook entries, photos, and maps?
- ☒ All additional data in logbook captured on data form and additional photos noted?
- ☒ Were all additional comments on stream habitat, etc. recorded on data form?
- ☐ Was any gear missing/damaged for this survey or did you have any problems that should require resampling of this stream for an adequate survey effort? Too little water

By signing below, I verify that all field data for this site has been verified for accuracy and completeness.

X	X
Fisheries Biologist (print)	Signature
X Kim Holmes	X
Field Crew Chief (print)	Signature

P_F51_0077 F51PA012 AL55

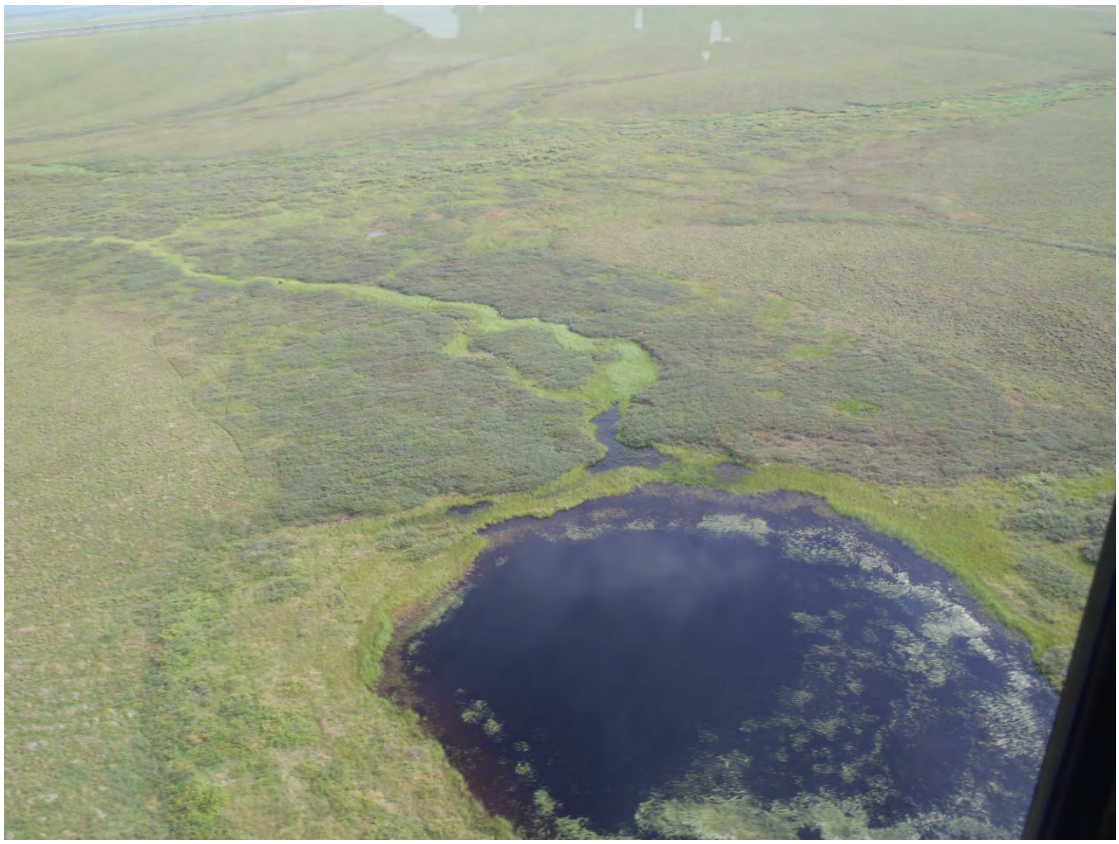
P_F51_0078 F51PA012 AL55

P_F51_0079 F51PA012 AL55

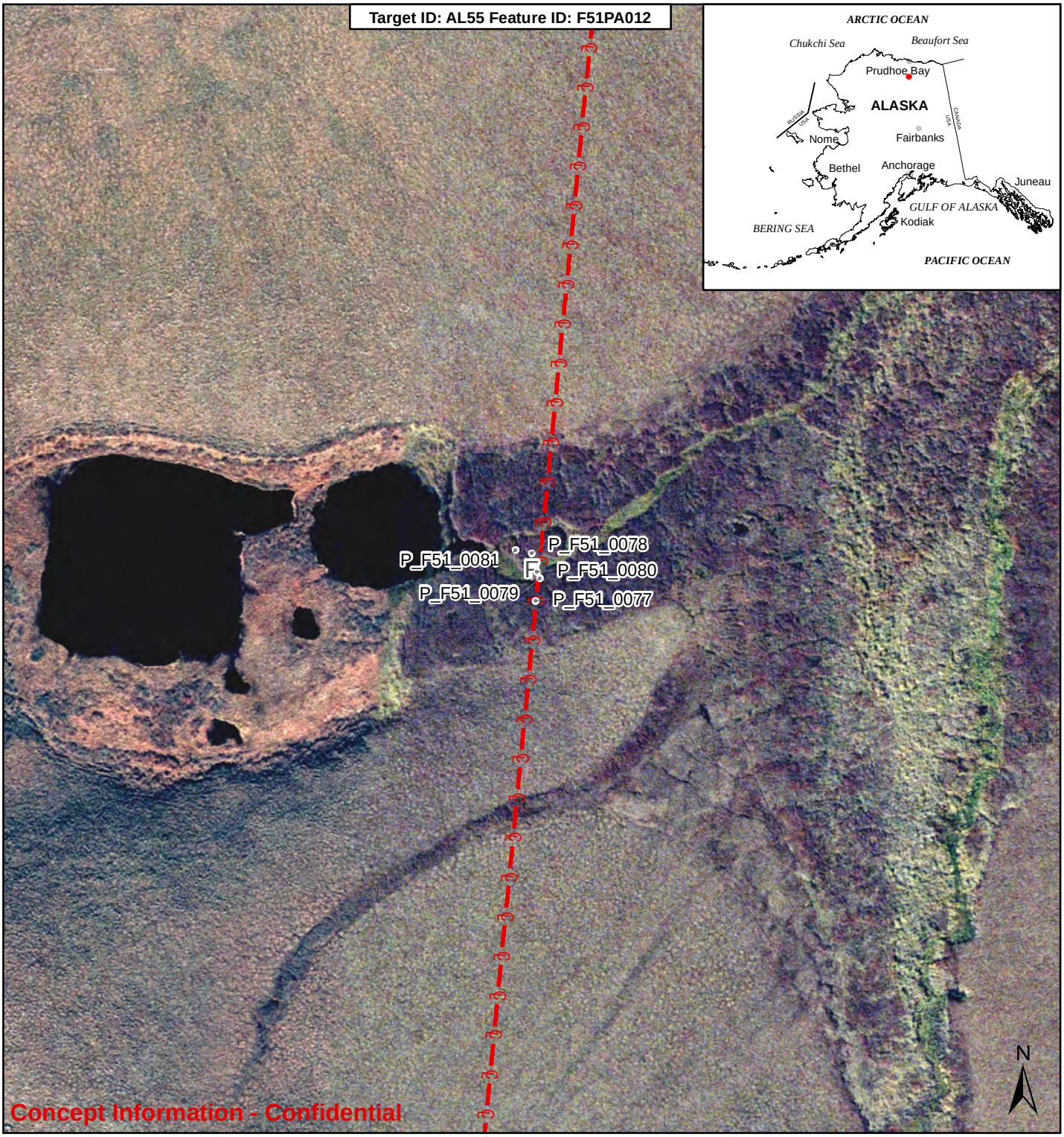
P_F51_0080 F51PA012 AL55

P_F51_0081 F51PA012 AL55

P_F51_0082 F51PA012 AL55



P_F51_0083 F51PA012 AL55



LEGEND

2013 Fish Survey Location

- F Fish Observed
- F No Fish Observed

Species Observed

- A G Arctic Grayling
- D V Dolly Varden
- N S Ninespine Stickleback
- R W Round Whitefish
- U Unknown

- Photo Point
- Alaska LNG Centerline with Mileposts

Feet: 0 200 400

Meters: 0 50 100

ALASKA LNG

NOTES:
Concept Information - Confidential. Produced by Alaska LNG team. The information used to create this product is based on the collected data on the date of issue; it is considered reliable only at the scale at which the data was created and the scale at which the map was published. This drawing is solely prepared for use by the contractual Alaska LNG team partners and the Alaska LNG team assumes no liability to any other party for any representations contained in these drawings. This map must be printed/viewed at full scale (100%) in order for the scale to remain correct.

DRAWN: TCS	ALASKA LNG 2013 FISH FIELD SURVEY LOCATIONS				
CHECK:	PROJECTION: AK ALB	DATUM: NAD83	CONTRACTOR NAME: URS ALASKA	MAP NUMBER:	REV.: B
DESIGN: TCS	SCALE: 1:2,750	DATE: 20 Feb 2014	PROJECT NUMBER: 226221163	ORIG.PAGE SIZE: 8.5 X 11	
APPR.					

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STREAM FISH INVESTIGATION DATA FORM

SITE DESCRIPTION

Date: 8.6.13	Investigators: KH, VW, CB	Team No.: FS1	Feature ID: FS1PA013
Stream Name: Unnamed Trib. No 7 to Atigun River	Stream ID: AL131.1A	Stream listed in Anadromous Fish Catalog (Y/N):	
Milepost: 164.7	Hwy Milepost: 253.7	TAPS Milepost: 158.2	
Latitude: 68° 13' 22.9029"	Longitude: 149° 24' 33.6377"		
Logbook No.: 1	Logbook Page No.: 35	Pic No(s): P_FS1_0084 - 0087	
US @ CL Pic No.:	DS @ CL Pic No.:	RB to LB@ CL Pic No.:	LB to RB@ CL Pic No.:
Additional Pic No.: N: P_FS1_0084	Additional Pic No.: S: P_FS1_0085	Additional Pic No.: W: P_FS1_0086	Additional Pic No.: E: P_FS1_0087

PHYSICAL/ CHEMICAL ATTRIBUTES

Weather (Describe): Sunny		Precipitation (Describe): None	
Water Temperature (°Δ*;	Air Temperature (°Δ*	pH:	Dissolved Oxygen (mg/l):
Specific Conductance(µS/cm):	Turbidity (NTU): NO WATER	Color:	ORP (mV):
Ambient Conductance(µS/cm):	Odor:	Sheen (Y/N):	Last date of Calibration:
Wetted Width (m):	Thalweg Depth @ CL (m):		Large Woody Debris Count:

Riparian Veg at 0-5 m at LB:	Riparian Veg at 0-5 m at RB:	Stream Substrate:	Aquatic Habitats
30 Grass/Sedge (%)	30 Grass/Sedge (%)	____ Organics (%)	____ Sand Bar
70 Shrubs (%)	70 Shrubs (%)	____ Silt (%)	____ Mud Bar
____ Trees (%)	____ Trees (%)	____ Sand (%)	____ Gravel Bar
____ Diameter DBH	____ Diameter DBH	25 Gravel (%)	____ Riffles (NO WATER)
		50 Cobble (%)	____ Pools
		25 Boulders(%)	____ Undercut Banks

Aquatic Habitats	
____ Large Woody Debris	
____ Overhanging vegetation	
____ Contiguous Wetlands	
____ Emergent Plants	
____ Submerged Plants	

Flow Type: Unknown

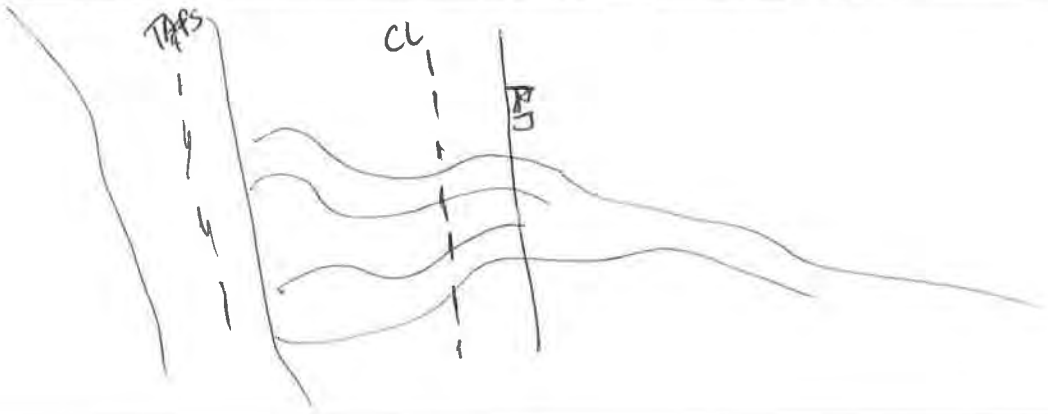
____ Perennial ____ Seasonal ____ Intermittent

STREAM PROFILE: Cross Sectional at Crossing (include riparian vegetation, wetted width, water depth, substrate, and aquatic habitats)

NORTH:

STREAM PROFILE: Plan View (include direction of flow, centerline, distances from centerline, photo locations, sample locations by gear type and ROW)

NORTH:



STREAM FISH INVESTIGATION DATA FORM

METHODS ATTRIBUTES				
Minnow Traps (Y/N):	Hook and Line (Y/N):	Beach Seine (Y/N):	Fyke Net (Y/N):	Hoop Net (Y/N):
No. of Minnow Traps Set:	Date & Time in: (mm/dd/yyyy) N/A	Date &Time in: (mm/dd/yyyy)	Date & Time in: (mm/dd/yyyy)	Date & Time in: (mm/dd/yyyy)
Date & Time in: (mm/dd/yyyy)	No. of lines in water:	No. of passes:	Date & Time out: (mm/dd/yyyy)	Date & Time out: (mm/dd/yyyy)
Date & Time out: (mm/dd/yyyy)	Time lines in water:	Reach Length (m):		

ELECTROFISHING ATTRIBUTES				
EF (Y/N):	EF Start Time:	EF End Time:	EF Time (seconds):	EF Reach Length (m):
Duty Cycle:	Frequency (Hz):	Waveform:	Sampling Efficiency (% of sample reach):	
Current (A):	Volts (V):	Power (W): N/A		(amp x volts)

FISH OBSERVATIONS

Gear Type	Species	Total Length (mm)	Life Stage (Juvenile or Adult)	Disposition (Dead or Alive)	Picture No.
		N/A			

NOTES (any additional information)

Not sure when channel gets water

huge channel - looks manmade

But no water

I think there are gravel mines nearby

Took point & photos

Field Crew Chief: _____ Field Scientist/Technician: _____

Technical Lead: _____

Revision Date: 4/17/2013

SCLNG Stream Fish Investigations Field Form
QA/QC Checklist

This form is to be completed before leaving the field site.

Feature ID: F51PA013 FT # AL131.1A Date: 8-6-13

For all items not checked, please provide detailed explanation in the notes section of data form.

1. **Site Description**
   - ☒ Was ADF&G contacted before conducting any work in this area?
   - ☒ Site Description complete? (Every cell must have entry or N/A)
   - ☒ Were all photos taken and labeled correctly?
2. **Physical/Chemical Attributes**
   - ☒ Calibration performed prior to sampling?
   - ☒ Physical/Chemical attributes complete? (Every cell must have entry or N/A)
   - ☒ N/A Water quality data within expected ranges?
     - ☒ N/A pH: 4.0 – 10.0
     - ☐ NTU: 0 – 3000
     - ☐ DO (mg/L): 1.0 – 15.0
     - ☐ DO (% saturation): 75- 100
     - ☐ Temp.: 1.0 – 19.0
     - ☐ Specific Conductance: 20 - 1500
   - ☒ N/A If outside expected ranges, was sample re-taken?
   - ☒ N/A Are units correct?
3. **Stream Profile**
   - ☒ Stream profile view sketch included?
   - ☒ N/A Stream profile view captures water depth and wetted width?
   - ☒ N/A Stream profile view captures where efforts were made to capture fish?
   - ☒ Plan view sketch included?
4. **Methods Attributes**
   - ☒ N/A Methods attributes complete? (Every cell must have entry or N/A)
     - ☐ Were methods used adequate (explanation needed if no methods selected)?
5. **Electrofishing Attributes**
   - ☒ N/A Electrofishing attributes complete? (Every cell must have entry or N/A)
     - ☐ Are units correct?
     - ☐ Are spawning/rearing answers consistent with fish observations?

SCLNG Stream Fish Investigations Field Form
QA/QC Checklist

6. Fish Observations

- [x] Are all fish captured/observed recorded in the Fish Observation table?
- [ ] Are units correct? (Fork Length (mm))
- [ ] Were adequate photos taken of fish captured? (Take a photo if in doubt)
- [ ] Were any specimens preserved?

7. General

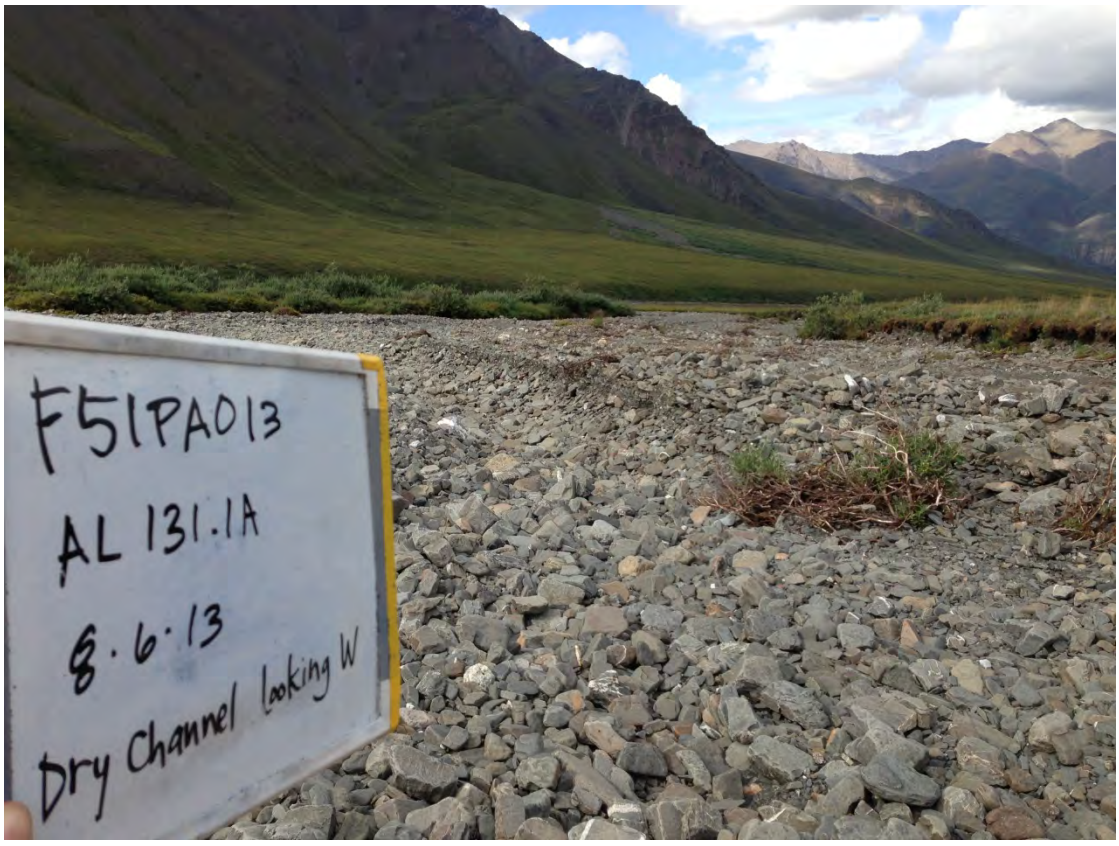
- [x] Feature ID and Field Target # are consistent on data forms, logbook entries, photos, and maps?
- [x] All additional data in logbook captured on data form and additional photos noted?
- [x] Were all additional comments on stream habitat, etc. recorded on data form?
- [x] Was any gear missing/damaged for this survey or did you have any problems that should require resampling of this stream for an adequate survey effort?

By signing below, I verify that all field data for this site has been verified for accuracy and completeness.

