

Alaska Sustainable Salmon Fund Statement of Work

I. Project Title: Chelatna Lake Pike Suppression

II. Project Number: 44365

III. Principal Investigator

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IV. Project Period: 1/1/18 – 11/30/19

V. AKSSF Objective: 1D-3 **PCSRF Objective:** HP&R

VI. Project Description

1. Synopsis

This project will remove invasive northern pike (*Esox lucius*) from Chelatna Lake, which supports a significant population of sockeye salmon (*Oncorhynchus nerka*) as well as Chinook (*O. tshawytscha*), coho (*O. kisutch*), chum (*O. keta*) and pink (*O. gorbuscha*) salmon. Northern pike will be removed using variable-mesh gill nets and hoop traps during the salmon smolt migrations in the spring of 2018 and 2019 to reduce pike predation.

2. Introduction

This project will remove invasive northern pike from Chelatna Lake, which supports the largest population of sockeye salmon in the Susitna River watershed with historical weir counts ranging from 17,721 to 84,899 and representing an average 17% of the total inriver run of Susitna River sockeye salmon since 2006. Although northern pike are native north and west of the Alaska Range, they are an introduced species in the Susitna River watershed where they are voracious predators on juvenile salmon and other native resident fish. Northern pike predation on juvenile salmon is likely reducing production of salmon populations in Chelatna Lake. Euphotic volume estimates indicate that Chelatna Lake has the potential to produce the largest run of sockeye salmon (364,000) in the Susitna River watershed, but this production has not

been achieved since monitoring began in the early 1990s. Recent Chelatna Lake studies found that northern pike catch per hour in variable-mesh gill nets ranged from 0.212 to 0.524 per net in the spring of 2010–2012, and that northern pike preyed on salmon smolts emigrating from the lake each spring (Glick and Willette in press, Smukall 2015). The Alaska Board of Fisheries designated Susitna River sockeye salmon as a stock of yield concern in 2008 due to a chronic inability to maintain expected fishery harvests above escapement needs

http://www.housemajority.org/coms/jcis/pdfs/susitna_salmon_action_plan_200802.pdf.

This project will remove northern pike from Chelatna Lake during the salmon smolt migrations in the spring of 2018 and 2019, continuing work funded by the National Fish Habitat Partnership which focused on restoring salmon production in Chelatna Lake through northern pike suppression in the spring of 2017.

3. Location

Chelatna Lake: Latitude: 62.433683, Longitude: -151.399533

4. Related Projects

N/A

VII. Objectives

Suppress northern pike from Chelatna Lake during the spring salmon smolt migration to reduce predation on juvenile salmon

VIII. Methods

Variable-mesh gillnets and hoop traps will be used to capture and remove northern pike in Chelatna Lake from late May through June 30, 2018 and 2019. Gillnets typically capture larger pike (>250 mm) and hoop traps capture smaller pike. Pike removal efforts will begin immediately after ice melts in the lake because northern pike are more active and vulnerable to capture during their spring spawning season.

Each day, ten variable-mesh gillnets will be deployed at 10 different shallow and vegetated sites that typically provide optimal northern pike habitat. Nets will be deployed in the afternoon or evening and retrieved the next morning. Time of each net set and retrieval will be recorded to the nearest minute. Gillnets will be 22.9 m long x 1.8 m deep and constructed of five panels with 2.5 cm, 3.8 cm, 5.1 cm, 6.4 cm, and 7.6 cm mesh sizes. The top line will be a floating core line and the bottom line will be lead weighted to sink. Gillnet mesh sizes were chosen to increase the size range and catchability of northern pike. Northern pike catch per unit effort (CPUE) will be calculated based on the number of hours each net was fished. CPUE will be recorded after each net set.

Each day, ten hoop nets will be deployed at the same 10 sites in close proximity to variable-mesh gillnets. Hoop nets will have 0.8 m diameter openings with 4.6 m wing leads. Nets will be set near shore in water depths ranging from 1-3 m, and, in general, nets will be set perpendicular to the shoreline. Nets will be retrieved one at a time and samples processed before retrieving other nets to prevent mixing fish from different net sets.

Captured pike will be removed from the nets and quickly dispatched using a small bat. Species other than northern pike will be removed and released immediately. Northern

pike fork length (length from tip of nose to fork of tail) will be measured to the nearest mm, weight to the nearest gram, and sex will be determined. Scales and cleithra will be taken from each fish for later age determination in the laboratory. Since this project is focused on eradicating northern pike, sample sizes will be determined by catch rates given the effort employed to remove pike rather than a minimum sample needed to achieve a given level of precision for parameter estimates.

Stomach contents will be recorded based on a visual evaluation of percent of total volume for each prey type. Prey categories will be sockeye smolt, sockeye fry, coho smolt, coho fry, other salmonids, trout, sticklebacks, partial unidentified fish, insects, leeches, snails, and unidentified prey. If juvenile salmon are found in the stomach, they will be counted by species and their lengths measured to the nearest mm. Harvested pike will be donated to local residents or cut in half and disposed of in the middle of the lake in accordance with permits.

Northern pike relative abundance will be estimated using catch per hour in variable-mesh gillnets and hoop traps using methods applied in a 2010-2012 study (Glick and Willette in press). Kolmogorov-Smirnov tests will be conducted to test whether the natural-logarithm transformed CPUE data are normally distributed. Then an analysis of variance (main effects model) will be conducted to test for differences in mean northern pike CPUE (natural logarithm transformed) between 2010-2012 and 2018-2019 and least-squares mean CPUEs will be estimated for each time period.

Age composition, sex ratio, and length at age will be compared between 2010-2012 and 2018-2019 to evaluate whether northern pike population characteristics have changed over time. Chi-square tests will be conducted to test whether northern pike age compositions and sex ratios differ; analyses of variance (main effects model) will be conducted to test for differences in mean northern pike length at age; and least-squares mean lengths will be estimated for each age class and time period.

The number of juvenile salmon that would have been consumed by northern pike that were removed from the lake in the year following the project will be estimated using a simple gastric evacuation rate model and assuming pike would have continued to consume juvenile salmon over a five month period (150 days) following the project. Seaburg and Moyle (1964) determined that northern pike stomach contents are 50% digested after 20 hours at 18-23° C. Assuming juvenile salmon that were more than 50% digested would not be identifiable, the number of identifiable juvenile salmon found in stomachs roughly represents consumption over the past day. We will estimate the potential number of juvenile salmon that would have been consumed during the summer following the project by simply multiplying the total number of juvenile salmon found in all stomachs by 150 days. This method will provide a minimum estimate of the number of juveniles saved by removing the pike, because it does not account for predation over winter and it does not account for predation beyond the first year following the project.

IX. Benefits

This project will benefit sockeye, Chinook, coho, chum, and pink salmon as well as other resident fish species in Chelatna Lake by reducing predation by invasive northern pike. Increased salmon runs into Chelatna Lake 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 Chelatna Lake ecosystem.

X. Products, Milestones, and Timelines

- January - April 2018 and 2019: Obtain required permits, order nets and other supplies for sampling, hire and train field crew
- May – June 30 July 15, 2018 and 2019: Conduct pike suppression and field sampling
- September 1 – November 30, 2018 and 2019: Analyze data and write project report
- November 30, 2019: Provide final report to AKSSF

XI. Project Budget

ADF&G Budget	Total
100 Personnel	\$39,229
200 Travel	\$0
300 Contractual	\$16,000
400 Supplies	\$14,600
500 Equipment	\$0
Subtotal	\$69,829
Expenses subject to indirect	\$39,229
600 Indirect	\$9,023
Total	\$78,852

ADF&G Budget Narrative:

Line 100: Personnel (\$39,229)

The State of Alaska salary calculator was used to estimate personnel costs.

- Cody Volk, Fish and Wildlife Technician (FWT) III, will supervise gill netting and data collection at Chelatna Lake: 2.5 months @ \$7,975/month = \$19,938 (includes 120 hours of overtime).
- Lucas Wright, FWT II, will assist with gill netting and data collection at Chelatna Lake: 2.5 months @ \$7,716/month = \$19,291 (includes 120 hours of overtime).

Line 300: Contractual (\$16,000)

- Float plane charters: 22 hours @ \$700/hour = \$15,400
- Satellite phone service: 4 months @ \$150/month = \$600

Line 400: Supplies (\$14,600)

- Field groceries: 80 days @ \$20/day x 2 people = \$3,200

- Propane: 200 gallons @ \$4/gallon = \$800
- Gill nets and hoop nets: 40 nets @ \$200/net = \$8,000
- Gas for boat: 400 gallons @ \$4/gallon = \$1,600
- Sampling supplies (hip boots, rain gear, gloves): 4 kits @ \$250/kit = \$1,000

Line 600: Indirect (\$9,023)

ADF&G's federally negotiated indirect rate changes each fiscal year but is estimated to be approximately 23% during the project period; indirect will be collected at the rate current at the time of the expense on direct salaries and wages including fringe benefits.

XII. Match Budget

ADF&G Match Budget	Total
100 Personnel	\$27,599
200 Travel	\$0
300 Contractual	\$0
400 Supplies	\$0
500 Equipment	\$0
Total	\$27,599

ADF&G Match Budget Narrative:

Line 100: Personnel (\$27,599)

The State of Alaska salary calculator was used to estimate personnel costs.

- Mark Willette, Fishery Biologist (FB) III, will take part in project design, budget monitoring, staff supervision, data analysis, and final report writing: 1 month @ \$12,465/month = \$12,465.
- Bob DeCino, FB II, will take part in staff supervision, data analysis, and final report writing: 1 month @ \$10,244/month = \$10,244.
- Cody Volk, FWT III, will supervise gill netting and data collection at Chelatna Lake: 0.61 months @ \$7,975/month = \$4,890 (includes 15 hours of overtime).

XIII. References

Glick, W. and T.M. Willette. in press. Relative abundance, food habits, age and growth of northern pike in five Susitna River drainage lakes, 2009-2012. Alaska Department of Fish and Game, Fishery Data Series, Anchorage.

Seaburg, K.G. and J.B. Moyle. 1964. Feeding habits, digestive rates, and growth of some Minnesota warmwater fishes. Trans. Am. Fish. Soc. 93(3): 269-285.

Smukall, M. 2015. Northern Pike Investigations, Final Report (2012-2014), Cook Inlet Aquaculture Association, <http://www.ciaanet.org>, 69 p.