

Alaska Sustainable Salmon Fund
Statement of Work
Revision #1: Expand location and add objective

I. Project Title: Mobile Northern Pike Suppression Crew

II. Project Number: 54006

III. Principal Investigator
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IV. Project Period: 3/1/2021 – 11/30/23

V. AKSSF Objective: Invasive species **PCSRF Objective:** HP&R

VI. Project Description

1. Synopsis *Revised with Revision #1*

The project will remove invasive northern pike (*Esox lucius*) from Whiskey, Hewitt, Chelatna, and Shell lakes, which support significant populations of sockeye salmon (*Oncorhynchus nerka*) as well as Chinook (*O. tshawytscha*), coho (*O. kisutch*), chum (*O. keta*) and pink (*O. gorbuscha*) salmon. During the open water season, a crew will rotate among the lakes from approximately mid-May to mid-September while conducting pike suppression by gillnetting and hook and line fishing. The crew will also conduct annual surveys for the invasive waterweed elodea (*Elodea* spp.) in each lake and estimate smolt abundance in Shell Lake in 2023.

2. Introduction *Revised with Revision #1*

Invasive species within Alaska are a serious threat to native salmon populations, salmon habitats, economies, and livelihoods. Northern pike and elodea are harmful invasive species that have expanded their reach into the Susitna River drainage. Salmon are particularly vulnerable to these novel invaders; northern pike prey on juvenile salmon and elodea alters salmon habitats.

The introduction of northern pike outside of their native range in Alaska in the 1950s has led to their populations expanding to take over whole lake systems and colonize new areas as they move through the Susitna River basin. Outside their native range northern pike have the potential to interfere with ecosystem function and destroy economically important fisheries. Due to the extensive nature of the northern pike invasion; high cost of chemical treatment on remote lakes and the effects on non-target species; and the interconnectedness of the waters in the Susitna River drainage,

complete eradication of northern pike has been deemed not feasible. In lieu of being able to eradicate the entire population, suppression using gillnet and hook and line fishing are effective tools for reducing northern pike impact on salmon and other native fish species.

At Whiskey and Hewitt lakes, suppression by way of gillnet and hook and line fishing has been employed as a strategy since 2012. Cook Inlet Aquaculture Association (CIAA) has either led or been partner to these efforts, with the most recent effort being a three-year project (2018–2020) to intensively harvest northern pike throughout the open water season (AKSSF project 51003, *Hewitt and Whiskey Lake Pike Suppression*). In the fall of each year of the project, the Alaska Department of Fish and Game (ADF&G) provided an estimate of juvenile salmon rearing in Hewitt Lake with a goal of increasing abundance to approximately 1,000,000 fish. Initial results from that project indicate that juvenile salmon rearing in Hewitt Lake is increasing alongside the intensive harvesting—from 2018 to 2019, the juvenile sockeye salmon population increased approximately 200,000 fish for a total of about 570,000 fish.

At Chelatna Lake, CIAA and ADF&G have both employed intensive suppression strategies. The most recent effort by ADF&G was funded by AKSSF and ended in 2019 (AKSSF project 44365, *Chelatna Lake Pike Suppression*).

Under this project, CIAA will employ a targeted suppression strategy to maintain the previous efforts put into increasing juvenile salmon through suppressing harmful invasive pike at Whiskey, Hewitt, and Chelatna lakes. In 2023, suppression efforts at Shell Lake will replace efforts at Chelatna Lake with the addition of smolt abundance estimation there.

In addition to the impact that northern pike are having on salmon populations, elodea, Alaska's first invasive submersed freshwater plant, is also negatively impacting native fish species. The establishment of elodea has broad ecological effects. Elodea alters habitats by displacing native macrophytes, impeding nutrient availability, and affecting dissolved oxygen levels depending on the growth stage of the plant. Dense mats of elodea can increase sedimentation and decrease stream velocity. These disruptions in salmon habitats can displace salmon from their natal spawning sites. Such disruptions within lake systems can also affect foraging and spawning of other native fish species. The most cost effective way to stop or slow the spread of elodea is through early detection and rapid response. Elodea is recognized as a major threat throughout Alaska, but particularly in the Matanuska-Susitna Basin. Under this project, CIAA will perform elodea surveys on Whiskey, Hewitt, Chelatna lakes.

3. Locations Revised with Revision #1
 - Whiskey Lake: 61.982799, -151.397047
 - Hewitt Lake: 62.000052, -151.378724
 - Chelatna Lake: 62.440246, -151.402622
 - Shell Lake: 61.966897, -151.559785
4. Related projects

VII. Objectives *Revised with Revision #1*

- Suppress invasive northern pike populations in Whiskey, Hewitt, Chelatna, and Shell lakes
- Conduct elodea surveys on Whiskey, Hewitt, and Chelatna lakes
- Estimate smolt abundance in Shell Lake (2023)

VIII. Methods

Pike Reduction *Revised with Revision #1*

One inch bar mesh gillnets will be used to capture and remove northern pike in Whiskey, Hewitt, Chelatna, and Shell lakes and the Whiskey-Hewitt Creek outlet that connects these lakes to the Yentna River. Pike removal efforts will begin immediately after ice melt because northern pike are more active and vulnerable to capture during their spring spawning season. Each day, up to ten 1" bar mesh gillnets will be deployed at 10 different shallow and vegetated sites that typically provide optimal northern pike habitat. Gillnets will be 15.2 m long x 2.4 m deep and constructed of monofilament line with a 1" bar mesh size. The top line will be a floating core line and the bottom line will be lead weighted to sink. Northern pike catch per hour rates will be calculated and recorded after each net set. Captured pike will be removed from the nets and quickly dispatched using a fish bat. The catch of species other than northern pike will be recorded and the fish will be removed and released immediately. Northern pike removed from the system will be donated to local residents for consumption. When there are no residents who want the northern pike they will be completely cut in half and disposed of in the deepest portions of the lake in accordance with ADF&G permitting.

Northern pike fork length will be measured to the nearest mm, weighed to the nearest gram, and sex will be determined. Cleithra will be taken from each fish for later age determination in the laboratory. Northern pike relative abundance will be estimated using CPUE in gillnets. Analyses of variance will be conducted for each gear type, separately pooling data among all sites to test for differences in mean northern pike CPUE among years (2012–2014, 2018–2020, and 2021–2023), and least-squares mean CPUEs will be estimated for each year. Results from these analyses will be used to evaluate whether northern pike CPUE was reduced by 80%. Hook and line fishing will also be used to remove pike, using a rod and reel combination with a baited hook or artificial lure. Northern pike caught via hook and line will have age, sex, and length measured, but will not be part of CPUE calculations.

Pike Composition

Age composition, sex ratio, and length at age will also be compared among years to evaluate whether northern pike population characteristics have changed over time in response to suppression efforts. Chi-square tests will be conducted to test whether northern pike age compositions and sex ratios differ among years. Analyses of variance will be conducted to test for differences in mean northern pike length at age among years, and least-squares mean lengths will be estimated for each age class and year. Results

from these analyses will be used to evaluate whether changes in northern pike population characteristics may have altered their individual consumption rates of juvenile salmon.

Elodea Surveys

The survey crew will complete elodea surveys on the three lakes selected for northern pike suppression. Elodea surveys will be full lake surveys and will follow a combination of the U.S. Fish and Wildlife Service (USFWS) Aquatic Invasive Species Survey Protocol (2012) and the Survey Design and Methodology for Elodea Detection in Alaska Lakes (Fulkerson 2019). Prior to surveying in the field, data will be gathered on the lakes including lake maps and size, depth and contour information, shoreline length, and adjoining land usage. Obtaining this information will better inform the surveyors about the lake.

Full shoreline surveys will be conducted on each lake. This will be carried out by a two-person crew. The crew will have a double-sided vegetation rake with 20 m length of rope, secchi disk, weatherproof notebook, zip-lock bags to collect unknown vegetation samples for identification, GPS with preloaded survey points, lifejacket, and paddles. The survey will begin with collecting general water body and weather information—water body name and GPS location, secchi depth, light conditions, weather during survey, water level, surface conditions, and viewing method. Information will be recorded in a weatherproof notebook and shared with Alaska Exotic Plants Information Clearinghouse (AKEPIC) by November of each survey season.

The crew will work as a team with one person steering the boat and the other doing a visual shoreline survey. The crew will complete rake throws at each designated point and identify all vegetation. If vegetation cannot be identified on site it will be collected in a zip-lock bag and labeled with the site number, lake name, and date for later identification with the aid of a field guide. At high risk areas like boat launches, docks, outlets and inlets, more thorough visual surveys will be completed and additional rake throws are encouraged if vegetation cannot be identified visually.

If elodea is found at any site, the survey will switch to determining the extent of the infestation. The appropriate agencies (Alaska Department of Natural Resources and ADF&G) will be notified as soon as possible.

Smolt Abundance

In 2023, smolt abundance will be estimated in Shell Lake. During the outmigration season, a fyke net and live box will capture all outmigrating smolts. Smolts will be enumerated by species and a portion sampled for age, weight, and length.

IX. Benefits

This project will benefit sockeye, Chinook, coho, chum, and pink salmon as well as resident fish species in Whiskey, Hewitt, Chelatna, and Shell lakes through reduction in northern pike predation. Increased salmon runs into Whiskey, Hewitt, and Chelatna lakes will also benefit terrestrial species (e.g., brown bear), avian species (e.g., bald eagle, glaucous gull, Arctic tern), and marine mammal species (e.g., harbor seal, beluga whale)

that feed on salmon and will increase the transfer of marine-derived nutrients through decaying salmon carcasses to further boost the productivity of the ecosystem. Early detection surveys for elodea will drastically reduce the eradication expense of this deleterious submersed aquatic invasive if it is detected.

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

- March–April 2021–2023: Purchase field equipment, recruit and hire crew, finalize elodea survey plans
- May 2021–2023: Obtain required permits and train field crew
- Approximately May 17–September 7, 2021–2023: Conduct pike suppression efforts among Whiskey and Hewitt lakes (2021-2023), Chelatna Lake (2021-2022), and Shell Lake (2023); conduct elodea surveys; conduct smoke abundance survey in Shell Lake (2023)
- September 2021–2023: Clean and repair gear; prep gear for storage and use in subsequent project years
- October 2021–2023: Conduct data entry; enter elodea survey information into AKEPIC
- November 2021–January 2022, November 2022–January 2023, and November 2023: Perform data analysis
- December 31, 2023: Provide final report to AKSSF

XI. Project Budget *Not revised with Revision #1*

CIAA Budget	Total
100 Personnel	\$85,914
200 Travel	\$0
300 Contractual	\$58,029
400 Supplies	\$26,618
500 Equipment	\$0
Subtotal	\$170,561
600 Indirect	\$17,056
Total	\$187,617

CIAA Budget Narrative:

Line 100: Personnel (\$85,914)

- Andy Wizik, Biologist II, will help oversee the project and complete all hiring, permitting, and reporting requirements: 48 days @ \$360/day = \$17,280.
- Emily Heale, Biologist I, will help oversee the project and assist with hiring, training, and reporting requirements: 24 days @ \$298/day = \$7,152.
- A Fisheries Technician II (TBD) will assist with staff orientation, camp deployments, maintenance, camp demobilizations, and data entry: 30 days @ \$235/day = \$7,050.
- A Fisheries Technician I (TBD), will be responsible assisting with camp set up, maintenance, northern pike harvesting, elodea surveys, and data collection: 336 days @ \$162/day = \$54,432.

Line 300: Contracts (\$58,029)

- Garmin InReach usage during field season for communication between camp and headquarters: 12 months @ \$72/month = \$864
- Beaver float plane charters: 36 hours @ \$675/hour = \$24,300
- Cessna 206 float plane charters: 21 hours @ \$565/hour = \$11,865
- Student Conservation Association (SCA) fees (including travel, recruitment fees, and insurance) to support a volunteer student intern: 3 years @ \$6,710/year = \$20,130
- Fishing licenses: 2 people @ \$145/person x 3 years = \$870

Line 400: Supplies (\$26,618)

- Groceries: 336 days @ \$22.50/day x 2 people (Fisheries Technician I and Intern) = \$15,120
- Groceries: 8 days @ \$22.50/day x 3 people (Biologist I, Biologist II, Fisheries Technician II) = \$540
- Shot gun and ammunition: \$700
- Bear spray: 4 cans @ \$35/can = \$140
- Personal floatation devices: 3 PFDs @ \$100/PFD = \$300
- Waders: 6 pairs @ \$250/pair = \$1,500
- Bear fence: \$300
- First aid kits: 3 kits @ \$30/kit = \$90
- Boat kits: 3 kits @ \$40/kit = \$120
- Bear canisters: 2 canisters @ \$80/canister = \$160
- InReach satellite communication device: \$300
- GPS: \$400
- Fish capture supplies (gillnets, rods, reels, lures, line, tackle boxes, fish pickers, fillet knives, buckets): \$1,676
- Sample kit (scales, length boards, cleithra envelopes, ziplock bags): \$542
- Camp supplies and equipment (filters, tents, insect repellent, kitchen items, lanterns, rope, twine, camp chairs, water filter device and filters, jet boil, pop up shelters, small hand tools, lumber, ice, solar battery chargers, extra batteries): \$2,680
- Jet boil fuel: 35 units @ \$10/unit = \$350
- Gas for boat: 350 gallons @ \$4/gallon = \$1,400
- Gas for truck: 75 gallons @ \$4/gallon = \$300

Line 600: Indirect (\$17,056)

CIAA will use the de minimis indirect rate of 10% (as described in 2 CFR 200) which excludes, among other items, subaward amounts over \$25,000, capital expenditures, and equipment.

XII. Match Budget

CIAA Match Budget	Total
100 Personnel	\$59,696

200 Travel	\$0
300 Contractual	\$0
400 Supplies	\$0
500 Equipment	\$0
Subtotal	\$59,696
600 Indirect	\$5,970
Total	\$65,666

CIAA Match Budget Narrative:

Line 100: Personnel (\$59,696)

- An SCA Intern (volunteer) will assist with camp set up, maintenance, northern pike harvesting, and data collection: 3,024 hours @ \$25.43/hour less the \$20,130 SCA contract = \$56,771.
- Lisa Ka'aihue, Special Projects Manager, will oversee project administration: 6.5 days @ \$450/day = \$2,925.

Line 600: Indirect (\$5,970)

CIAA will use the de minimis indirect rate of 10% (as described in 2 CFR 200) which excludes, among other items, subaward amounts over \$25,000, capital expenditures, and equipment.

XIII. References

Fulkerson, J.R. and B. Shaftel. 2019. Survey design and methodology for elodea detection in Alaska lakes: summary of the 2018 field season. Alaska Center for Conservation Science, University of Alaska Anchorage. Anchorage, AK.

United States Fish and Wildlife Service. 2012. Aquatic invasive survey protocol: a rapid screening method for Alaska's lakes and slow rivers.