

Alaska Sustainable Salmon Fund Statement of Work

I. Project Title: Instream Flow Protection: Southwest Alaska - Phase 2

II. Project Number: 54015

III. Principal Investigator

Ann Marie Larquier, Habitat Biologist III
Alaska Department of Fish and Game
Division of Sport Fish/RTS
333 Raspberry Rd
Anchorage, AK 99518-1599
907-267-2311
ann.larquier@alaska.gov

IV. Project Period: 7/1/21 – 6/30/23

V. AKSSF Objective: Instream flow protection **PCSRF Objective:** P&A

VI. Project Description

1. Synopsis

This project will quantify and protect instream flows for important salmon-producing rivers in Southwest Alaska (SW AK). Planned activities include hydrologic data collection for the purpose of preparing and filing reservation of water applications within the Kuskokwim River watershed, specifically the Aniak River and its tributaries, as well as additional mainstem tributaries including the Holitna and Stony Rivers in the middle Kuskokwim area up river from Aniak (Figures 1-3).

2. Introduction

The rivers of SW AK support some of North America’s most productive sport, commercial, and subsistence salmon fisheries. Salmon migration, spawning, rearing, and, ultimately, production in these waterbodies depend on sufficient seasonal quantities of water. The purpose of this project is to quantify and reserve instream flows needed to attain long-term protection and conservation of salmon habitat in SW AK rivers.

The primary mechanism that will be used in this project to reserve and protect instream flows is the Alaska Water Use Act (AS 46.15). The Alaska legislature amended this Act in 1980 in recognition of the economic, social, and other benefits of retaining water in rivers and lakes. This amendment provides the opportunity for government agencies, as well as non-governmental, private sector, and public entities or individuals to legally secure reservations of water. Alaska Statute (AS 46.15.145) and regulation (11 AAC 93.141-147) provide the opportunity to maintain instream flow rates in rivers or water levels in lakes for a variety of purposes, including the protection of fish and wildlife habitat, migration, and propagation.

Alaska water law is based on the doctrine of “prior appropriation”, giving the first appropriator of water from a given water source a priority of right over subsequent appropriators on a “first-in-time, first-in-right” basis. With an established water right (in this case, called a Certificate of Reservation), the permittee has a legal standing to assert that right against conflicting uses of water from others who do not have water rights or who are junior in priority. The priority date for reservation of water applications is based on the date they are accepted for filing by the Alaska Department of Natural Resources (DNR). A Certificate of Reservation remains in effect in perpetuity unless DNR determines the purpose for which it was filed has changed or new information demonstrates that a lower amount of water would provide the same level of protection, at which time DNR can amend the reservation.

The main activities of this project include collecting and analyzing the biological and hydrologic data needed to quantify the instream flow requirements of salmon in candidate water bodies and preparing reservation of water applications for filing with the DNR. It continues and expands upon AKSSF project 51011, *Instream Flow Protection: Southwest Alaska – Phase 1*, which funded the first two (of five) years of streamgaging on the Aniak River and discharge measurement (DM) sites on its tributaries.

3. Locations

This project funds an additional two years of operation of a streamgauge on the mainstem of the Aniak River and DM stations on the Doestock and Buckstock rivers (tributaries to the Aniak River) to collect the hydrologic data needed to quantify instream flow. In addition, DM stations will be established on the Holitna and Stony (or similar) rivers. Continuation of a DM station on the Salmon River is contingent on operation of a salmon weir on this tributary by the Native Village of Napaimute (scheduled for 2021; Table 1).

- Aniak River Streamgauge: 61.4983333, -159.3713888
- Doestock River DM station:
61.5327777, -159.3922222
- Buckstock River DM station:
61.3484022, -159.2243061
- Salmon River DM station (tentative):
61.0627176, -159.1940722
- Holitna River (or similar) DM station:
61.5404222, -157.0519444
- Stony River (or similar) DM station:
61.7415139, -156.5872222

Table 1. Summary of proposed hydrologic measurement stations in the Aniak River watershed

Name	Station Type	Proposal
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Aniak River	Streamgauge	Currently installed and operating
Doestock River	DM station	Active DM site
Buckstock River	DM station	Active DM site
Salmon River	DM station	Active DM site; continuation and completion contingent on renewed operation of salmon weir (scheduled for 2021)
Holitna River	Proposed DM station	Proposed 2021
Stony River	Proposed DM station	Proposed 2021

4. Related Projects
51011

VII. Objectives

1. Obtain the biological, hydrologic, and other information needed to quantify instream flow requirements of salmon in priority waterbodies
2. Prepare and file reservation of water applications to protect salmon habitat in priority waterbodies

VIII. Methods

Streamgaging Network

To collect the hydrologic data necessary for reservation of water applications, a streamgaging network will be utilized. A streamgaging network consists of an index streamgauge station that is operated continuously over a long period of time and an associated network of semi-permanent DM stations operated concurrently on nearby waterbodies that are hydrologically similar. The index streamgauge will be in operation for at least five years, during which time instantaneous DMs will be collected concurrently at identified DM stations. Instantaneous discharge data collected at the DM stations will be regressed against corresponding discharge values from the index streamgauge. For sites with robust correlations, a five-year record of continuous streamflow data will be estimated (Klein 2013).

Streamgages are installed and operated by project staff in accordance with standard sampling protocols developed by the United States Geological Survey (USGS; Rantz and others 1982) and ADF&G's Instream Flow Program (Klein 2013) and through consultation with USGS staff and other hydrologists as applicable.

A streamgage is currently being operated on the Aniak River. In conjunction with this streamgage, discharge measurements are being collected at three other stations: Doestock River, Buckstock River, and Salmon River. This project funds two more years of funding to continue operation of the Aniak River streamgaging network from July 1, 2021, through June 30, 2023, as well as collection of initial flow measurements on Kuskokwim River tributaries (Holitna and Stony rivers, or similar) by USGS. Flows at these sites are likely to correlate with the Aniak River streamgage or other USGS streamgages in the middle Kuskokwim area (mainstem Kuskokwim at Lisky's Crossing, mainstem Kuskokwim at Crooked Creek, or Crooked Creek).

Preparing Reservation of Water Applications

DNR Reservation of Water application forms will be prepared to comply with state law (AS 46.15.145) and regulations (11 AAC 93.141-147) and following protocols established by the Instream Flow Program. Applications will include: maps and legal descriptions identifying the location of the waterbody to be reserved and gaging stations within the waterbody, a description of inter- and intra-annual variability in stream flows, fish distribution and periodicity data (seasonal use of habitat for migration, spawning, incubation, and rearing) by species and life stage, and the requested flows to be reserved during specified time periods.

Fish distribution and periodicity data by species and life stage will be compiled and summarized from the *Catalog of Waters Important for the Spawning, Rearing or Migration of Anadromous Fishes* and its associated Atlas, input from biologists from ADF&G and other agencies, and the scientific literature. Requested flows will be based primarily on flow duration analyses (Annear et al. 2004) combined with available fish use information. This approach provides a basis to mimic natural seasonal flows that fish are adapted to and depend upon (Estes and Orsborn 1986; Poff et al. 1997; Annear et al. 2004; Lytle and Poff 2004; Arthington et al. 2006).

How Project Success Will Be Evaluated

This project will be evaluated based on successfully collecting hydrologic data at each of the streamgage and DM stations and subsequently on the number of reservation of water applications prepared and filed.

IX. Benefits

The rivers of SW AK support some of North America's most viable and productive salmon stocks. Salmon depend on sufficient quantities of water to meet their spawning, rearing, incubation, overwintering, and migration habitat requirements. This project will provide long-term habitat protection by legally reserving instream flows needed to conserve salmon habitat.

X. Products, Milestones, and Timelines

- July 1, 2021 – June 30, 2023: Visit streamgage and DM stations approximately every four to eight weeks during the open water season and one to two times during winter months to collect streamflow measurements, survey pressure transducer and staff

gage elevations, download transducer data, perform maintenance, and compute gage records

- July 1, 2021 – June 30, 2023: Contract the USGS to collect instantaneous DMs on Holitna and Stony Rivers (or similar locations) in the middle Kuskokwim River area
- June 30, 2023: Submit initial reservation of water applications to DNR for sites with ten or more measurements and robust correlations

XI. Project Budget

ADF&G SF Budget	Total
100 Personnel	\$0
200 Travel	\$25,000
300 Contractual	\$27,000
400 Supplies	\$6,550
500 Equipment	\$0
Total	\$58,550

ADF&G SF Budget Narrative:

Line 200: Travel (\$25,000)

Ann Marie Larquier, Leah Ellis, Kevin Keith, and/or Joe Klein (two participants each trip, travelers may vary) will travel from Anchorage to Aniak for streamgage maintenance four times during the open water seasons:

- Airfare: 2 tickets/trip @ \$700/ticket x 4 trips = \$5,600
- Lodging: 2 nights/trip @ \$200/night x 2 people x 4 trips = \$3,200
- Meals per diem: \$150/trip (3 days per trip) x 2 people x 4 trips = \$1,200

Ann Marie Larquier, Leah Ellis, Kevin Keith, and/or Joe Klein (three participants each trip, travelers may vary) will travel from Anchorage to Aniak for streamgage maintenance four times during the winter seasons:

- Airfare: 3 tickets/trip @ \$700/ticket x 4 trips = \$8,400
- Lodging: 2 nights/trip @ \$200/night x 3 people x 4 trips = \$4,800
- Meals per diem: \$150/trip (3 days per trip) x 3 people x 4 trips = \$1,800

Line 300: Contractual (\$27,000)

- Statistical analysis software program (SAS) license: 2 licenses/year @ \$650/license x 2 years = \$2,600
- Mapping software program (GIS) license (for hydrologic analyses and reservation of water maps): 2 years @ \$800/year = \$1,600
- Streamgage data software program and database (WISKI) annual license: 2 years @ \$1,200/year = \$2,400
- Boat rentals for streamgage maintenance and DM stations: 4 trips @ \$150/trip = \$600
- Snow machine rentals for winter streamgage maintenance trips: 3 snow machines/trip @ \$100/machine x 4 trips = \$1,200
- Airfreight and excess baggage fees: 8 trips @ \$325/trip = \$2,600

- Contract with USGS to collect miscellaneous instantaneous DMs on middle Kuskokwim River tributaries: \$16,000

Line 400: Supplies (\$6,550)

- Winter DM equipment/supplies (e.g., ADV cable, auger blades, batteries): \$1,000
- Personnel protection (safety supplies, gloves, boots, waders, raincoats): \$1,500
- Streamgage/DM equipment/supplies (e.g. Bluetooth dongle, flash drive, ropes for towing ADCP): \$1,000
- Cases and dry bags for transport of scientific equipment: \$250
- Miscellaneous field supplies (e.g., repair tools, overnight camping items, bear fence, bear canisters): \$2,000
- Boat and snow machine gas and oil: 8 trips @ \$100/trip = \$800

XII. Match Budget

ADF&G SF Match Budget	Total
100 Personnel	\$20,493
200 Travel	\$0
300 Contractual	\$0
400 Supplies	\$0
500 Equipment	\$0
Total	\$20,493

ADF&G SF Match Budget Narrative:

Line 100: Personnel (\$220,493)

- Leah Ellis, Habitat Biologist II, will install and maintain streamgages; prepare and review reservation of water applications; and prepare and review gaging operational plans and reports: 2.62 months @ \$7,832/month = \$20,493.

XIII. References

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Arthington, A.H., S.E. Bunn, N.L. Poff, and R.J. Naiman. 2006. The challenge of providing environmental flow rules to sustain river ecosystems. *Ecological Applications* 16 :1311-1318.

Estes, C. C., and J. F. Orsborn. 1986. Review and analysis of methods for quantifying instream flow requirements. *Water Resources Bulletin*. 22(3):389-398.

Klein, J. 2013. Surface-water data manual for the statewide aquatic resources coordination unit. Alaska Department of Fish and Game, Special Publication No. 13-05, Anchorage.

Lytle, D.A., and N.L. Poff. 2004. Adaptation to natural flow regimes. *Trends in Ecology and Evolution* 19:94-100.

- Poff, N.L., J.D. Allen, M.B. Bain, J.R. Karr, K.L. Prestergaard, B. Richter, R. Sparks, and J. Stromberg. 1997. The natural flow regime: a paradigm for river conservation and restoration. *Bioscience* 47:769-784.
- Rantz, S.E., and others. 1982. *Measurement and Computation of Streamflow*. USGS Water Supply Paper 2175.