X	X
Fisheries Biologist (print)	Signature
X Kim Holmes	X
Field Crew Chief (print)	Signature

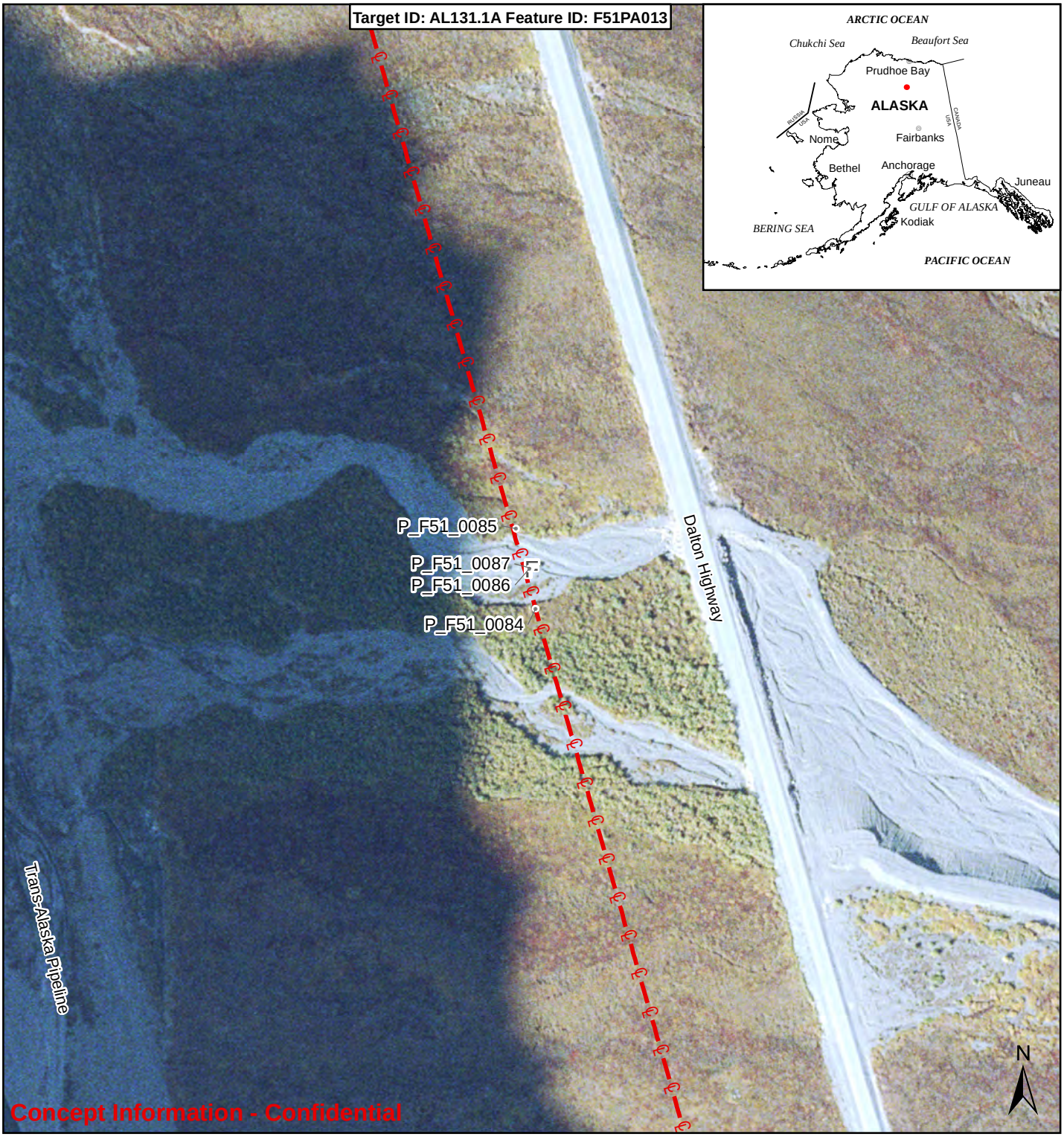
P_F51_0084 F51PA013 AL131.1A

P_F51_0085 F51PA013 AL131.1A



P_F51_0086 F51PA013 AL131.1A

P_F51_0087 F51PA013 AL131.1A



LEGEND

2013 Fish Survey Location

- F Fish Observed
- F No Fish Observed

Species Observed

- A G Arctic Grayling
- D V Dolly Varden
- N S Ninespine Stickleback
- R W Round Whitefish
- U Unknown

- Photo Point
- Alaska LNG Centerline with Mileposts

Feet: 0 200 400

Meters: 0 50 100

ALASKA LNG

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DRAWN: TCS	ALASKA LNG 2013 FISH FIELD SURVEY LOCATIONS				
CHECK:	PROJECTION: AK ALB	DATUM: NAD83	CONTRACTOR NAME: URS ALASKA	MAP NUMBER:	REV.: B
DESIGN: TCS	SCALE: 1:2,750	DATE: 20 Feb 2014	PROJECT NUMBER: 226221163	ORIG.PAGE SIZE: 8.5 X 11	
APPR.					

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STREAM FISH INVESTIGATION DATA FORM

SITE DESCRIPTION

Date: 8-8-13	Investigators: KH, VW, CB	Team No.: FS1	Feature ID: FS1AY001
Stream Name: Little Piddler Creek	Stream ID: AL241	Stream listed in Anadromous Fish Catalog (Y/N): N	
Milepost: 280.9	Hwy Milepost: 138.2	TAPS Milepost: 271.9	
Latitude: 66° 49' 07.03371"	Longitude: 150° 37' 42.0877"		
Logbook No.: 1	Logbook Page No.: 37	Pic No(s): P_FS1_0088--0092	
US @ CL Pic No.: P_FS1_0088	DS @ CL Pic No.: P_FS1_0089	RB to LB@ CL Pic No.: P_FS1_0090	LB to RB@ CL Pic No.: P_FS1_0091
Additional Pic No.: P_FS1_0092	Additional Pic No.:	Additional Pic No.:	Additional Pic No.:

PHYSICAL/ CHEMICAL ATTRIBUTES

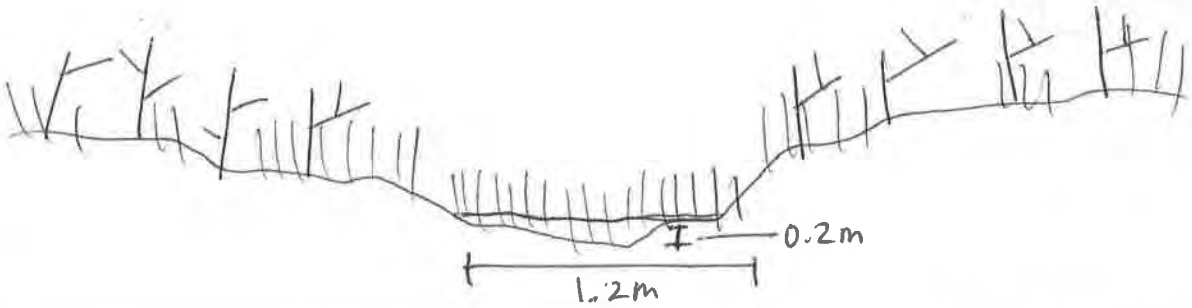
Weather (Describe): Sunny	Precipitation (Describe): None		
Water Temperature (°Δ*; ~~7.67 KH~~ 11.06	Air Temperature (°Δ*; 21	pH: ~~7.89 KH~~	Dissolved Oxygen (mg/l): ~~3.78~~ 3.56 (32.4%)
Specific Conductance(µS/cm): ~~97 KH~~ 54	Turbidity (NTU): 1453	Color: 5.19 Tannic	ORP (mV): ~~206.7~~ 165.7
Ambient Conductance(µS/cm): ~~0.115~~ 0.073	Odor: None	Sheen (Y/N): N	Last date of Calibration: 8.2.13
Wetted Width (m): ~~3.9 KH~~ 1.2m	Thalweg Depth @ CL (m): ~~0.8 KH~~ 0.2m	Large Woody Debris Count: N/A	

Riparian Veg at 0-5 m at LB:	Riparian Veg at 0-5 m at RB:	Stream Substrate:	Aquatic Habitats	
70 Grass/Sedge (%)	80 Grass/Sedge (%)	100 Organics (%)	___ Sand Bar	X Large Woody Debris
30 Shrubs (%)	20 Shrubs (%)	___ Silt (%)	___ Mud Bar	___ Overhanging vegetation
___ Trees (%)	___ Trees (%)	___ Sand (%)	___ Gravel Bar	X Contiguous Wetlands
___ Diameter DBH	___ Diameter DBH	___ Gravel (%)	___ Riffles	X Emergent Plants
		___ Cobble (%)	X Pools	X Submerged Plants
		___ Boulders(%)	___ Undercut Banks	

Flow Type: ___ Perennial X Seasonal X - Possibly Intermittent

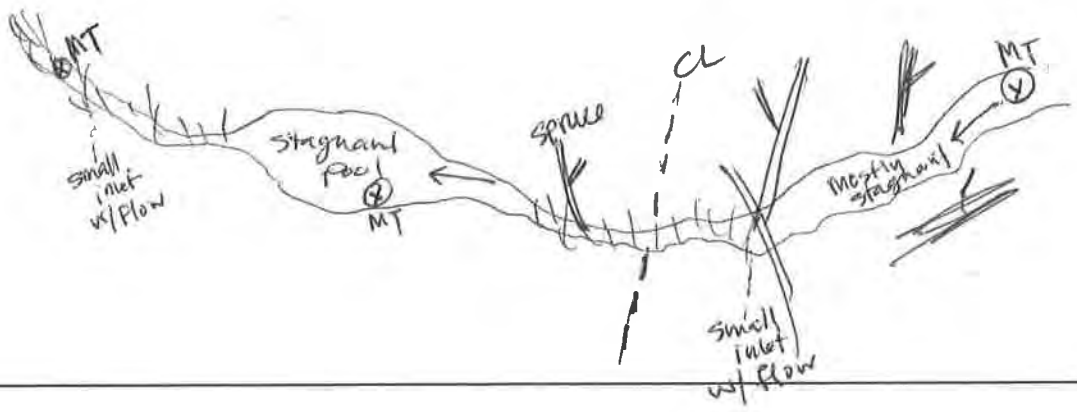
STREAM PROFILE: Cross Sectional at Crossing (include riparian vegetation, wetted width, water depth, substrate, and aquatic habitats)

NORTH:



STREAM PROFILE: Plan View (include direction of flow, centerline, distances from centerline, photo locations, sample locations by gear type and ROW)

NORTH:



STREAM FISH INVESTIGATION DATA FORM

METHODS ATTRIBUTES				
Minnow Traps (Y/N): Y	Hook and Line (Y/N):	Beach Seine (Y/N):	Fyke Net (Y/N):	Hoop Net (Y/N):
No. of Minnow Traps Set: 3	Date & Time in: (mm/dd/yyyy)	Date &Time in: (mm/dd/yyyy)	Date & Time in: (mm/dd/yyyy)	Date & Time in: (mm/dd/yyyy)
Date & Time in: (mm/dd/yyyy) 8/18/13 1045	No. of lines in water:	No. of passes: N/A	Date & Time out: (mm/dd/yyyy)	Date & Time out: (mm/dd/yyyy)
Date & Time out: (mm/dd/yyyy) 8/18/13 1545	Time lines in water:	Reach Length (m):		

ELECTROFISHING ATTRIBUTES				
EF (Y/N):	EF Start Time:	EF End Time:	EF Time (seconds):	EF Reach Length (m):
Duty Cycle:	Frequency (Hz):	Waveform:	Sampling Efficiency (% of sample reach):	
Current (A):	Volts (V): N/A	Power (W):		(amp x volts)

FISH OBSERVATIONS

Gear Type	Species	Total Length (mm)	Life Stage (Juvenile or Adult)	Disposition (Dead or Alive)	Picture No.
		N/A			

NOTES (any additional information)

DO & pH outside of normal range. Retook sample upstream. pH and water temp increased quite a bit DO remained low. Probably due to stagnant nature of stream. Brown algae & organic material collected in pools. There are a few areas w/ some flow but water never clears up much. In this area the channel is connected w/ areas of overgrown grass & spruce debris. Wouldn't be surprised if the stream is obstructed in some places

Field Crew Chief: _____ Field Scientist/Technician: _____

Technical Lead: _____

Revision Date: 4/17/2013

SCLNG Stream Fish Investigations Field Form
QA/QC Checklist

This form is to be completed before leaving the field site.

Feature ID: FS1A4001 FT # AL241 Date: 8.8.13

For all items not checked, please provide detailed explanation in the notes section of data form.

1. **Site Description**
   - ☒ Was ADF&G contacted before conducting any work in this area?
   - ☒ Site Description complete? (Every cell must have entry or N/A)
   - ☒ Were all photos taken and labeled correctly?
2. **Physical/Chemical Attributes**
   - ☒ Calibration performed prior to sampling?
   - ☒ Physical/Chemical attributes complete? (Every cell must have entry or N/A)
   - ☒ Water quality data within expected ranges?
     - ☒ pH: 4.0 – 10.0 on 2nd take
     - ☒ NTU: 0 – 3000
     - ☒ DO (mg/L): 1.0 – 15.0
     - ☐ DO (% saturation): 75- 100 (32.4%)
     - ☒ Temp.: 1.0 – 19.0
     - ☒ Specific Conductance: 20 - 1500
   - ☒ If outside expected ranges, was sample re-taken?
   - ☒ Are units correct?
3. **Stream Profile**
   - ☒ Stream profile view sketch included?
   - ☒ Stream profile view captures water depth and wetted width?
   - ☒ Stream profile view captures where efforts were made to capture fish?
   - ☒ Plan view sketch included?
4. **Methods Attributes**
   - ☒ Methods attributes complete? (Every cell must have entry or N/A)
   - ☒ Were methods used adequate (explanation needed if no methods selected)?
5. **Electrofishing Attributes**
   - N/A Electrofishing attributes complete? (Every cell must have entry or N/A)
   - ☐ Are units correct?
   - ☐ Are spawning/rearing answers consistent with fish observations?

SCLNG Stream Fish Investigations Field Form
QA/QC Checklist

6. Fish Observations

- N/A Are all fish captured/observed recorded in the Fish Observation table?
- ☐ Are units correct? (Fork Length (mm))
- ☐ Were adequate photos taken of fish captured? (Take a photo if in doubt)
- ☐ Were any specimens preserved?

7. General

- ☒ Feature ID and Field Target # are consistent on data forms, logbook entries, photos, and maps?
- ☒ All additional data in logbook captured on data form and additional photos noted?
- ☒ Were all additional comments on stream habitat, etc. recorded on data form?
- NO Was any gear missing/damaged for this survey or did you have any problems that should require resampling of this stream for an adequate survey effort?

By signing below, I verify that all field data for this site has been verified for accuracy and completeness.

X	X
Fisheries Biologist (print)	Signature
X Kim Holmes	X
Field Crew Chief (print)	Signature

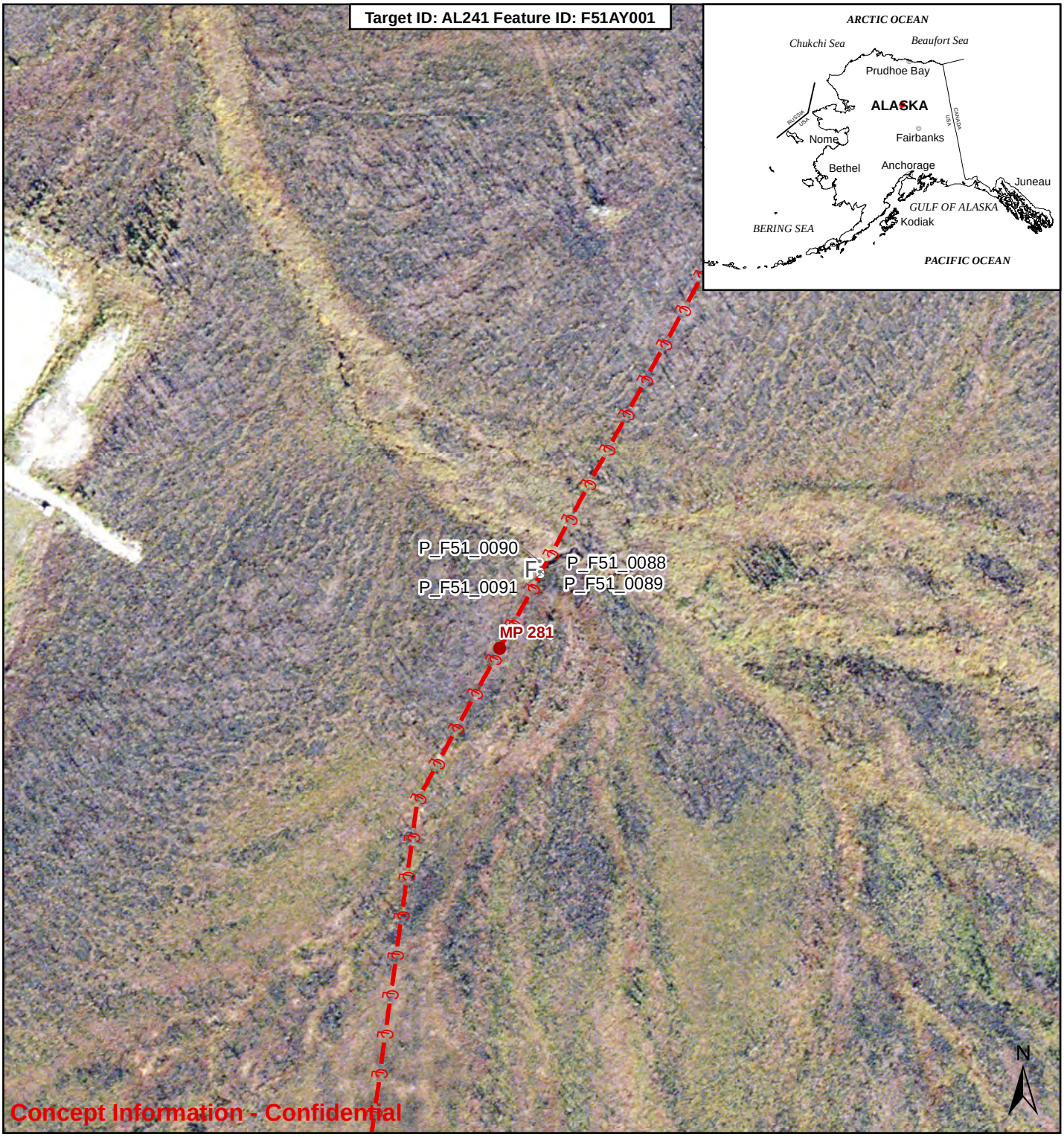
P_F51_0088 F51AY001 AL241

P_F51_0089 F51AY001 AL241

P_F51_0090 F51AY001 AL241

P_F51_0091 F51AY001 AL241

P_F51_0092 F51AY001 AL241



LEGEND

2013 Fish Survey Location

- F Fish Observed
- F No Fish Observed

Species Observed

- A G Arctic Grayling
- D V Dolly Varden
- N S Ninespine Stickleback
- R W Round Whitefish
- U Unknown

- Photo Point
- Alaska LNG Centerline with Mileposts

Feet: 0 200 400

Meters: 0 50 100

ALASKA LNG

NOTES:
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DRAWN	CHECK	DESIGN	APPR.
TCS		TCS	

ALASKA LNG
2013 FISH FIELD SURVEY LOCATIONS

PROJECTION	DATUM	CONTRACTOR NAME	MAP NUMBER	REV.
AK ALB	NAD83	URS ALASKA		B

SCALE	DATE	PROJECT NUMBER	ORIG.PAGE SIZE
1:2,750	20 Feb 2014	226221163	8.5 X 11

I:\26221163 SCLNG Studies\10 - Geospatial\10.06 - MXD\2013 Field Reporting\Fish\2013_Fish_Field_Report_AppendixB_8x11.mxd

STREAM FISH INVESTIGATION DATA FORM

SITE DESCRIPTION

Date: 8-8-13	Investigators: KH, VW, CB	Team No.: FS1	Feature ID: FS1AY002
Stream Name: Unnamed Trib No.4 to Jim River	Stream ID: AL242	Stream listed in Anadromous Fish Catalog (Y/N): N	
Milepost: 281.5	Hwy Milepost: 137.5	TAPS Milepost: 272.7	
Latitude: 66° 48' 40.3594	Longitude: 150° 37' 58.1673"		
Logbook No.: 1	Logbook Page No.: 37	Pic No(s): P_FS1_0093 - 0096	
US @ CL Pic No.:	DS @ CL Pic No.:	RB to LB @ CL Pic No.:	LB to RB @ CL Pic No.:
Additional Pic No.: N: P_FS1_0093	Additional Pic No.: S: P_FS1_0094	Additional Pic No.: E: P_FS1_0095	Additional Pic No.: W: P_FS1_0096

