# 2014 STREAM FISH AND AQUATIC HABITAT SURVEYS ON PEDRO BAY CORPORATION LANDS IN THE KVICHAK RIVER WATERSHED

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## INTRODUCTION

From August 9 to 30, 2014, investigators intensively sampled streams tributary to Lake Clark and the northwestern half of Iliamna Lake in the Kvichak River drainage to collect data necessary to develop freshwater fish distribution models. This marked our seventh year of work in the Kvichak and Nushagak river drainages.

In 2014 we collected information at 367 stream locations (Figure 1). We made fish observations at 223 locations (Table 1): at 154 sites we conducted systematic fish community and habitat inventories and we made aerial observations only at an additional 69 locations. Where we made systematic inventories we sampled local fish assemblages with standardized methods developed by Wiedmer (2003). Electrofishing was our primary fish collection method, supplemented with visual observations, underwater video, and angling (Wiedmer 2014). At these sites we also measured a suite of local water chemistry, channel morphology, and riparian habitat parameters.

We recorded barrier (actual or potential) information at 144 locations: 102 cross-channel beaver dams, 34 waterfalls, and 8 sites where there was no surface flow in the stream channel. Where we made only aerial observations we did not record habitat or fish community information.

Where we observed salmon at locations where they were previously not documented (Johnson and Coleman 2014), we were required to report these sightings to the Alaska Department of Fish and Game (ADF&G). We also recommended deleting 13.5 km of previously specified salmon habitat upstream of observed waterfalls which salmon cannot pass. We submitted the results of all our field work to ADF&G and in the coming months they will post these results on their Alaska Freshwater Fish Inventory website (ADF&G 2015).

**Table 1.-Fish species, all life stages combined, sampled or observed across the entire 2014 study area.**

| Name | | Observations | |
|---|---|---|---|
| Common | Scientific | Sites (n) | Individuals (n) |
| sockeye salmon | *Oncorhynchus nerka* | 70 | 97,007 |
| sculpin[1] | *Cottus sp.* | 84 | 1,682 |
| Dolly Varden | *Salvelinus malma* | 72 | 615 |
| coho salmon | *O. kisutch* | 15 | 271 |
| threespine stickleback | *Gasterosteus aculeatus* | 8 | 202 |
| Arctic grayling | *Thymallus arcticus* | 13 | 196 |
| ninespine stickleback | *Pungitius pungitius* | 7 | 164 |
| rainbow trout | *O. mykiss* | 18 | 152 |
| longnose sucker | *Catostomus catostomus* | 6 | 9 |
| burbot | *Lota lota* | 6 | 7 |
| northern pike | *Esox lucius* | 5 | 7 |
| Arctic char | *S. alpinus* | 1 | 5 |
| lake trout | *S. namaycush* | 1 | 5 |
| round whitefish | *Prosopium cylindraceum* | 3 | 4 |
| No fish observed | | 46 | 0 |
| Grand Total | | | 100,326 |

[1] The two extant freshwater sculpin species, slimy and coastrange, are not reliably and consistently distinguished in field collections and are combined here.

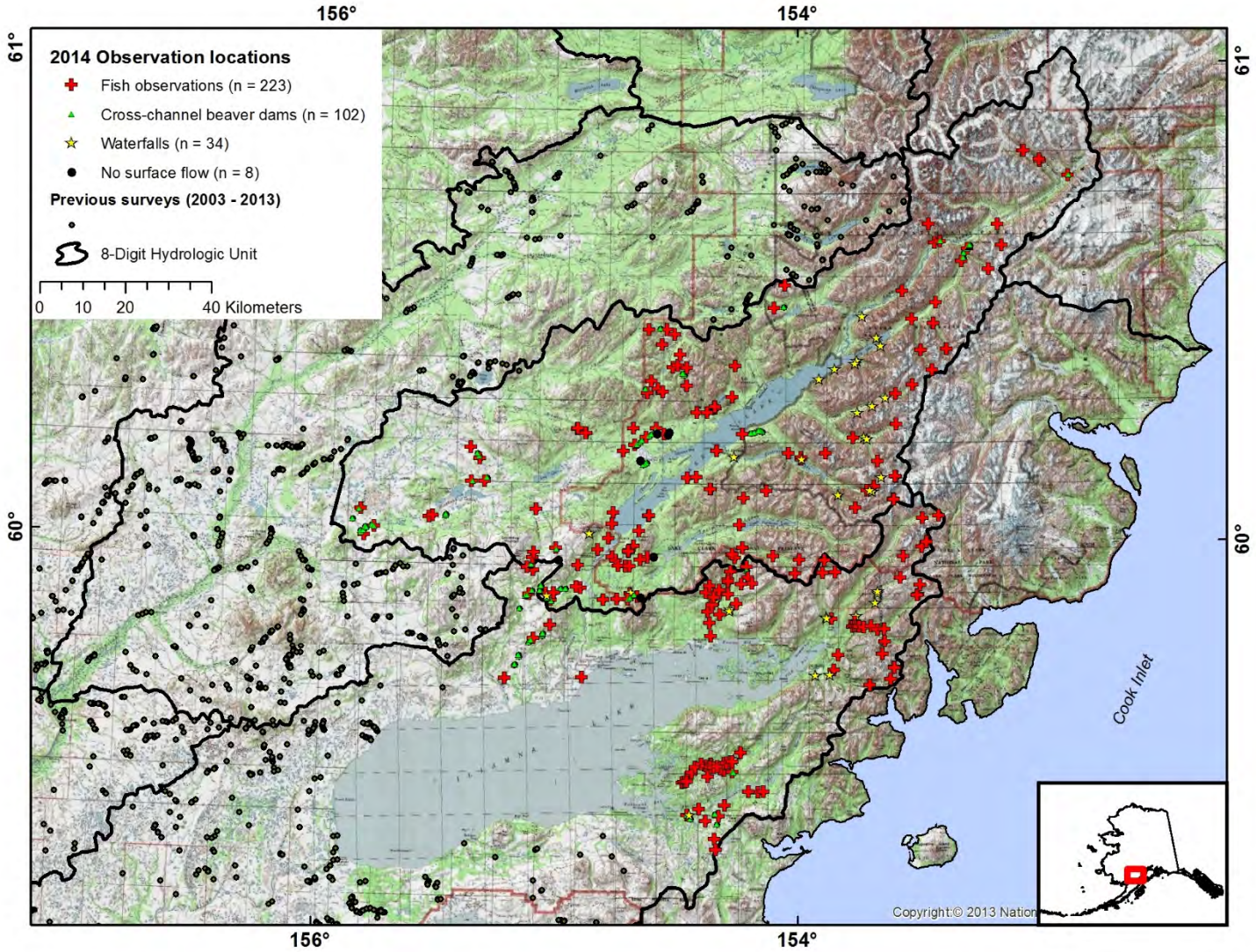


**Figure 1.-Locations of waterbody observations within the 2014 upper Kvichak River watershed study area.**

## RESULTS ON PEDRO BAY CORPORATION LANDS

Between August 14 and 20, 2014, we made 15 observations on Pedro Bay Corporation lands. These included 4 aerial observations of waterfalls, 12 aerial observations of spawning sockeye salmon (1 observation at a waterfall), and 1 systematic fish community and habitat inventory (Figure 2).

