# Alaska Sustainable Salmon Fund
# Statement of Work

*Revision #1: Extend end date to 5/31/18*

**I. Project Title:** Slikok Creek Flow Protection

**II. Project Number:** 44154

**III. Principal Investigator**

Jeff Sires, Environmental Scientist
Kenai Watershed Forum (KWF)
44129 Sterling Highway
Soldotna, Alaska 99669
907-260-5449 x1207
jeff@kenaiwatershed.org

Branden Bornemann, former PI

**IV. Project Period:** 3/1/15 – 5/31/18

**V. AKSSF Objective:** 1A-1 **PCSRF Objective:** HP&R

**VI. Project Description**

1. Synopsis

   Slikok Creek is an important salmon producing water body on the Kenai Peninsula. This project will quantify and evaluate Slikok Creek's instream flow regime in order to prepare and submit a reservation of water (ROW) application, ensuring sufficient water flow to support its salmon populations.

2. Introduction

   The integrity of freshwater and estuarine ecosystems depends upon adequate quantity, quality, and timing and temporal variability of water flow. This is especially important for Alaska's Kenai Peninsula (KP), which supports numerous anadromous water bodies that provide the ecological, economic, and societal goods and services that much of the Peninsula relies upon in varying capacities. Natural resource managers on the KP are faced with balancing the often conflicting needs of a growing population and the sustainability of naturally dynamic freshwater ecosystems. At the most fundamental level, sustainable resource management of the KP's anadromous waters requires a holistic approach to understanding the natural flow regime essential to the propagation of healthy salmon populations.

   Natural flow regimes are defined by the interaction of five critical hydrologic components: magnitude, frequency, duration, timing, and rate of change. Limited hydrologic data exist throughout the KP and historical data that does exist tends to be insufficient for properly capturing the natural flow regime of dynamic anadromous freshwater ecosystems. Understanding and quantifying natural flow regimes is a broadly accepted and necessary step in sustaining native biodiversity and ecosystem

integrity in rivers. Under Alaska law, specifically the Water Use Act (AS 46.15.), natural flow regime data (water quantity) is required to determine water availability and needs for protection of fish and wildlife habitat, migration or propagation, recreation, navigation, or water quality purposes.

To reserve water under Alaska law, an application which contains supporting data and analysis that demonstrates the need for the amount of water being requested must be submitted to the Alaska Department of Natural Resources (AK DNR) for adjudication. AK DNR requires a minimum of five years of hydrologic data to describe the natural variation in hydrologic pattern for a specific stream system.

Slikok Creek on the KP represents a significant freshwater anadromous stream experiencing varying rates of anthropogenic and ecosystem change, both of which have the ability to significantly impact natural flow regimes and, as a result, salmon populations. KWF has established a stream gage on this freshwater system and has been monitoring flow when resources allow. Continuation of this monitoring will result in a more holistic understanding of its unique natural flow regime and submission of a ROW.

3. Location
   Site: Slikok Creek Staff Gauge
   Latitude: 60.482269 N Longitude: 151.133083 W

## VII. Objective

Prepare and submit an ROW to protect salmon habitat on Slikok Creek

## VIII. Methods

Stream gaging involves the collection of three main data sets: 1) stream stage, usually obtained using survey leveling techniques and expressed as height or elevation of surface water relative to nearby benchmark; 2) instantaneous flow or discharge, which is usually measured over a range of flows or stage several times per year; and 3) a “continuous” data set that is achieved by using a submersible pressure sensor and data logger to automatically measure and record (usually at 15-minute intervals) water depth which can be calibrated to the stage or surface water elevation data. Stream flow, expressed in terms of volume of water per unit of time, is calculated by determining the relationship between surveyed stage and discharge known as a rating curve or rating. This stage-discharge relationship is a power function; therefore a log-log transformation of the data and linear regression is used to solve for the stage-discharge parameters.