PHYSICAL/ CHEMICAL ATTRIBUTES

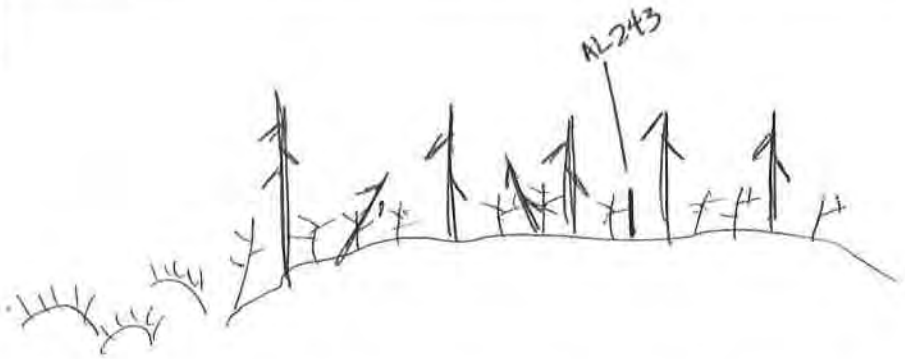
Weather (Describe): Sunny		Precipitation (Describe): None	
Water Temperature (°Δ*;	Air Temperature (°Δ*;	pH:	Dissolved Oxygen (mg/l):
Specific Conductance(µS/cm):	Turbidity (NTU):	Color:	ORP (mV):
Ambient Conductance(µS/cm):	Odor:	Sheen (Y/N):	Last date of Calibration:
Wetted Width (m):	Thalweg Depth @ CL (m):		Large Woody Debris Count:

Riparian Veg at 0-5 m at LB:	Riparian Veg at 0-5 m at RB:	Stream Substrate:	Aquatic Habitats	
_____ Grass/Sedge (%)	_____ Grass/Sedge (%)	_____ Organics (%)	_____ Sand Bar	_____ Large Woody Debris
_____ Shrubs (%)	_____ Shrubs (%)	_____ Silt (%)	_____ Mud Bar	_____ Overhanging vegetation
_____ Trees (%)	_____ Trees (%)	_____ Sand (%)	_____ Gravel Bar	_____ Contiguous Wetlands
_____ Diameter DBH	_____ Diameter DBH	_____ Gravel (%)	_____ Riffles	_____ Emergent Plants
		_____ Cobble (%)	_____ Pools	_____ Submerged Plants
Flow Type:		_____ Boulders (%)	_____ Undercut Banks	
_____ Perennial _____ Seasonal _____ Intermittent				

WATER

STREAM PROFILE: Cross Sectional at Crossing (include riparian vegetation, wetted width, water depth, substrate, and aquatic habitats)

NORTH:



STREAM PROFILE: Plan View (include direction of flow, centerline, distances from centerline, photo locations, sample locations by gear type and ROW)

NORTH:

STREAM FISH INVESTIGATION DATA FORM

METHODS ATTRIBUTES				
Minnow Traps (Y/N):	Hook and Line (Y/N):	Beach Seine (Y/N):	Fyke Net (Y/N):	Hoop Net (Y/N):
No. of Minnow Traps Set:	Date & Time in: (mm/dd/yyyy)	Date & Time in: (mm/dd/yyyy)	Date & Time in: (mm/dd/yyyy)	Date & Time in: (mm/dd/yyyy)
Date & Time in: (mm/dd/yyyy)	No. of lines in water:	No. of passes:	Date & Time out: (mm/dd/yyyy)	Date & Time out: (mm/dd/yyyy)
Date & Time out: (mm/dd/yyyy)	Time lines in water:	Reach Length (m):		

ELECTROFISHING ATTRIBUTES				
EF (Y/N):	EF Start Time:	EF End Time:	EF Time (seconds):	EF Reach Length (m):
Duty Cycle:	Frequency (Hz) :	Waveform:	Sampling Efficiency (% of sample reach):	
Current (A):	Volts (V):	Power (W):		(amp x volts)

FISH OBSERVATIONS

Gear Type	Species	Total Length (mm)	Life Stage (Juvenile or Adult)	Disposition (Dead or Alive)	Picture No.

NOTES (any additional information)

No water

This site was probably chosen from aerial mapping because there is a change of veg to increased shrubs

No stream channel

Field Crew Chief: _____ Field Scientist/Technician: _____

Technical Lead: _____

Revision Date: 4/17/2013

SCLNG Stream Fish Investigations Field Form
QA/QC Checklist

This form is to be completed before leaving the field site.

Feature ID: FS1AY002 FT # AL242 Date: 8.8.13

For all items not checked, please provide detailed explanation in the notes section of data form.

1. **Site Description**
   - [x] Was ADF&G contacted before conducting any work in this area?
   - [x] Site Description complete? (Every cell must have entry or N/A)
   - [x] Were all photos taken and labeled correctly?
2. **Physical/Chemical Attributes**
   - [x] Calibration performed prior to sampling?
   - [x] Physical/Chemical attributes complete? (Every cell must have entry or N/A)
   - [NA] Water quality data within expected ranges?
     - [NA] pH: 4.0 – 10.0
     - [ ] NTU: 0 – 3000
     - [ ] DO (mg/L): 1.0 – 15.0
     - [ ] DO (% saturation): 75- 100
     - [ ] Temp.: 1.0 – 19.0
     - [ ] Specific Conductance: 20 - 1500
   - [NA] If outside expected ranges, was sample re-taken?
   - [ ] Are units correct?
3. **Stream Profile**
   - [x] Stream profile view sketch included?
   - [NA] Stream profile view captures water depth and wetted width?
   - [ ] Stream profile view captures where efforts were made to capture fish?
   - [x] Plan view sketch included?
4. **Methods Attributes**
   - [x] Methods attributes complete? (Every cell must have entry or N/A)
   - [x] Were methods used adequate (explanation needed if no methods selected)?
5. **Electrofishing Attributes**
   - [NA] Electrofishing attributes complete? (Every cell must have entry or N/A)
   - [ ] Are units correct?
   - [ ] Are spawning/rearing answers consistent with fish observations?

SCLNG Stream Fish Investigations Field Form
QA/QC Checklist

6. Fish Observations

- [N/A] Are all fish captured/observed recorded in the Fish Observation table?
- [ ] Are units correct? (Fork Length (mm))
- [ ] Were adequate photos taken of fish captured? (Take a photo if in doubt)
- [ ] Were any specimens preserved?

7. General

- [✓] Feature ID and Field Target # are consistent on data forms, logbook entries, photos, and maps?
- [✓] All additional data in logbook captured on data form and additional photos noted?
- [✓] Were all additional comments on stream habitat, etc. recorded on data form?
- [No] Was any gear missing/damaged for this survey or did you have any problems that should require resampling of this stream for an adequate survey effort?

By signing below, I verify that all field data for this site has been verified for accuracy and completeness.

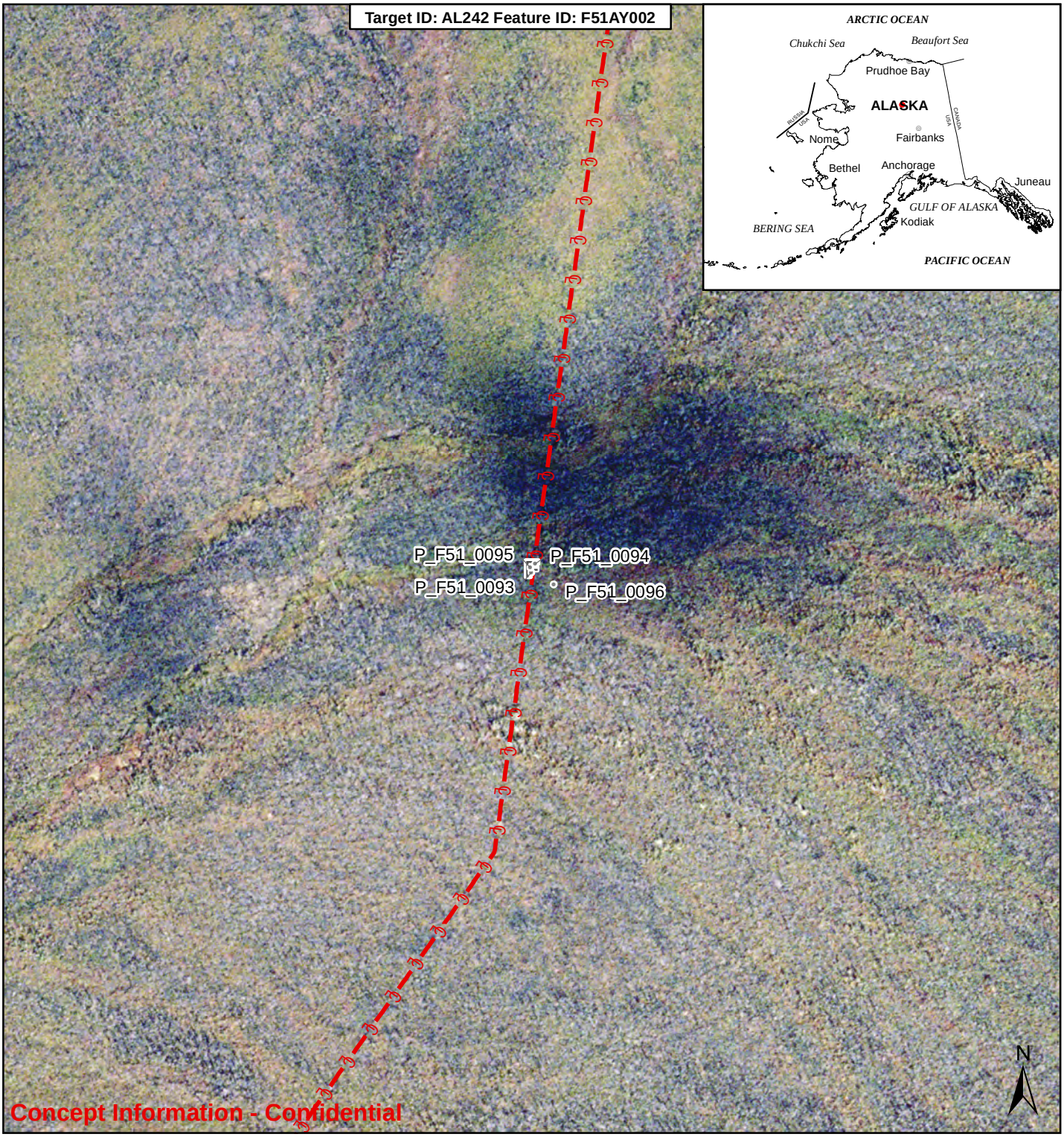
X	X
Fisheries Biologist (print)	Signature
X Kim Holmes	X
Field Crew Chief (print)	Signature

P_F51_0093 F51AY002 AL242

P_F51_0094 F51AY002 AL242

P_F51_0095 F51AY002 AL242

P_F51_0096 F51AY002 AL242



LEGEND

2013 Fish Survey Location

- F Fish Observed
- F No Fish Observed

Species Observed

- A G Arctic Grayling
- D V Dolly Varden
- N S Ninespine Stickleback
- R W Round Whitefish
- U Unknown

- Photo Point
- Alaska LNG Centerline with Mileposts

Feet: 0 200 400

Meters: 0 50 100

ALASKA LNG

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DRAWN	CHECK	DESIGN	APPR.
TCS		TCS	

ALASKA LNG
2013 FISH FIELD SURVEY LOCATIONS

PROJECTION	DATUM	CONTRACTOR NAME	MAP NUMBER	REV.
AK ALB	NAD83	URS ALASKA		B

SCALE	DATE	PROJECT NUMBER	ORIG.PAGE SIZE
1:2,750	20 Feb 2014	226221163	8.5 X 11

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STREAM FISH INVESTIGATION DATA FORM

SITE DESCRIPTION

Date: 8-8-13	Investigators: KH, VW, CB	Team No.: F51	Feature ID: F51AY003
Stream Name: Unnamed Trib No. 5 to Jim River	Stream ID: AL243	Stream listed in Anadromous Fish Catalog (Y/N): N	
Milepost: 282.1	Hwy Milepost: 136.9	TAPS Milepost: 273.2	
Latitude: 66° 48' 14.9677"	Longitude: 150° 38' 39.6415"		
Logbook No.: 1	Logbook Page No.: 37	Pic No(s): P_F51_0097-0100	
US @ CL Pic No.:	DS @ CL Pic No.:	RB to LB@ CL Pic No.:	LB to RB@ CL Pic No.:
Additional Pic No.: N: P_F51_0097	Additional Pic No.: S: P_F51_0098	Additional Pic No.: E: P_F51_0099	Additional Pic No.: W: P_F51_0100

PHYSICAL/ CHEMICAL ATTRIBUTES

Weather (Describe): Sunny		Precipitation (Describe): None	
Water Temperature (°Δ*;	Air Temperature (°Δ*;	pH:	Dissolved Oxygen (mg/l):
Specific Conductance(µS/cm):	Turbidity (NTU):	Color:	ORP (mV):
Ambient Conductance(µS/cm):	Odor:	Sheen (Y/N):	Last date of Calibration:
Wetted Width (m):	Thalweg Depth @ CL (m):	Large Woody Debris Count:	

Riparian Veg at 0-5 m at LB:	Riparian Veg at 0-5 m at RB:	Stream Substrate:	Aquatic Habitats	
_____Grass/Sedge (%)	_____Grass/Sedge (%)	_____Organics (%)	_____Sand Bar	_____Large Woody Debris
_____Shrubs (%)	_____Shrubs (%)	_____Silt (%)	_____Mud Bar	_____Overhanging vegetation
_____Trees (%)	_____Trees (%)	_____Sand (%)	_____Gravel Bar	_____Contiguous Wetlands
_____Diameter DBH	_____Diameter DBH	_____Gravel (%)	_____Riffles	_____Emergent Plants
		_____Cobble (%)	_____Pools	_____Submerged Plants
Flow Type:		_____Boulders(%)	_____Undercut Banks	
_____Perennial _____Seasonal _____Intermittent				

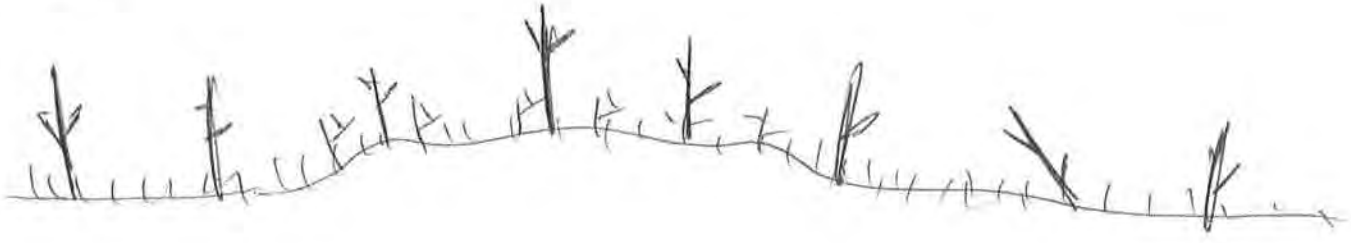
N/A NO WATER NO CHANNEL

STREAM PROFILE: Cross Sectional at Crossing (include riparian vegetation, wetted width, water depth, substrate, and aquatic habitats)

NORTH:

STREAM PROFILE: Plan View (include direction of flow, centerline, distances from centerline, photo locations, sample locations by gear type and ROW)

NORTH:



STREAM FISH INVESTIGATION DATA FORM

METHODS ATTRIBUTES				
Minnow Traps (Y/N):	Hook and Line (Y/N):	Beach Seine (Y/N):	Fyke Net (Y/N):	Hoop Net (Y/N):
No. of Minnow Traps Set:	Date & Time in: (mm/dd/yyyy) N	Date &Time in: (mm/dd/yyyy)	Date & Time in: (mm/dd/yyyy)	Date & Time in: (mm/dd/yyyy)
Date & Time in: (mm/dd/yyyy)	No. of lines in water:	No. of passes: N/A	Date & Time out: (mm/dd/yyyy)	Date & Time out: (mm/dd/yyyy)
Date & Time out: (mm/dd/yyyy)	Time lines in water:	Reach Length (m):		

ELECTROFISHING ATTRIBUTES				
EF (Y/N):	EF Start Time:	EF End Time:	EF Time (seconds):	EF Reach Length (m):
Duty Cycle:	Frequency (Hz) : N	Waveform: N/A	Sampling Efficiency (% of sample reach):	
Current (A):	Volts (V):	Power (W):		(amp x volts)

FISH OBSERVATIONS

Gear Type	Species	Total Length (mm)	Life Stage (Juvenile or Adult)	Disposition (Dead or Alive)	Picture No.
		N/A			

NOTES (any additional information)

No defined channel. No water

Wetlands complex - water table @ about surface
- water rises up in footprint

Black spruce, blueberry, willow and labrador tea

Field Crew Chief: _____ Field Scientist/Technician: _____

Technical Lead: _____

SCLNG Stream Fish Investigations Field Form
QA/QC Checklist

This form is to be completed before leaving the field site.

Feature ID: FS1AY003 FT # AL243 Date: 8.8.13

For all items not checked, please provide detailed explanation in the notes section of data form.

1. **Site Description**
   - [x] Was ADF&G contacted before conducting any work in this area?
   - [x] Site Description complete? (Every cell must have entry or N/A)
   - [x] Were all photos taken and labeled correctly?
2. **Physical/Chemical Attributes**
   - [x] Calibration performed prior to sampling?
   - [x] Physical/Chemical attributes complete? (Every cell must have entry or N/A)
   - [NA] Water quality data within expected ranges?
     - [NA] pH: 4.0 – 10.0
     - [ ] NTU: 0 – 3000
     - [ ] DO (mg/L): 1.0 – 15.0
     - [ ] DO (% saturation): 75- 100
     - [ ] Temp.: 1.0 – 19.0
     - [ ] Specific Conductance: 20 - 1500
   - [NA] If outside expected ranges, was sample re-taken?
     - [ ] Are units correct?
3. **Stream Profile**
   - [x] Stream profile view sketch included?
   - [NA] Stream profile view captures water depth and wetted width?
   - [ ] Stream profile view captures where efforts were made to capture fish?
   - [x] Plan view sketch included?
4. **Methods Attributes**
   - [NA] Methods attributes complete? (Every cell must have entry or N/A)
   - [x] Were methods used adequate (explanation needed if no methods selected)?
5. **Electrofishing Attributes**
   - [NA] Electrofishing attributes complete? (Every cell must have entry or N/A)
     - [ ] Are units correct?
     - [ ] Are spawning/rearing answers consistent with fish observations?

SCLNG Stream Fish Investigations Field Form
QA/QC Checklist

6. Fish Observations

- [x] N/A Are all fish captured/observed recorded in the Fish Observation table?
- [ ] Are units correct? (Fork Length (mm))
- [ ] Were adequate photos taken of fish captured? (Take a photo if in doubt)
- [x] Were any specimens preserved?

7. General

- [x] Feature ID and Field Target # are consistent on data forms, logbook entries, photos, and maps?
- [x] All additional data in logbook captured on data form and additional photos noted?
- [x] Were all additional comments on stream habitat, etc. recorded on data form?
- [x] N/A Was any gear missing/damaged for this survey or did you have any problems that should require resampling of this stream for an adequate survey effort?

By signing below, I verify that all field data for this site has been verified for accuracy and completeness.