At these sites we observed or sampled 2 species and a total of 13,151 fish (Table 2). A report for each of the 15 sites where we made observations is provided in Appendix A.

**Table 2.-Fish species, all life stages combined, sampled or observed on Pedro Bay lands.**

| Name | | Observations | |
|---|---|---|---|
| Common | Scientific | Sites (n) | Individuals (n) |
| sockeye salmon | *Oncorhynchus nerka* | 12 | 13,149 |
| sculpin[2] | *Cottus sp.* | 1 | 2 |
| Grand Total | | | 13,151 |

[2] The two extant freshwater sculpin species, slimy and coastrange, are not reliably and consistently distinguished in field collections and are combined here.

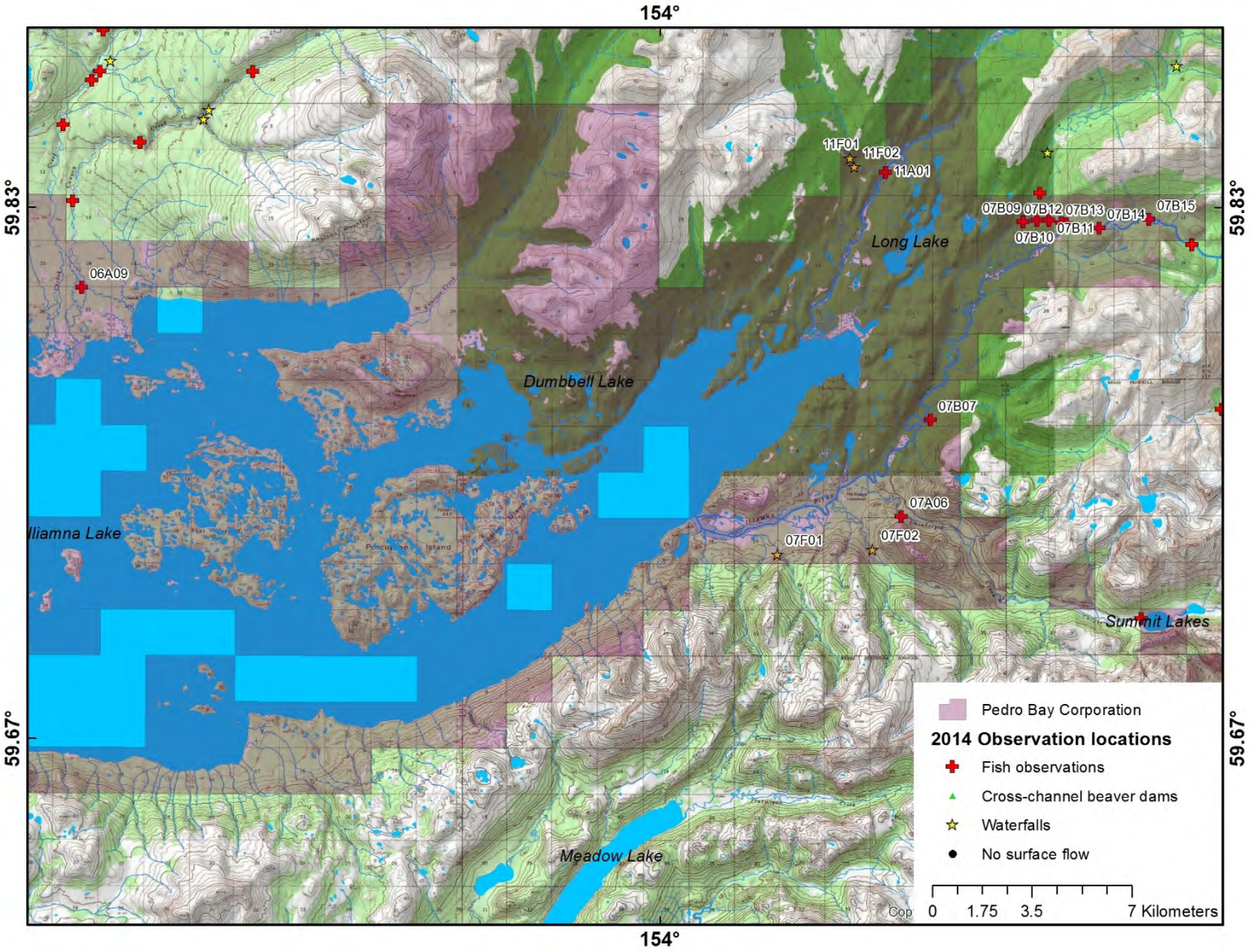


**Figure 2.- Locations of waterbody observations on Pedro Bay Corporation lands.**

# REFERENCES CITED

ADF&G (Alaska Department of Fish and Game). 2015. Alaska Freshwater Fish Inventory; Available URL "http://www.adfg.alaska.gov/index.cfm?adfg=ffinventory.main" [Accessed 01/20/2015]. Alaska Department of Fish and Game, Division of Sport Fish.

Johnson, J., and J. Coleman. 2014. Catalog of waters important for spawning, rearing, or migration of anadromous fishes – Southwestern Region, Effective June 1, 2014, Special Publication No. 14-05. Alaska Department of Fish and Game, Divisions of Sport Fish and Habitat, Anchorage, AK.

Wiedmer, M. 2003. Synoptic inventory of anadromous fish distribution in Southcentral Alaska freshwaters: FY 2004 Operational Plan. Alaska Department of Fish and Game, Division of Sport Fish, Anchorage.

Wiedmer, M. 2014. Calendar year 2014 investigation plan: Stream fish and aquatic habitat surveys, Kvichak River watershed, southwest Alaska. Malma Consulting, Anchorage, AK.

# APPENDIX A. SITE REPORTS

**Station** 06A09

**Survey Team:** Michael Wiedmer **Date/Time:** 08/14/2014 10:55 AM

## Geographic Information

**Elevation (m):** 26 **Point Coordinates (decimal degrees)** **Latitude** 59.80824 **Longitude** -154.36330

**Datum:** WGS84

**Coordinate Determination Method:** Non-Differential GPS Field Measurement

**USGS Quadrangle:** Iliamna D-4

**Waterbody Name:** Chekok Creek **Legal Description:** Section 25, T. 4 S., R. 30 W., S.M.

**Anadromous Waters Catalog Number:** 324-10-10150-2267

**Geographic Comments:** As of 8/14/2014, Canyon Creek and Chekok Creek join at 59.8179, -154.37202. They do not flow in parallel channels to Iliamna Lake as shown in the current NHD. The Chekok Creek channel shifted east to merge with Canyon Creek.