The basic unit of measure for stream flow characterization and reporting is mean daily flow expressed in terms of volume, usually cubic feet (or meters) per second. Mean daily flows are used for a variety of other metrics that describe the natural flow regime. The primary descriptors of natural flow regime include timing (when or seasonality), duration (how much time is the flow at or higher than a specific value), frequency, rate of change, and magnitude. Mean monthly (or weekly), mean annual, and monthly flow duration are the most common of these expressions or statistics.

After the collection and analysis of flow data on Slikok Creek, KWF will evaluate the data and create an annual hydrograph outlining the measured and estimated monthly flow for Slikok Creek. KWF will then use this data, along with additional environmental data such as a fish species periodicity chart, to apply to AK DNR for a reservation of water for the protection of fish and wildlife habitat, migration, and propagation.

## IX. Benefits

This project will provide long-term habitat protection by legally reserving a sufficient natural flow regime in Slikok Creek to sustain existing salmon habitat and production.

## X. Products, Milestones, and Timelines *Revised with Revision #1*

- March 1, 2015 – December 31, 2015: Conduct 12 site visits over a diverse transect of flow regimes in order to quantify instream flow at the Slikok Creek staff gage
- January 1, 2016 – January 15, 2016: Summarize stream gage, instantaneous discharge measurements, and continuous pressure level sensor (PLS) data collected during 2015 for Slikok Creek
- January 18, 2016 – December 31, 2016: Conduct 12 site visits over a diverse transect of flow regimes in order to quantify instream flow at the Slikok Creek staff gage
- January 2, 2017 – January 16, 2017: Summarize stream gage, instantaneous discharge measurements, and continuous PLS data collected during 2016 for Slikok Creek
- February 1, 2017 – October 31, 2017: Conduct 12 site visits over a diverse transect of flow regimes in order to quantify instream flow at the Slikok Creek staff gage
- January 2, 2018 – January 31, 2018: Summarize stream gage, instantaneous discharge measurements, and continuous PLS data collected during 2017 for Slikok Creek site
- February 1, 2018 – April 30, 2018: Prepare and submit application for Slikok Creek ROW to AK DNR
- May 1, 2018 – May 31, 2018: Provide final project report to AKSSF, including a water quantity status report and a submitted ROW application

## XI. Budget

| KWF Budget | Total |
|---|---|
| 100 Personnel | $44,262 |
| 200 Travel | $142 |
| 300 Contractual | $0 |
| 400 Supplies | $0 |
| 500 Equipment | $0 |
| Subtotal | $44,404 |
| 600 Indirect @ 19.71% | $8,752 |
| Total | $53,156 |

KWF Budget Narrative:

Line 100: Personnel ($44,262)

- Branden Bornemann, KWF Environmental Scientist, will oversee data collection, data management, and project reporting and will submit the ROW application: 648 hours @ $38.18/hour = $24,740.

- The KWF Environmental Specialist will assist with data collection, data management, and project reporting: 408 hours @ $31.44/hour = $12,828.
- Robert Ruffner, KWF Executive Director, will QA/QC data collection, assist with stream gage maintenance, review data management, and complete project reporting: 130 hours @ $51.29/hour = $6,694.

Line 200: Travel ($142)
Branden Bornemann and the KWF Environmental Specialist will travel to the Slikok Creek site 12 times per year for three years to measure stream flow and maintain staff gage:

- Fuel: $142

Line 600: Indirect ($8,752)
KWF's federally negotiated indirect rate through December 31, 2015, is 19.71% on salaries and fringe benefits and excludes equipment, tuition, and contracts over $25,000.

## XII. Match Budget

| KWF Match (35%) | Total |
|---|---|
| 100 Personnel | $0 |
| 200 Travel | $6,480 |
| 300 Contractual | $6,540 |
| 400 Supplies | $0 |
| 500 Equipment | $5,585 |
| Total | $18,605 |

KWF Match Budget Narrative:

Line 200: Travel ($6,480)

- Vehicle: 12/year days @ $180/day x 3 years = $6,480

Line 300: Contractual ($6,540)

- AK DNR ROW application fee: $1,500
- Sontek Flow Tracker: 12 days/year @ $140/day x 3 years = $5,040

Line 500: Equipment ($5,585)

- OTT PLS Remote Station : $5,585