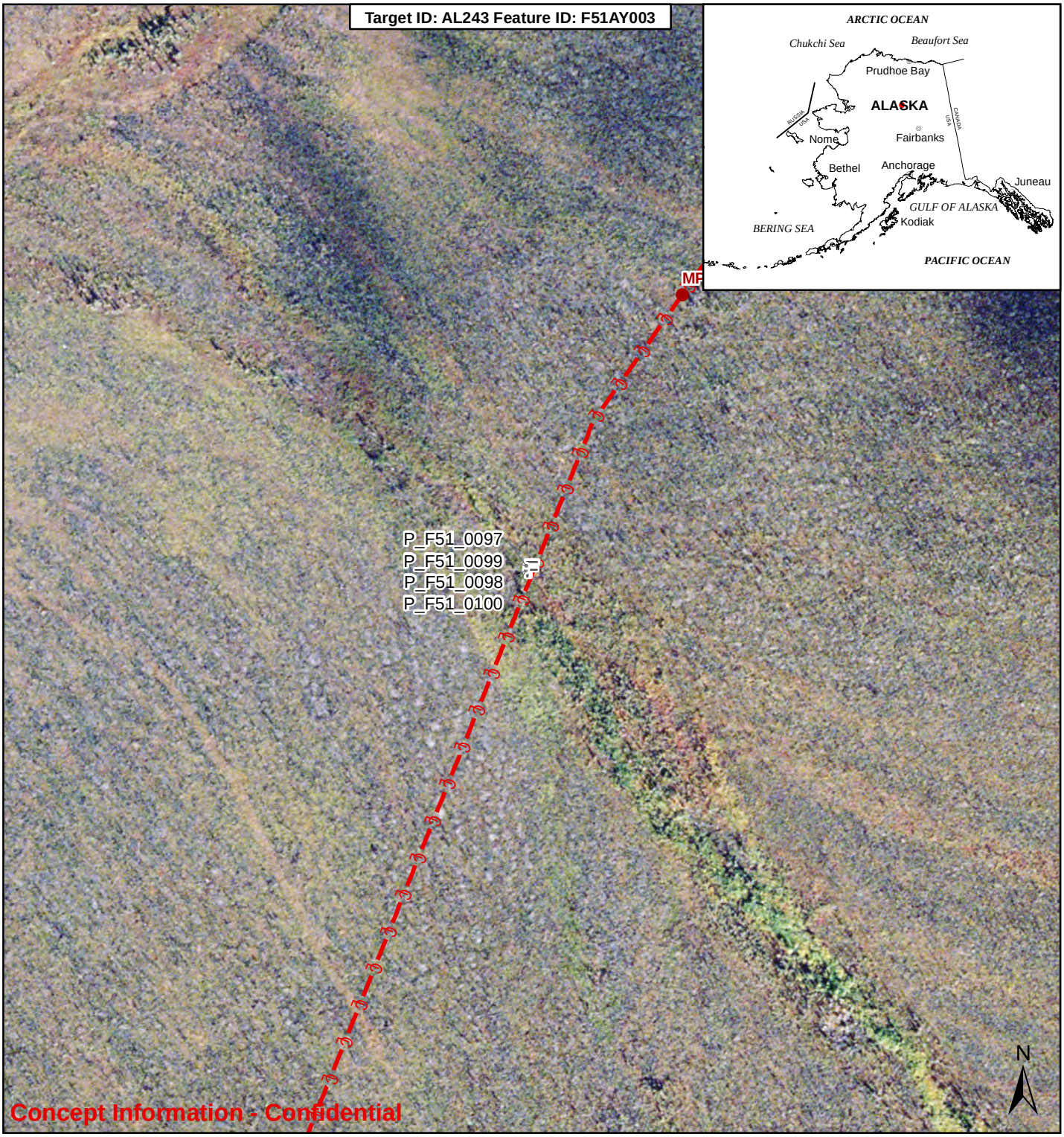
X	X
Fisheries Biologist (print)	Signature
X Kim Holmes	X
Field Crew Chief (print)	Signature

P_F51_0097 F51AY003 AL243

P_F51_0098 F51AY003 AL243

P_F51_0099 F51AY003 AL243

P_F51_0100 F51AY003 AL243



LEGEND

2013 Fish Survey Location

- F Fish Observed
- F No Fish Observed

Species Observed

- A G Arctic Grayling
- D V Dolly Varden
- N S Ninespine Stickleback
- R W Round Whitefish
- U Unknown

- Photo Point
- Alaska LNG Centerline with Mileposts

Feet: 0 200 400

Meters: 0 50 100

ALASKA LNG

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DRAWN	CHECK	DESIGN	APPR.
TCS		TCS	

ALASKA LNG
2013 FISH FIELD SURVEY LOCATIONS

PROJECTION	DATUM	CONTRACTOR NAME	MAP NUMBER	REV.
AK ALB	NAD83	URS ALASKA		B

SCALE	DATE	PROJECT NUMBER	ORIG.PAGE SIZE
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I:\26221163 SCLNG Studies\10 - Geospatial\10.06 - MXD\2013 Field Reporting\Fish\2013_Fish_Field_Report_AppendixB_8x11.mxd

STREAM FISH INVESTIGATION DATA FORM

SITE DESCRIPTION

Date: 8/9/13	Investigators: KH, VW, CR	Team No.: FS1	Feature ID: FS1AY004
Stream Name: Caribou Mountain Creek	Stream ID: AL259	Stream listed in Anadromous Fish Catalog (Y/N): N	
Milepost: 312.8	Hwy Milepost: 102.2	TAPS Milepost: 303.8	
Latitude: 66° 24' 35.1420"	Longitude: 150° 33' 08.4415"		
Logbook No.: 1	Logbook Page No.: 39	Pic No(s): P_FS1_0109 - 0112	
US @ CL Pic No.: P_FS1_0109	DS @ CL Pic No.: P_FS1_0110	RB to LB@ CL Pic No.: P_FS1_0111	LB to RB@ CL Pic No.: P_FS1_0112
Additional Pic No.:	Additional Pic No.:	Additional Pic No.:	Additional Pic No.:

PHYSICAL/ CHEMICAL ATTRIBUTES

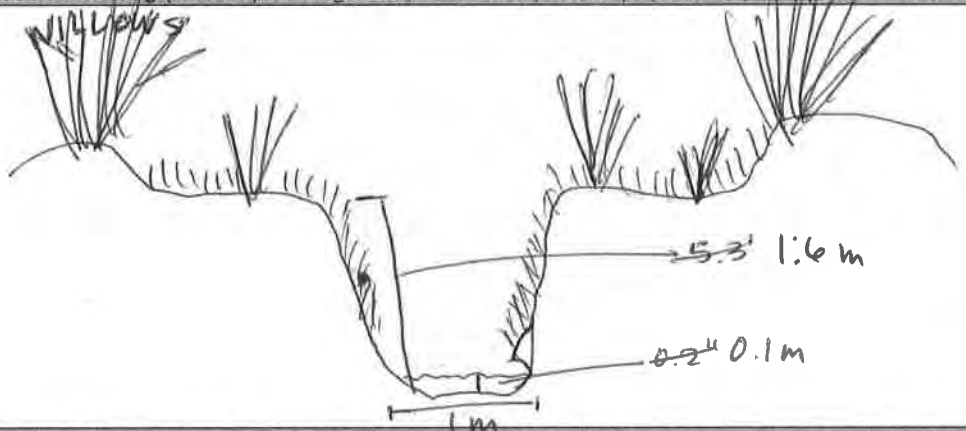
Weather (Describe): cloudy	Precipitation (Describe): None		
Water Temperature (°C): 6.75	Air Temperature (°C): 20	pH: 5.48	Dissolved Oxygen (mg/l): ~~8.5~~ 10.48
Specific Conductance(µS/cm): 88	Turbidity (NTU): 3.58	Color: clear	ORP (mV): ~168 (Ranged from 45 - 168)
Ambient Conductance(µS/cm): 0.135	Odor: None	Sheen (Y/N): N	Last date of Calibration: 8/9/13
Wetted Width (m): ~~3.2ft~~ 1m	Thalweg Depth @ CL (m): ~~0.2m~~ 0.1m		Large Woody Debris Count: NA

Riparian Veg at 0-5 m at LB:	Riparian Veg at 0-5 m at RB:	Stream Substrate:	Aquatic Habitats	
60 Grass/Sedge (%)	50 Grass/Sedge (%)	____ Organics (%)	X Sand Bar	____ Large Woody Debris
20 Shrubs (%)	50 Shrubs (%)	____ Silt (%)	____ Mud Bar	X Overhanging vegetation
____ Trees (%)	____ Trees (%)	100 Sand (%)	____ Gravel Bar	____ Contiguous Wetlands
____ Diameter DBH	____ Diameter DBH	____ Gravel (%)	____ Riffles	____ Emergent Plants
		____ Cobble (%)	____ Pools	____ Submerged Plants
		____ Boulders(%)	X Undercut Banks	

Flow Type: X Perennial ____ Seasonal ____ Intermittent

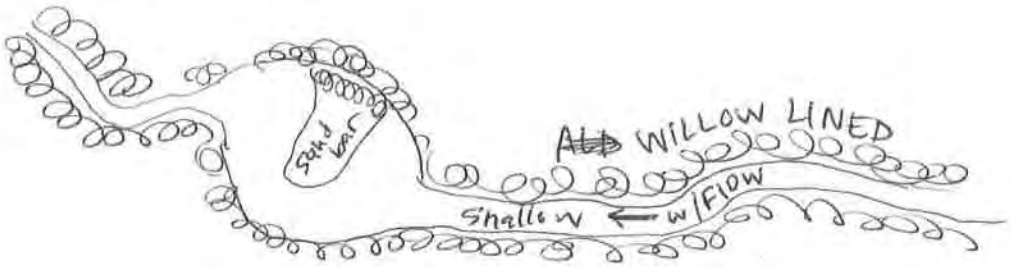
STREAM PROFILE: Cross Sectional at Crossing (include riparian vegetation, wetted width, water depth, substrate, and aquatic habitats)

NORTH:



STREAM PROFILE: Plan View (include direction of flow, centerline, distances from centerline, photo locations, sample locations by gear type and ROW)

NORTH:



STREAM FISH INVESTIGATION DATA FORM

METHODS ATTRIBUTES				
Minnow Traps (Y/N): Y	Hook and Line (Y/N):	Beach Seine (Y/N):	Fyke Net (Y/N):	Hoop Net (Y/N):
No. of Minnow Traps Set: 3	Date & Time in: (mm/dd/yyyy)	Date &Time in: (mm/dd/yyyy) NA	Date & Time in: (mm/dd/yyyy)	Date & Time in: (mm/dd/yyyy)
Date & Time in: (mm/dd/yyyy) 8/8/13 1145	No. of lines in water:	No. of passes:	Date & Time out: (mm/dd/yyyy)	Date & Time out: (mm/dd/yyyy)
Date & Time out: (mm/dd/yyyy) 8/10/13 1045	Time lines in water:	Reach Length (m):		

ELECTROFISHING ATTRIBUTES				
EF (Y/N): N	EF Start Time:	EF End Time:	EF Time (seconds):	EF Reach Length (m):
Duty Cycle:	Frequency (Hz) :	Waveform:	Sampling Efficiency (% of sample reach):	
Current (A):	Volts (V):	Power (W):	(amp x volts)	

FISH OBSERVATIONS

Gear Type	Species	Total Length (mm)	Life Stage (Juvenile or Adult)	Disposition (Dead or Alive)	Picture No.
		NO FISH			

NOTES (any additional information)

stream is cut deep down (~5') and lined w/willow on both sides

Fast moving stream but small water column (~0.2")* in most of channel

Small pool w/sand bar nearby (~2' deep) then turns back into thin channel

Lots of undercut banks. Sandy substrate

Too much veg to electrofish.

Field Crew Chief: _____ Field Scientist/Technician: _____

Technical Lead: _____

SCLNG Stream Fish Investigations Field Form
QA/QC Checklist

This form is to be completed before leaving the field site.

Feature ID: FS1A4004 FT # 259 Date: 8/9/13

For all items not checked, please provide detailed explanation in the notes section of data form.

1. **Site Description**
   - [X] Was ADF&G contacted before conducting any work in this area?
   - [X] Site Description complete? (Every cell must have entry or N/A)
   - [X] Were all photos taken and labeled correctly?
2. **Physical/Chemical Attributes**
   - [X] Calibration performed prior to sampling?
   - [X] Physical/Chemical attributes complete? (Every cell must have entry or N/A)
   - [X] Water quality data within expected ranges?
     - [X] pH: 4.0 – 10.0
     - [X] NTU: 0 – 3000
     - [X] DO (mg/L): 1.0 – 15.0
     - [X] DO (% saturation): 75- 100
     - [X] Temp.: 1.0 – 19.0
     - [X] Specific Conductance: 20 - 1500
   - [NA] If outside expected ranges, was sample re-taken?
   - [X] Are units correct?
3. **Stream Profile**
   - [X] Stream profile view sketch included?
   - [X] Stream profile view captures water depth and wetted width?
   - [X] Stream profile view captures where efforts were made to capture fish?
   - [ ] Plan view sketch included?
4. **Methods Attributes**
   - [X] Methods attributes complete? (Every cell must have entry or N/A)
   - [X] Were methods used adequate (explanation needed if no methods selected)?
5. **Electrofishing Attributes**
   - [NA] Electrofishing attributes complete? (Every cell must have entry or N/A)
   - [ ] Are units correct?
   - [ ] Are spawning/rearing answers consistent with fish observations?

SCLNG Stream Fish Investigations Field Form
QA/QC Checklist

6. Fish Observations

- [x] N/A Are all fish captured/observed recorded in the Fish Observation table?
- [ ] Are units correct? (Fork Length (mm))
- [ ] Were adequate photos taken of fish captured? (Take a photo if in doubt)
- [ ] Were any specimens preserved?

7. General

- [x] Feature ID and Field Target # are consistent on data forms, logbook entries, photos, and maps?
- [x] All additional data in logbook captured on data form and additional photos noted?
- [x] Were all additional comments on stream habitat, etc. recorded on data form?
- [ ] NO Was any gear missing/damaged for this survey or did you have any problems that should require resampling of this stream for an adequate survey effort?

By signing below, I verify that all field data for this site has been verified for accuracy and completeness.

X	X
Fisheries Biologist (print)	Signature
X Ryan Holmes	X
Field Crew Chief (print)	Signature

P_F51_0109 F51AY004 AL259

P_F51_0110 F51AY004 AL259

P_F51_0111 F51AY004 AL259

P_F51_0112 F51AY004 AL259

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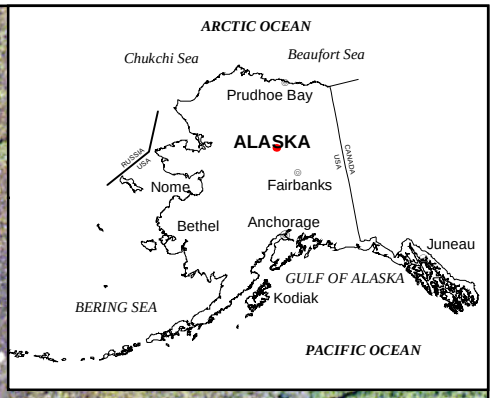

P_F51_0109
P_F51_0110
P_F51_0111
P_F51_0112

Dalton Highway

Trans-Alaska Pipeline

N

Concept Information - Confidential

LEGEND

2013 Fish Survey Location

- F Fish Observed
- F No Fish Observed

Species Observed

- A G Arctic Grayling
- D V Dolly Varden
- N S Ninespine Stickleback
- R W Round Whitefish
- U Unknown

- Photo Point
- Alaska LNG Centerline with Mileposts

Feet: 0 200 400

Meters: 0 50 100

ALASKA LNG

NOTES:
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DRAWN	CHECK	DESIGN	APPR.
TCS		TCS	

ALASKA LNG
2013 FISH FIELD SURVEY LOCATIONS

PROJECTION	DATUM	CONTRACTOR NAME	MAP NUMBER	REV.
AK ALB	NAD83	URS ALASKA		B

SCALE	DATE	PROJECT NUMBER	ORIG.PAGE SIZE
1:2,750	20 Feb 2014	226221163	8.5 X 11

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STREAM FISH INVESTIGATION DATA FORM

Unnamed Trib Kanuti River Wetlands

SITE DESCRIPTION

Date: 8/9/13	Investigators: KH, VW, CB	Team No.: F51	Feature ID: F51AY005
Stream Name: ~~Unnamed Trib Kanuti River Wetlands~~	Stream ID: AL260	Stream listed in Anadromous Fish Catalog (Y/N): N	
Milepost: 313.2	Hwy Milepost: ~~102.6~~ 102.2	TAPS Milepost: ~~305.6~~ 304.2	
Latitude: 66° 24' 22.1729"		Longitude: 150° 32' 29.8446"	
Logbook No.: 1	Logbook Page No.: 39	Pic No(s): P_F51_0101-0104	
US @ CL Pic No.:	DS @ CL Pic No.:	RB to LB@ CL Pic No.:	LB to RB@ CL Pic No.:
Additional Pic No.: N: P_F51_0101	Additional Pic No.: S: P_F51_0102	Additional Pic No.: E: P_F51_0103	Additional Pic No.: W: P_F51_0104

PHYSICAL/ CHEMICAL ATTRIBUTES

Weather (Describe): cloudy		Precipitation (Describe):	
Water Temperature (°Δ*;	Air Temperature (°Δ*;	pH:	Dissolved Oxygen (mg/l):
Specific Conductance(µS/cm):	Turbidity (NTU):	Color:	ORP (mV):
Ambient Conductance(µS/cm):	Odor:	Sheen (Y/N):	Last date of Calibration:
Wetted Width (m):	Thalweg Depth @ CL (m):		Large Woody Debris Count:

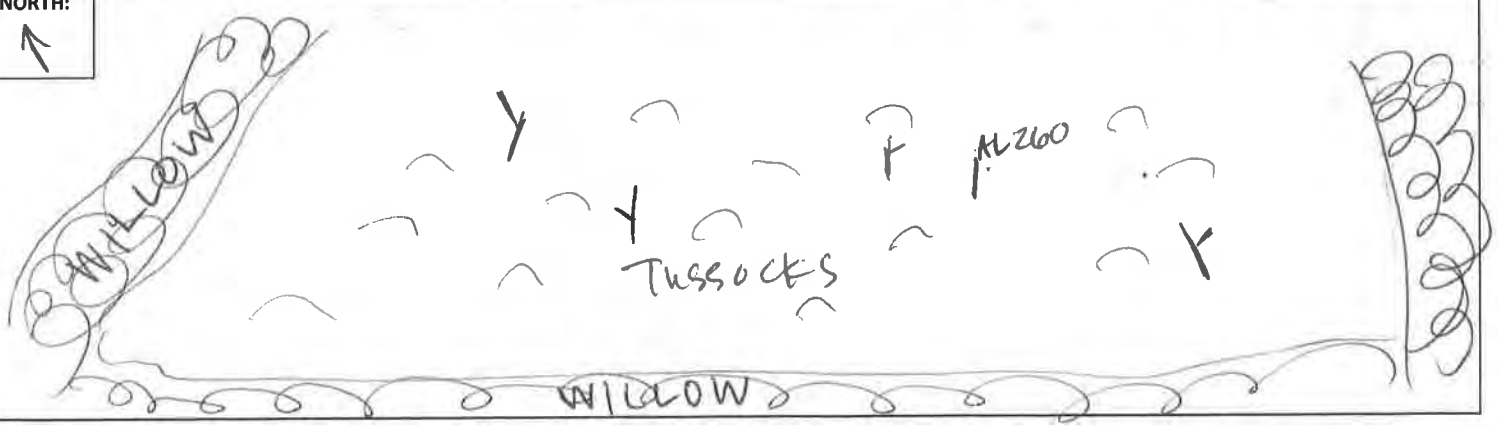
Riparian Veg at 0-5 m at LB:	Riparian Veg at 0-5 m at RB:	Stream Substrate:	Aquatic Habitats	
_____Grass/Sedge (%)	_____Grass/Sedge (%)	_____Organics (%)	_____Sand Bar	_____Large Woody Debris
1 Shrubs (%)	_____Shrubs (%)	A Silt (%)	_____Mud Bar	_____Overhanging vegetation
_____Trees (%)	_____Trees (%)	_____Sand (%)	_____Gravel Bar	_____Contiguous Wetlands
_____Diameter DBH	_____Diameter DBH	_____Gravel (%)	_____Riffles	_____Emergent Plants
	Wetland Complex	_____Cobble (%)	_____Pools	_____Submerged Plants
Flow Type:		_____Boulders(%)	_____Undercut Banks	
_____Perennial _____Seasonal _____Intermittent				

STREAM PROFILE: Cross Sectional at Crossing (include riparian vegetation, wetted width, water depth, substrate, and aquatic habitats)

NORTH: ↑

STREAM PROFILE: Plan View (include direction of flow, centerline, distances from centerline, photo locations, sample locations by gear type and ROW)

NORTH: ↑



STREAM FISH INVESTIGATION DATA FORM

METHODS ATTRIBUTES				
Minnow Traps (Y/N):	Hook and Line (Y/N):	Beach Seine (Y/N):	Fyke Net (Y/N):	Hoop Net (Y/N):
No. of Minnow Traps Set:	Date & Time in: (mm/dd/yyyy)	Date &Time in: (mm/dd/yyyy)	Date & Time in: (mm/dd/yyyy)	Date & Time in: (mm/dd/yyyy)
Date & Time in: (mm/dd/yyyy)	No. of lines in water: N/A	No. of passes:	Date & Time out: (mm/dd/yyyy)	Date & Time out: (mm/dd/yyyy)
Date & Time out: (mm/dd/yyyy)	Time lines in water:	Reach Length (m):		

ELECTROFISHING ATTRIBUTES				
EF (Y/N):	EF Start Time:	EF End Time:	EF Time (seconds):	EF Reach Length (m):
Duty Cycle:	Frequency (Hz): N/A	Waveform:	Sampling Efficiency (% of sample reach):	
Current (A):	Volts (V):	Power (W):		(amp x volts)

FISH OBSERVATIONS

Gear Type	Species	Total Length (mm)	Life Stage (Juvenile or Adult)	Disposition (Dead or Alive)	Picture No.
		N/A			

NOTES (any additional information)

No channel. No water.