## Stream Characteristics

**Water Temp (C):** **DO (ppm):** **Conductivity (µS/cm):** **Turbidity (NTU)** **pH:**

**Stream Stage:** **Water Color:**

**48 hr. Precipitation/Runoff:** N/A **Max. velocity (m/s):** **Stream Gradient (%):**

**Substrates Dominant:** **Subdominant:** **Subdominant:**

**Rosgen Class:** ()

**Channel Dimensions (m):** **OHW Width** **Wetted Thalweg Depth**

**Visit Comments:** Aerial observation of adult sockeye salmon only; no habitat or fish community information collected. Coordinates are on the main channel, below the confluence of Chekok and Canyon creeks. Based on the ratio of carcasses and live spawners, today appears to be very near the peak of spawning in this system. Essentially continuous spawning throughout both streams to the upstream limits of sockeye distribution. Many tens of thousands of sockeye in drainage.

## Riparian Vegetation Communities (Viereck et al. 1992)

| Dist. from bank (m) | Left Bank Vegetation Type | Canopy Height (m) | Right Bank Vegetation Type | Canopy Height (m) |
|---|---|---|---|---|
| 0 - 5 | | | | |
| 5 - 10 | | | | |
| 10 - 20 | | | | |
| 20 - 30 | | | | |

## Fish Sampling Efforts

**Gear Type:** Visual Observation, Helicopter (A)

**EF Time (sec.)** **Efficiency:** N/A **Voltage (V):** **Frequency (Hz)**

**Channel Type:** Main Channel (>50% of water flow)

## Fish Observations

**Species:** carcass sockeye salmon **Life History:** Obligate anadromous population

**Total Fish Observed:** 800 **Fish Measured:** **Fork Lengths (mm)** **Min.:** **Max:** **Average:**

**Sampling method (No. of fish):** A (800)

**Comments:**

**Species:** adult spawning sockeye salmon **Life History:** Obligate anadromous population

**Total Fish Observed:** 1000 **Fish Measured:** **Fork Lengths (mm)** **Min.:** **Max:** **Average:**

**Sampling method (No. of fish):** A (1000)

**Comments:**

**Station** 07A06

**Survey Team:** Michael Wiedmer, Colin Shaney, Sue Flensburg, Damon Allen **Date/Time:** 08/15/2014 12:28 PM

## Geographic Information

**Elevation (m):** 61 **Point Coordinates (decimal degrees)** **Latitude** 59.73661 **Longitude** -153.84846

**Datum:** WGS84

**Coordinate Determination Method:** Non-Differential GPS Field Measurement

**USGS Quadrangle:** Iliamna C-3

**Waterbody Name:** Chinkelyes Creek **Legal Description:** Section 15, T. 5 S., R. 27 W., S.M.

**Anadromous Waters Catalog Number:** 324-10-10150-2402-3014

**Geographic Comments:**

## Stream Characteristics

**Water Temp (C):** **DO (ppm):** **Conductivity (µS/cm):** **Turbidity (NTU)** **pH:**

**Stream Stage:** **Water Color:**

**48 hr. Precipitation/Runoff:** N/A **Max. velocity (m/s):** **Stream Gradient (%):**

**Substrates Dominant:** **Subdominant:** **Subdominant:**

**Rosgen Class:** ()

**Channel Dimensions (m):** **OHW** **Wetted**

**Width**

**Thalweg Depth**

**Visit Comments:** Aerial observation of upstream-most school of adult sockeye salmon. No fish community or habitat information collected.

## Riparian Vegetation Communities (Viereck et al. 1992)

| Dist. from bank (m) | Left Bank Vegetation Type | Canopy Height (m) | Right Bank Vegetation Type | Canopy Height (m) |
|---|---|---|---|---|
| 0 - 5 | | | | |
| 5 - 10 | | | | |
| 10 - 20 | | | | |
| 20 - 30 | | | | |

## Fish Sampling Efforts

**Gear Type:** Visual Observation, Helicopter (A)

**EF Time (sec.)** **Efficiency:** N/A **Voltage (V):** **Frequency (Hz)**

**Channel Type:** Main Channel (>50% of water flow)

## Fish Observations

**Species:** adult sockeye salmon **Life History:** Obligate anadromous population

**Total Fish Observed:** 50 **Fish Measured:** **Fork Lengths (mm)** **Min.:** **Max:** **Average:**

**Sampling method (No. of fish):** A (50)

**Comments:**

**Station** 07A06

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DSC_0770.jpg

DSC_0771.jpg

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**Station** 07B07

**Survey Team:** Christine Woll, Daniel Chythlook, Keenan Troll, Damon Allen **Date/Time:** 08/15/2014 6:42 PM

## Geographic Information

**Elevation (m):** 23 **Point Coordinates (decimal degrees)** **Latitude** 59.76703 **Longitude** -153.83016

**Datum:** WGS84

**Coordinate Determination Method:** Non-Differential GPS Field Measurement

**USGS Quadrangle:** Iliamna D-3

**Waterbody Name:**

**Legal Description:** Section 2, T. 5 S., R. 27 W., S.M.

**Anadromous Waters Catalog Number:**

**Geographic Comments:**

## Stream Characteristics

**Water Temp (C):** **DO (ppm):** **Conductivity (µS/cm):** **Turbidity (NTU)** **pH:**

**Stream Stage:** **Water Color:**

**48 hr. Precipitation/Runoff:** N/A **Max. velocity (m/s):** **Stream Gradient (%):**

**Substrates Dominant:** **Subdominant:** **Subdominant:**

**Rosgen Class:** ()

**Channel Dimensions (m):** **OHW** **Wetted Width** **Thalweg Depth**

**Visit Comments:** Aerial observation of spawning sockeye salmon in a distributary channel in the delta of this unnamed tributary to the Iliamna River. No other fish community or habitat information collected. This channel was not surveyed further upstream, so the upstream limit of sockeye salmon in this stream was not established.

## Riparian Vegetation Communities (Viereck et al. 1992)

| Dist. from bank (m) | Left Bank Vegetation Type | Canopy Height (m) | Right Bank Vegetation Type | Canopy Height (m) |
|---|---|---|---|---|
| 0 - 5 | | | | |
| 5 - 10 | | | | |
| 10 - 20 | | | | |
| 20 - 30 | | | | |

## Fish Sampling Efforts

**Gear Type:** Visual Observation, Helicopter (A)

**EF Time (sec.)** **Efficiency:** N/A **Voltage (V):** **Frequency (Hz)**

**Channel Type:** Side Channel (connected to main channel at inlet and outlet)

## Fish Observations

**Species:** adult spawning sockeye salmon **Life History:** Obligate anadromous population

**Total Fish Observed:** 50 **Fish Measured:** **Fork Lengths (mm)** **Min.:** **Max:** **Average:**

**Sampling method (No. of fish):** A (50)

**Comments:**

**Species:** adult sockeye salmon **Life History:** Obligate anadromous population

**Total Fish Observed:** 500 **Fish Measured:** **Fork Lengths (mm)** **Min.:** **Max:** **Average:**

**Sampling method (No. of fish):** A (500)

**Comments:**

**Station** 07B07

P8150050.jpg

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**Station** 07B09

**Survey Team:** Christine Woll, Daniel Chythlook, Keenan Troll, Damon Allen **Date/Time:** 08/15/2014 1:07 PM

## Geographic Information

**Elevation (m):** 27 **Point Coordinates (decimal degrees)** **Latitude** 59.82910 **Longitude** -153.77163

**Datum:** WGS84

**Coordinate Determination Method:** Non-Differential GPS Field Measurement

**USGS Quadrangle:** Iliamna D-3

**Waterbody Name:** **Legal Description:** Section 16, T. 4 S., R. 26 W., S.M.

**Anadromous Waters Catalog Number:** 324-10-10150-2402-3025

**Geographic Comments:**

## Stream Characteristics

**Water Temp (C):** **DO (ppm):** **Conductivity (µS/cm):** **Turbidity (NTU)** **pH:**

**Stream Stage:** **Water Color:**

**48 hr. Precipitation/Runoff:** N/A **Max. velocity (m/s):** **Stream Gradient (%):**

**Substrates Dominant:** **Subdominant:** **Subdominant:**

**Rosgen Class:** () **Channel Dimensions (m):** **OHW** **Wetted Width** **Thalweg Depth**

**Visit Comments:** Aerial observation of adult sockeye salmon only, no habitat or fish community information collected.

## Riparian Vegetation Communities (Viereck et al. 1992)

| Dist. from bank (m) | Left Bank Vegetation Type | Canopy Height (m) | Right Bank Vegetation Type | Canopy Height (m) |
|---|---|---|---|---|
| 0 - 5 | | | | |
| 5 - 10 | | | | |
| 10 - 20 | | | | |
| 20 - 30 | | | | |

## Fish Sampling Efforts

**Gear Type:** Visual Observation, Helicopter (A)

**EF Time (sec.)** **Efficiency:** N/A **Voltage (V):** **Frequency (Hz)**

**Channel Type:** Main Channel (>50% of water flow)

## Fish Observations

**Species:** adult spawning sockeye salmon **Life History:** Obligate anadromous population

**Total Fish Observed:** 600 **Fish Measured:** **Fork Lengths (mm)** **Min.:** **Max:** **Average:**

**Sampling method (No. of fish):** A (600)

**Comments:**

**Species:** adult sockeye salmon **Life History:** Obligate anadromous population

**Total Fish Observed:** 250 **Fish Measured:** **Fork Lengths (mm)** **Min.:** **Max:** **Average:**

**Sampling method (No. of fish):** A (250)

**Comments:**

**Station** 07B09

P8150017.jpg

**Station** 07B10

**Survey Team:** Christine Woll, Daniel Chythlook, Keenan Troll, Damon Allen **Date/Time:** 08/15/2014 1:07 PM

## Geographic Information

**Elevation (m):** 32 **Point Coordinates (decimal degrees)** **Latitude** 59.82954 **Longitude** -153.76281

**Datum:** WGS84

**Coordinate Determination Method:** Non-Differential GPS Field Measurement

**USGS Quadrangle:** Iliamna D-3

**Waterbody Name:** Iliamna River **Legal Description:** Section 16, T. 4 S., R. 26 W., S.M.

**Anadromous Waters Catalog Number:** 324-10-10150-2402

**Geographic Comments:**

## Stream Characteristics

**Water Temp (C):** **DO (ppm):** **Conductivity (µS/cm):** **Turbidity (NTU)** **pH:**

**Stream Stage:** **Water Color:**

**48 hr. Precipitation/Runoff:** N/A **Max. velocity (m/s):** **Stream Gradient (%):**

**Substrates Dominant:** **Subdominant:** **Subdominant:**

**Rosgen Class:** () **Channel Dimensions (m):** **OHW** **Wetted Width** **Thalweg Depth**

**Visit Comments:** Aerial observation of adult sockeye salmon only, no habitat or fish community information collected.

## Riparian Vegetation Communities (Viereck et al. 1992)

| Dist. from bank (m) | Left Bank Vegetation Type | Canopy Height (m) | Right Bank Vegetation Type | Canopy Height (m) |
|---|---|---|---|---|
| 0 - 5 | | | | |
| 5 - 10 | | | | |
| 10 - 20 | | | | |
| 20 - 30 | | | | |

## Fish Sampling Efforts

**Gear Type:** Visual Observation, Helicopter (A)

**EF Time (sec.)** **Efficiency:** N/A **Voltage (V):** **Frequency (Hz)**

**Channel Type:** Main Channel (>50% of water flow)

## Fish Observations

**Species:** adult spawning sockeye salmon **Life History:** Obligate anadromous population

**Total Fish Observed:** 200 **Fish Measured:** **Fork Lengths (mm)** **Min.:** **Max:** **Average:**

**Sampling method (No. of fish):** A (200)

**Comments:**

**Species:** adult sockeye salmon **Life History:** Obligate anadromous population

**Total Fish Observed:** 150 **Fish Measured:** **Fork Lengths (mm)** **Min.:** **Max:** **Average:**

**Sampling method (No. of fish):** A (150)

**Comments:**

**Station** 07B10

P8150018.jpg

**Station** 07B11

**Survey Team:** Christine Woll, Daniel Chythlook, Keenan Troll, Damon Allen **Date/Time:** 08/15/2014 1:07 PM

## Geographic Information

**Elevation (m):** 44 **Point Coordinates (decimal degrees)** **Latitude** 59.82950 **Longitude** -153.75528

**Datum:** WGS84

**Coordinate Determination Method:** Non-Differential GPS Field Measurement

**USGS Quadrangle:** Iliamna D-3

**Waterbody Name:** Iliamna River **Legal Description:** Section 16, T. 4 S., R. 26 W., S.M.

**Anadromous Waters Catalog Number:** 324-10-10150-2402

**Geographic Comments:**

## Stream Characteristics

**Water Temp (C):** **DO (ppm):** **Conductivity (µS/cm):** **Turbidity (NTU)** **pH:**

**Stream Stage:** **Water Color:**

**48 hr. Precipitation/Runoff:** N/A **Max. velocity (m/s):** **Stream Gradient (%):**

**Substrates Dominant:** **Subdominant:** **Subdominant:**

**Rosgen Class:** () **Channel Dimensions (m):** **OHW** **Wetted Width** **Thalweg Depth**

**Visit Comments:** Aerial observation of adult sockeye salmon only, no habitat or fish community information collected.

## Riparian Vegetation Communities (Viereck et al. 1992)

| Dist. from bank (m) | Left Bank Vegetation Type | Canopy Height (m) | Right Bank Vegetation Type | Canopy Height (m) |
|---|---|---|---|---|
| 0 - 5 | | | | |
| 5 - 10 | | | | |
| 10 - 20 | | | | |
| 20 - 30 | | | | |

## Fish Sampling Efforts

**Gear Type:** Visual Observation, Helicopter (A)

**EF Time (sec.)** **Efficiency:** N/A **Voltage (V):** **Frequency (Hz)**

**Channel Type:** Main Channel (>50% of water flow)

## Fish Observations

**Species:** adult spawning sockeye salmon **Life History:** Obligate anadromous population

**Total Fish Observed:** 250 **Fish Measured:** **Fork Lengths (mm)** **Min.:** **Max:** **Average:**

**Sampling method (No. of fish):** A (250)

**Comments:**

**Species:** adult sockeye salmon **Life History:** Obligate anadromous population

**Total Fish Observed:** 350 **Fish Measured:** **Fork Lengths (mm)** **Min.:** **Max:** **Average:**

**Sampling method (No. of fish):** A (350)

**Comments:**

**Station** 07B11

P8150019.jpg

**Station** 07B12

**Survey Team:** Christine Woll, Daniel Chythlook, Keenan Troll, Damon Allen **Date/Time:** 08/15/2014 1:07 PM

## Geographic Information

**Elevation (m):** 45 **Point Coordinates (decimal degrees)** **Latitude** 59.82880 **Longitude** -153.74709

**Datum:** WGS84

**Coordinate Determination Method:** Non-Differential GPS Field Measurement

**USGS Quadrangle:** Iliamna D-2

**Waterbody Name:** Iliamna River **Legal Description:** Section 16, T. 4 S., R. 26 W., S.M.

**Anadromous Waters Catalog Number:** 324-10-10150-2402

**Geographic Comments:**

## Stream Characteristics

**Water Temp (C):** **DO (ppm):** **Conductivity (µS/cm):** **Turbidity (NTU)** **pH:**

**Stream Stage:** **Water Color:**

**48 hr. Precipitation/Runoff:** N/A **Max. velocity (m/s):** **Stream Gradient (%):**

**Substrates Dominant:** **Subdominant:** **Subdominant:**

**Rosgen Class:** ()

**Channel Dimensions (m):** **OHW** **Wetted Width** **Thalweg Depth**

**Visit Comments:** Aerial observation of adult sockeye salmon only, no habitat or fish community information collected.

## Riparian Vegetation Communities (Viereck et al. 1992)

| Dist. from bank (m) | Left Bank Vegetation Type | Canopy Height (m) | Right Bank Vegetation Type | Canopy Height (m) |
|---|---|---|---|---|
| 0 - 5 | | | | |
| 5 - 10 | | | | |
| 10 - 20 | | | | |
| 20 - 30 | | | | |

## Fish Sampling Efforts

**Gear Type:** Visual Observation, Helicopter (A)

**EF Time (sec.)** **Efficiency:** N/A **Voltage (V):** **Frequency (Hz)**

**Channel Type:** Main Channel (>50% of water flow)

## Fish Observations

**Species:** adult spawning sockeye salmon **Life History:** Obligate anadromous population

**Total Fish Observed:** 50 **Fish Measured:** **Fork Lengths (mm)** **Min.:** **Max:** **Average:**

**Sampling method (No. of fish):** A (50)

**Comments:**

**Species:** adult sockeye salmon **Life History:** Obligate anadromous population

**Total Fish Observed:** 50 **Fish Measured:** **Fork Lengths (mm)** **Min.:** **Max:** **Average:**

**Sampling method (No. of fish):** A (50)

**Comments:**

**Station** 07B12

P8150020.jpg

**Station** 07B13

**Survey Team:** Christine Woll, Daniel Chythlook, Keenan Troll, Damon Allen **Date/Time:** 08/15/2014 1:07 PM

## Geographic Information

**Elevation (m):** 44 **Point Coordinates (decimal degrees)** **Latitude** 59.82837 **Longitude** -153.74425

**Datum:** WGS84

**Coordinate Determination Method:** Non-Differential GPS Field Measurement

**USGS Quadrangle:** Iliamna D-2

**Waterbody Name:** Iliamna River **Legal Description:** Section 16, T. 4 S., R. 26 W., S.M.

**Anadromous Waters Catalog Number:** 324-10-10150-2402

**Geographic Comments:**

## Stream Characteristics

**Water Temp (C):** **DO (ppm):** **Conductivity (µS/cm):** **Turbidity (NTU)** **pH:**

**Stream Stage:** **Water Color:**

**48 hr. Precipitation/Runoff:** N/A **Max. velocity (m/s):** **Stream Gradient (%):**

**Substrates Dominant:** **Subdominant:** **Subdominant:**

**Rosgen Class:** ()

**Channel Dimensions (m):** **OHW** **Wetted Width** **Thalweg Depth**

**Visit Comments:** Aerial observation of adult sockeye salmon only, no habitat or fish community information collected.

## Riparian Vegetation Communities (Viereck et al. 1992)

| Dist. from bank (m) | Left Bank Vegetation Type | Canopy Height (m) | Right Bank Vegetation Type | Canopy Height (m) |
|---|---|---|---|---|
| 0 - 5 | | | | |
| 5 - 10 | | | | |
| 10 - 20 | | | | |
| 20 - 30 | | | | |

## Fish Sampling Efforts

**Gear Type:** Visual Observation, Helicopter (A)

**EF Time (sec.)** **Efficiency:** N/A **Voltage (V):** **Frequency (Hz)**

**Channel Type:** Main Channel (>50% of water flow)

## Fish Observations

**Species:** adult spawning sockeye salmon **Life History:** Obligate anadromous population

**Total Fish Observed:** 100 **Fish Measured:** **Fork Lengths (mm)** **Min.:** **Max:** **Average:**

**Sampling method (No. of fish):** A (100)

**Comments:**

**Species:** adult sockeye salmon **Life History:** Obligate anadromous population

**Total Fish Observed:** 300 **Fish Measured:** **Fork Lengths (mm)** **Min.:** **Max:** **Average:**

**Sampling method (No. of fish):** A (300)

**Comments:**

**Station** 07B13

P8150021.jpg

**Station** 07B14

**Survey Team:** Christine Woll, Daniel Chythlook, Keenan Troll, Damon Allen **Date/Time:** 08/15/2014 1:08 PM

## Geographic Information

**Elevation (m):** 42 **Point Coordinates (decimal degrees)** **Latitude** 59.82706 **Longitude** -153.72371

**Datum:** WGS84

**Coordinate Determination Method:** Non-Differential GPS Field Measurement

**USGS Quadrangle:** Iliamna D-2

**Waterbody Name:** Iliamna River **Legal Description:** Section 15, T. 4 S., R. 26 W., S.M.

**Anadromous Waters Catalog Number:** 324-10-10150-2402

**Geographic Comments:**

## Stream Characteristics

**Water Temp (C):** **DO (ppm):** **Conductivity (µS/cm):** **Turbidity (NTU)** **pH:**

**Stream Stage:** **Water Color:**

**48 hr. Precipitation/Runoff:** N/A **Max. velocity (m/s):** **Stream Gradient (%):**

**Substrates Dominant:** **Subdominant:** **Subdominant:**

**Rosgen Class:** ()

**Channel Dimensions (m):** **OHW** **Wetted Width** **Thalweg Depth**

**Visit Comments:** Aerial observation of adult sockeye salmon only, no habitat or fish community information collected.

## Riparian Vegetation Communities (Viereck et al. 1992)

| Dist. from bank (m) | Left Bank Vegetation Type | Canopy Height (m) | Right Bank Vegetation Type | Canopy Height (m) |
|---|---|---|---|---|
| 0 - 5 | | | | |
| 5 - 10 | | | | |
| 10 - 20 | | | | |
| 20 - 30 | | | | |

## Fish Sampling Efforts

**Gear Type:** Visual Observation, Helicopter (A)

**EF Time (sec.)** **Efficiency:** N/A **Voltage (V):** **Frequency (Hz)**

**Channel Type:** Main Channel (>50% of water flow)

## Fish Observations

**Species:** adult spawning sockeye salmon **Life History:** Obligate anadromous population

**Total Fish Observed:** 125 **Fish Measured:** **Fork Lengths (mm)** **Min.:** **Max:** **Average:**

**Sampling method (No. of fish):** A (125)

**Comments:**

**Station** 07B14

P8150022.jpg

**Station** 07B15

**Survey Team:** Christine Woll, Daniel Chythlook, Keenan Troll, Damon Allen **Date/Time:** 08/15/2014 1:08 PM

## Geographic Information

**Elevation (m):** 52 **Point Coordinates (decimal degrees)** **Latitude** 59.82964 **Longitude** -153.69246

**Datum:** WGS84

**Coordinate Determination Method:** Non-Differential GPS Field Measurement

**USGS Quadrangle:** Iliamna D-2

**Waterbody Name:** Iliamna River **Legal Description:** Section 14, T. 4 S., R. 26 W., S.M.

**Anadromous Waters Catalog Number:** 324-10-10150-2402

**Geographic Comments:**

## Stream Characteristics

**Water Temp (C):** **DO (ppm):** **Conductivity (µS/cm):** **Turbidity (NTU)** **pH:**

**Stream Stage:** **Water Color:**

**48 hr. Precipitation/Runoff:** N/A **Max. velocity (m/s):** **Stream Gradient (%):**

**Substrates Dominant:** **Subdominant:** **Subdominant:**

**Rosgen Class:** () **Channel Dimensions (m):** **OHW** **Wetted Width** **Thalweg Depth**

**Visit Comments:** Aerial observation of adult sockeye salmon only, no habitat or fish community information collected.

## Riparian Vegetation Communities (Viereck et al. 1992)

| Dist. from bank (m) | Left Bank Vegetation Type | Canopy Height (m) | Right Bank Vegetation Type | Canopy Height (m) |
|---|---|---|---|---|
| 0 - 5 | | | | |
| 5 - 10 | | | | |
| 10 - 20 | | | | |
| 20 - 30 | | | | |

## Fish Sampling Efforts

**Gear Type:** Visual Observation, Helicopter (A)

**EF Time (sec.)** **Efficiency:** N/A **Voltage (V):** **Frequency (Hz)**

**Channel Type:** Main Channel (>50% of water flow)

## Fish Observations

**Species:** adult spawning sockeye salmon **Life History:** Obligate anadromous population

**Total Fish Observed:** 100 **Fish Measured:** **Fork Lengths (mm)** **Min.:** **Max:** **Average:**

**Sampling method (No. of fish):** A (100)

**Comments:**

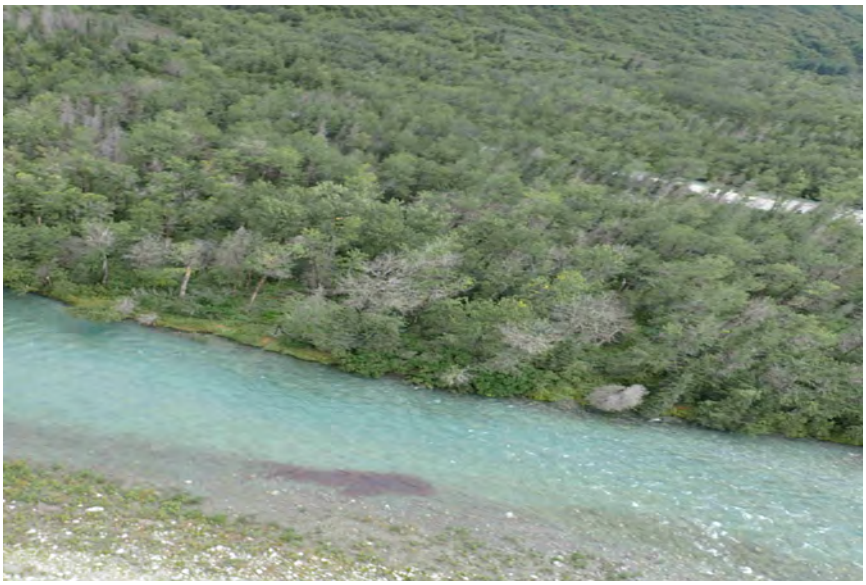
**Species:** adult sockeye salmon **Life History:** Obligate anadromous population

**Total Fish Observed:** 200 **Fish Measured:** **Fork Lengths (mm)** **Min.:** **Max:** **Average:**

**Sampling method (No. of fish):** A (200)

**Comments:**

**Station** 07B15



P8150023.jpg

**Station** 07F01

**Survey Team:** Michael Wiedmer, Colin Shaney, Sue Flensburg, Damon Allen **Date/Time:** 08/15/2014 12:18 PM

## Geographic Information

**Elevation (m):** 64 **Point Coordinates (decimal degrees)** **Latitude** 59.72493 **Longitude** -153.92635

**Datum:** WGS84

**Coordinate Determination Method:** Non-Differential GPS Field Measurement

**USGS Quadrangle:** Iliamna C-3

**Waterbody Name:** **Legal Description:** Section 19, T. 5 S., R. 27 W., S.M.

**Anadromous Waters Catalog Number:** 324-10-10150-2402-3006

**Geographic Comments:** Waterfall

## Stream Characteristics

**Water Temp (C):** **DO (ppm):** **Conductivity (µS/cm):** **Turbidity (NTU)** **pH:**

**Stream Stage:** **Water Color:**

**48 hr. Precipitation/Runoff:** N/A **Max. velocity (m/s):** **Stream Gradient (%):**

**Substrates Dominant:** **Subdominant:** **Subdominant:**

**Rosgen Class:** ()

**Channel Dimensions (m):** **OHW Width** **Wetted Thalweg Depth**

**Visit Comments:** Aerial observation of a migratory barrier waterfall. No other fish community or habitat information collected. Two ~15 m falls, with substantial cascades both upstream and downstream.

## Riparian Vegetation Communities (Viereck et al. 1992)

| Dist. from bank (m) | Left Bank Vegetation Type | Canopy Height (m) | Right Bank Vegetation Type | Canopy Height (m) |
|---|---|---|---|---|
| 0 - 5 | | | | |
| 5 - 10 | | | | |
| 10 - 20 | | | | |
| 20 - 30 | | | | |

## Fish Sampling Efforts

**Gear Type:** Visual Observation, Helicopter (A)

**EF Time (sec.)** **Efficiency:** N/A **Voltage (V):** **Frequency (Hz)**

**Channel Type:** Main Channel (>50% of water flow)

**Station** 07F01

DSC_0832.jpg

DSC_0840.jpg

**Station** 07F02

**Survey Team:** Michael Wiedmer, Colin Shaney, Sue Flensburg, Damon Allen **Date/Time:** 08/15/2014 12:23 PM

## Geographic Information

**Elevation (m):** 64
**Datum:** WGS84
**Point Coordinates (decimal degrees)** **Latitude** 59.72631 **Longitude** -153.86656
**Coordinate Determination Method:** Non-Differential GPS Field Measurement
**USGS Quadrangle:** Iliamna C-3
**Waterbody Name:**
**Legal Description:** Section 22, T. 5 S., R. 27 W., S.M.
**Anadromous Waters Catalog Number:**
**Geographic Comments:** Waterfall

## Stream Characteristics

**Water Temp (C):** **DO (ppm):** **Conductivity (µS/cm):** **Turbidity (NTU)** **pH:**
**Stream Stage:** **Water Color:**
**48 hr. Precipitation/Runoff:** N/A **Max. velocity (m/s):** **Stream Gradient (%):**
**Substrates Dominant:** **Subdominant:** **Subdominant:**
**Rosgen Class:** ()
**Channel Dimensions (m):** **OHW Width** **Wetted Thalweg Depth**

**Visit Comments:** Aerial observation of a migratory barrier waterfall. No other fish community or habitat information collected.

## Riparian Vegetation Communities (Viereck et al. 1992)

| Dist. from bank (m) | Left Bank Vegetation Type | Canopy Height (m) | Right Bank Vegetation Type | Canopy Height (m) |
|---|---|---|---|---|
| 0 - 5 | | | | |
| 5 - 10 | | | | |
| 10 - 20 | | | | |
| 20 - 30 | | | | |

## Fish Sampling Efforts

**Gear Type:** Visual Observation, Helicopter (A)
**EF Time (sec.)** **Efficiency:** N/A **Voltage (V):** **Frequency (Hz)**
**Channel Type:** Main Channel (>50% of water flow)

**Station** 07F02

DSC_0767.jpg

DSC_0768.jpg

**Station** 11A01

**Survey Team:** Michael Wiedmer, Daniel Young, Olivia Olin **Date/Time:** 08/20/2014 11:27 AM

## Geographic Information

**Elevation (m):** 20 **Point Coordinates (decimal degrees)** **Latitude** 59.84472 **Longitude** -153.85806
**Datum:** WGS84
**Coordinate Determination Method:** Non-Differential GPS Field Measurement
**USGS Quadrangle:** Iliamna D-3
**Waterbody Name:** **Legal Description:** Section 11, T. 4 S., R. 27 W., S.M.
**Anadromous Waters Catalog Number:**
**Geographic Comments:**

## Stream Characteristics

**Water Temp (C):** 8.05 **DO (ppm):** 11.91 **Conductivity (µS/cm):** 21 **Turbidity (NTU)** 0 **pH:** 7.0
**Stream Stage:** Medium **Water Color:** Clear
**48 hr. Precipitation/Runoff:** Moderate **Max. velocity (m/s):** 1.3594 **Stream Gradient (%):** 1
**Substrates Dominant:** Cobble **Subdominant:** Boulder **Subdominant:** Gravel
**Rosgen Class:** C3 (Low gradient, meandering, point-bar, riffle/pool, alluvial channels with broad, well-defined floodplains.)

| Channel Dimensions (m): | OHW | Wetted |
|---|---|---|
| Width | 31 | 20.5 |
| Thalweg Depth | 1.1 | 0.70 |

**Visit Comments:** Thousands of adult sockeye in tributary and at mouth. No sockeye observed on this date in the Pile River upstream of this confluence. The tributary is clear water, the Pile River is glacially turbid--sockeye spawning in glacial systems is often later than in clear water (D. Young, Lake Clark NPS).

## Riparian Vegetation Communities (Viereck et al. 1992)

| Dist. from bank (m) | Left Bank Vegetation Type | Canopy Height (m) | Right Bank Vegetation Type | Canopy Height (m) |
|---|---|---|---|---|
| 0 - 5 | Closed White Spruce-Paper Birch-Balsam Poplar | 11 | Closed Spruce-Paper Birch Forest | 11 |
| 5 - 10 | Closed White Spruce-Paper Birch-Balsam Poplar | 11 | Closed Spruce-Paper Birch Forest | 11 |
| 10 - 20 | Closed White Spruce-Paper Birch-Balsam Poplar | 11 | Closed Spruce-Paper Birch Forest | 11 |
| 20 - 30 | Closed White Spruce-Paper Birch-Balsam Poplar | 11 | Closed Spruce-Paper Birch Forest | 11 |

## Fish Sampling Efforts

**Gear Type:** Portable Electrofisher (A)
**EF Time (sec.)** 433 **Efficiency:** Fair **Voltage (V):** 990 **Frequency (Hz)** 30
**Channel Type:** Main Channel (>50% of water flow)

**Gear Type:** Visual Observation, Ground (B)
**EF Time (sec.)** **Efficiency:** N/A **Voltage (V):** **Frequency (Hz)**
**Channel Type:** Main Channel (>50% of water flow)

## Fish Observations

**Species:** adult sculpin-unspecified **Life History:** Resident
**Total Fish Observed:** 1 **Fish Measured:** **Fork Lengths (mm) Min.:** **Max:** **Average:**
**Sampling method (No. of fish):** B (1)
**Comments:**

**Species:** carcass sockeye salmon **Life History:** Obligate anadromous population
**Total Fish Observed:** 4 **Fish Measured:** **Fork Lengths (mm) Min.:** **Max:** **Average:**
**Sampling method (No. of fish):** B (4)
**Comments:**

**Species:** adult spawning sockeye salmon **Life History:** Obligate anadromous population
**Total Fish Observed:** 500 **Fish Measured:** **Fork Lengths (mm) Min.:** **Max:** **Average:**
**Sampling method (No. of fish):** B (500)
**Comments:**

**Station** 11A01

**Species:** adult slimy sculpin **Life History:** Resident
**Total Fish Observed:** 1 **Fish Measured:** 1 **Fork Lengths (mm) Min.:** 93 **Max:** 93 **Average:** 93
**Sampling method (No. of fish):** A (1)
**Comments:**

**Station** 11A01

DSC_1328.jpg

DSC_1329.jpg

DSC_1340.jpg

C:\HR_Pr

**Station** 11A01

DSC_1345.jpg

DSCF2380.jpg

C:\HR_Pr

**Station** 11F01

**Survey Team:** Michael Wiedmer **Date/Time:** 08/20/2014 10:59 AM

## Geographic Information

**Elevation (m):** 98 **Point Coordinates (decimal degrees)** **Latitude** 59.84926 **Longitude** -153.88025

**Datum:** WGS84

**Coordinate Determination Method:** Non-Differential GPS Field Measurement

**USGS Quadrangle:** Iliamna D-3

**Waterbody Name:** **Legal Description:** Section 11, T. 4 S., R. 27 W., S.M.

**Anadromous Waters Catalog Number:**

**Geographic Comments:** Waterfall

## Stream Characteristics

**Water Temp (C):** **DO (ppm):** **Conductivity (µS/cm):** **Turbidity (NTU)** **pH:**

**Stream Stage:** **Water Color:**

**48 hr. Precipitation/Runoff:** N/A **Max. velocity (m/s):** **Stream Gradient (%):**

**Substrates Dominant:** **Subdominant:** **Subdominant:**

**Rosgen Class:** ()

**Channel Dimensions (m):** **OHW** **Wetted**

**Width**

**Thalweg Depth**

**Visit Comments:** Ultimate upstream migratory barrier on this unnamed tributary to Pile River. A narrow chute 0.5 km downstream (FSB1411F02) marked the upstream-most observation of adult sockeye salmon on this date, but that hydraulic feature maybe passable during certain flows. The falls at this location (11F01) are not passable under any flow conditions. Aerial observation only, no fish or other habitat information collected.

## Riparian Vegetation Communities (Viereck et al. 1992)

| Dist. from bank (m) | Left Bank Vegetation Type | Canopy Height (m) | Right Bank Vegetation Type | Canopy Height (m) |
|---|---|---|---|---|
| 0 - 5 | | | | |
| 5 - 10 | | | | |
| 10 - 20 | | | | |
| 20 - 30 | | | | |

## Fish Sampling Efforts

**Gear Type:** Visual Observation, Helicopter (A)

**EF Time (sec.)** **Efficiency:** N/A **Voltage (V):** **Frequency (Hz)**

**Channel Type:** Main Channel (>50% of water flow)

**Station** 11F01

DSC_1310.jpg

DSC_1312.jpg

**Station** 11F02

**Survey Team:** Michael Wiedmer **Date/Time:** 08/20/2014 11:01 AM

## Geographic Information

**Elevation (m):** 58 **Point Coordinates (decimal degrees)** **Latitude** 59.84645 **Longitude** -153.87757
**Datum:** WGS84
**Coordinate Determination Method:** Non-Differential GPS Field Measurement
**USGS Quadrangle:** Iliamna D-3
**Waterbody Name:** **Legal Description:** Section 11, T. 4 S., R. 27 W., S.M.
**Anadromous Waters Catalog Number:**
**Geographic Comments:** Waterfall

## Stream Characteristics

**Water Temp (C):** **DO (ppm):** **Conductivity (µS/cm):** **Turbidity (NTU)** **pH:**
**Stream Stage:** **Water Color:**
**48 hr. Precipitation/Runoff:** N/A **Max. velocity (m/s):** **Stream Gradient (%):**
**Substrates Dominant:** **Subdominant:** **Subdominant:**
**Rosgen Class:** () **Channel Dimensions (m):** **OHW** **Wetted Width** **Thalweg Depth**

**Visit Comments:** Aerial observation of the upsteam-most adult sockeye salmon in this unnamed tributary to the Pile River. Twenty adult sockeye salmon observed at base of falls. The falls/chute at this location marked the furthest upstream observation of sockeye, but this hydrologic feature maybe passable under certain conditions. The falls upstream at FSB1411A01 is not passable under any conditions. Aerial observation only, no other fish community or habitat information collected.

## Riparian Vegetation Communities (Viereck et al. 1992)

| Dist. from bank (m) | Left Bank Vegetation Type | Canopy Height (m) | Right Bank Vegetation Type | Canopy Height (m) |
|---|---|---|---|---|
| 0 - 5 | | | | |
| 5 - 10 | | | | |
| 10 - 20 | | | | |
| 20 - 30 | | | | |

## Fish Sampling Efforts

**Gear Type:** Visual Observation, Helicopter (A)
**EF Time (sec.)** **Efficiency:** N/A **Voltage (V):** **Frequency (Hz)**
**Channel Type:** Main Channel (>50% of water flow)

## Fish Observations

**Species:** adult spawning sockeye salmon **Life History:** Obligate anadromous population
**Total Fish Observed:** 7500 **Fish Measured:** **Fork Lengths (mm)** **Min.:** **Max:** **Average:**
**Sampling method (No. of fish):** A (7500)
**Comments:**

**Species:** adult sockeye salmon **Life History:** Obligate anadromous population
**Total Fish Observed:** 20 **Fish Measured:** **Fork Lengths (mm)** **Min.:** **Max:** **Average:**
**Sampling method (No. of fish):** A (20)
**Comments:**

**Station** 11F02

DSC_1306.jpg

DSC_1307.jpg

DSC_1308.jpg

C:\HR_Pr