Field of tussocks w/ some willows

This site is also a hydro site. Will mark as Obs pt

Field Crew Chief: _____ Field Scientist/Technician: _____

Technical Lead: _____

Revision Date: 4/17/2013

SCLNG Stream Fish Investigations Field Form
QA/QC Checklist

This form is to be completed before leaving the field site.

Feature ID: FSLAY005 FT # AL260 Date: 6-9-13

For all items not checked, please provide detailed explanation in the notes section of data form.

1. **Site Description**
   - ☒ Was ADF&G contacted before conducting any work in this area?
   - ☒ Site Description complete? (Every cell must have entry or N/A)
   - ☒ Were all photos taken and labeled correctly?
2. **Physical/Chemical Attributes**
   - ☒ Calibration performed prior to sampling?
   - ☒ Physical/Chemical attributes complete? (Every cell must have entry or N/A)
   - ☒ Water quality data within expected ranges?
     - ☒ pH: 4.0 – 10.0
     - ☐ NTU: 0 – 3000
     - ☐ DO (mg/L): 1.0 – 15.0
     - ☐ DO (% saturation): 75- 100
     - ☐ Temp.: 1.0 – 19.0
     - ☐ Specific Conductance: 20 - 1500
   - ☒ If outside expected ranges, was sample re-taken?
   - ☐ Are units correct?
3. **Stream Profile**
   - ☒ Stream profile view sketch included?
   - ☒ Stream profile view captures water depth and wetted width?
   - ☒ Stream profile view captures where efforts were made to capture fish?
   - ☒ Plan view sketch included?
4. **Methods Attributes**
   - ☒ Methods attributes complete? (Every cell must have entry or N/A)
   - ☐ Were methods used adequate (explanation needed if no methods selected)?
5. **Electrofishing Attributes**
   - ☒ Electrofishing attributes complete? (Every cell must have entry or N/A)
   - ☐ Are units correct?
   - ☐ Are spawning/rearing answers consistent with fish observations?

SCLNG Stream Fish Investigations Field Form
QA/QC Checklist

6. Fish Observations

- N/A Are all fish captured/observed recorded in the Fish Observation table?
- ☐ Are units correct? (Fork Length (mm))
- ☐ Were adequate photos taken of fish captured? (Take a photo if in doubt)
- ☐ Were any specimens preserved?

7. General

- ☐ Feature ID and Field Target # are consistent on data forms, logbook entries, photos, and maps?
- ☐ All additional data in logbook captured on data form and additional photos noted?
- ☐ Were all additional comments on stream habitat, etc. recorded on data form?
- NO ☐ Was any gear missing/damaged for this survey or did you have any problems that should require resampling of this stream for an adequate survey effort?

By signing below, I verify that all field data for this site has been verified for accuracy and completeness.

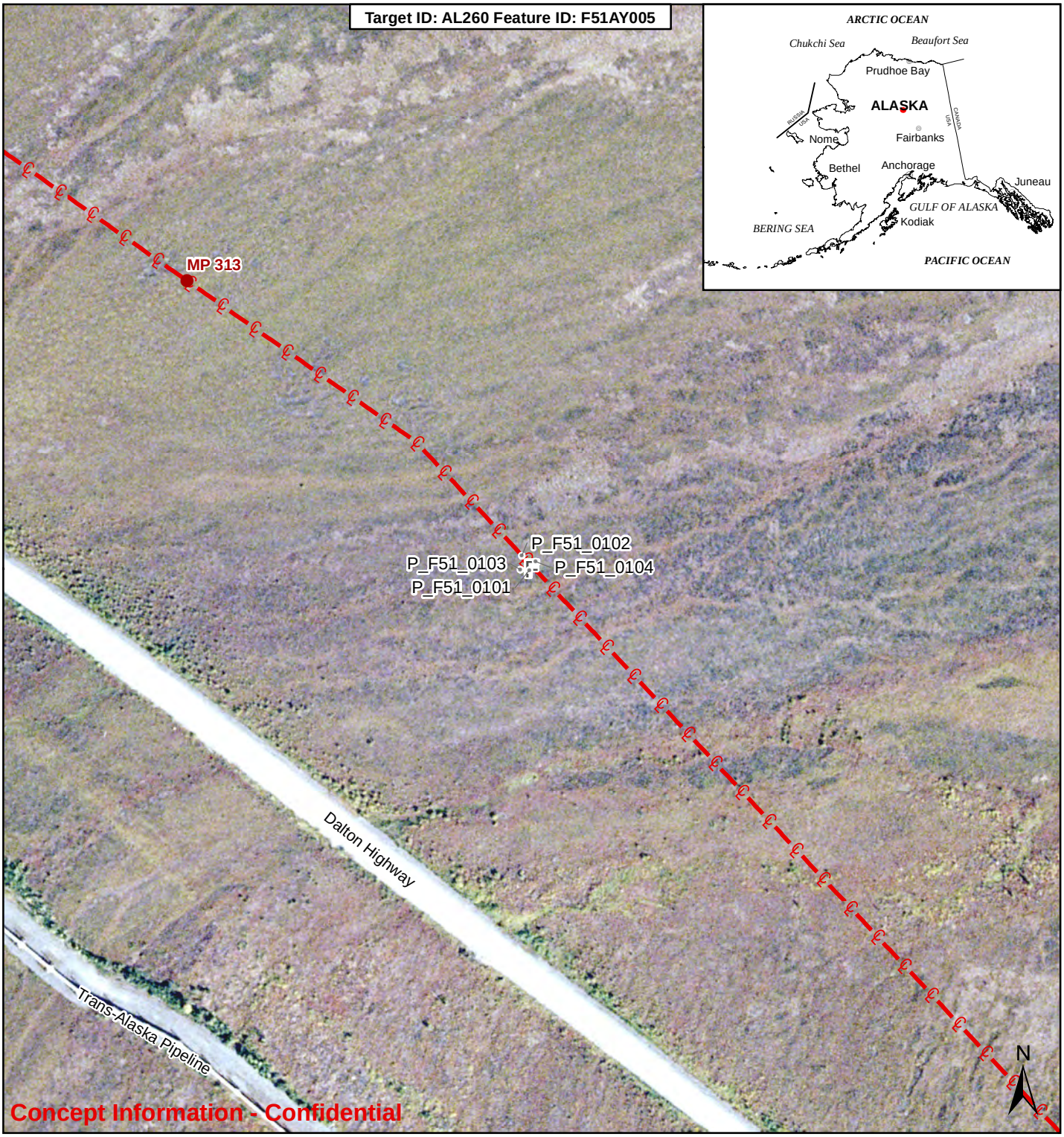
X	X
Fisheries Biologist (print)	Signature
X Kim Holmes	X
Field Crew Chief (print)	Signature

P_F51_0101 F51AY005 AL260

P_F51_0102 F51AY005 AL260

P_F51_0103 F51AY005 AL260

P_F51_0104 F51AY005 AL260



LEGEND

2013 Fish Survey Location

- F Fish Observed
- F No Fish Observed

Species Observed

- A G Arctic Grayling
- D V Dolly Varden
- N S Ninespine Stickleback
- R W Round Whitefish
- U Unknown

- Photo Point
- Alaska LNG Centerline with Mileposts

Feet: 0 200 400

Meters: 0 50 100

ALASKA LNG

NOTES:
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DRAWN	CHECK	DESIGN	APPR.
TCS		TCS	

ALASKA LNG
2013 FISH FIELD SURVEY LOCATIONS

PROJECTION	DATUM	CONTRACTOR NAME	MAP NUMBER	REV.
AK ALB	NAD83	URS ALASKA		B

SCALE	DATE	PROJECT NUMBER	ORIG.PAGE SIZE
1:2,750	20 Feb 2014	226221163	8.5 X 11

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STREAM FISH INVESTIGATION DATA FORM

SITE DESCRIPTION

Date: 8-9-13	Investigators: KH, VW, CB	Team No.: FS1	Feature ID: FS1AY006
Stream Name: Unnamed Trib No. 2 to Prospect Creek	Stream ID: AL245_1	Stream listed in Anadromous Fish Catalog (Y/N): N	
Milepost: 284.5	Hwy Milepost: 134.6	TAPS Milepost: 275.5	
Latitude: 66° 46' 27.7576"	Longitude: 150° 39' 56.1472"		
Logbook No.:	Logbook Page No.: 40	Pic No(s): P_FS1_0105-0108	
US @ CL Pic No.:	DS @ CL Pic No.:	RB to LB@ CL Pic No.:	~~LB to RB@ CL~~ Pic No.:
Additional Pic No.: N: P_FS1_0105	Additional Pic No.: S: P_FS1_0106	Additional Pic No.: E: P_FS1_0107	Additional Pic No.: W: P_FS1_0108

PHYSICAL/ CHEMICAL ATTRIBUTES

Weather (Describe): Cloudy		Precipitation (Describe):	
Water Temperature (°Δ*;	Air Temperature (°Δ*;	pH:	Dissolved Oxygen (mg/l):
Specific Conductance(µS/cm):	Turbidity (NTU):	Color:	ORP (mV):
Ambient Conductance(µS/cm):	Odor:	Sheen (Y/N):	Last date of Calibration:
Wetted Width (m):	Thalweg Depth @ CL (m):		Large Woody Debris Count:

Riparian Veg at 0-5 m at LB:
- _____Grass/Sedge (%)
- _____Shrubs (%)
- _____Trees (%)
- _____Diameter DBH

Riparian Veg at 0-5 m at RB:
- _____Grass/Sedge (%)
- _____Shrubs (%)
- _____Trees (%)
- _____Diameter DBH

Flow Type:
_____Perennial _____Seasonal _____Intermittent

Stream Substrate:
- _____Organics (%)
- _____Silt (%)
- _____Sand (%)
- _____Gravel (%)
- _____Cobble (%)
- _____Boulders(%)

Aquatic Habitats
- _____Sand Bar
- _____Mud Bar
- _____Gravel Bar
- _____Riffles
- _____Pools
- _____Undercut Banks
- _____Large Woody Debris
- _____Overhanging vegetation
- _____Contiguous Wetlands
- _____Emergent Plants
- _____Submerged Plants

Wetland Complex

STREAM PROFILE: Cross Sectional at Crossing (include riparian vegetation, wetted width, water depth, substrate, and aquatic habitats)

NORTH: ↖

STREAM PROFILE: Plan View (include direction of flow, centerline, distances from centerline, photo locations, sample locations by gear type and ROW)

NORTH: ↖

STREAM FISH INVESTIGATION DATA FORM

METHODS ATTRIBUTES				
Minnow Traps (Y/N):	Hook and Line (Y/N):	Beach Seine (Y/N):	Fyke Net (Y/N):	Hoop Net (Y/N):
No. of Minnow Traps Set:	Date & Time in: (mm/dd/yyyy) N/A	Date &Time in: (mm/dd/yyyy)	Date & Time in: (mm/dd/yyyy)	Date & Time in: (mm/dd/yyyy)
Date & Time in: (mm/dd/yyyy)	No. of lines in water:	No. of passes:	Date & Time out: (mm/dd/yyyy)	Date & Time out: (mm/dd/yyyy)
Date & Time out: (mm/dd/yyyy)	Time lines in water:	Reach Length (m):		

ELECTROFISHING ATTRIBUTES				
EF (Y/N):	EF Start Time:	EF End Time:	EF Time (seconds):	EF Reach Length (m):
Duty Cycle:	Frequency (Hz):	Waveform:	Sampling Efficiency (% of sample reach):	
Current (A):	Volts (V):	Power (W) N/A		(amp x volts)

FISH OBSERVATIONS

Gear Type	Species	Total Length (mm)	Life Stage (Juvenile or Adult)	Disposition (Dead or Alive)	Picture No.

N/A

NOTES (any additional information)

This site is also a hydro site. Will mark as Obs pt
No channel
Large swath of wetlands w/ wet areas
Some water near site & small pond nearby
but does not seem to seasonally have flow.
Wetland complex

Field Crew Chief: _____ Field Scientist/Technician: _____

Technical Lead: _____

SCLNG Stream Fish Investigations Field Form
QA/QC Checklist

This form is to be completed before leaving the field site.

Feature ID: FS1AY006 FT # AL245.1 Date: 8.9.13

For all items not checked, please provide detailed explanation in the notes section of data form.

1. **Site Description**
   - [X] Was ADF&G contacted before conducting any work in this area?
   - [X] Site Description complete? (Every cell must have entry or N/A)
   - [X] Were all photos taken and labeled correctly?
2. **Physical/Chemical Attributes**
   - [X] Calibration performed prior to sampling?
   - [X] Physical/Chemical attributes complete? (Every cell must have entry or N/A)
   - [NA] Water quality data within expected ranges?
     - [NA] pH: 4.0 – 10.0
     - [ ] NTU: 0 – 3000
     - [ ] DO (mg/L): 1.0 – 15.0
     - [ ] DO (% saturation): 75- 100
     - [ ] Temp.: 1.0 – 19.0
     - [ ] Specific Conductance: 20 - 1500
   - [NA] If outside expected ranges, was sample re-taken?
   - [NA] Are units correct?
3. **Stream Profile**
   - [X] Stream profile view sketch included?
   - [NA] Stream profile view captures water depth and wetted width?
   - [NA] Stream profile view captures where efforts were made to capture fish?
   - [X] Plan view sketch included?
4. **Methods Attributes**
   - [NA] Methods attributes complete? (Every cell must have entry or N/A)
   - [ ] Were methods used adequate (explanation needed if no methods selected)?
5. **Electrofishing Attributes**
   - [NA] Electrofishing attributes complete? (Every cell must have entry or N/A)
     - [ ] Are units correct?
     - [ ] Are spawning/rearing answers consistent with fish observations?

SCLNG Stream Fish Investigations Field Form
QA/QC Checklist

6. Fish Observations

- [x] N/A Are all fish captured/observed recorded in the Fish Observation table?
- [ ] Are units correct? (Fork Length (mm))
- [ ] Were adequate photos taken of fish captured? (Take a photo if in doubt)
- [ ] Were any specimens preserved?

7. General

- [x] Feature ID and Field Target # are consistent on data forms, logbook entries, photos, and maps?
- [x] All additional data in logbook captured on data form and additional photos noted?
- [x] Were all additional comments on stream habitat, etc. recorded on data form?
- [x] N/A Was any gear missing/damaged for this survey or did you have any problems that should require resampling of this stream for an adequate survey effort?

By signing below, I verify that all field data for this site has been verified for accuracy and completeness.

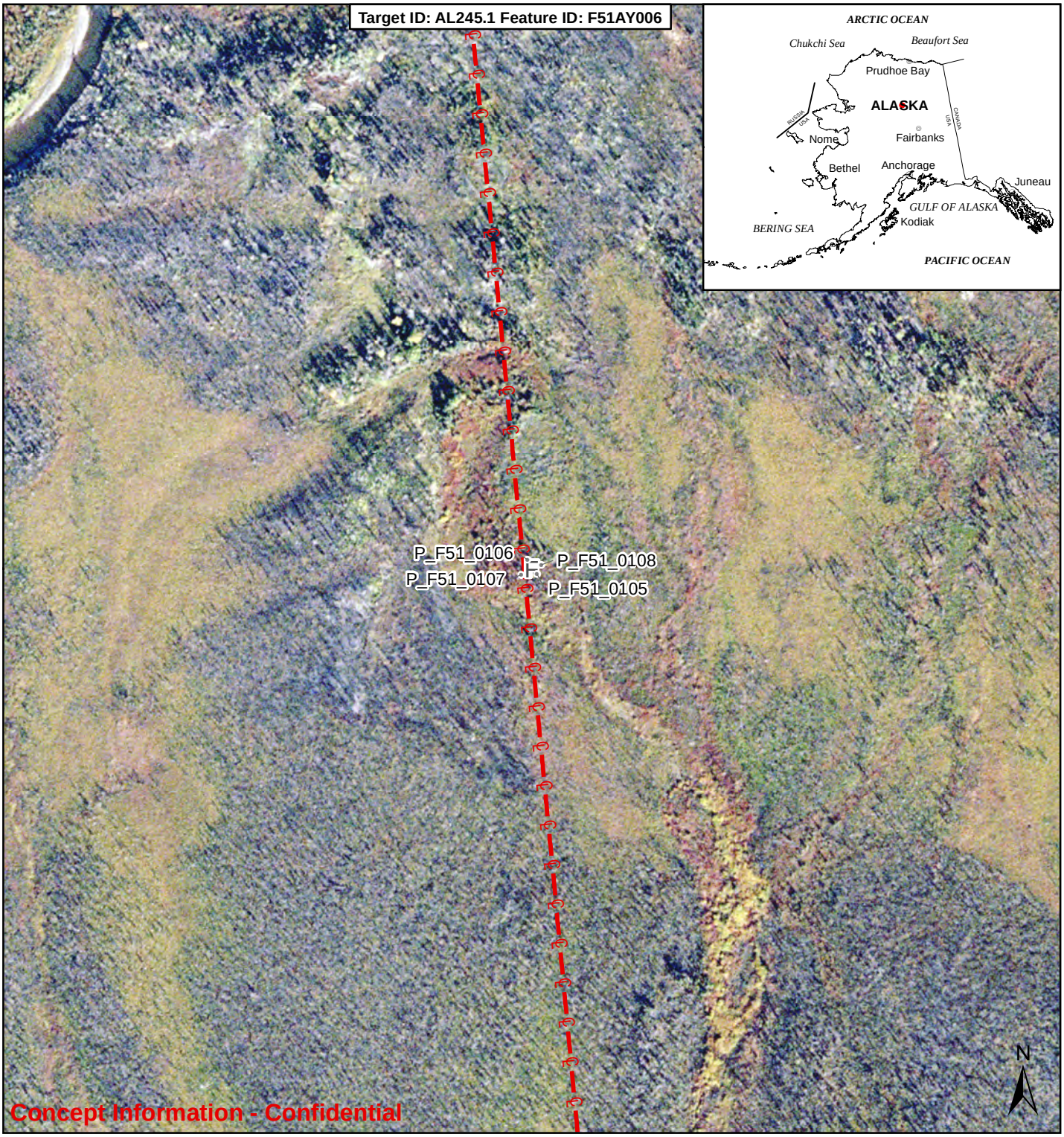
X	X
Fisheries Biologist (print)	Signature
X Kim Holmes	X
Field Crew Chief (print)	Signature

P_F51_0105 F51AY006 AL245.1

P_F51_0106 F51AY006 AL245.1

P_F51_0107 F51AY006 AL245.1

P_F51_0108 F51AY006 AL245.1



LEGEND

2013 Fish Survey Location

- F Fish Observed
- F No Fish Observed

Species Observed

- A G Arctic Grayling
- D V Dolly Varden
- N S Ninespine Stickleback
- R W Round Whitefish
- U Unknown

- Photo Point
- Alaska LNG Centerline with Mileposts

Feet: 0 200 400

Meters: 0 50 100

ALASKA LNG

NOTES:
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DRAWN	TCS
CHECK	
DESIGN	TCS
APPR.	

ALASKA LNG
2013 FISH FIELD SURVEY LOCATIONS

PROJECTION	DATUM	CONTRACTOR NAME	MAP NUMBER	REV.
AK ALB	NAD83	URS ALASKA		B

SCALE	DATE	PROJECT NUMBER	ORIG.PAGE SIZE
1:2,750	20 Feb 2014	226221163	8.5 X 11

I:\26221163 SCLNG Studies\10 - Geospatial\10.06 - MXD\2013 Field Reporting\Fish\2013_Fish_Field_Report_AppendixB_8x11.mxd

APPENDIX C: SF2013-253 FISH COLLECTION SUMMARY REPORT

ADF&G permit no. SF2013-253

Summary report of fish collection activity.

The area biologists were contacted on: 15:00/July 18, 2013 (Deadhorse) and 7:45/August 8, 2013 (Coldfoot to Yukon)

Location ID (optional)	Latitude	Longitude	Datum	Coordinate determination method	Name of water body	Date	Observer name (first name, middle initial, last name)	Fish collection method	Species	Life stage	Length (mm) No estimates/ranges	Length method	Weight (g)	Sex	Age	Age method	ADF&G GCL	Additional count (1)	Disposition (1)	Additional count (2)	Disposition (2)	Comments
F51PP001	70.152254	-147.424580	NAD83	GPS		7/26/2013	Kimberly A Holmes	Backpack Electrofisher	ninespine stickleback	juvenile	48	total							measured and released			
F51PP001	70.152254	-147.424580	NAD83	GPS		7/26/2013	Kimberly A Holmes	Backpack Electrofisher	ninespine stickleback	juvenile	49	total							measured and released			
F51PP001	70.152254	-147.424580	NAD83	GPS		7/26/2013	Kimberly A Holmes	Backpack Electrofisher	ninespine stickleback	juvenile/adult	59	total							measured and released			
F51PP001	70.152254	-147.424580	NAD83	GPS		7/26/2013	Kimberly A Holmes	Backpack Electrofisher	ninespine stickleback	not recorded									ID'ed and released			OBSERVED WHILE ELECTROFISHING BUT NOT COLLECTED BY NET

ADF&G permit no. SF2013-253

Summary report of fish collection activity.

The area biologists were contacted on: 15:00/July 18, 2013 (Deadhorse) and 7:45/August 8, 2013 (Coldfoot to Yukon)

Location ID (optional)	Latitude	Longitude	Datum	Coordinate determination method	Name of water body	Date	Observer name (first name, middle initial, last name)	Fish collection method	Species	Life stage	Length (mm) No estimates/ranges	Length method	Weight (g)	Sex	Age	Age method	ADF&G GCL	Additional count (1)	Disposition (1)	Additional count (2)	Disposition (2)	Comments
F51PP001	70.152254	-147.424580	NAD83	GPS		7/26/2013	Kimberly A Holmes	Fyke Net	ninespine stickleback	not recorded									ID'ed and released			NOT MEASURED DUE TO VOLUME OF FISH CAUGHT

ADF&G permit no. SF2013-253

Summary report of fish collection activity.

The area biologists were contacted on: 15:00/July 18, 2013 (Deadhorse) and 7:45/August 8, 2013 (Coldfoot to Yukon)

Location ID (optional)	Latitude	Longitude	Datum	Coordinate determination method	Name of water body	Date	Observer name (first name, middle initial, last name)	Fish collection method	Species	Life stage	Length (mm) No estimates/ranges	Length method	Weight (g)	Sex	Age	Age method	ADF&G GCL	Additional count (1)	Disposition (1)	Additional count (2)	Disposition (2)	Comments
F51PP001	70.152254	-147.424580	NAD83	GPS		7/26/2013	Kimberly A Holmes	Fyke Net	ninespine stickleback	not recorded									ID'ed and released			NOT MEASURED DUE TO VOLUME OF FISH CAUGHT

ADF&G permit no. SF2013-253

Summary report of fish collection activity.

The area biologists were contacted on: 15:00/July 18, 2013 (Deadhorse) and 7:45/August 8, 2013 (Coldfoot to Yukon)

Location ID (optional)	Latitude	Longitude	Datum	Coordinate determination method	Name of water body	Date	Observer name (first name, middle initial, last name)	Fish collection method	Species	Life stage	Length (mm) No estimates/ranges	Length method	Weight (g)	Sex	Age	Age method	ADF&G GCL	Additional count (1)	Disposition (1)	Additional count (2)	Disposition (2)	Comments
F51PP001	70.152254	-147.424580	NAD83	GPS		7/26/2013	Kimberly A Holmes	Fyke Net	ninespine stickleback	not recorded									ID'ed and released			NOT MEASURED DUE TO VOLUME OF FISH CAUGHT

ADF&G permit no. SF2013-253

Summary report of fish collection activity.

The area biologists were contacted on: 15:00/July 18, 2013 (Deadhorse) and 7:45/August 8, 2013 (Coldfoot to Yukon)

Location ID (optional)	Latitude	Longitude	Datum	Coordinate determination method	Name of water body	Date	Observer name (first name, middle initial, last name)	Fish collection method	Species	Life stage	Length (mm) No estimates/ranges	Length method	Weight (g)	Sex	Age	Age method	ADF&G GCL	Additional count (1)	Disposition (1)	Additional count (2)	Disposition (2)	Comments
F51PP001	70.152254	-147.424580	NAD83	GPS		7/26/2013	Kimberly A Holmes	Fyke Net	ninespine stickleback	not recorded									ID'ed and released			NOT MEASURED DUE TO VOLUME OF FISH CAUGHT

ADF&G permit no. SF2013-253

Summary report of fish collection activity.

The area biologists were contacted on: 15:00/July 18, 2013 (Deadhorse) and 7:45/August 8, 2013 (Coldfoot to Yukon)

Location ID (optional)	Latitude	Longitude	Datum	Coordinate determination method	Name of water body	Date	Observer name (first name, middle initial, last name)	Fish collection method	Species	Life stage	Length (mm) No estimates/ranges	Length method	Weight (g)	Sex	Age	Age method	ADF&G GCL	Additional count (1)	Disposition (1)	Additional count (2)	Disposition (2)	Comments
F51PP001	70.152254	-147.424580	NAD83	GPS		7/26/2013	Kimberly A Holmes	Fyke Net	ninespine stickleback	not recorded									ID'ed and released			NOT MEASURED DUE TO VOLUME OF FISH CAUGHT

ADF&G permit no. SF2013-253

Summary report of fish collection activity.

The area biologists were contacted on: 15:00/July 18, 2013 (Deadhorse) and 7:45/August 8, 2013 (Coldfoot to Yukon)

Location ID (optional)	Latitude	Longitude	Datum	Coordinate determination method	Name of water body	Date	Observer name (first name, middle initial, last name)	Fish collection method	Species	Life stage	Length (mm) No estimates/ranges	Length method	Weight (g)	Sex	Age	Age method	ADF&G GCL	Additional count (1)	Disposition (1)	Additional count (2)	Disposition (2)	Comments
F51PP001	70.152254	-147.424580	NAD83	GPS		7/26/2013	Kimberly A Holmes	Fyke Net	ninespine stickleback	not recorded									ID'ed and released			NOT MEASURED DUE TO VOLUME OF FISH CAUGHT

ADF&G permit no. SF2013-253

Summary report of fish collection activity.

The area biologists were contacted on: 15:00/July 18, 2013 (Deadhorse) and 7:45/August 8, 2013 (Coldfoot to Yukon)

Location ID (optional)	Latitude	Longitude	Datum	Coordinate determination method	Name of water body	Date	Observer name (first name, middle initial, last name)	Fish collection method	Species	Life stage	Length (mm) No estimates/ranges	Length method	Weight (g)	Sex	Age	Age method	ADF&G GCL	Additional count (1)	Disposition (1)	Additional count (2)	Disposition (2)	Comments
F51PP001	70.152254	-147.424580	NAD83	GPS		7/26/2013	Kimberly A Holmes	Minnow Trap	ninespine stickleback	not recorded									ID'ed and released			NOT MEASURED DUE TO VOLUME OF FISH CAUGHT
F51PP001	70.152254	-147.424580	NAD83	GPS		7/26/2013	Kimberly A Holmes	Minnow Trap	ninespine stickleback	not recorded									ID'ed and released			NOT MEASURED DUE TO VOLUME OF FISH CAUGHT
F51PP001	70.152254	-147.424580	NAD83	GPS		7/26/2013	Kimberly A Holmes	Minnow Trap	ninespine stickleback	not recorded									ID'ed and released			NOT MEASURED DUE TO VOLUME OF FISH CAUGHT
F51PP001	70.152254	-147.424580	NAD83	GPS		7/26/2013	Kimberly A Holmes	Minnow Trap	ninespine stickleback	not recorded									ID'ed and released			NOT MEASURED DUE TO VOLUME OF FISH CAUGHT
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F51PP001	70.152254	-147.424580	NAD83	GPS		7/26/2013	Kimberly A Holmes	Minnow Trap	ninespine stickleback	not recorded									ID'ed and released			NOT MEASURED DUE TO VOLUME OF FISH CAUGHT
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F51PP001	70.152254	-147.424580	NAD83	GPS		7/26/2013	Kimberly A Holmes	Minnow Trap	ninespine stickleback	not recorded									ID'ed and released			NOT MEASURED DUE TO VOLUME OF FISH CAUGHT
F51PA004	68.97639320	-148.88928690	NAD83	GPS		8/3/2013	Kimberly A Holmes	Angling	Arctic grayling	juvenile/adult	200	total							ID'ed and released			ESTIMATED LENGTH. ESCAPED BEFORE MEASUREMENT COLLECTED
F51PA004	68.97639320	-148.88928690	NAD83	GPS		8/3/2013	Kimberly A Holmes	Angling	Arctic grayling	adult	225	total							ID'ed and released			ESTIMATED LENGTH. ESCAPED BEFORE MEASUREMENT COLLECTED
F51PA004	68.97639320	-148.88928690	NAD83	GPS		8/3/2013	Kimberly A Holmes	Angling	Arctic grayling	adult	256	total							measured and released			
F51PA004	68.97639320	-148.88928690	NAD83	GPS		8/3/2013	Kimberly A Holmes	Visual Observation, Ground	Arctic grayling	juvenile/adult	170	total										ESTIMATED LENGTH
F51PA004	68.97639320	-148.88928690	NAD83	GPS		8/3/2013	Kimberly A Holmes	Visual Observation, Ground	stickleback - unspecified	juvenile/adult	60	total										ESTIMATED LENGTH
F51PA006	68.84361915	-148.85976630	NAD83	GPS		8/4/2013	Kimberly A Holmes	Visual Observation, Ground	Round whitefish	adult	457	total										ESTIMATED LENGTH
F51PA006	68.84361915	-148.85976630	NAD83	GPS		8/4/2013	Kimberly A Holmes	Visual Observation, Ground	Round whitefish	adult	457	total										ESTIMATED LENGTH
F51PA006	68.84361915	-148.85976630	NAD83	GPS		8/4/2013	Kimberly A Holmes	Visual Observation, Ground	Round whitefish	adult	508	total										ESTIMATED LENGTH
F51PA006	68.84361915	-148.85976630	NAD83	GPS		8/4/2013	Kimberly A Holmes	Visual Observation, Ground	Round whitefish	adult	508	total										ESTIMATED LENGTH
F51PA007	68.86915173	-148.88085591	NAD83	GPS		8/4/2013	Kimberly A Holmes	Angling	Arctic grayling	juvenile/adult	178	total							ID'ed and released			ESTIMATED LENGTH. ESCAPED BEFORE MEASUREMENT COLLECTED
F51PA007	68.86915173	-148.88085591	NAD83	GPS		8/4/2013	Kimberly A Holmes	Visual Observation, Ground	Arctic grayling	juvenile/adult	178	total										ESTIMATED LENGTH
F51PA007	68.86915173	-148.88085591	NAD83	GPS		8/4/2013	Kimberly A Holmes	Visual Observation, Ground	general fish observation, no species information	juvenile/adult	60	total										ESTIMATED LENGTH
F51PA007	68.86915173	-148.88085591	NAD83	GPS		8/4/2013	Kimberly A Holmes	Visual Observation, Ground	general fish observation, no species information	juvenile/adult	60	total										ESTIMATED LENGTH
F51PA008	68.95819324	-148.89247914	NAD83	GPS		8/5/2013	Kimberly A Holmes	Minnow Trap	Dolly Varden	juvenile	103	total							measured and released			
F51PA008	68.95819324	-148.89247914	NAD83	GPS		8/5/2013	Kimberly A Holmes	Minnow Trap	Dolly Varden	juvenile	159	total							measured and released			
F51PA009	68.69554352	-149.07954681	NAD83	GPS		8/5/2013	Kimberly A Holmes	Angling	Arctic grayling	juvenile	135	total							measured and released			
F51PA009	68.69554352	-149.07954681	NAD83	GPS		8/5/2013	Kimberly A Holmes	Angling	Arctic grayling	juvenile/adult	180	total							measured and released			
F51PA009	68.69554352	-149.07954681	NAD83	GPS		8/5/2013	Kimberly A Holmes	Angling	Arctic grayling	adult	205	total							measured and released			
F51PA009	68.69554352	-149.07954681	NAD83	GPS		8/5/2013	Kimberly A Holmes	Angling	Arctic grayling	adult	230	total							measured and released			
F51PA009	68.69554352	-149.07954681	NAD83	GPS		8/5/2013	Kimberly A Holmes	Angling	Arctic grayling	adult	235	total							measured and released			

APPENDIX D: 2013 STREAM FISH INVESTIGATIONS FIELD STUDY PROTOCOLS AND EXECUTION PLAN

Concept Information
Confidential

Alaska LNG

2013 Stream Fish Investigations

Field Study Protocols and Execution Plan

USAKE-UR-SPFLD-00-0001

Rev	Rev date	Description	Prepared By	Checked By	Endorsed By	Approved By
0	6.20.13	Issued for Information	VW			
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REVISION MODIFICATION LOG

Revision	Section	Description
1	Global	Changed project name, description, and related references to reflect project name change.

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Figure 1 2013 Summer Survey Area

ACRONYMS AND ABBREVIATIONS

ADF&G	Alaska Department of Fish and Game
ANS	Alaska North Slope
GIS	Geographic Information System
GPS	Global Positioning System
GTP	Gas Treatment Plant
JSA	Job Safety Analysis
LNG	liquefied natural gas
MLBV	mainline block valve
PBU	Prudhoe Bay Unit
PT Pipeline	Point Thomson Gas Transmission Pipeline
PTU	Point Thomson Unit
QA/QC	Quality Assurance/Quality Control
ROW	right-of-way
U.S.	United States

1. PROJECT DESCRIPTION

Please see Project Description at the beginning of this Resource Report.

Figure 1- 2013 Summer Survey Area

2. INTRODUCTION

Alaska LNG is proposing to conduct field surveys in 2013 to characterize fish presence and habitat at streams and rivers crossed by the proposed alignment. The identification of resident and anadromous fish streams is required to determine Alaska Department of Fish and Game (ADF&G) regulatory authority under Alaska Statute 16.05.841 and 871. All anadromous fish streams in the project area are also subject to the Essential Fish Habitat provisions of the Magnuson-Stevens Fishery Conservation and Management Act. Results of this field survey will facilitate the eventual evaluation of project-related direct, indirect, and cumulative impacts under the National Environmental Policy Act and other permits, including the United States (U.S.) Army Corps of Engineers Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act.

3. OBJECTIVES

The primary objective of the 2013 Alaska LNG fish stream surveys is to identify all resident and/or anadromous fish streams affected by the Project footprint. Secondary objectives include:

- Identify specific stream crossing sites with critical fish habitat (spawning and high-value rearing habitat);
- Collect water quality parameters important to fish; and
- Describe streambed and stream channel morphology at each surveyed stream crossing site.

The data collected during the stream surveys will also assist in developing recommendations for Project footprint adjustments to avoid critical fish habitat and be used to develop stream crossing mitigation measures for specific stream crossing sites. Results from this study will be provided to ADF&G, other fisheries agencies, and the National Environmental Policy Act (NEPA) process to assist in overall Project permitting and in developing future stream fish surveys sampling strategies.

4. METHODS

Stream surveys will be conducted by experienced field crews consisting of a Field Crew Chief - fisheries biologist, a field crew technician – fisheries technician, and a Geographic Information System (GIS) technician. Field Crew Chiefs will be individuals that have demonstrated the ability to work safely and efficiently on previous stream surveys. All field crew members conducting fish sampling activities will meet ADF&G training criteria and will comply with all fish collection permit stipulations and safety requirements.

Field crews will access stream crossing sites by existing highways and secondary roads where possible. A helicopter may be required to access stream crossings sites where the alignment diverges from the existing road system and vehicular access or access on foot is not practical.

At all identified stream crossing sites to be surveyed in 2013, each field team will sample fish, record habitat characteristics, and measure water quality parameters on a hardcopy datasheet (**Appendix A**) and an electronic data form that will be developed for the project. The number of stream crossing sites sampled per day will vary depending on the distance between sites, distance of sampling sites from access points, the size of the streams sampled, and the sampling techniques employed. A detailed Fish Stream Survey gear list is included in **Appendix B**.

A Global Positioning System (GPS) unit will be used to locate each stream crossing site and to document sampling locations. The GPS data entry protocol will commit to one standard format (i.e., NAD 83) to ensure the consistency and completeness of data collection at each stream crossing site.

Immediately after arriving at the stream crossing site, an initial assessment of the stream reach will be conducted. This initial assessment will include an attempt to observe adult and juvenile fish with the aid of polarized sunglasses. Field crews will photograph each stream crossing location from both banks, and also photograph views of the stream reach upstream and downstream of the crossing site.

After completing the initial assessment of the proposed stream crossing site, a site-specific sampling strategy will be developed. The sampling strategy will consider water depth, water velocity, substrate composition, and other factors to ensure fish sampling is conducted safely and efficiently. The necessary sampling effort at each stream crossing will be determined by the fisheries biologist.

Fish Sampling

The goal of the fish sampling strategy is to ensure adequate effort is made, and appropriate sampling techniques are used, to capture fish species inhabiting the area. Fish sampling will only be performed on streams where adequate fisheries data is lacking or incomplete.

To minimize stress, all captured fish will be removed from the water for the shortest duration of time practical and held in a bucket for processing. All captured fish will be positively identified to species, measured to the nearest millimeter fork length from the tip of the snout to the fork in the tail, and released near the point of capture. Dichotomous fish keys will be used to assist in positively identifying fish species. Representative photographs of common fish species and fish not positively identified will be taken. These samples and photographs will be sent to subject matter experts for confirmation of species identification.

Electrofishing

Electrofishing will be the preferred method of field sampling in most wadeable streams. Electrofishing has been determined to be the most efficient single method for fish sampling within a stream reach (U.S. Environmental Protection Agency 2008). In streams with low conductivity (micro Siemens per centimeter), such as those on the North Slope, alternative sampling techniques may be required to optimize sampling efficiencies.

Electrofishing will not be conducted in areas where adult salmon, adult trout, or adult char are observed (2010 ADF&G Fish Resource Permit stipulations). Electrofishing will be conducted along a sample stream reach equal to approximately 40 times the mean channel width, or roughly one meander length (Fitzpatrick et al. 1998; and Buckwalter 2008). Crews will attempt to include at least two examples each of two different habitat types (riffles, pools, and runs) in the sample reach.

Field crews will collect fish using a battery-powered Smith-Root Backpack Electrofisher (Model LR20B), a small dip net, and a bucket for holding the fish after capture. Electrofishing will begin at the downstream end of the sample stream reach and move upstream. Electrofishing effort will be conducted using protocols implemented by ADF&G (Buckwalter et al. 2008). Electrofishing will be conducted from bank to bank to ensure all channel and habitat types are sampled. Crews will avoid herding fish by electrofishing intermittently. After a continuous 5-10 second electrofishing pulse, crews will advance upstream before continuing. This sampling strategy will continue for no more than 30 minutes total sampling time, with a cumulative electrofishing total of no less than 300 seconds (button time) per reach. All captured fish will be dipped from the water as soon as possible and placed into a bucket to minimize exposure to the electrical field.

At each sampling site, electrofishing will be immediately stopped if:

- Adult salmon, adult trout, or adult char are observed or captured;
- Large numbers (greater than 40) of juvenile fish have been captured;
- Stunned fish fail to recover quickly in the holding bucket; and
- Any instance of greater than 10 percent sampling mortality occurs.

Electrofishing will not be attempted in large, non-wadeable streams and rivers.

Minnow Trapping

Field crews will use minnow traps for sampling a broad range of fish species in a variety of stream habitats. The use of minnow traps is a common and effective sampling method for both juvenile fish and smaller fish species. Minnow traps will be baited, in accordance with ADF&G requirements, with cured salmon roe or salmon roe treated with a 1/100 Betadine solution. Minnow traps will be placed from the stream bank and remain in the water overnight. Minnow traps will be pulled from the site at the completion of sampling. Parameters to be recorded include: The total time set, type of habitat, and species and numbers captured.

Each deployed minnow trap will be secured to a fixed object, such as a branch or shrub, to ensure the minnow trap is not lost. All minnow traps will be labeled in accordance with ADF&G requirements and removed upon completion of sampling.

Seining

A 3 by 1.2 meter seine, referred to as a "common sense" seine, with 6.4 millimeter mesh size, will be used to capture fish by enclosing and/or encircling them. The bottom of the seine net has a lead line to keep the net on the stream substrate, while the top of the net has a float line or floats to keep the seine at the water surface. The fish captured will be removed from the seine and transferred to a collection bucket for processing.

Seining protocols will be based on the judgment of the fisheries biologist. Seining will be conducted in slow-moving streams and in shallow pool habitats. Seining efforts will be limited to survey sites where other sampling protocols are relatively inefficient, and/or used to complement electrofishing collections. Typically, seining will be performed after electrofishing has been completed. Seining protocols generally require hauling the net through a stream reach, herding fish toward the center of the net, and then dragging the net to shore. Fish caught in the net are dipped out, identified to species, measured, and released. The time spent seining, percent of reach sampled, and the total area of the stream sampled by the net is recorded along with stream habitat parameters.

Fyke Nets

Fyke nets may be used at sites where other sampling techniques have been ineffective. Fyke nets may be placed across slow moving streams to capture fish moving through the sampling reach overnight. They are generally placed so the wings of the net steer upstream migrating fish into a collection area. Fyke nets are expected to be used sparingly, but may be effective on the slow-moving streams of the North Slope where alternative sampling techniques are unsuccessful. Typically, fyke nets are set with one wing on shore and the other staked a short distance offshore. Sampling effort is recorded as the amount of time the net is set. The species caught, size, and number are recorded for each set. Care must be taken if non-target wildlife are caught in the net, such as loons, otters, or beavers.

Angling

Angling, or hook-and-line sampling, may be conducted on larger streams where other techniques are not practical, and could be limited to survey sites where other sampling protocols are not used. Angling may also be used where water depth and/or stream currents make it hazardous to seine, or where stream banks are too steep for placement of minnow traps. The length of time spent angling, bait used, species captured, and size of each fish will be recorded. To eliminate any misperceptions of sport fishing, angling will not occur if local residents are present.

Visual Observation

Prior to conducting any fisheries sampling, visual observations will be conducted using polarized sunglasses. If adult salmon, adult trout or adult char are observed, electrofishing will not be conducted and other fish sampling techniques will be employed.

Habitat and Water Quality

Baseline water quality data and physical habitat data will be collected at each stream crossing site to assess habitat conditions. Water quality parameters will include water temperature, pH, dissolved oxygen (DO), conductivity, and oxidation reduction potential. Water quality measurements will be collected in the field with a Yellow Spring Instruments Model 556 water quality meter. The water quality meters will be calibrated on a daily basis and dissolved oxygen

membranes will be inspected weekly. Membranes will be cleaned and replaced as necessary. Water quality data will be checked for values within expected ranges during the Quality Assurance /Quality Control (QA/QC) process. Physical characteristics of the stream or river site, such as channel width, depth, aquatic habitats, substrate, and riparian vegetation, will also be recorded.

Data Recording and Processing

All fish stream survey data collected will be recorded on hard copy field data forms and entered into an electronic data form that will be developed for the project. The electronic data files will include the GPS location of the stream reach, electronic data sheets, site photos, sketches and field notes. The field data will be uploaded to a project website through an Internet connection or by a satellite link.

Data Quality Assurance/Quality Control

The Fisheries Technical Lead will conduct a quality assessment during the first week of the deployment. The assessment will verify data quality and consistency and will provide an opportunity for any problems to be corrected immediately.

It is the responsibility of each crew member to collect complete, accurate, and clear data. This requires all equipment and gear to be calibrated, maintained, and repaired as needed to ensure the highest level of data quality. Water quality meters will be calibrated and inspected daily. The Field Crew Manager will be responsible for providing all necessary replacement gear and equipment to keep the crew functioning while in the field.

Before leaving each sampling site, the Crew Chief will review the hardcopy data sheets. The Fisheries Field Form QA/QC Checklist (**Appendix C**) will be completed prior to leaving the field site. All field data will also be reviewed and compared each evening prior to transmittal. These files will be sent to the data management staff in Anchorage via internet for review by a subject matter expert. Detailed field QA/QC procedures will be outlined in the 2013 Field Data Management Plan.

5. FIELD STUDIES EXECUTION

Crew Composition

Stream Fisheries Investigations field crews will be composed of the following:

- Field Crew Chief- Fisheries Biologist.
- Field Crew Technician- Fisheries Technician
- GIS Technician
- Bear Guard/Field Safety Officer

A Field Crew Manager will accompany field crews to all lodging locations. The Field Crew Manager will provide logistics support and serve as a field crew alternate.

Field Sampling Strategy

Twenty field targets will need to be surveyed in 2013. These field targets represent 20 streams where data is lacking and therefore require fisheries investigations and characterization. Several streams intersect the Project footprint in multiple locations and therefore may require multiple sampling events. The figures in **Appendix D** illustrate the Stream Fisheries Investigations study areas. A more detailed review of the field target locations will determine if there is a need for additional sampling.

Table 1 outlines the preliminary 2013 Stream Fisheries Investigations Program field deployment schedule. One Stream Fisheries Investigations field crew will work from Point Thomson to Prudhoe Bay, and then south to Livengood. This deployment schedule assumes one field crew averaging two field target surveys per day. A stand down day will be taken every eighth day. Field surveys between Point Thomson and Prudhoe Bay will be by helicopter transport. Dates are subject to change. **Appendix E** contains a detailed march chart that identifies the sites that are planned to be surveyed by the fish crew each day of deployment. Any departures from this schedule must be coordinated with the Field Crew Manager.

Table 1. Stream Fisheries Investigations Deployment Summary

Work Segment	Dates	Field Targets	Lodging
Prudhoe Bay – Pt. Thomson	July 27 - 28	1	Deadhorse. Five rooms/1 night.
Atigun Pass – Prudhoe Bay	July 28 – August 4	13	Deadhorse. Five rooms/8 nights. Stand down day on Aug 2.
Prospect Creek – Atigun Pass	August 5 - 7	3	Coldfoot. Five rooms/3 nights.
Livengood – Prospect Creek	August 7 - 9	3	Yukon Crossing. Five rooms/3 nights. Crews demobilize to Fairbanks August 10.

Permits and Approvals

The Stream Fisheries Field Crew will be provided a copy of all permits and approvals required to conduct field surveys. The field crew is responsible for understanding and abiding by permit conditions. Permits and approvals include:

- Alyeska Pipeline Service Letter of Non-Objection;

- Bureau of Land Management Casual Use Permit;
- Alaska Department of Transportation and Public Facilities Access Permit;
- North Slope Borough Land Management and Development Permit and Science Permits;
- BP Exploration (Alaska), Inc. (BPXA) Letter of Non-objection;
- ADF&G, Title 16 Fish Habitat Permit or Approval (ADF&G will need to review all low water crossings, and will then determine whether or not a permit is necessary.); and
- ADF&G, Fish Resource Permit (collection permit).

The ADF&G Fish Resource Permit is required to conduct fish surveys, in addition to a valid Alaska fishing license. Under the terms of this permit, only personnel identified on the permit application will be authorized to perform collection activities. A copy of the permit will be carried by all fish teams while conducting fish surveys. ADF&G has 30 days to review and approve or deny the permit application.

Two field study reports are required as part of the ADF&G Fish Resource Permit requirements. These include:

- ADF&G Collections Report: This report, using a template provided by ADF&G, will include species, numbers, dates, locations of collection, disposition, and, if applicable, sex, age and breeding condition and lengths and weights of fish. It must also include the date/time the local biologist was contacted for final authorization to carry out collection activities. This report is due within 60 days of the permit expiration date.
- ADF&G Completions Report: This report requires an abstract, Project background, description of sampling methods, field data and data analysis. Data from such reports are considered public information. This report is due within six months of the permit expiration date.

Field Safety

Safety of Project personnel and the public is of the highest importance and will not be compromised for any reason. The Project will develop and distribute a comprehensive Project Safety and Security Plan, including protocols and procedures designed to ensure the safety of all Project staff and the public. In turn, it is expected that Project personnel will understand and adhere to all Project safety processes and protocols, and demonstrate a personal commitment to the safe performance of work at all times. Specific Job Safety Analysis (JSAs) developed for fish stream studies are included in **Appendix F**.

Project-specific training covering safety and security will be required for all personnel performing field work on the Project. Training will occur prior to deployment and will be scheduled in consultation with Project staff.

6. REFERENCES

Buckwalter, J. 2008. FY 2008 operational plan. Inventory of fish distribution in upper Kuskokwim drainage. Alaska Department of Fish and Game. Anchorage, AK. 102 pp.

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APPENDIX A: FISH FIELD SURVEY FORM

Fish Survey Streams Data Form

SITE DESCRIPTION			
Date:	Investigators:	Team No.:	Feature ID:
Stream Name:	Stream ID:	Stream listed in Anadromous Fish Catalog (Y/N):	
Milepost:	Hwy Milepost:	TAPS Milepost:	
Latitude:	Longitude:		
Logbook No.:	Logbook Page No.:	Pic No(s):	
US @ CL Pic No.:	DS @ CL Pic No.:	RB to LB@ CL Pic No.:	LB to RB@ CL Pic No.:
Additional Pic No.:	Additional Pic No.:	Additional Pic No.:	Additional Pic No.:

PHYSICAL/ CHEMICAL ATTRIBUTES			
Weather (Describe):	Precipitation (Describe):		
Water Temperature (°C):	Air Temperature (°C):	pH:	Dissolved Oxygen (mg/l):
Specific Conductance(µS/cm):	Turbidity (NTU):	Color:	ORP (mV):
Ambient Conductance(µS/cm):	Odor:	Sheen (Y/N):	Last date of Calibration:
Wetted Width (m):	Thalweg Depth @ CL (m):	Large Woody Debris Count:	

Riparian Veg at 0-5 m at LB:

_____Grass/Sedge (%)

_____Shrubs (%)

_____Trees (%)

_____Diameter DBH

Riparian Veg at 0-5 m at RB:

_____Grass/Sedge (%)

_____Shrubs (%)

_____Trees (%)

_____Diameter DBH

Flow Type:

_____Perennial _____Seasonal _____Intermittent

Stream Substrate:

_____ Organics (%)

_____Silt (%)

_____Sand (%)

_____Gravel (%)

_____Cobble (%)

_____Boulders(%)

Aquatic Habitats

_____Sand Bar

_____Mud Bar

_____Gravel Bar

_____Riffles

_____Pools

_____Undercut Banks

_____Large Woody Debris

_____Overhanging vegetation

_____ Contiguous Wetlands

_____Emergent Plants

_____Submerged Plants

STREAM PROFILE: Cross Sectional at Crossing (include riparian vegetation, wetted width, water depth, substrate, and aquatic habitats)

NORTH:

STREAM PROFILE: Plan View (include direction of flow, centerline, distances from centerline, photo locations, sample locations by gear type and ROW)

NORTH:

METHODS ATTRIBUTES				
Minnow Traps (Y/N):	Hook and Line (Y/N):	Beach Seine (Y/N):	Fyke Net (Y/N):	Hoop Net (Y/N):
No. of Minnow Traps Set:	Date & Time in: (mm/dd/yyyy)	Date &Time in: (mm/dd/yyyy)	Date & Time in: (mm/dd/yyyy)	Date & Time in: (mm/dd/yyyy)
Date & Time in: (mm/dd/yyyy)	No. of lines in water:	No. of passes:	Date & Time out: (mm/dd/yyyy)	Date & Time out: (mm/dd/yyyy)
Date & Time out: (mm/dd/yyyy)	Time lines in water:	Reach Length (m):		

ELECTROFISHING ATTRIBUTES				
EF (Y/N):	EF Start Time:	EF End Time:	EF Time (seconds):	EF Reach Length (m):
Duty Cycle:	Frequency (Hz) :	Waveform:	Sampling Efficiency (% of sample reach):	
Current (A):	Volts (V):	Power (W):		(amp x volts)

FISH OBSERVATIONS					
Gear Type	**Species**	**Total Length (mm)**	**Life Stage (Juvenile or Adult)**	**Disposition (Dead or Alive)**	**Picture No.**

NOTES (any additional information)

Field Crew Chief: _____ Field Scientist/Technician: _____

Technical Lead: _____

APPENDIX B: FISHERIES FIELD EQUIPMENT LIST

Equipment	No. Needed	Notes
Electrofishing Unit	1	Smith-Root LR 20 or Smith-Root LR 24.
Batteries for Electrofishing Unit	3	
Battery Charger for Electrofishing Unit	2	
6' 2 Section Fiberglass Pole (for Electrofishing)	2	2 section poles and telescoping poles. The telescoping poles need to be fiberglass for safety.
Insulated tear drop dip net (for Electrofishing)	2	Small and medium.
11" adjustable aluminum electrode ring	2	
Rattail electrode	2	
Insulated Lineman Rubber Gloves (for Electrofishing)	3	
PFDs	2	
AED		
Water Quality Meter	1	YSI Model 556, or preferred model.
Hach Model 2100P Turbidity Meter	1	The meters that can be calibrated before every use are preferred.
Extra batteries (for turbidity)	2	AA
Color Test Kit Model C0-1	1	
Calibration solutions for all water quality instruments	1	Water quality parameters collected include: water temp, air temp, pH, Dissolved Oxygen, Specific Conductivity, Ambient Conductivity, ORP, Turbidity, and Color. pH solutions needed include pH 4, 7, and 10. DO may need a special solution this year. Turbidity meters that are calibrated before every use are better than on a daily basis.
Air thermometers	1	Only if water quality meter doesn't capture. Not glass would be preferred.
Minnow Traps	20	20 per team
Cured salmon roe	*	*depends on how many minnow traps set
Cooler (for storing salmon roe)	1	5-day coolers with wheels and handles
Tags (for minnow traps)	20	Laminated small index cards, or something similar but sturdier would be better. Holes need to be punched into card so can be tied to trap line.
Thin parachute cord or something similar (for minnow traps)		For securing set traps to bank
Beach Seine with ¼" mesh	1	The 10' lighter one is more useable. 1/8" mesh would be better if possible
Fyke or Hoop Net with ¼" mesh	1	1/8" mesh would be better if possible
Stakes and rebar for securing fyke and hoop nets	6	6 for each team
Sledge (for securing fyke and hoop nets)	1	
Essence Elite Fly Fishing Outfits	2	Another option would be to have 1 Fly Fishing Rod Kit for each team and one nice Reel Fishing Kit for each team. Each team needs 2 rods of some sort and having the combo of fly and reel fishing would be

Equipment	No. Needed	Notes
		best.
Fishing line, lures, weights, hooks and bobs	2	2 sets for each team dependent on type of rod provided
Collapsible buckets	2	2 per team. Need to be sturdy enough when filled so that it is safe to hold fish and will not collapse
Bucket buddies	2	Or something similar so can carry bucket while electrofishing hands-free
Small aquarium net	1	1 per team
Measuring board	1	For measuring juvenile fish—circular with ends work best.
Cloth measuring tape	1	For measuring adult fish
Whirly bags	20	For taking samples
Alcohol	1 bottle	For taking samples
Alka seltzer tabs	1 box	
Collapsible yard stick	1	For collecting water depth
Retractable measuring tape		For measuring water width—best if has nail and loop at end so can secure on one bank
Fertilizer spray bottles	2	For sanitizing gear between sites
Betadyne	1 bottle	For sanitizing gear between sites
Backpack frame	1	For carrying gear
Bungee cords	2	For securing gear to backpack frame
Water proof bags	2	Various sizes
Water proof gun bag	1	For seine and electrofishing poles
Tote boxes	2	For holding fish gear and waders in trucks. Need to be small enough to fit on helicopter
Small crescent wrench	1	To fit the electrode ring screw
Leatherman	2	2 per team
Parachute cord	1 roll	Extra for each team
Rite in the Rain Notebook and pens	1	1 per team per month and extra pens
Waterproof digital camera	1	1 for each team
Flagging tape	1	Pink
Polarized sunglasses	8	2 per person
Paper towels	1	
Zip lock bags	2	Multiple sizes
Garbage bags	1	
Hand sanitizer	1	
Sharpie pens	2	
Clipboard	2	
Extra batteries	2	
Electrical tape	1	
Duct tape	1	
Tarp	2	2 per team

APPENDIX C: FISHERIES FIELD FORM QA/QC CHECKLIST

This form is to be completed before leaving the field site.

Feature ID:_____ FT #_____ Date:_____

For all items not checked, please provide detailed explanation in the notes section of data form.

1. **Site Description**
   - ☐ Was ADF&G contacted before conducting any work in this area?
   - ☐ Site Description complete? (Every cell must have entry or N/A)
   - ☐ Were all photos taken and labeled correctly?
2. **Physical/Chemical Attributes**
   - ☐ Calibration performed prior to sampling?
   - ☐ Physical/Chemical attributes complete? (Every cell must have entry or N/A)
   - ☐ Water quality data within expected ranges?
     - ☐ pH: 4.0 – 10.0
     - ☐ NTU: 0 – 3000
     - ☐ DO (mg/L): 1.0 – 15.0
     - ☐ DO (% saturation): 75- 100
     - ☐ Temp.: 1.0 – 19.0
     - ☐ Specific Conductance: 20 - 1500
   - ☐ If outside expected ranges, was sample re-taken?
   - ☐ Are units correct?
3. **Stream Profile**
   - ☐ Stream profile view sketch included?
   - ☐ Stream profile view captures water depth and wetted width?
   - ☐ Stream profile view captures where efforts were made to capture fish?
   - ☐ Plan view sketch included?
4. **Methods Attributes**
   - ☐ Methods attributes complete? (Every cell must have entry or N/A)
   - ☐ Were methods used adequate (explanation needed if no methods selected)?
5. **Electrofishing Attributes**
   - ☐ Electrofishing attributes complete? (Every cell must have entry or N/A)
   - ☐ Are units correct?

- ☐ Are spawning/rearing answers consistent with fish observations?

6. Fish Observations

- ☐ Are all fish captured/observed recorded in the Fish Observation table?
- ☐ Are units correct? (Fork Length (mm))
- ☐ Were adequate photos taken of fish captured? (Take a photo if in doubt)
- ☐ Were any specimens preserved?

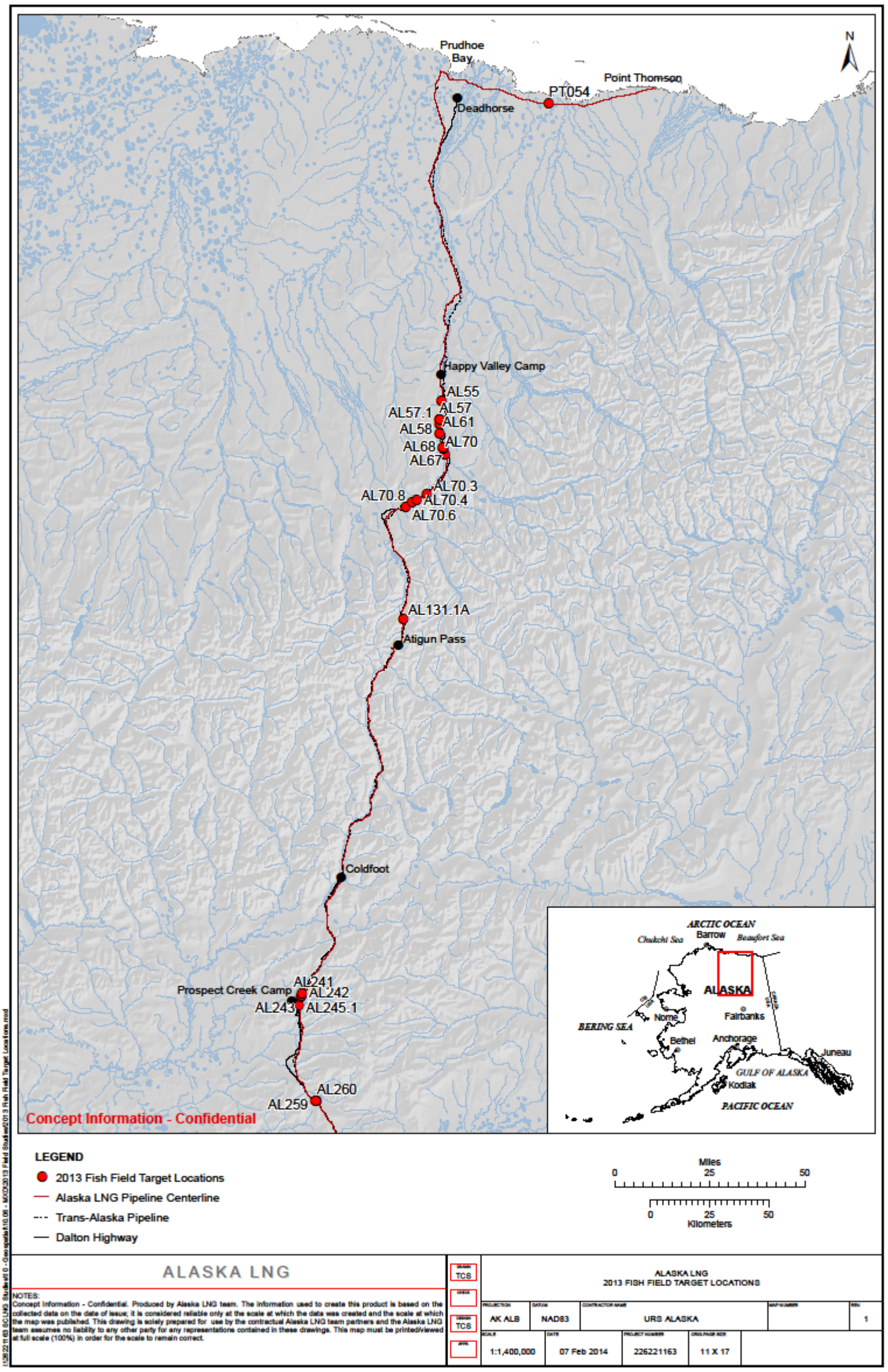
7. General

- ☐ Feature ID and Field Target # are consistent on data forms, logbook entries, photos, and maps?
- ☐ All additional data in logbook captured on data form and additional photos noted?
- ☐ Were all additional comments on stream habitat, etc. recorded on data form?
- ☐ Was any gear missing/damaged for this survey or did you have any problems that should require resampling of this stream for an adequate survey effort?

By signing below, I verify that all field data for this site has been verified for accuracy and completeness.

X	X
Fisheries Biologist (print)	Signature
X	X
Field Crew Chief (print)	Signature

APPENDIX D: FIELD TARGET MAPS


N
Prudhoe Bay
Point Thomson
PT054
Deadhorse
Happy Valley Camp
AL55
AL57.1
AL57
AL58
AL61
AL68
AL70
AL67
AL70.8
AL70.3
AL70.4
AL70.6
AL131.1A
Atigun Pass
Coldfoot
AL241
Prospect Creek Camp
AL242
AL243
AL245.1
AL260
AL259
Concept Information - Confidential
ARCTIC OCEAN
Chukchi Sea
Barrow
Beaufort Sea
ALASKA
Nome
Fairbanks
BERING SEA
Bethel
Anchorage
Juneau
GULF OF ALASKA
Kodiak
PACIFIC OCEAN
LEGEND
2013 Fish Field Target Locations
Alaska LNG Pipeline Centerline
Trans-Alaska Pipeline
Dalton Highway
Miles
0 25 50
0 25 50
Kilometers
ALASKA LNG
NOTES:
Concept Information - Confidential. Produced by Alaska LNG team. The information used to create this product is based on the collected data on the date of issue; it is considered reliable only at the scale at which the data was created and the scale at which the map was published. This drawing is solely prepared for use by the contractual Alaska LNG team partners and the Alaska LNG team assumes no liability to any other party for any representations contained in these drawings. This map must be printed/viewed at full scale (100%) in order for the scale to remain correct.
DRAWN TCS
CHECK
DESIGN TCS
APPR.
ALASKA LNG
2013 FISH FIELD TARGET LOCATIONS
PROJECTION AK ALB
DATUM NAD83
CONTRACTOR NAME URS ALASKA
MAP NUMBER
REV. 1
SCALE 1:1,400,000
DATE 07 Feb 2014
PROJECT NUMBER 226221163
ORIG PAGE SIZE 11 X 17
I:\226221163 SC\LNG Studies\10 - Geographic\10.09 - MXD\2013 Field Studies\2013 Fish Field Target Locations.mxd

APPENDIX E: MARCH CHART

March Chart for Fish Stream Surveys

	Team #	Proposed Dates	Field Target #	Pipeline Milepost *	Latitude	Longitude	Distance from Hwy (mi)	Distance from TAPS (mi)	Distance from Camp (mi)	Method of Access (Pedestrian/ Vehicular/ Helicopter)	Land Owner	Access Road	Notes on Access to Parcel	Spread	Lodging
	F51	6/19/2013	Travel to Fairbanks												Fairbanks
	F51	6/20/2013	Training in Fairbanks												Fairbanks
	F51	6/21/2013	Training in Fairbanks												Fairbanks
	F51	6/22/2013	Training in Fairbanks												Fairbanks
	F51	6/23/2013	Training in Fairbanks												Fairbanks
	F51	7/27/2013	Travel to Deadhorse for any crew members not on Lake Survey												Deadhorse
1	F51	7/28/2013	PT054	PT 28.5	70.15224	-147.42476	NA	NA	24.2	Helicopter				PB - PT	Deadhorse
2	F51	7/28/2013	AL55	94.7	69.04582	-148.85351	0.8	NA	83.7	Vehicle				AP - PB	Deadhorse
3	F51	7/29/2013	AL57	99.8	68.97728	-148.88881	1.14	1.08	87.7	Vehicle				AP - PB	Deadhorse
4	F51	7/29/2013	AL57.1	99.9	68.97641	-148.88931	1.13	1.07	87.7	Vehicle				AP - PB	Deadhorse
5	F51	7/30/2013	AL58	101.1	68.95828	-148.89263	0.62	0.56	89	Vehicle				AP - PB	Deadhorse
6	F51	7/30/2013	AL61	103.5	68.92547	-148.89730	1	0.47	91	Vehicle				AP - PB	Deadhorse
7	F51	7/31/2013	AL67	107.6	68.86916	-148.88080	0.63	0.51	94.8	Vehicle				AP - PB	Deadhorse
8	F51	7/31/2013	AL68	108	68.86194	-148.87362	0.7	0.49	95.3	Vehicle				AP - PB	Deadhorse
9	F51	8/1/2013	AL70	109.3	68.84350	-148.85988	0.9	0.71	97.3	Vehicle				AP - PB	Deadhorse
10	F51	8/1/2013	AL70.3	122.2	68.69574	-149.07928	0.31	0.16	109.9	Vehicle				AP - PB	Deadhorse
	F51	8/2/2013	Stand down day												Deadhorse
11	F51	8/3/2013	AL70.4	125.5	68.67677	-149.18835	0.03	NA	113.2	Vehicle				AP - PB	Deadhorse
12	F51	8/3/2013	AL70.6	126.8	68.66740	-149.23773	0.03	NA	114.6	Vehicle				AP - PB	Deadhorse
13	F51	8/4/2013	AL70.8	128.8	68.65119	-149.30622	0.03	NA	116.7	Vehicle				AP - PB	Deadhorse
14	F51	8/4/2013	AL131.1A	164.8	68.22260	-149.40916	0.05	NA	153.4	Vehicle				AP - PB	Deadhorse
	F51	8/5/2013	Travel to Coldfoot												Coldfoot

	Team #	Proposed Dates	Field Target #	Pipeline Milepost *	Latitude	Longitude	Distance from Hwy (mi)	Distance from TAPS (mi)	Distance from Camp (mi)	Method of Access (Pedestrian/ Vehicular/ Helicopter)	Land Owner	Access Road	Notes on Access to Parcel	Spread	Lodging
15	F51	8/6/2013	AL241	280.9	66.81870	-150.62810	0.85	0.75	35.8	Vehicle				PC - AP	Coldfoot
16	F51	8/6/2013	AL242	281.5	66.81176	-150.63254	1.08	0.9	36.4	Vehicle				PC - AP	Coldfoot
17	F51	8/7/2013	AL243	282.2	66.80420	-150.64427	0.8	0.65	37.1	Vehicle				PC - AP	Coldfoot
18	F51	8/7/2013	AL245.1	284.3	66.77437	-150.66561	0.65	0.33	39.5	Vehicle				LI - PC	Coldfoot
	F51	8/8/2013	Travel to Yukon Crossing												Yukon Crossing
19	F51	8/9/2013	AL259	312.9	66.40962	-150.55202	0.1	NA	45.4	Vehicle				LI - PC	Yukon Crossing
20	F51	8/9/2013	AL260	313.1	66.40616	-150.54156	0.1	NA	45	Vehicle				LI - PC	Yukon Crossing
	F51	8/10/2013	Travel to Fairbanks												Fairbanks

* Mileposts along the Prudhoe Bay to Point Thomson route displayed with PT.

LI = Livengood
PC = Prospect Creek
AP = Atigun Pass
PB = Prudhoe Bay
PT = Pt. Thomson

APPENDIX F: JOB SAFETY ANALYSIS

Job Safety Analysis – Alaska LNG Field Studies 2013

Work Around Water – Fish Stream Investigations

JSAs are living documents that identify potential hazards, and provide written safe work procedures to avoid the hazards. JSA are reviewed and discussed prior to, throughout, and after work to identify hazards or changing work conditions to assess adequacy of mitigation procedures. **The continued refinement of job safety is a responsibility shared by all who participate in work activities specific to the JSA**.

Field Crew Chiefs are to ensure that the entire crew shares the burden of carrying equipment and alternating which equipment is carried to their respective survey sites. This will reduce strain and potential injuries.

Project Number/Name:	LNG/26221163
Job/Task Description (What am I about to do?):	Conduct fish stream field investigations

Task: Fish Stream Surveys		
Major Job Steps (What am I about to do?)	**Hazards and Consequences (What could go wrong?)**	**Requirements to Eliminate or Reduce Hazards (What could be done to make it safer?)**
Remote field work	Loss of contact during field work	• Obtain and maintain reliable contact information for all team members. Verify employees have appropriate qualifications and training.
	Emergency management problems	• Review Emergency Response procedures • Discuss reporting procedures (report all incidents immediately) • For each route and destination, know hospital locations • Confirm weather and fire forecast prior to departure • Review requirements for driving on project business o Daily vehicle inspection o Seat belts must be worn by all occupants o Minimize distractions to driver (conversations, music, etc.) – **driver may not use a cell phone while operating vehicle** o Headlights on at all times o Speed limits adhered to at all times o Rules for overtaking or being passed on the road o Minimize speed and exercise caution when driving of slick muddy roadways when watered for road maintenance. • Avoid standing on gravel roadway prism when vehicles are passing due to thrown debris (ie., gravel)

Task: Fish Stream Surveys		
Major Job Steps (What am I about to do?)	**Hazards and Consequences (What could go wrong?)**	**Requirements to Eliminate or Reduce Hazards (What could be done to make it safer?)**
Working in remote areas	Injury and / or stranded (weathered-in) with delay in response	**Buddy system is required** At least two persons trained in first aid / Cardiopulmonary Resuscitation. Survival equipment and supplies must accompany the crew at all times. **Required minimum survival equipment to be carried by each crew member:** • Personal medication and eyewear; • Lunch plus extra food; • Water; • Sunblock cream; and • Extra clothing. **Equipment to be carried and shared by each crew at remote locations:** • First aid kit; • Field guides and maps; • Compass; • Global Positioning System (GPS) unit; • Binoculars; • Communication equipment; • Insect repellent and/or bug jackets; • Mirror; • Knife; and • Whistle. **If helicopter leaves crew, an emergency duffel will be left at drop-off with:** • Wilderness First Aid Kit; • Four-season tent; • "Space" blankets (one per person); • Water purification tablets; • Extra food (stored in bear canister); • Waterproof matches; • Rope; • Flashlight; • Extra batteries; and • Plastic bags.
Long days in field	Fatigue, cold exposure, weather variability	• Limit work shifts to account for hours associated with travel (12 hours). • Take adequate rests if feeling exerted. • Drink water. For walking activity, minimum of ½-liter per hour. • Be observant of indications of cold stress or heat injury symptoms (shivering, numbness, disorientation, tiredness, dizziness, headache, and fatigue). If noticed or felt, notify others immediately. • Workers should be prepared for both hot and cold stress situations. Wear appropriate clothing for the weather conditions.

Task: Fish Stream Surveys		
Major Job Steps (What am I about to do?)	**Hazards and Consequences (What could go wrong?)**	**Requirements to Eliminate or Reduce Hazards (What could be done to make it safer?)**
		• Warm up when chilled. Take breaks to warm-up as appropriate for the conditions. • Stay dry; change wet clothing.
Attire	Exposure to sun, rain, temperature extremes	Suspend work in extreme conditions including but not limited to: temperature, wind chill less than -20 degrees Fahrenheit or precipitation which poses potential for hypothermia; lightning, and poor visibility. **Required minimum attire:** • A water-resistant outer layer to protect against the wind and allow some ventilation. • A middle layer of wool or synthetic fabric to insulate against body heat loss while permitting body moisture to evaporate. • An inner layer of synthetic weave • Footgear that is impervious and insulated with extra tough soles to protect against cold, wet, and walking hazards • Recommended: sunglasses and brimmed hard hat. • High visibility vest and safety glasses at all times. **Working near water:** • Personal flotation device (PFD) for working from boats **Working near noise:** • Hearing protection **Any possibility of hunters in the area** • Brightly colored vests.
Walking and wading along shoreline and in shallow water	Slip and trips on rocks or soil	• Wear high-traction footwear and full coverage abrasion-resistant clothing. • Do not step on slippery rocks. Maneuver carefully and slowly as to not to lose balance. • Shoreline sampling and wading must be conducted with a buddy at all times. When wading in muddy bottoms, always place and retrieve footing vertically, avoiding twisting motions of upper body and knees.
	Drowning (shoreline locations)	• Assess hazards at each location: slope of shoreline, stability of footing, flow velocity or proximity to high flow sections of the river (steep shores, boulders, woody debris, clay substrates and areas in or near high flow velocity should be avoided). • If bank or shoreline drops off steeply and work is above, immediately adjacent to, or within 6 feet of water that is more than 3 feet deep, or water where a drowning hazard exists (e.g., fast-moving stream, water body with soft bottom creating entrapment hazard), a PFD must be worn and a life-saving boat with trained operator must be immediately

Task: Fish Stream Surveys		
Major Job Steps (What am I about to do?)	**Hazards and Consequences (What could go wrong?)**	**Requirements to Eliminate or Reduce Hazards (What could be done to make it safer?)**
		available.
Walking/hiking	Slips/Trips/Falls	• Maintain continuous situational awareness at all times. • Move at a prudent pace. • Look ahead, concentrate on your path, don't move in a direction where you're not looking. • Stop to view or talk. • Choose a route that is clear of obstacles and hazards. • Do not step in areas that may have hidden hazards (holes covered by grass, water etc.) – use a walking stick to probe areas not previously traversed • Always wear required footwear. • Maintain good housekeeping in Field Camp and at field work sites.
Working over or within 6 feet of water which is more than 3-feet-deep	Drowning or hypothermia due to falling in the water	• Strict buddy system when working near or over water, with buddy located in the immediate area. • USCG approved flotation required when working from boat or floating helicopter on a lake more than 20 feet from shore • Type III PFD required when working within 6 feet of water more than 3-feet-deep. • Crew members must carry spare set of clothing into the field if working near water. • Safety equipment on inflatable boats will include: o Alternate means of propulsion (oars or paddles); o Air horn and / or rescue whistle; o Two-way communication system with shore crew; o Waterproof flashlight; o Bailer; o Duct tape; and o Rescue rope in throw bag.
Using sharp hand tools	Cut by blade or sharp edge	• With the exception of ceramic blade knives used for tubing, fixed open blade knives are not generally allowed. • Always wear leather work gloves when using a cutting tool • Inspect bladed tools for damage or defects before use. • Receive proper training in tool use. • Only use tool for the task it was designed for.
Helicopter Transport	Noise, physical, equipment damage	• Always adhere to mandatory pre-flight safety protocols provided by pilots for all passengers. • Hearing protection (ear plugs) is required at all

Task: Fish Stream Surveys		
Major Job Steps (What am I about to do?)	**Hazards and Consequences (What could go wrong?)**	**Requirements to Eliminate or Reduce Hazards (What could be done to make it safer?)**
		times when helicopter is operating. • Always secure loose and light items on ground surfaces (including clothing) to prevent airborne or shifting materials from rotor wash. • Always place field gear well outside the potential influence of rotor wash. • Fully secure all loose lines or tethers (minnow traps or fishing gear prior to loading helicopter.
Material Handling	Cuts and abrasions	• Wear work gloves to prevent cuts and abrasions from sharp or pointed vegetation and when moving materials.
	Back and muscle strains	• Backpack - ideally not to exceed 35 pounds (maximum 50 pounds). Get help donning packs. • Prohibit individual lifting of large, heavy or cumbersome items. Get help lifting crates, bins and equipment. • Practice proper lifting technique. • Use material handling/lifting equipment if possible. • The Crew Chief will approve all manual loads as appropriate for the terrain, distance, and individual team member's capacity. • Tools/materials may be carried in the hands for short distances only on clear established paths. Walk entire length of travel path for adequate assessment prior to load transport. • All attempts will be made to not carry materials in the hands when traversing cross-country.
Wildlife	Encounters with bears and other large wildlife	• Control of food and food wastes (wrapped and dispose of properly). • Observation of any tracks. • Stay in groups of two minimum when hiking or moving across the site or in the adjacent areas. • Strict adherence to the buddy system is required for all activities outside Field Camp • Noise is an effective measure for wildlife avoidance; therefore constant conversation should be maintained. Periodic use of a whistle is also an effective means of avoiding wildlife and warning other crew members when an animal is sited. • If a bear is encountered, leave the area. Don't panic.
Insects	Mosquitoes, flies and other biting insects	• Use head nets and/or insect repellent when mosquitoes or other biting insects are present. • Insect repellent containing DEET should be applied only to clothing and should not be applied directly to the skin.
Prepare for	Working without proper	• PFD required while electrofishing – no exceptions.

Task: Fish Stream Surveys		
Major Job Steps (What am I about to do?)	**Hazards and Consequences (What could go wrong?)**	**Requirements to Eliminate or Reduce Hazards (What could be done to make it safer?)**
electrofishing	equipment and training	• All crew members will wear safety-toed composite chest or hip waders to insulate the wearer from electric shock. Breathable waders are not allowed for electrofishing. Steel-toed safety waders are prohibited. • Footwear will be equipped with non-slipped safety soles. • All crew members (shockers and netters) must wear lineman's gloves. • Extra dry clothing is required; change clothes if they become wet. • Backpacks will have quick-release belt and shoulder straps. • All crew members must be trained or thoroughly oriented on site prior to start of operations. • The on-off switch must be readily accessible. • All equipment must be equipped with a tilt switch that opens the circuit if the operator falls. • Electrode handles will be constructed of a nonconductive material and long enough to avoid hand contact with water and include an immersion sensor.
Electrofishing	Electric shock	• Crew communications will be reviewed daily • Electrofishing will not be conducted in water deeper than hip height • Gloves and waders must be visually inspected for punctures before each use and will be replaced or repaired if tears or punctures are evident. • All external wiring, cables, and connectors will be visually inspected for physical damage or corrosion daily before each use. • The mechanical operation of safety switches will be conducted daily prior to energizing the equipment. • Manual switches activating the anode may not be bypassed or taped down. • All equipment must be turned off before making any connections or replacing parts, or performing repairs. • No unprotected part of the body may make contact with the water when electrofishing equipment is operating. • Do not touch metallic part of electrode. • Electrodes will never be energized unless immersed in water.
Emergency preparedness	Not having emergency equipment or	• An AED will be on site • At least two AED-trained personnel will be present

Task: Fish Stream Surveys		
Major Job Steps (What am I about to do?)	**Hazards and Consequences (What could go wrong?)**	**Requirements to Eliminate or Reduce Hazards (What could be done to make it safer?)**
	procedures, leading to greater severity of shock injuries	at all times during electrofishing. Training will be on the specific AED used in the field. • If anyone falls, the operation will stop immediately. • Wet clothes must be changed immediately. • If water enters waders or gloves, stop work, don dry clothing, and patch or replace insulated garments as necessary. **If a crew member is shocked:** • Switch off electrodes; • Switch off emergency on / off stop; • Remove electrodes from water; • Administer first aid; • Loss of consciousness always requires evaluation by a doctor. Incidents and Near Misses will be reported and analyzed for root cause. Corrective action will be implemented prior to resuming operations.

Staff briefed on JSA (What have I done to communicate the hazards?):

Field Crew Chief _____

Field Crew Technician_____

GIS Technician_____

Bear Guard_____

Analysis Prepared By: Date: