2022 FISHERIES RESOURCE MONITORING PROGRAM

OVERVIEW

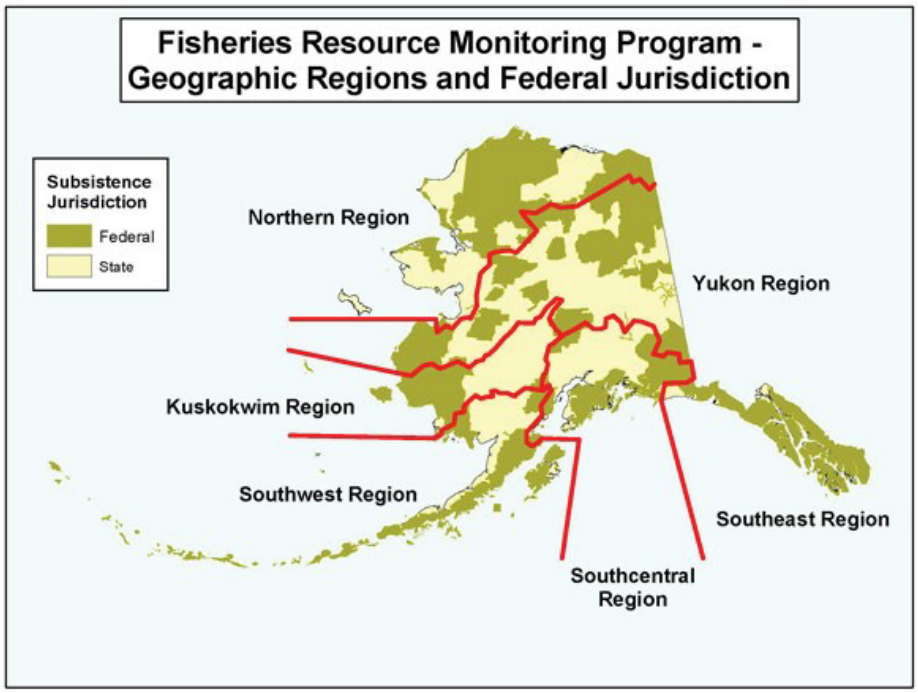
The mission of the Fisheries Resource Monitoring Program (Monitoring Program) is to identify and provide information needed to sustain subsistence fisheries on Federal public lands for rural Alaskans through a multidisciplinary and collaborative program. It is the responsibility of the Monitoring Program to develop the strongest possible Monitoring Plan for each region and across the entire state.

The Monitoring Program's Technical Review Committee evaluated and ranked 43 project proposals for strategic priority, technical and scientific merit, investigator ability and resources, partnership and capacity building, and cost/benefit. Of these proposals, 20 were for continuing projects currently funded through the Monitoring Program. High ranking projects comprise a strong Monitoring Plan for the region by addressing strategically important information needs based on science and promoting cooperative partnerships and capacity building. The highest-ranking projects in each region were considered for funding in the 2022 Fisheries Resource Monitoring Plan.

Background

Section 812 of the Alaska National Interest Lands Conservation Act (ANILCA) directs the Departments of the Interior and Agriculture, cooperating with other Federal agencies, the State of Alaska, and Alaska Native and other rural organizations to research fish and wildlife subsistence uses on Federal public lands and to seek data from, consult with, and make use of the knowledge of local residents engaged in subsistence. When the Federal government assumed responsibility for management of subsistence fisheries on Federal public lands and waters in Alaska in 1999, the Secretaries of the Interior and Agriculture made a commitment to increase the quantity and quality of information available to manage subsistence fisheries, to increase quality and quantity of meaningful involvement by Alaska Native and other rural organizations, and to increase collaboration among Federal, State, Alaska Native, and rural organizations. The Monitoring Program is a collaborative, interagency, interdisciplinary approach to enhance fisheries research and data in Alaska and effectively communicate information needed for subsistence fisheries management on Federal public lands and waters.

Every two years, the Office of Subsistence Management announces a funding opportunity for investigation plans addressing subsistence fisheries on Federal public lands. The 2022 Notice of Funding Opportunity focused on priority information needs developed by the Subsistence Regional Advisory Councils with input from strategic plans and subject matter specialists. The Monitoring Program is administered through regions to align with stock, harvest, and community issues common to a geographic area. The six Monitoring Program regions are outlined in the map on the next page.



Strategic plans sponsored by the Monitoring Program have been developed by workgroups of fisheries managers, researchers, Subsistence Regional Advisory Councils, and by other stakeholders for three of the six regions: Southeast, Southcentral (excluding Cook Inlet Area), and Southwest Alaska, and for Yukon and Kuskokwim drainages whitefish (available for viewing at the Monitoring Program webpage at https://www.doi.gov/subsistence/frmp/plans). These strategic plans identify priority information needs for each major subsistence fishery. Individual copies of the strategic plans are available from the Office of Subsistence Management by calling (907) 786-3888 or toll Free: (800) 478-1456 or by email subsistence@fws.gov. An independent strategic plan was completed for the Kuskokwim Region for salmon in 2006 and can be viewed at the Alaska-Yukon-Kuskokwim Sustainable Salmon Initiative website at https://www.aykssi.org/salmon-research-plans/.

To implement the Monitoring Program, a collaborative approach is used in which five Federal agencies (U.S. Fish and Wildlife Service, Bureau of Land Management, National Park Service, Bureau of Indian Affairs, and U.S. Forest Service) work with the Alaska Department of Fish and Game, Subsistence Regional Advisory Councils, Alaska Native and rural organizations, and other organizations. Projects are selected for funding through an evaluation and review process that is designed to advance projects that are strategically important for subsistence fisheries management, technically sound, administratively competent, promote partnerships and capacity building, and are cost effective.

Investigation plans are reviewed and evaluated by Office of Subsistence Management and U.S. Forest Service staff, and then scored by a panel called the Technical Review Committee (TRC). This committee is a standing interagency committee of senior technical experts, which is foundational to the credibility and scientific integrity of the evaluation process for projects funded by the Monitoring Program. The Technical Review Committee reviews, evaluates, and makes recommendations about proposed projects

consistent with the mission of the Monitoring Program. Fisheries and Anthropology staff from the Office of Subsistence Management provide support for the Technical Review Committee. Recommendations from the Technical Review Committee provide the basis for ranking proposals for funding, along with further comments from Regional Advisory Councils, the public, the Interagency Staff Committee, and the Federal Subsistence Board, with final approval of the Monitoring Plan by the Assistant Regional Director of the Office of Subsistence Management.

The following three broad categories of information that are solicited for the Monitoring Program: (1) harvest monitoring, (2) traditional ecological knowledge, and (3) stock status and trends. Projects that combine these approaches are encouraged. Definitions of these three categories of information are listed below.

Harvest monitoring studies provide information on numbers and species of fish harvested, locations of harvests, and gear types used. Methods used to gather information on subsistence harvest patterns may include harvest calendars, mail-in questionnaires, household interviews, subsistence permit reports, and telephone interviews.

Traditional ecological knowledge studies are investigations of local knowledge directed at collecting and analyzing information on a variety of topics such as the sociocultural aspects of subsistence, fish ecology, species identification, local names, life history, taxonomy, seasonal movements, harvests, spawning and rearing areas, population trends, environmental observations, and traditional management systems. Methods used to document traditional ecological knowledge include ethnographic fieldwork, key respondent interviews with local experts, place name mapping, and open-ended surveys.

Stock status and trends studies provide information on abundance and run timing; age, size, and sex composition; migration and geographic distribution; survival of juveniles or adults; stock production; genetic stock identification; and mixed stock analyses. Methods used to gather information on stock status and trends include aerial and ground surveys, test fishing, towers, weirs, sonar, video, genetics, mark-recapture, and telemetry.

Available Funds

Federal Subsistence Management Program guidelines direct initial distribution of funds among regions. While regional budget guidelines provide an initial target for planning, they are not final allocations. The anticipated funding available for the 2022 Monitoring Program is up to $2.6 million from the Department of the Interior and approximately $800,000 from the U.S. Department of Agriculture.

NORTHERN ALASKA REGION

Priority Information Needs

The 2022 Notice of Funding Opportunity for the Northern Alaska Region identified the following sixteen priority information needs:

- Chinook, Chum, and Coho Salmon abundance estimate for Boston, Fish, Pargon, and Wagon Wheel rivers.
- Summer and fall Chum Salmon abundance estimates for the Agiapuk River drainage including American River and Igloo Creek.
- Chinook Salmon abundance estimate for the Unalakleet River.
- Chinook, Chum and Coho abundance estimate for the Pikmiktalik River.
- Changes in Grayling, Dolly Varden, and Sheefish populations related to climate change.
- Inventory and baseline data of fish assemblages in major rivers tied to subsistence use in Northwest Alaska. When possible, applicants are encouraged to include fisheries proximal to the communities of Shishmaref, Buckland, Deering, Kivalina, Point Hope, and villages along Kobuk and Noatak rivers.
- Changes in species compositions, abundance, migration timing, especially of Dolly Varden, Lake Trout, and whitefish species in the Northwest Arctic, to address changing availability of subsistence fishery resources.
- Evaluate changing salmon distribution, abundance, migration, and timing in river drainages of Kotzebue Sound (the Noatak and Kobuk River Drainages)
- Identifying spawning areas, critical habitat and range expansion in major rivers tied to subsistence for Broad Whitefish, Least Cisco, Northern Pike, salmon, Grayling, Dolly Varden, and Sheefish in the Northwest Alaska Region.
- Evaluate changes in water temperature in major river systems associated with subsistence fishery resources in the Northwest Arctic Region and how these changes will affect subsistence resources.
- The effects of expanding beaver populations and range on subsistence fisheries in the Northwest Arctic Region. Include effects of dams on fish migration and effects of changes to water quality on fish health.

- Using traditional ecological knowledge and harvest monitoring, document new fish species and changes in abundance, size, timing, and distribution of existing fish species, and impacts of new or expanding species on other fish that are important to subsistence in the North Slope Region.

- Document and investigate the possible causes of mold, disease, and discoloration on Broad Whitefish in the Colville River. Investigators are encouraged to draw on both stock status and trends and traditional ecological knowledge research methods.

- Effects of climate change, including late freeze-up on subsistence access, practices, and fish preservation, and the impact of these changes on continuity of traditions and food security for communities on the North Slope. Studies including Ikpikpuk River are of particular interest.

- Monitoring and documentation of changing subsistence fish harvest and consumption, as well as subsistence user concerns, in the community of Nuiqsut.

- Baseline fish habitat and water quality monitoring (especially temperature, dissolved oxygen, and silt) on the rivers and tributaries important to subsistence fishing for communities of the North Slope Region. Investigators are encouraged to include overwintering areas.

Proposals Submitted for the Northern Alaska Region

Four proposals were submitted for funding in the Northern Alaska Region.

Table 1. Projects submitted for the Northern Alaska Region, 2022 Monitoring Program, including total funds requested and average annual funding requests.

Project	Title	Total Request	Avg. Annual
22-101	Kotzebue Sound Sheefish-Describing Coastal Movement, Temperature Preference, and Potential Range Expansion	$232,911	$77,637
22-103	Unalakleet River Chinook Salmon Escapement Assessment-Continuation	$706,329	$176,582
22-104	Selawik River Inconnu Spawning Population Age Structure Evaluation and Spawner Recruitment Response to a 2004 Permafrost Thaw Slump	$281,534	$93,844
22-150	Traditional Ecological Knowledge of Salmon in the River Drainages of Kotzebue Sound	$282,091	$141,046
	Total	**$1,502,865**	**$489,109**

In addition to these proposed projects, the following three projects are currently being funded by the Monitoring Program in the Northern Alaska Region:

- 20-100 Fish Assemblages and Genetic Stock Determination of Salmon in Bering Land Bridge National Preserve

- 20-101 Life-History Variability and Mixed-stock Analysis of Dolly Varden in the Noatak River

- 20-150 Traditional and Ecological Knowledge of Dolly Varden and Whitefish Species in Northwest Alaska

Regional Advisory Council Comments

Seward Peninsula Subsistence Regional Advisory Council

While the Council did not have comments regarding the proposals, it did state the importance of salmon in their region and the need for ongoing research.

Northwest Arctic Alaska Subsistence Regional Advisory Council

The Council spoke in support of the three projects in their area, Projects 22-101, 22-104 and 22-150, stating that both sheefish and salmon are very important for food security in the region.

North Slope Alaska Subsistence Regional Advisory Council

There were no comments regarding the proposals from the Council. It did express continuing interest in the program and a desire to have more research completed in their area.

Interagency Staff Committee Comments

The Interagency Staff Committee supports the Technical Review Committee's assessment of the 2022 Northern Alaska Region proposals. All four projects include partnership and capacity building; three projects specify local hire, and one will bring on an Alaska Native Science and Engineering Program student. We note the loss of the Native Village of Unalakleet as a co-Investigator on Project 22-103 but recognize a capacity building component within the community of Unalakleet remains intact. Three projects were supported by the Northwest Arctic Regional Advisory Council. The proposed projects for the Northern Alaska Region directly address some of the region's 2022 Priority Information Needs.

Executive Summaries and Technical Review Committee Evaluations

The investigators' executive summaries of their investigation plans are provided below. All executive summaries reflect what was submitted to the Technical Review Committee for review, with only minor formatting changes completed by the Office of Subsistence Management to ensure readability and accessibility. The executive summaries include synopses of the issue addressed, the objectives, the methods, and the partnership/capacity building. Following each executive summary is the Technical Review Committee's Evaluation of the investigation plan. The Technical Review Committee assessed investigation plans based on the set criteria: strategic priority, technical and scientific merit, investigator ability and resources, partnership and capacity building, and cost/benefit.

Project Number: 22-101
Project Title: Kotzebue Sound Sheefish-Describing Coastal Movement, Temperature Preference, and Potential Range Expansion

Issue Addressed: Our project will address the sheefish portion of three Priority Information Needs identified by the 2022 Fisheries Resource Monitoring Program through information gathered in Subsistence Regional Advisory Committee meetings:

1. Changes in Arctic grayling, Dolly Varden, and sheefish populations related to Climate Change.

2. Changes in species compositions, abundance, migration timing, especially of Dolly Varden, llake trout and whitefish species in the Northwest Arctic, to address changing availability of subsistence fishery resources.

3. Identifying spawning areas, critical habitat and range expansion in major rivers tied to subsistence for bwlcnbroad whitefish, least cisco, northern pike, salmon, Arctic grayling, Dolly Varden and sheefish in the Northwest Alaska Region.

Based on the multiple 2022 Priority Information Needs that address sheefish (or whitefish) populations, migrations, and range expansions, it is clear that more information is needed to answer questions posed by local fishermen, the Northwest Arctic Subsistence Regional Advisory Council, and fisheries researchers about sheefish ecology in Northwest Alaska. Given this need, we have designed a project that will answer several of the important questions posed regarding sheefish migration, distribution, and potential new feeding or spawning areas. The findings from our project will enhance the current information known about the species, allowing federal subsistence managers to make informed decisions in the future based on the abundance, movements, and availability of these fish along the Chukchi Sea Coast. Additionally, the results from this project will be of great interest to subsistence fishers, particularly given recent reports of poor sheefish harvests and changes in abundance. Subsistence fishermen harvest over 25,000 sheefish annually in the Kotzebue region, thus the population health of the species is vital to local food security.

Objectives:

1. Identify the seasonal movements and northern range extent of sheefish found along the southern Chukchi Sea coast north of their typical overwintering areas (Hotham Inlet) and feeding range (Kotzebue Sound) with the use of pop-up archival satellite tags (PSATs).

2. Identify previously unknown or recently colonized sheefish spawning, feeding, or overwintering habitats.

3. Identify sheefish water temperature occupancy in coastal habitats and freshwater.

Methods: To assess sheefish movements and behavior, first, in 2022-2023 we will catch fish in coastal lagoons in Cape Krusenstern National Monument, Alaska (north of the typical range of the species) via fyke net, beach seine, and gillnet during annual WCS fisheries monitoring efforts. Next, we will attach pop-up satellite archival tags to 20 adult sheefish. The tags will record water temperature, depth, and light intensity experienced by the fish, will release and float to the water surface after several months, and will transmit data to researchers via the Argos Satellite Network. Data will be used to determine locations,

movements, water temperature occupied, and depths of each fish over the time it was tagged. Information will be summarized to quantify the extent of sheefish northerly movements, seasonal migration patterns, habitat preferences, and novel feeding or spawning areas in and around Kotzebue Sound.

Partnerships and Capacity Building: This project will be a collaborative effort between the Native Village of Kotzebue, the Wildlife Conservation Society, University of Alaska Fairbanks, Alaska Department of Fish and Game, Selawik National Wildlife Refuge, and the National Park Service. Collaborating with local communities is paramount to the success of this project and is a guiding principle for all WCS work. The Native Village of Kotzebue, through their Environmental Program Director Alex Whiting, was involved in the study design, helped shape the outreach approach, and will continue to be an equal partner in the continued project efforts. Additionally, during project implementation, we will hire a local field technician through the Native Village of Kotzebue to assist with the study.

Technical Review Committee Evaluation: This proposal addresses parts of three 2022 priority information needs for the Northern Alaska Region. The proposal is directly linked to subsistence resources in multiple Federal conservation units, and Sheefish are an important subsistence resource for the people living in the communities of this region. The investigator proposes using satellite tags to gain knowledge about Sheefish behavior in fresh, brackish, and saltwater. This information will build upon previous work and has the potential to help managers and scientists better understand the relationship between Sheefish and the coastal habitat in the Kotzebue area. The investigator has experience working in Northwestern Alaska and will be engaging the Native Village of Kotzebue's Environmental Program Director in an advisory capacity and to assist with local hire. The budget is reasonable for a project of this magnitude and the National Park Service will be contributing travel funds to reduce the overall project costs.

Project Number: 22-103
Project Title: Unalakleet River Chinook Salmon Escapement Assessment-Continuation

Issue Addressed: The Unalakleet River supports the largest Chinook salmon subsistence fishery in Norton Sound. Unalakleet River Chinook salmon total annual run averaged 20,790 fish prior to 2000 and 6,058 fish since 2000, a 64% decrease. Failure to consistently meet the escapement goal lead the Alaskan Board of Fisheries to declare Unalakleet River Chinook salmon a stock of yield concern in 2004, which has continued through 2021.

Prior to 2010, management decisions depended on an enumeration tower on the North River and radiotelemetry studies conducted in 1998–1999 and 2009 to estimate the total escapement to the Unalakleet River drainage. Inconsistent operation of the counting tower and uncertainties concerning the number of spawners in the North River versus the Unalakleet River called into question the ability of the project to inform fishery management decisions. In 2010, the Unalakleet River weir was initiated to provide: 1) a reliable annual estimate of Chinook salmon escapement and 2) unbiased age, sex, and length (ASL) composition for Chinook salmon escapement.

The Unalakleet River weir project has been renewed twice by OSM for continued operations. The Unalakleet River weir escapement estimates and ASL data are being used to manage Chinook salmon subsistence, commercial, and sport fisheries in Subdistrict 6, develop outlooks of run abundance, evaluate brood year productivity, and examine effects of harvest practices on spawning escapement. Though the data collected during weir operations have improved management precision, several more years of data are needed before recruit-per-spawner analyses can produce a reliable escapement goal for the Unalakleet River drainage.

Objectives:

1. Estimate daily and total Unalakleet River Chinook salmon escapement from mid-June to August 15 each year.

2. Describe the timing of Unalakleet River Chinook salmon run.

3. Estimate ASL composition of the Unalakleet River Chinook salmon escapement such that the age composition estimate is within 20% of the actual estimate 90% of the time and the sex composition estimate is within 10% of the actual estimate 95% of the time.

Methods: A resistance board weir will be installed approximately 22 kilometers upstream from the Unalakleet River mouth, which is below identified Chinook salmon spawning habitat. The Unalakleet River weir will be installed in mid-June and operate until August 15. Two passage chute/live trap assemblies will allow project staff to count Chinook salmon and will be configured with an angled high visibility flash panel to enhance visibility. Counting periods will consist of three 8-hour shifts. Salmon will be identified by species, enumerated, and summed to estimate a total daily passage by species. Counts will be conducted 24 hours a day with flood lamps used during low-light conditions. Counting schedules can be adjusted for changes in diurnal migratory patterns or operational constraints. Missed daily counts for Chinook salmon will be interpolated using a hierarchical Bayesian estimation technique.

Active sampling techniques will be utilized to capture Chinook salmon for data collection. Salmon will be measured to the nearest millimeter from mid-eye to tail fork and sex will determined by examining external characteristics. Three scales will be taken from each Chinook salmon using standard protocols, mounted on gummed cards, and sent to the Nome ADF&G office for processing. Sampling protocols can be adjusted inseason to address differences between expected and observed run abundance and timing. Stream and ambient air temperature, relative water level, and atmospheric observations will be recorded twice daily. Additionally, a HOBO Pro v2 data logger will record stream temperature at 6-hour intervals.

Partnerships and Capacity Building: ADF&G holds annual community meetings in Unalakleet to share information and address concerns about the project from area residents. The goal is to work with Unalakleet residents to minimize the effects of the weir on individuals using the river for subsistence harvest and to collect sound biological information. Additionally, ADF&G attends the Seward Peninsula Subsistence Regional Advisory Council Meeting to present information and address questions.

Currently two local organizations participate in the operation of the Unalakleet River weir: Norton Sound Economic Development (NSEDC) and Unalakleet Native Corporation (UNC). Weir oversight is provided by ADF&G with daily operations conducted by a Fish and Wildlife Technician III crew leader, ADF&G Fish and Wildlife Technician II, and one locally hired Fishery Technician (NSEDC). Locally hired technicians learn fish sampling skills which include proper salmon scale collection, standardized length measurement and sex determination, installation and operation of a weir, and accurate collection, recording, and reporting of data. Local-hire emphasis fosters involvement of resource users as active participants in fisheries assessment and management. A BLM fishery biologist and student intern will participate in setting up and removing the weir. The field camp is situated on UNC land.

In addition to improving management tools and filling data gaps, the Unalakleet River weir project promotes communication, data sharing, and interaction between subsistence users, Federally recognized tribes, organizations, communities, and agencies.

Letters of support from NSEDC and UNC have been included.

Technical Review Committee Evaluation: This proposal directly addresses a priority information need: Assessment of Unalakleet River Chinook Salmon escapement. The investigator requests continuation funding of a long-term project to monitor Chinook Salmon escapement using a resistance board-floating weir in the Unalakleet River. Chinook Salmon stocks have been depressed since 2000, and Federal waters of the Unalakleet River have been closed to the retention of Chinook Salmon since 2009. Estimates from the weir provide Chinook Salmon daily passage and run timing which is used to make inseason and post-season fishery management decisions. In addition, this information was reviewed by the Seward Peninsula Regional Subsistence Advisory Council and Federal Subsistence Board to support a continued closure of Federal public waters of the Unalakleet River to the retention of Chinook Salmon. While the principal investigator is new to the project, the two co-investigators have been on the project since its inception and all the investigators are experienced fisheries biologists. The project represents a working a partnership between State and Federal agencies and a regional organization. The Native Village of Unalakleet is no longer a co-investigator resulting in a loss of local representation on the project. The cost of the proposal is in line with previous years funding and is typical for a large weir (320 ft. weir). The investigators are leveraging outside resources from Alaska Department of Fish and Game and Bureau of Land Management to reduce the overall cost of operating the weir.

Project Number: 22-104
Project Title: Selawik River Inconnu Spawning Population Age Structure Evaluation and Spawner Recruitment Response to a 2004 Permafrost Thaw Slump

Issue Addressed: This project addresses priority issues identified for the Northern Alaska Region in the Fisheries Resource Monitoring Program (FRMP): most prominently from 2021's list, "Changes in Grayling, Dolly Varden and Sheefish populations related to Climate Change". This project benefits from information provided by FRMP projects 16-104,14-104,12-100, 04-101, 03-016, 02-040, 00-020.

In the Kotzebue Sound region of northwest Alaska, two Inconnu spawning populations have been identified, one in the upper Kobuk River and the other in the upper Selawik River within the Selawik

National Wildlife Refuge. Inconnu is one of the most important food resources in the Kotzebue region where 20,000 or more are harvested each year in subsistence, sport, and commercial fisheries.

A large permafrost thaw slump (slump), located about 50 rkm upstream from the Inconnu spawning area on the Selawik River, began releasing large amounts of sediment into the river in 2004. From approximately 2004 to 2011 the Selawik River flowed turbid through the spawning area during the summer months and at times the gravel bars in the spawning area became layered in fine sediment and mud. As of 2012, more than 580,000 m^3 of sediment had thawed with approximately two-thirds of that volume mobilized into the Selawik River. During the summers of 2009–2011, measured turbidity at the slump outflow averaged 34 times greater than a reference site upstream from the slump, and turbidity near the Inconnu spawning area was about 11 times greater than a reference site. Turbid water conditions have been observed at the mouth of the Tagagawik River, 150 rkm downstream from the slump, but were rarely observed in the lower Selawik River, 100 rkm farther downstream. It was clear that the sediment released by the slump has been progressively and steadily deposited onto the riverbed. By 2016 the slump had stabilized and its floor and deposition fan were almost completely vegetated with grasses and shrubs. In mid-July 2019, however, the slump began thawing again and delivering sediment into the Selawik River and continued during summer 2020. Based on similar slumps longevity, we assume that the Selawik River slump could continue for some time.

Sediment additions to rivers, whether natural or human caused, are known to be detrimental to river-spawning fishes. Habitat qualities of the Inconnu spawning area in the Selawik River have undoubtedly been changed because of the dramatically increased sediment exposure. Habitat changes may reduce the proportion of fertilized eggs that develop successfully and produce young. If production is reduced but not eliminated the Inconnu population would be expected to decline over time. If production is eliminated the population would be expected to become extinct as existing fish gradually die off. The increased sediment in the upper Selawik River is an environmental factor that may have a profound effect on the Inconnu population that spawns there as well as the subsistence fishers that depend on them.

Objectives:

1. Collect Inconnu age and length data from male Inconnu from the Selawik and Kobuk River spawning populations in 2023 and 2024;

2. Characterize the brood years observed in 2023 and 2024 (BY 1992-2012) as weak or strong recruitment years using catch-curve residuals (Maceina 1997; Tetzlaff et al. 2011).

3. Test the null hypothesis that the proportional compositions of the young (≤15 years of age) and old (>15 years of age) components are similar among the two spawning populations.

Methods: We hypothesize that Inconnu recruitment success will be similar in the Kobuk and Selawik rivers if there is no slump effect on reproductive success, but that reduced recruitment success in the Selawik River would be indicative of a slump effect. The age distribution will be characterized in each river in 2023 and 2024, corresponding to fully recruited age classes (age-15 and older) from the 2007 and 2008 brood years, respectively, and earlier. In the Selawik River, this will be derived from a sample of

200 males caught on the spawning grounds. These fish can be sacrificed for otoliths and distributed to communities without reducing the number of fertilized eggs on the spawning grounds. The Alaska Department of Fish and Game will provide a similar sample (up to 200, if available) from incidental Inconnu captures from their Chum Salmon test fishery on the Kobuk River near the community of Kiana in July and August. Chi-squared analysis testing the difference in the proportion of young (< 15 years) fish in each river will be performed to test our hypothesis.

We further hypothesize that Selawik River brood years associated with the slump (2004 and later) will be relatively weak compared to brood years prior to the slump. To test this, we will perform a catch-curve regression and characterize brood years as weak or strong using a residual analysis. We will increase our aged fish sample by sampling an additional 300 males each year, measuring fork length and releasing unharmed, in the Selawik River and applying an age-length key derived from the 200 aged fish to estimate ages for the additional sample prior to the regression analysis.

Partnerships and Capacity Building: Through the Native Village of Selawik (NVOS), residents of Selawik will be sought for assistance with collecting otoliths, overseeing Inconnu carcass processing, and transportation and logistical support. Training for sampling procedures will be conducted for individuals prior to initiating sampling. During the 2011-2018 project period there were numerous Selawik residents plus the NVOS that cooperated with the project to help make it a success and we intend to continue that relationship through contracts or similar methods. The FFWFO has worked periodically with Selawik residents or the NVOS organization for about 30 years.

The USFWS has partnered with the Alaska Native Science and Engineering program (ANSEP) to increase the number of Alaska Native Persons within the science workforce. By providing internships and an academic scholarship, the USFWS creates an opportunity for students pursuing degrees in the sciences to gain experience in the field of conservation. An ANSEP student interning on this project will build their skills and experience with fish collection, biological fish sampling, importance of careful data recording and management, biological sample organization and accounting, fish preservation, exposure to other Selawik River fish species, field equipment care, and shared camp life experience. The ANSEP student's salary will be requested through the proposed project budget. An ANSEP student academic scholarship(s) will be funded through a separate financial assistance award issued by the USFWS Regional Office. The student will have communication with the project leader(s) before field work to familiarize how and why the study is being conducted and provided with educational materials such as literature about northwest Alaska Inconnu and permafrost thaw.

In coordination with the NVOS we will mentor a senior or junior Selawik high school student at the project to provide skill building experience similar to the ANSEP student. If appropriate, provide documentation for the student to receive academic credit for their experience and participation. The student will receive a daily stipend within the scope of the USFWS regulations. The student will have communication with the project leader(s) similar to the ANSEP student before field work. The student will also have opportunity to share their views and experiences about fish and wildlife resources they have encountered.

Technical Review Committee Evaluation: The proposed work addresses the following 2022 priority information need: changes in Grayling, Dolly Varden, and Inconnu populations related to climate change. The work focuses on an important subsistence Inconnu fishery associated with Selawik National Wildlife Refuge. The investigators request continued funding to study the effect of a permafrost slump located about 40 km upstream from the Inconnu spawning area in the Selawik River. In 2004, the permafrost slump began emitting large amounts of sediment into the river. In 2010, the investigators began monitor the annual abundance and age structure of the Selawik River Inconnu spawning population to determine if the sediment emitted from the permafrost slump resulted in an identifiable impact to the Inconnu population over time. Through that research the data did not establish an effect of the permafrost slump on Inconnu recruitment. Information collected from this project would confirm the previous study and may be useful on a wide scale for interpreting the effect of climate change on other white fish populations. Capacity building consists of engaging a local hire via a contract, youth involvement and consulting with stakeholders. This project proposes involving two local youth internships (university and high school) with the goal of introducing young individuals to fisheries resource management. Investigators have successfully completed multiple years of work funded through Monitoring Plan. They have a history of fisheries research in the Arctic and have been involved in many Inconnu studies.

Project Number: 22-150
Project Title: Traditional Ecological Knowledge of Salmon in the River Drainages of Kotzebue Sound

Issue Addressed: This proposed project addresses a priority information need identified for the Arctic region regarding changes in salmon distribution, abundance, migration, and timing in river drainages of Kotzebue Sound (USFWS 2021). While chum (*Oncorhynchus keta*) are the predominant species of salmon in the region, all five species of Pacific salmon that return to Alaska are found in the Kobuk and Noatak River drainages.[1] Chum, sockeye (*Oncorhynchus nerka*), Chinook (*Oncorhynchus tshawytscha)*, and ppink salmon (*Oncorhynchus gorbuscha)* are present in the Kobuk River, while these four species and coho salmon (*Oncorhynchus kisutch)* are present in the Noatak River. Salmon species are an important part of the subsistence diet of the region and are harvested in large quantities by residents throughout the 14 communities of the Kotzebue management district (Braem et al. 2017, Braem et al. 2018, Braem et al. 2015, Magdanz et al. 2011). Division of Subsistence harvest assessment projects in 12 Kotzebue District communities show a heavy reliance on salmon resources (Braem et al. 2017, Braem at al. 2018). In 2013, an estimated 53,272 salmon were harvested by 9 communities (Noatak, Kiana, Noorvik, Selawik, Ambler, Shungnak, Kobuk, Buckland, and Deering). In 2014, an estimated 89,880 salmon were caught by 11 communities in the district (Noatak, Kiana, Noorvik, Selawik, Ambler, Shungnak, Kobuk, Buckland, Point Hope, Shishmaref, and Kotzebue). Recent ethnographic information collected by the Division of Subsistence as a part of these harvest assessment projects has documented concerns by residents of the Kotzebue District regarding environmental changes that have affected their ability to harvest and process salmon. Additionally, during recent Northwest Arctic Regional Subsistence Advisory Council (RAC) meetings in March and November 2020, council members expressed concern

[1] ADF&G. 2021. Anadromous Waters Catalog Interactive Mapping. https://www.adfg.alaska.gov/sf/SARR/AWC/index.cfm?ADFG=main.interactive. Accessed February 10, 2021

regarding water temperatures in the rivers delaying salmon runs, concerns over the potential effects of development, and the particularly poor salmon fishing season in 2020. Building on these recent studies, this project will document traditional ecological knowledge (TEK) from residents of Ambler, Noorvik, and Kotzebue regarding changing salmon distribution, abundance, migration, and timing. These communities were chosen to include perspectives of residents of the region who harvest salmon in the lower and upper Kobuk River, as well as in Kotzebue Sound and the Noatak River. Key respondent interviews will document local observations of fish behavior, health, and abundance. Additionally, interviews will assess the amounts harvested, harvest areas, and means of harvest of key species along with the social and cultural importance of fish resources.

Objectives: There are three objectives for this project:

1. In the communities of Ambler, Noorvik, and Kotzebue, conduct in-depth ethnographic interviews about the TEK of salmon ecology. Interviews will include questions about:

2. salmon species utilized for subsistence;

3. life history and biological information including habitat preferences, spawning and rearing areas, and seasonal movements of fish;

4. traditional and contemporary harvest methods, including timing of harvest, and gear used;

5. observations of fish behavior including seasonal movements, migration timing, spawning and rearing areas, and fish health;

6. relative abundance and population trends for salmon species; and

7. general observations of environmental change.

8. Map historical and contemporary subsistence harvest locations, observed fish migrations, and other important habitats (spawning, juvenile rearing, etc.).

9. Contribute to local capacity building by utilizing a framework of community involvement in research.

Methods: The research will employ standard anthropological data gathering methods of key respondent interviews, participant observation, and mapping to document the TEK of salmon species in Northwest Alaska. ADF&G staff will work closely with participating communities to assure effective local participation. As such, tribal governments will serve as project collaborators, supporting the research through tribal resolutions and assisting investigators in local logistics. In each of the study communities local research assistants will be hired to assist with data collection.

Semi-structured interview protocols provide a format for systematically documenting comparable information about the same or an overlapping set of topics in each community while providing flexibility for each key respondent's level of expertise, experience, and focus. Investigators will use a general semi-

structured interview guide framed around the topics listed in Objective 1 and developed in consultation with the tribal councils and other knowledgeable community members. The guide may be modified to reflect regional differences along each river, such as variations in resource use or ceremonial life. Davis and Ruddle (2010:891) stress the importance of a systematic methodology for gathering local knowledge, primarily through peer recommendations. In each community, individuals knowledgeable about salmon will be identified using a snowball method to learn about other experts with the assistance of tribal council and other community members (Usher 2000). Researchers will attempt to interview 10 individuals in Ambler and Noorvik, and, due to the size of the community, 15 individuals in Kotzebue. These sample sizes are based on researchers' previous research experience with the proposed communities and residents' collective subsistence use practices. Because this type of knowledge is likely to be highly specialized, researchers will strive to include all experts with this knowledge without attempting to represent a variety of demographics, including age, gender, and profession.

During interview sessions, key respondents will be asked to map historical and contemporary subsistence harvest areas, as well as historical and contemporary areas of observed fish migration. The temporal focus of these two mapping topics will allow for the documentation of changes to productive areas of harvest as well as any changes to fish abundance and movement in key waterways utilized for subsistence.

Partnerships and Capacity Building: The principal investigator will work with tribal councils in the study communities to hire local project assistants to assist with key respondent interviews and facilitate community meetings. The local research assistants will be trained in ethnographic interview methods. Local research assistants are well positioned to aid in interview data collection due to their understanding of the key species harvested by their community as well their knowledge of local geography for mapping sessions. The PI will work with local research assistants to develop a presentation on study results for community review. Working together in data collection increases communication and leads to better understanding of local issues and local understanding of science and management issues.

Technical Review Committee Evaluation: This two-year project will contribute to understanding the effects of environmental change on salmon in the Northwest Arctic, as well as the shifting capacity for subsistence users in Ambler, Noorvik, and Kotzebue to harvest them. This project would directly address the 2022 priority information need: "Evaluate changing salmon distribution, abundance, migration, and timing in river drainages of Kotzebue Sound (the Noatak and Kobuk River Drainages)." The investigators would have strengthened their response to the priority information need by combining TEK with Stock Status and Trends work. Federal nexus is provided by the Noatak National Preserve and Kobuk Valley National Park. Ms. Mikow will rely on well-established social science methods, employing participant observation and semi-structured interviews that integrate mapping. Local research assistants will be hired to assist with fieldwork and community meetings, as well as presentations on research to the communities. A letter of support was provided from the Native Village of Kotzebue, which has a history of coordinating regional research.

YUKON REGION

Priority Information Needs

The 2022 Notice of Funding Opportunity identified the following thirteen priority information needs in the Yukon Region:

- Impacts of climate change in continued harvest and use of fish; and impacts of climate change on fish, for example, impacts to fish migration, spawning, and life cycle.
- Effects of environmental stressors, such as heat stress, on salmon mortality during adult upriver migration and/or pre-spawn mortality within spawning tributaries.
- Effects of *Ichthyophonus* infection on Chinook Salmon mortality and spawning success.
- Knowledge of population, reproduction, and health of spawning habitat for Bering Cisco and Humpback Whitefish.
- Reliable estimates of Chinook, summer Chum, fall Chum, and Coho Salmon escapements and/or harvests, particularly sub-stocks in District 5 that are large contributors to the total run, for example in the Chandalar and Sheenjek Rivers.
- Distribution, abundance, condition, and survival of juvenile and out-migrating salmon in the Yukon River drainage.
- Estimates of "quality of escapement" measures for Chinook Salmon, for example, potential egg deposition, age, sex, and size composition of spawners, percentage of females, percentage of jacks, and spawning habitat utilization, with an emphasis on Canadian-origin stocks.
- Reliable in-season estimates of salmon harvests in the lower, middle, and upper Yukon River subsistence fisheries.
- Reliable estimates of age-sex-length and genetic composition of salmon harvested in the subsistence fishery, with emphasis on Chinook and fall Chum Salmon.
- In-season estimates of genetic stock composition of Chinook, summer Chum Salmon, and fall Chum Salmon runs and harvests.
- Reliable methods of forecasting Chinook, summer Chum, fall Chum, and Coho Salmon run abundance.
- Assessment of incidental mortality with gillnets, dip nets, and seines, with particular consideration for delayed mortality from entanglement from drop-outs and live release of Chinook Salmon (for example, loss of Chinook Salmon from 6-inch mesh nets during Chum Salmon fisheries and the live release of Chinook Salmon from dip nets and seines).
- Traditional ecological knowledge of fishes.

Proposals Submitted for the Yukon Region

Seven proposals were submitted for funding in the Yukon Region.

Table 2. Projects submitted for the Yukon Region, 2022 Monitoring Program, including total funds requested and average annual funding requests.

Project	Title	Total Request	Avg. Annual
22-201	East Fork Andreafsky River Weir Chinook and Summer Chum Salmon Abundance and Run Timing Assessment	$701,347	$175,336
22-202	Gisasa River Weir Chinook and Summer Chum Salmon Abundance and Run Timing Assessment	$342,652	$171,826
22-203	Outmigrating Chinook Salmon and Prey Species Assessment in the Lower Yukon River	$304,642	$152,321
22-204	Western Alaska Coho Salmon Genetic Baseline Development	$116,782	$58,491
22-251	Presence and Use of Salmon in the Pastolik and Pastoliak Rivers	$204,603	$102,301
22-252	Humpback Whitefish and other Nonsalmon Fishes Traditional Ecological Knowledge and Biological Sampling in the Upper Koyukuk Region	$231,952	$115,976
22-253	Yukon River Nonsalmon Subsistence Survey	$219,342	$54,835
	Total	**$2,121,320**	**$796,986**

In addition to the proposed projects, the following seven projects are currently being funded by the Monitoring Program in the Yukon Region:

- 20-200 Yukon River Coho Salmon Radio Telemetry
- 20-201 Application of Mixed-stock Analysis for Yukon River Chum Salmon
- 20-202 Evaluating Dart and Telemetry Tags in an Effort to Track Run Timing and Migration Patterns of Yukon River Arctic Lamprey
- 20-204 Abundance and Run Timing of Adult Salmon in Henshaw Creek, Kanuti National Wildlife Refuge, Alaska
- 20-251 In-season Yukon River Subsistence Salmon Survey Program
- 20-252 Customary Trade in the Lower and Middle Yukon River
- 20-256 Yukon River In-Season Salmon Management Teleconferences

Regional Advisory Council Comments

Yukon-Kuskokwim Delta Subsistence Regional Advisory Council

The Council commented on poor salmon returns and future research priorities for the Yukon Region. The Council expressed concern about the poor Chum Salmon returns in the region. The Council would like future research that examines fry and juvenile salmon as they exit the upper Yukon River and determines if flooding from ice jams may result in stranding of juveniles before they exit the river. The Council noted that communities have relied heavily on whitefish in the past 4–5 years and research is needed to understand these fish, especially in the lower section of the river.

The Council posed several questions about the FRMP process and the composition of the Technical Review Committee. There was concern about the lack of Tribal and Alaska Native representation and input when evaluating proposals.

Western Interior Alaska Subsistence Regional Advisory Council

The Council expressed support for Projects 22-201, 22-202, 22-203, 22-204, and 22-252. The Council noted that the proposed weir projects, Projects 22-201 and 22-202, are necessary. In regard to Project 22-203, the Council said it is important to understand the smolt outmigration of Chinook Salmon and assess their prey in the lower Yukon River. However, the Council suggested that Project 22-203 also include a predator assessment because predators, such as pike, may impact smolt outmigration. Project 22-204 received support because development of a Coho Salmon genetic baseline is an important need. The Council noted that there has been an increase in harvest pressure on nonsalmon species due to the poor performance of salmon stocks. In addition, Elders from the Koyukuk River are concerned increased harvest pressure on whitefish and Sheefish may result in population declines. Therefore, the harvest of nonsalmon species should be monitored (Project 22-252). Finally, support was also expressed for Projects 22-202 and 22-252 because of their involvement with the Tanana Chiefs Conference.

In addition to providing comments on submitted projects, the Council also highlighted research needs in the Yukon Region. One suggestion was for a study on pike. Pike are a major predator of salmon and their abundance may have increased due to reduced harvest effort. Another suggestion was for a project that genetically samples outmigrating salmon to determine their origin and which systems are more productive than others.

Lastly, the Council provided recommendations for improving the FRMP process. The Council noted there is no Tribal or rural representation on the Technical Review Committee and these organizations need a more meaningful involvement in the FRMP process. The Council expressed concern about the amount of funding going to research led by ADF&G and suggested there should be a priority for funding research led by local tribes and rural organizations instead.

Eastern Interior Alaska Subsistence Regional Advisory Council

The Council focused their comments on sharing local observations and future research priorities. The Council shared reports of fish being caught farther north than in the past. The Council suggested that changes in ocean conditions, such as warming temperatures, may have affected fish distributions and research is needed to determine what is going on. Additionally, during their annual report discussion, the Council also highlighted the importance of coordination among groups and agencies, such as YRDFA and OSM, when solving the salmon problem on the Yukon River.

Interagency Staff Committee Comments

The Interagency Staff Committee supports the Technical Review Committee's assessment of the 2022 Yukon Region proposals. The Interagency Staff Committee also notes that Projects 22-253 and 22-203 did not make the list of fundable projects but do address critical needs and information gaps in the region, Project 22-253 documents local knowledge, harvest methods, and use of nonsalmon species on the Yukon River, an issue of critical importance considering the recent closure on Yukon River salmon harvest. This project addresses an emerging need and the Interagency Staff Committee suggests the Monitoring Program consider funding it if more money becomes available. Additionally, while the Technical Review Committee did not recommend Project 22-203 for funding, the Western Interior Subsistence Regional Advisory Council supported this proposal. The Interagency Staff Committee recognizes that little is known about the juvenile life-history of Chinook Salmon and this remains a critical priority information need for the region.

The Interagency Staff Committee acknowledges the Council comments encouraging meaningful involvement of Tribal or rural representation on the Technical Review Committee and concern over the proportion of funding going to research led by the Alaska Department of Fish & Game rather than by local tribes and rural organizations. The Interagency Staff Committee encourages changes to accommodate these shortcomings. Finally, the Interagency Staff Committee concurs with the Eastern Interior Alaska Subsistence Regional Advisory Councils comment on the importance of coordination among groups and agencies, such as the collaboration between the Yukon River Drainage Fisheries Association and the Office of Subsistence Management, when solving salmon population problems on the Yukon River.

Executive Summaries and Technical Review Committee Evaluations

The investigators' executive summaries of their investigation plans are provided below. All executive summaries reflect what was submitted to the Technical Review Committee for review, with only minor formatting changes completed by the Office of Subsistence Management to ensure readability and accessibility. The executive summaries include synopses of the issue addressed, the objectives, the methods, and the partnership/capacity building. Following each executive summary is the Technical Review Committee's evaluation of the investigation plan. The Technical Review Committee assessed investigation plans based on the set criteria: strategic priority, technical and scientific merit, investigator ability and resources, partnership and capacity building, and cost/benefit.

Project Number: 22-201
Project Title: East Fork Andreafsky River Weir Chinook and Summer Chum Salmon Abundance and Run Timing

Issue Addressed: The Alaska National Interest Lands Conservation Act (ANILCA) specifies that salmon populations in federal conservation units are to be managed to conserve natural diversity, fulfill international treaty obligations, and maintain a priority for subsistence harvest opportunities. Run sizes and production rates in Yukon Chinook and Chum salmon populations have been lower than expected in a number of years over the recent two decades.

The primary function of the East Fork Andreafsky River weir project is to collect fish passage counts and estimate annual escapement for Chinook and summer Chum salmon in this tributary. Estimates of age, sex, size composition of these escapements are also provided by the project. The Andreafsky River is the lowest major salmon producing tributary in the Yukon river drainage and contributes a major proportion of lower Yukon River Chinook and summer Chum salmon stocks. Salmon escapement data from East Fork Andreafsky River provide a valuable early indicator of run strength and timing to fishery managers. In addition, these escapement estimates are the only measure of salmon abundance below the Pilot Station sonar and fill a critical gap in data needed for estimating total Chinook and summer Chum salmon run sizes for the Yukon River. The estimates are necessary to evaluate Chinook and summer Chum salmon escapement goals established by the Alaska Department of Fish and Game (ADF&G) and are an essential component of drainage wide run reconstructions and forecasts.

The Andreafsky River is the first major tributary encountered by salmon migrating up the Yukon River. Salmon fisheries below that point encounter essentially all the Yukon River salmon stocks as they migrate through the area. All communities in the lower Yukon area depend on reliable, large salmon harvests for sustenance in this remote area, where the costs of imported fuel and groceries are exorbitant, and supplies of fresh, healthful foods are limited. Recent Chinook and summer Chum salmon harvests in this area have been lower than historic averages; Chinook Salmon subsistence harvests have been among the lowest on record. The Pilot Station sonar project, situated about 30 rkm upriver from the Andreafsky River confluence, and which provides estimates of total salmon run sizes of all species at that point in the river, does not include the Andreafsky River salmon stocks. Andreafsky River Chinook and summer Chum salmon stocks are not represented in mixed-stock samples collected at the sonar project site for genetic analysis of the Chinook and Chum salmon runs. This underscores the importance of the East Fork Andreafsky weir project in assessing the status of salmon runs which are not represented in other run size and stock group estimates.

A recent review of long-term project data indicated that East Fork Andreafsky Chinook and summer Chum salmon escapements have remained stable over the lifetime of the project, as has run timing for both species. This stability indicates resilience in the East Fork Andreafsky River salmon populations to both environmental change and fishing. The long-term data record will be valuable for future assessments in the face of more severe climate change effects, major ocean ecosystem shifts, and freshwater warming. Recent heat stress studies show that East Fork Andreafsky River weir project is

taking on a new dimension of importance in conservation in the era of accelerating anthropogenic climate change.

Objectives:

1. Estimate daily and seasonal escapement and run timing of adult Chinook and summer Chum salmon (target species) between the third week of June and the end of July.

2. Estimate the age, sex, and length (ASL) composition of the adult Chinook and summer Chum salmon escapements, for which the 95% confidence intervals of age-sex proportions are no larger than ± 0.1.

3. Identify and count other fish species passing through the weir daily (recognizing that for most species, these will be partial counts).

4. Record species, ASL information, and spawning condition for all Chinook and summer Chum salmon carcasses, and species, sex, and spawning condition for Sockeye and Coho salmon carcasses, found during daily checks on the upstream side of the weir and along both banks.

5. Measure and record water level and temperature at the fish passage chute every 4 hours, and record air temperature and other weather data at least twice daily.

Methods: The project will use same weir design and structure used in previous years. New floating weir panels were constructed and installed in 2019. The main fish passage chute is located at the deepest part of the channel and leads into a sampling trap and then a video chute, which is fitted with a glass view window and underwater video camera. The weir and video system will be operated 24 hours a day starting June 16 and continuing until the end of July. Statistical methods will be used to estimate probable passage of Chinook and summer Chum salmon after the last day of weir operation. Data and scale samples will be collected from Chinook and summer Chum salmon escapements to characterize their age, sex, and length (ASL) composition. The sample size goal for each species (Chinook and summer Chum salmon) is 220–240 fish for the season. Sampling will be suspended if water temperatures exceed specific thresholds for physiological stress in salmon. The crew will collect ASL samples and check carcasses of heat-stressed salmon near the weir for spawning condition, and log water depth and temperature and air temperature using automated data loggers and backup manual measurements. Daily fish counts and other data will be reported to the FFWCO for distribution to managers, biologists, and stakeholders in the morning following each 24-hour day. ADF&G will analyze scales for age determination. Annual performance reports will be submitted, and project results will be published each year in the USFWS Alaska Fishery Data Series.

Partnerships and Capacity Building: Yupiit of Andreafskii (a Tribal organization in St. Mary's), Nerklikmute Corporation (a local Alaska Native organization in St. Mary's), and the City of St. Mary's have an ongoing association with the project, through hiring local crew members, leasing land for the project camp site to the USFWS, and providing services in St. Mary's. FFWCO will also continue as in recent years to contract with St. Mary's Native Corporation/SMNC Properties LLC for logistical support and services using local crews. These Tribal and local organizations have built working relationships with

FFWCO staff over many years. Furthermore, residents of St. Mary's devote substantial time, expertise, and traditional knowledge, to federal, state, and international fish and wildlife regulatory processes. They hold seats on state and federal Advisory Councils, the Yukon River Panel, and the board of directors of the Yukon River Drainage Fisheries Association. In these capacities they discuss and make decisions about various research and stock assessment projects, including the East Fork Andreafsky River weir, and engage in ongoing conversations about their observations and traditional knowledge of salmon runs with agency staff.

Technical Review Committee Evaluation: The investigation plan outlines the continuation of a successfully implemented project that uses weir and video technology to collect fish passage counts and estimate annual escapement for Chinook and summer Chum salmon in the East Fork Andreafsky River. The Federal nexus is clear, and this project addresses a 2022 priority information need for the Yukon Region. Escapement estimates from this project are used in run reconstructions and forecasts, and to inform in-season management decisions and post-season evaluations. While this project provides important data and is technically sound, the investigation plan did not outline any meaningful consultations with local communities or provide examples of long-term capacity building. However, a letter of support was received from St. Mary's Native Corporation. Letters of support were also received from the Alaska Department of Fish and Game (Division of Commercial Fisheries), University of Alaska Fairbanks (Institute of Arctic Biology), and Yukon Delta National Wildlife Refuge. Four years of funding are requested to complete the proposed work and matching funds will be provided to offset project costs. Project costs are comparable to other weirs in the region and are reasonable for the proposed work.

Project Number: 22-202
Project Title: Gisasa River Weir Chinook and Summer Chum Salmon Abundance and Run Timing Assessment

Issue Addressed: Through Section 302 of the Alaska National Interest Lands Conservation Act, the USFWS has a responsibility to ensure that salmon populations within federal conservation units are conserved in their natural diversity, that international treaty agreements are met, and subsistence opportunities are maintained. The Gisasa River provides important spawning and rearing habitat for Chinook and summer Chum salmon that contribute to complex Yukon River mixed stock subsistence and commercial fisheries. The Gisasa River weir is currently one of only two projects within the Koyukuk River drainage that provide in-season run information. The data is utilized postseason to produce an annual estimate of escapement and assess the success of management actions in-season. These data will also help evaluate long-term trends in species abundance and age, sex, and length composition.

Objectives:

1. Use video weir technology to enumerate daily passage of all fish species and forward this data on to managers and users daily.

2. Estimate seasonal escapement of adult Chinook Salmon and summer Chum Salmon using Sethi and Bradley (2016) model, as needed, and characterize their run timing.

3. Estimate the age, sex, and length (ASL) composition of the adult Chinook and summer Chum salmon escapements, for which the 95% confidence intervals of age-sex proportions are no larger than ± 0.1.

4. Work with Tanana Chiefs Conference (TCC), as the Tribal Organization for the region, to transition operation of the project from USFWS staff to TCC.

Methods: A resistance board weir will be installed and operated on the Gisasa River from mid-June through early to mid-August during each year. A trap equipped with a video counting chute will allow all fish passing through the weir to be identified to species and counted. Count data will be provided to managers and other interested parties daily. Age (scales), sex, and length data will be collected from Chinook, and Chum salmon. Scales will be sent to Alaska Department of Fish and Game for aging. Personnel from TCC will participate in all aspects of the project to build the capacity to assume the role of principle investigator

Partnerships and Capacity Building: Project staff have worked with staff from Tanana Chiefs Conference's (TCC) Henshaw River Weir, the other Koyukuk River monitoring project, to share knowledge, methods, and labor for weir setup. This cooperation with TCC will be expanded upon by working closely with TCC during both years of this project to familiarize them with all aspects of the project and help them build the capacity to take over as the principal investigator after the 2023 season. The FFWCO has strived for local involvement and capacity building with the project and is committed to continually promoting capacity building by describing project opportunities at RAC, YRDFA, and Refuge coordination meetings. The FFWCO has also worked with Koyukuk National Wildlife Refuge to provide field work experience for Alaska Native Science & Engineering Program students and local hires from the Refuge.

Technical Review Committee Evaluation: The Gisasa River weir is an established monitoring project that has operated since 1994 and has been funded by the Monitoring Program since 2003. The Federal nexus is clear and this project addresses multiple 2022 priority information needs for the Yukon Region. The methods used in this project have consistently achieved results and the investigators have the experience needed to conduct this research. Data collected by this project are used to inform in-season management decisions and produce annual escapement estimates, assess in-season management actions, and develop run reconstructions for the Yukon River basin. The previous relationship between the Fairbanks Fish and Wildlife Conservation Office and the Tanana Chiefs Conference will be expanded in order for the Tanana Chiefs Conference to build the capacity needed to serve as the principal investigator after the 2023 season. Matching funds will be provided to offset project costs and the funds requested to complete this project are comparable to other weirs in the region and are reasonable for the proposed work. This project received letters of support from the Koyukuk/Nowitna/Innoko National Wildlife Refuges, Tanana Chiefs Conference, and University of Alaska, Fairbanks.

Project Number: 22-203
Project Title: Outmigrating Chinook Salmon and Prey Species Assessment in the Lower Yukon River

Issue Addressed: The proposed research addresses Yukon Region 2022 Priority Information Need: Distribution, abundance, condition, and survival of juvenile and out-migrating salmon in the Yukon River drainage. This research will evaluate the composition, spatial variation, and temporal variation in fish and invertebrate prey for juvenile Chinook salmon in distributary habitats and assess the quality of prey resources in relation to juvenile Chinook salmon growth and condition. Juvenile salmon migration timing has evolved in response to seasonal patterns in prey availability. To optimize growth, juvenile salmon must be capable of rapidly capitalizing on short-lived episodes ('resource pulses') of high prey availability in order to amass energy stores prior to the stressful parr-smolt transformation. Several studies indicate that juvenile growth in freshwater may influence survival during marine entry and early marine life stages, and that the quality and quantity of prey resources available during outmigration and early marine residence are crucial factors for juvenile salmon growth and survival.

The Yukon River is experiencing rapid climatic changes that are evidenced in warmer water temperatures, decreased ice periods, and reduced ice thickness. Since 2015, water temperatures in the lower Yukon River have consistently exceeded the long-term average. Less predictable inter-annual variability in environmental conditions can lead to temporal mismatches between juvenile salmon and pulsed prey resources in certain years. Such mismatches could lead to high mortality if pulses are missed during critical times for feeding.

Recent advances in the use of DNA-based diet determination provide an additional tool for accurate diet analysis. DNA-based methods can identify prey regardless of the degree of digestion. When standard morphological content analysis and DNA-based methods are combined, they can provide greater resolution of diet and trophic interactions than when either method is used in isolation. This research proposes to evaluate how seasonal patterns in resource availability interact with inter-annual environmental variation to influence the growth and energetic status of outmigrating Chinook salmon. We propose to conduct two years of prey field sampling and DNA-analysis of stomach samples. Prey field data will be compared with existing data from a pilot study of prey dynamics in 2016. Combining all three years of data will increase our understanding of mechanisms by which seasonal patterns in prey availability affect Chinook salmon growth and by extension survival rates.

Objectives:

1. Characterize changes in diet composition of juvenile Chinook salmon in the Yukon Delta over the duration of the outmigration season using an integrative approach.

2. Characterize changes in the composition and quality (lipid content) of prey available to, and changes in prey selection by, juvenile Chinook salmon across the outmigration season and across years

3. Relate inter-annual environmental variation to among-year differences in lipid availability (prey) and among-year differences in size and condition of juvenile Chinook salmon

Methods: Chinook salmon and weekly prey field samples will be collected using other funding. Diet analysis of individual Chinook will be assessed by excising the stomachs from frozen samples and

weighing and identifying stomach contents under a microscope to the lowest taxonomic level feasible. Each taxa or prey group will be measured and enumerated, and the percent prey weight composition will be summarized. DNA samples will be extracted from the stomach contents and processed in a commercial laboratory. Drift samples will be processed by trained taxonomists at UAA's Alaska Center for Conservation Science aquatic ecology lab. Published length-weight regressions will be used to estimate biomass for all major prey taxa. Flow volume (measured during field sampling; described previously) will be multiplied by surface area to estimate water volume sampled; this estimate will be combined with biomass estimates to produce estimates of drift prey densities by taxa. Non-parametric analysis (i.e., PERMANOVA, MDS) will be used to investigate the relationship between biotic (e.g., Chinook body size) and abiotic (i.e., water temperature, season, year) factors and community composition of the diets. Seasonal variations in diet quality in relation to juvenile Chinook condition will be assessed by evaluating consumed energy in relation to required maintenance metabolism given Chinook size and water temperature. The result will provide information on how well diets are fulfilling Chinook energetic needs for varying sizes of salmon, and throughout the migration period.

Partnerships and Capacity Building: Project management is done by the in-region CDQ group YDFDA. This proposal continues to build on a multi-year history of research and engagement with the residents of the Lower Yukon, specifically in the communities of Emmonak, Alakanuk, and Kotlik. YDFDA has been an important lead in this research, enabling local fishermen and technicians (mostly high school students) throughout the Yukon Delta to have an active role in juvenile Chinook salmon research. Local knowledge and expertise have been invaluable in helping identify appropriate sampling locations, navigating complex waterways, and developing sampling protocols for the Yukon River environment. In exchange, local fishermen and technicians have gained first-hand knowledge of scientific research principals and processes. The project PI lives in the community during the summer and is often approached by community members to talk about the research and its importance to salmon ecology. The unique relationship between scientists and fishermen has made this research successful and is providing a valuable multi-year dataset on understudied aspects of juvenile salmon ecology in the Yukon River.

Technical Review Committee Evaluation: The investigation plan requests two years of funding to evaluate the composition, spatial variation, and temporal variation in fish and invertebrate prey for juvenile Chinook Salmon and assess the quality of prey resources in relation to juvenile Chinook Salmon condition in the Yukon Delta. The investigation plan does not clearly articulate its relevance to Federal subsistence management, but this project does address a 2022 priority information need for the Yukon Region. This study may shed light on juvenile Chinook Salmon survival by identifying factors contributing to variation in individual size and energetic status just prior to transitioning to the marine phase of their life history. Study objectives are clear and measurable, but it is difficult to determine if they are achievable due to methods and procedures that are not described in sufficient detail. This project would continue a multi-year history of research and engagement with the residents of the lower Yukon River. Local capacity will be built by presenting information about juvenile fish to science classes in Emmonak and Alakanuk. The investigation plan mentions that the Yukon Delta Fisheries Development Association intends on hosting an Alaska Native Science and Engineering Program intern. However, a letter of recommendation was not received from the Alaska Native Science and Engineering Program and

salary/scholarship information was not included in the Budget Table. While this project leverages substantial contributions from the Yukon Delta Fisheries Development Association for field sample collections, more detail is needed for DNA analyses that make up a large proportion of the requested funds. No letters of support were received for this project.

Project Number: 22-204
Project Title: Western Alaska Coho Salmon Genetic Baseline Development

Issue Addressed: Chinook salmon (*Oncorhynchus tshawytscha*) and chum salmon (*O. keta*) runs are major subsistence fishery resources for Yukon River communities (ADF&G 2013; JTC 2020). However, low productivity and poor return years have been observed for both species in recent years, resulting in economic hardships and food security issues for fishing communities throughout the region. With variable Chinook and chum salmon returns, the importance of other fishery resources is growing on the Yukon River, including coho salmon (*O. kisutch*). Coho salmon have been relatively understudied on the Yukon River compared to Chinook and chum salmon, and limited information exists on the distribution and abundance of coho salmon throughout the drainage. Nevertheless, fisheries biologists and managers are required to use the best available information to assess coho salmon abundance when managing the subsistence coho salmon fisheries on the Yukon River.

Currently, ADF&G and NOAA collaborate to conduct annual offshore trawl surveys in the Bering Sea to assess abundances of juvenile salmon species. Prior studies have demonstrated a clear relationship between juvenile abundance and future adult returns of Yukon River Chinook salmon, enabling juvenile-based forecasts of adult run sizes (Howard et al. 2020). Furthermore, an in-progress study is developing a similar forecast tool for Yukon River chum salmon. Due to a mixture of salmon stocks in the Bering Sea, genetic mixed-stock analysis (MSA) is a central component of these models and facilitates apportionment of Yukon River salmon from other Alaskan salmon stocks. These forecasts are the best available and directly inform conservation and management of major fishery resources in the Yukon River. Coho salmon conservation and management could similarly benefit from juvenile-based forecasts of adult run sizes, since coho salmon samples and abundance data is collected during the annual Bering Sea trawl surveys. However, a genetic baseline for coho salmon that can be used for Bering Sea MSA is necessary before developing a juvenile-based forecast model for coho salmon in the Yukon River.

The proposed project addresses the following Office of Subsistence Management Priority Information Need for Federal Subsistence Fisheries in the Yukon Region: ***Baseline information about geographic distribution, migration patterns, run timing, genetic structure, and tributary escapements of Yukon River coho Salmon.*** Ultimately, the product of the proposed project will eventually contribute to a second Priority Information Need for Federal Subsistence Fisheries in the Yukon Region: ***Reliable methods of forecasting Coho salmon run abundance.***

The primary goal of this proposed project is to develop a high-resolution genetic baseline for Yukon River and Coastal Western Alaska coho salmon populations. The genetic baseline can be used to describe the genetic structure of coho salmon 1) within the Yukon River and 2) between the Yukon River and other Coastal Western Alaska populations (i.e., Norton Sound, Kuskokwim River, and Bristol Bay). Moreover, the baseline can then be used for MSA in subsistence fisheries management applications. MSA

can provide federal, state, and local subsistence fisheries managers and biologists with stock composition estimates of mixed-stock catch or harvest samples, which can be utilized in interdisciplinary efforts to 1) understand population dynamics and run structures, 2) estimate escapement, harvest, and stock-specific abundances, and 3) forecast future runs of coho salmon. Project objectives include:

> ***Objective 1:*** Genotype 43 Western Alaska coho salmon collections for 372 genetic markers using amplicon sequencing and a bioinformatic pipeline.
>
> ***Objective 2:*** Construct a genetic baseline and analyze the baseline for population structure.
>
> ***Objective 3:*** Evaluate the MSA potential of the baseline for management applications and identify missing baseline populations through engagement with subsistence fisheries stakeholders.

Methods: DNA from 3,990 coho salmon tissue samples collected from 43 spawning locations across Western Alaska (Yukon River, Norton Sound, Kuskokwim River, and Bristol Bay) will be genotyped at 372 genetic markers using novel, yet well-vetted, Genotyping-in-Thousands by Sequencing methods (GT-seq; Campbell et al. 2015), a cost-effective method for screening hundreds of genetic markers for baseline development. The GT-seq marker panel of 372 loci was developed for coastwide coho salmon collaboration by WDFW and designed to include the genetic markers used by DFO. Libraries of pooled samples will be prepared and sequenced following the GT-seq methods described in Campbell et al. (2015) with modifications as described in Barclay et al. (2019). We will examine population genetic structure among populations. We will test reporting groups by sampling individuals from the baseline without replacement to generate test mixtures and use the R package *rubias* to estimate the stock composition of test mixtures. With these methods, we will evaluate the capability of the baseline to accurately and precisely estimate Yukon River stock compositions within mixture samples. The results of these baseline tests will be shared with Yukon River Western Alaska fisheries managers and scientists and local community organizations. Discussions with these groups will us help identify missing baseline populations and recommend future avenues of improvement for a more comprehensive Western Alaska coho salmon baseline needed for Yukon River subsistence fisheries management applications.

Partnerships and Capacity Building: Our long-term vision is that the initial genetic baseline developed through our proposed project will be expanded into a more comprehensive Western Alaska baseline through partnerships and collaboration with local communities. This initial project represents the first step towards building a valuable partnership with Yukon River and Western Alaska rural communities and Alaska Native organizations to more meaningfully participate in management of subsistence fisheries.

The baseline proposed here would be a product of previous opportunistic sampling in Western Alaska. Therefore, it is an initial Western Alaska coho salmon baseline that will benefit from additional, targeted baseline sample collecting. The quantitative measures obtained through genetic structure analysis will allow us to form hypotheses about missing populations within the baseline. However, ground-truthing with local knowledge will be essential for identifying additional baseline collection sites across the vast and remote Western Alaska landscape. Partnership building with Yukon River and Western Alaska community organizations will be facilitated by ADF&G local area staff, Research Coordinators, Fisheries

Managers, and Fisheries Scientists throughout the project. Formal meetings will be planned with these groups each Spring of the project duration to disseminate baseline progress, gather feedback from local community organizations, and discuss baseline improvement options with these stakeholders. Ultimately, development of a comprehensive Western Alaska coho salmon baseline will provide the foundation for more sustainable harvesting of an increasingly important fishery resource on the Yukon River.

References:

ADF&G. 2013. Chinook salmon stock assessment and research plan, 2013. Alaska Department of Fish and Game, Special Publication No. 13-01
Barclay et al. 2019. New genetic baseline for Upper Cook Inlet Chinook salmon allows for the identification of more stocks in mixed stock fisheries: 413 loci and 67 populations. Alaska Department of Fish and Game, Fishery Manuscript Series No. 19-06.
Campbell et al. 2015. Genotyping-in-Thousands by sequencing (GT-seq): A cost effective SNP genotyping method based on custom amplicon sequencing. Molecular Ecology Resources.
Howard et al. 2020. Northeastern Bering Sea juvenile Chinook salmon survey, 2017 and Yukon River adult run forecasts, 2018–2020. Alaska Department of Fish and Game, Fishery Data Series No. 19-04.
JTC. 2020. Yukon River salmon 2019 season summary and 2020 season outlook. Alaska Department of Fish and Game, RIR 3A20-01.

Technical Review Committee Evaluation: The primary goal of this proposal is to develop a high-resolution genetic baseline for Yukon River and Coastal Western Alaska Coho Salmon populations. Currently, during years where Chinook and Chum salmon abundance are low, subsistence harvests are beginning to increase on other species such as Coho Salmon. This proposed work is timely to help inform in-season managers to give them an additional information to assess forecasted run strength. This proposed work, would provide the needed genetic baseline to someday begin the development of a juvenile-based run assessment to forecast adult returns of Coho Salmon in the Yukon River. Alaska Department of Fish and Game have already collected the necessary tissue samples needed across 18 Federal public lands and waters, which includes 43 spawning sites. Once completed, this newly developed genetic baseline will enhance mixed-stock assessments across Western Alaska for various fisheries stakeholders.

Project Number: 22-251
Project Title: Presence and Use of Salmon in the Pastolik and Pastoliak Rivers

Issue Addressed: Sustainable management of salmon fisheries requires accurate data about stock status and harvest. For two coastal rivers located in the Yukon Delta National Wildlife Refuge, this information does not exist or is very limited, outdated, or unsubstantiated. The Pastolik and Pastoliak rivers, near the north mouth of the Yukon River, have been traditionally used by residents of Kotlik and the surrounding area for subsistence salmon and nonsalmon fishing long before Alaska became a state (Wolfe 1981; Yukon Delta National Wildlife Refuge 1988; Runfola et al. 2018). Despite long-term use of these rivers, fisheries managers have no data on subsistence salmon harvests for them and maintain unresolved questions about presence or absence, abundance, and health of the salmon species in these rivers. This study seeks to address the data gaps that exist about the presence and use of salmon in the Pastolik and Pastoliak rivers.

Objectives:

1. Document local and traditional knowledge held by Kotlik residents about:

    a. the presence and ecology of salmon in the Pastolik and Pastoliak rivers;

b. the historical and contemporary uses of these river systems for subsistence salmon fishing.

2. Document subsistence salmon harvests and the locations of harvest in the Pastolik and Pastoliak rivers during the 2022 fishing season to understand patterns of harvest specific to these rivers and distinct from the total harvest within the Y1 District of the Yukon River.

3. Substantiate presence and enhance knowledge of salmon stocks in the Pastolik and Pastoliak rivers through biological sampling methods. Specifically,

    a. identify what species of salmon are present in what life stages, with a focus on identifying adult spawning salmon and distributions throughout both rivers of adult spawning and juvenile rearing.

    b. document run timing.

    c. determine if stocks identify genetically with Yukon River or other major stocks through genetic sampling.

    d. submit detailed nominations to the AWC for waterbodies supporting anadromous species, including seasonal efforts that document the fish assemblages present, including life stages of certain species. Share results publicly through the ADF&G AFFI online mapper.

Methods: ADF&G researchers will work with the Kotlik Traditional Council to identify two local research assistants (LRAs) to help with ethnographic interviews and household surveys. Semi-structured interviews will be conducted with long-time residents who have a history of fishing on the Pastolik and Pastoliak rivers. Researchers will administer a short salmon harvest survey to households who fished for subsistence salmon in the Pastolik and Pastoliak rivers in 2021. The survey will document what species were harvested, the amounts, timing of harvest, gear types used, and location of harvest. These data will be the first attempt to quantify subsistence salmon harvest information specific to these rivers. During interviews and surveys, a map of the Pastolik and Pastoliak rivers and nearby surrounding areas will be used as a visual reference. Fishing sites, observations of salmon and salmon habitat, and other relevant information related to the topics of interest will be noted on the maps. Map data will later be digitized and formatted using ESRI ArcMap GIS software.

For biological data collection, ADF&G staff will also utilize the expertise of a LRA and local boat driver. Staff and LRAs will travel the Pastolik and Pastoliak rivers by boat and helicopter, conducting biological sampling throughout each drainage. Primary fish capture methods proposed to be used throughout the duration of field work include actively sampling with electrofishing in upper segments of the rivers and more passive sampling using gillnets in downstream reaches of each river. In each river, two 100′ gillnets with 5.5″ (for chum and pink salmon) and 7″ (Chinook and chum) stretched mesh will be fished perpendicular to streambanks and set overnight and checked each day throughout the duration of the project. Researchers will also seek to rent fishing nets from local fishers to increase the mesh selectivity.

Fishers in this area tend to use 6″ or 7.5″ stretched mesh to catch salmon. Opportunistic sampling methods include minnow trapping, aerial observations, and angling. Minnow traps will be set opportunistically by boat or raft-electrofishing crews in habitats able to support juvenile salmon. Trapped juveniles will be visually identified, measured to fork length (mm), and will provide verification of rearing habitat. Aerial surveys will be performed opportunistically during helicopter travel to, from, and at raft-electrofishing sites with any observations georeferenced on a handheld GPS. If salmon are observed to be abundant, angling will be used as an alternative method of capture to reduce salmon mortality during sampling. Direct and indirect genetic sampling will be performed and then analyzed by the ADF&G genetics laboratory and Jonah Ventures Lab in Boulder, CO. Captured fishes from any method will be identified, measured to fork length, photographed when necessary (such as to document identity for verification of species), and recorded. Sex will be recorded for adult salmon. Any remarkable or informative notes (e.g., sex, spawning condition, disease) for other species will be noted. In addition, in each river, researchers will collect three water samples from six locations in each river (N=36) for environmental DNA (eDNA) analysis, which will provide evidence of potential presence or absence of various salmon species to be detected. All captured adult salmon will be tissue sampled via clipping the axillary process and saved for genetic analysis, which will help determine if they are a unique stock from other Yukon River salmon. For observations of anadromous fishes, staff will generate nominations to the AWC.

Partnerships and Capacity Building: Throughout the development of this proposal, the lead investigator was in communication with local residents of Kotlik who have expressed interest for more informed and comprehensive salmon management of the Pastolik and Pastoliak rivers. This communication helped shape project design and decide the sampling methods for household harvest surveys and traditional knowledge interviews. Through consultation with the Kotlik Traditional Council, investigators and community leaders have agreed to include local research assistants (LRAs) in all aspects of data collection. One of the main goals of this project is to facilitate information sharing between local residents and fisheries management agencies. Local residents will have the opportunity to share their knowledge of salmon in the Pastolik and Pastoliak rivers with researchers, and in return project staff will share what they learn through biological sampling with the community. This two-way information exchange will help build a relationship between the community and managers to strengthen additional partnerships in the future.

Additionally, project staff will work with the tribal council in Kotlik to hire LRAs, to select key respondents, and facilitate community meetings. The LRAs will be trained in anthropological and biological sampling methods. This training will increase the capacity for local involvement in future research opportunities. This increases coordination between agencies, tribal entities, and community members; working together in data collection increases communication and leads to better understanding of local issues and local understanding of science and management issues.

Technical Review Committee Evaluation: Investigators responded to two priority information needs identified in the 2022 Notice of Funding Opportunity. The project is within the Yukon Delta National Wildlife Refuge. The Federal nexus is clear. Objectives are clearly stated, and the investigation plan is well-written. Investigators appear qualified to do the work, and the budget is reasonable for the work

being proposed. Results from this research will contribute to two long-term data sets. Investigators say they will work with three local Tribal governments in Kotlik through a cooperative agreement to provide logistical help; however, funding was not provided in the budget for these tasks. Local hires to assist with field work are planned. Four letters supporting this project were provided.

Project Number: 22-252
Project Title: Humpback Whitefish and Other Nonsalmon Fishes Traditional Ecological Knowledge and Biological Sampling in the Upper Koyukuk Region

Issue Addressed: Whitefishes and other nonsalmon fishes are an integral component of the overall subsistence harvest profile in Yukon River communities, including Allakaket and Alatna. However, despite their prolific subsistence use and commercial exploitation, there is limited information about their stock statuses, life histories, and annual subsistence harvests (Brown et al 2012). This lack of information makes managing nonsalmon fisheries extremely difficult for both federal and state managers. Using mixed qualitative and quantitative methods, the proposed research will update the documentation of TEK of nonsalmon fishes in the upper Koukuk River area with a focus on local fishers' observations of landscape and waterway change linked to climate effects. It will also update harvest estimates of nonsalmon species for the communities of Allakaket and Alatna in order to allow the investigation of shifting harvest patterns. The biological component of this study will address existing data gaps in humpback whitefish populations in the upper Koyukuk River drainage. Specifically, the demographic composition of humpback whitefish will be described for spawning populations in the Alatna and South Fork Koyukuk rivers. This study will describe age, sex, and length structures, assess fish condition through weight at length relationships, and assess the reproductive health of spawning populations by analyzing the gonadosomatic index, or the relationship of ovary weight to total weight. This work will have multiple applications. Updated harvest data will assess changes in the harvest, provide managers information about important nonsalmon fish habitats (mapped data), and develop their understanding of role of nonsalmon fishes within a total context of subsistence, especially in light of declining salmon runs. Critical assessments of local experiences of and adaptations to climate, landscape-based, and economic change in the fisheries are critical inputs to management and policy.

Objectives:

1. Update documented TEK of critical nonsalmon fish populations held by Alatna and Allakaket residents with particular attention to humpback whitefish, including:

    a. Observational knowledge about landscape and waterway change linked to climate change effects in the upper Koyukuk River region;

    b. Observed changes to nonsalmon fish populations, their habitats, or both over time;

    c. Adaptations in subsistence harvest practices over time due to environmental or resource change and associated regulatory, economic, or social change.

2. Estimate nonsalmon fish harvests, timing, and locations and compare with results from previous studies.

3. Describe the demographic composition (age, sex, length, weight, and gonadosomatic index) of humpback whitefish spawning populations in the Alatna and South Fork Koyukuk rivers.

Methods: This research will utilize an interdisciplinary approach to study humpback whitefish and other nonsalmon fishes in the upper Koyukuk River drainage. ADF&G staff from the Division of Subsistence will lead the ethnographic and harvest research components of this project and staff from Tanana Chiefs Conference will lead the biological components of the project. Local research assistants (LRAs) will be hired to aid both aspects of the data collection.

Division of Subsistence staff will administer a short household harvest survey to better understand harvest levels, the timing of harvest, the gear types used, and locations of harvest. A census of all households in both communities will be attempted. Ethnographic research will consist of semi-structured interviews and mapping of nonsalmon habitats. Researchers will develop an interview protocol prior to fieldwork in consultation with tribal councils and fisheries managers. Topics are expected to include traditional harvest practices; nonsalmon fish life histories and habitat; effects of climate change on nonsalmon fish, especially humpback whitefish, and their habitats; and any concerns related to fisheries management and the proposed Ambler Road development. The semi-structured protocol will help guide conversations, but it is expected that respondents will discuss additional topics related to subsistence fishing and resource management. Maps will be also be used during interviews to record information about current and historical fishing sites, nonsalmon fish habitat, and observations of environmental change.

For the biological component of the project, project investigators (PIs) will sample humpback whitefish in two locations either through acquired samples from subsistence caught fish or through direct sampling. In the Alatna River, PIs will sample whitefish harvested by subsistence fishers. In the South Fork Koyukuk River, PIs will apply for an aquatic resource permit through ADF&G to allow for the lawful collection of fish and will utilize a small mesh beach seine. All identified humpback whitefish will be measured for length, weighed, and sexed. Additionally, ovaries will be weighed, and otoliths will be collected. Fork length (FL) will be measured to the nearest 1 mm using a 100 cm soft tape measuring ruler. Wet weight will be measured to nearest 1 g using a digital hanging scale with a capacity of 50 g to 50 kg. After recording length and weight measurements, all fish will be cut open so the reproductive organs can be visually assessed for sex identification. Otoliths (2) from each fish will be removed, stored individually, and systematically tied to the recorded data for each individual fish so that ages can be associated with fork length, wet weight, ovary weights, and sex identification records. All sampled fish will be donated to the communities of Allakaket and Alatna.

Partnerships and Capacity Building: This interdisciplinary project relies heavily on the partnership with the tribal councils, communities, and residents of Allakaket and Alatna. Through the development of this proposal, representatives from both the Allakaket and Alatna tribal councils have contributed to the development of the research design. If this project is funded, project staff will work with the councils to identify and hire LRAs to assist with data collection. These LRAs will be trained in anthropological and

biological sampling methods. This training will increase the capacity for local involvement in future research opportunities. Additionally, this project brings together researchers from the State of Alaska, USFWS, and the Tanana Chiefs Conference. This partnership and collaboration will inevitably draw on diverse perspectives and experience that will allow researchers to analyze results critically and develop strong recommendations for future research and improved management of whitefish species.

Technical Review Committee Evaluation: Investigators responded to three priority information needs identified in the 2022 Notice of Funding Opportunity and in other ways make a good case for the need for this research. The project area is most closely associated with the Kanuti National Wildlife Refuge. The Federal nexus is clear. Investigators intend a strong partnership with Tanana Chiefs Conference. The investigation plan is well-written including extensive background information and inventory of previous research conducted on this topic in this area. Investigators describe a well thought out, collaborative and interdisciplinary study plan. Two letters of support were provided.

Project Number: 22-253
Project Title: Yukon River Nonsalmon Fish Harvest Survey

Issue Addressed: The Yukon River Drainage Fisheries Association (YRDFA) is proposing to address two of the 2022 Priority Information Needs identified by the Yukon Region Federal Subsistence Regional Advisory Councils. The first issue addressed is to gather Traditional Ecological Knowledge (TEK) of freshwater species in the Yukon River, and the second issue is to gather knowledge on the population, reproduction, and health of spawning habitat for Bering Cisco and Humpback Whitefish. This project is significant because there has been an increase of expressed concern from residents of the Yukon River at 2020 Federal Subsistence Regional Advisory Council (RAC) meetings about the population and health of nonsalmon species.

Gathering knowledge about the population and health of freshwater species, also referred to as nonsalmon species of fish in the Yukon River through TEK methodology has direct association to the federal subsistence freshwater species fisheries that take place along the Yukon River. Nonsalmon species of fish are prioritized in 2022 by the Yukon River RACs, with a specific focus on Humpback Whitefish (*Coregoninae clupeaformis*) and Bering Cisco (*C. laurettae*). This project is relevant to the Federal Subsistence Management and Section 812 of the Alaska National Interest Lands Claims Act (ANILCA) which directs the Department of the Interior (DOI) to cooperate with other federal agencies, the State of Alaska, and Alaska Native and rural organizations to research and monitor subsistence uses of fish and wildlife on federal public lands and to seek data from, consult with, and make use of the knowledge of local residents engaged in subsistence activities. The creation of a nonsalmon subsistence survey that will work specifically with the federal fisheries management team will add another tool in the federal fishery manager's toolbox.

This project will address harvest pressure on nonsalmon species through the collection of information about local fisher observations, traditional harvest practices and timing of nonsalmon species.

This program will be an adaptive communication program which maximizes fishers' voices in subsistence fisheries and enables the federal manager to send important conservation messages directly into the

fishers' households in five key villages. With this proposal, the surveyor program is responding to the most recent feedback from the fishers, and expanding to hire more surveyors, survey new fishers and include new information to pre-season, in-season, and post-season meetings to strengthen both the capacity building and communication aspects of the program.

The extent and depth of subsistence use of nonsalmon species in the Yukon River can be seen in the most recent Annual Management Report from 2017 showing the harvest of 67,464 whitefish (*Coregonus spp. and Prosopium cylindraceum*), 22,877 northern pike (*Esox lucius*), and 13,038 sheefish (*Stenodus leucichthys)* (Estensen et al. 2018). Other species are also harvested but are only reported by total because of small amounts of harvest or because they occur outside of the salmon season. The following were their totals for 2017: 2,843 burbot (*Lota lota*), 6,661 tomcod (*Eleginus gracilis*), 1,501 Arctic grayling (*Thymallus arcticus*), 179 longnose suckers (*Catostomus catostomus*), 109,888 Alaska blackfish (*Dallia pectoralis*), 19,357 Arctic lamprey (*Lethenteron camtschaticum)*, and 16,492 Pacific herring (*Clupea pallasii*). ADF&G reports that estimates of nonsalmon harvest in Yukon River drainage is poorly understood at a species level and a comprehensive assessment of nonsalmon harvest and use, by species, has been identified as a research priority (Estensen 2018:37-38; Brown RJ et al. 2012). They note that information about nonsalmon harvests are collected through the ADF&G annual postseason subsistence survey but does not include species distinctions.

Objectives:

1. Develop a protocol for nonsalmon subsistence survey program that will collect fisher information about Yukon River nonsalmon harvests and observations.

    a. Review protocol with Yukon River fishery managers and researchers to include methods for community selection, time in the field, data collection, approvals and informed consent.

2. Implement nonsalmon subsistence survey program

    a. Conduct community outreach, travel to communities, hold meetings, hire and train surveyors, collect nonsalmon fisher harvest data and observations from five Yukon River communities in the spring and late summer/ fall nonsalmon fishing periods, and evaluate annually.

3. Build capacity of YRDFA, local surveyors, fishers and Yukon River Federal Subsistence Regional Advisory Councils to participate in nonsalmon subsistence fisheries management and regulatory decision-making.

Methods: Methods for this project include communication, outreach, survey instrument, data analysis, and annual evaluations. YRDFA will develop a Traditional Ecological Knowledge (TEK) survey protocol for community surveyors to conduct weekly interviews with active fishers about their nonsalmon harvests in five Yukon River communities and will focus on identification and differentiation of Bering Cisco and Humpback Whitefish. Additionally, the survey will gather information about whether fishing was for

daily use or for preservation for later use. This knowledge will be utilized to build on existing knowledge and provide contemporary updates that are shared with federal fisheries managers for the Yukon River for their use in subsistence fisheries decision-making.

YRDFA will hire local surveyors from five of the 10 salmon surveyed villages who will interview known nonsalmon fishers in their communities about qualitative harvest data and observations. This protocol will be adapted from and modeled after the successful In-season Subsistence Salmon Survey Program. The interview methodology will follow the National Academy of Science's *Principles for Conduct of Research in the Arctic* and will include informed consent for participants, to be conducted prior to the first interview. Privacy and confidentiality will be protected in the reporting. In addition to collecting information from fishers, surveyors will disseminate relevant information to fishers. For the data analysis, at the end of the season the PI will review all the survey forms and the compiled MS Excel spreadsheet and produce summary narrative reports.

Partnerships and Capacity Building: This project will build the capability and expertise of the locally hired surveyors to enhance their communication and reporting skills. Partnerships will be maintained with the federal fishery managers and also with the village Tribal Councils and individuals working as a part of the project. YRDFA will be working in partnership with all these entities but no formal partnership agreements are made as a result of this. Contracts with the Tribal Councils and/or the individuals hired will be working agreements that guide the quality of the program to ensure we meet our goals and objectives of the program.

Technical Review Committee Evaluation: This project is attempting to addresses two priority information needs identified in the 2022 Notice of Funding Opportunity. Research funded by the Monitoring Program to identify information needed for whitefish includes collection of high-quality annual harvest estimates as well as traditional ecology knowledge. In contrast, the focus of this project is harvest monitoring, which is not an identified priority information need in either document. Project objectives and plans to achieve those objectives need more work. Study communities have not been chosen. Some budgeted costs appear to duplicate those in another Monitoring Program project implemented by this organization. Five letters of support were provided.

KUSKOKWIM REGION

Priority Information Needs

The 2022 Notice of Funding Opportunity identified the following 15 priority information needs for the Kuskokwim Region:

- Impacts of climate change in continued harvest and use of fish and impacts of climate change on fish, for example fish migration, spawning, and life cycle.
- Knowledge of population, reproduction, and health of spawning habitat for declining Humpback Whitefish populations.
- Documentation of oral histories describing salmon harvest methods in the Kuskokwim River drainage, specifically the period before the development of the modern commercial fishery.
- Reliable quantitative and/or qualitative estimates of salmon run size, escapement, and harvest in the Kuskokwim River drainage including Kuskokwim Bay tributaries.
- Explore new and cost-effective methods for conducting in-season salmon run and harvest assessments in the Kuskokwim River drainage, with an emphasis on community-based monitoring.
- Estimates of "quality of escapement" measures to help inform salmon stock assessments, for example potential egg deposition, age, sex, and size composition of spawners, advancing genetic baselines.
- Improved Kuskokwim River drainage-wide and sub-stock specific salmon run size and timing forecasts.
- Distribution, abundance, condition, and survival of juvenile and out-migrating salmon in the Kuskokwim River drainage.
- Traditional ecological knowledge of fishes.
- Information sharing between stakeholders and agencies concerning salmon conservation in the Kuskokwim River drainage, for example outreach to villages using the media and other methods.
- The meaning and significance of sharing, barter, and/or customary trade of subsistence foods in the context of the social, cultural, and economic life of people in the lower Kuskokwim drainage.
- Effects of environmental stressors, such as heat stress, on salmon mortality during adult upriver migration and/or pre-spawn mortality within spawning tributaries.

- Effects of *Ichthyophonus* infection on Chinook and Chum Salmon mortality and spawning success.

- Assessment of incidental Chinook Salmon mortality with gillnets, with particular consideration for delayed mortality from entanglement or direct mortality from drop-outs (for example, loss of Chinook Salmon from 6-inch mesh nets).

- Collect baseline information on the resident fish community to better understand potential impacts and to assess impacts of proposed development projects.

Proposals Submitted for the Kuskokwim Region

Eight proposals were submitted for funding in the Kuskokwim Region.

Table 3. Projects submitted for the Kuskokwim Alaska Region, 2022 Monitoring Program, including total funds requested and average annual funding requests.

Project	Title	Total Request	Avg. Annual
22-300	Takotna River Weir Salmon Run Timing and Abundance	$176,256	$44,064
22-301	Kuskokwim River Broad Whitefish subsistence harvest and spawning abundance	$800,084	$200,021
22-304	George River Salmon Weir	$733,900	$183,475
22-350	Bethel Subsistence Harvest Surveys	$372,134	$93,034
22-351	Kuskokwim Management Area Postseason Subsistence Salmon Harvest Survey	$859,011	$214,753
22-352	Local and Traditional Knowledge of Salmon Harvest and Use for Subsistence in the Lower Kuskokwim River Drainage	$366,440	$183,220
22-353	Natural Indicators of Salmon in the Upper Kuskokwim River	$180,055	$90,028
22-354	Community-Based Harvest Monitoring Network for Kuskokwim River Chinook Salmon	$254,795	$63,699
	Total	**$3,742,675**	**$1,072,294**

In addition to the above proposed projects, the following four projects are currently being funded by the Monitoring Program in the Kuskokwim Region:

- 20-301 Kuskokwim River Coho Salmon Abundance Estimation and Whitefish Indices Using Sonar

- 20-302 Salmon River of the Pitka Fork Chinook Salmon Escapement Monitoring

- 20-303 Middle Kuskokwim River Chinook and Chum Salmon In-Season Assessment

- 20-308 Kwethluk River Salmon Run Timing and Abundance

Regional Advisory Council Comments

Yukon-Kuskokwim Delta Subsistence Regional Advisory Council

Council comments focused on poor salmon returns and future research priorities for the Kuskokwim Region. The Council expressed concern regarding the low Chum Salmon returns in the region and noted that returns were far below historical levels. The Council suggested that studies be conducted at broad spatial scales and consider the impact of commercial fisheries to understand the factors causing the declines in Chum Salmon. In addition, the Council requested future studies that determine the distribution and migration patterns of salmon.

Western Interior Alaska Subsistence Regional Advisory Council

The Council expressed support for Projects 22-300, 22-301, 22-304, 22-350, 22-351, 22-353, and 22-354. The Council noted that Project 22-300 provides important information regarding escapement and escapement quality of salmon in the upper Kuskokwim River. The Council expressed support for Project 22-301 due to increasing harvest pressure on whitefish species. Project 22-304 received support from the Council because it provides important information. Projects 22-350 and 22-351 received support because they provide important harvest information. Regarding Project 22-352, the Council noted that this information may have already been gathered and this project may be redundant. When discussing Project 22-353, the Council highlighted the importance of water and stream temperature monitoring. Project 22-354 received support from the Council because it is important to know what each community is harvesting to determine if subsistence needs are being met.

Interagency Staff Committee Comments

The Interagency Staff Committee supports the Technical Review Committee's assessment of the 2022 Kuskokwim Region proposals and notes that all eight projects were forwarded for funding. However, the Interagency Staff Committee also notes that if all eight projects are funded, the Kuskokwim Region would consume almost 39% of the available funding through the Department of the Interior for the 2022 Monitoring Plan. The Interagency Staff Committee appreciates the Yukon-Kuskokwim Delta Subsistence Regional Advisory Council's input into future research priorities for the Kuskokwim Region including concern for declining Chum Salmon, and the Western Interior Alaska Subsistence Regional Advisory Council's guidance on the value of the proposed projects. The proposed projects address a significant portion of the priority information needs for the region.

Executive Summaries and Technical Review Committee Evaluations

The investigators' executive summaries of their investigation plans are provided below. All executive summaries reflect what was submitted to the Technical Review Committee for review, with only minor formatting changes completed by the Office of Subsistence Management to ensure readability and accessibility. The executive summaries include synopses of the issue addressed, the objectives, the methods, and the partnership/capacity building. Following each executive summary is the Technical Review Committee's evaluation of the investigation plan. The Technical Review Committee assessed investigation plans based on the set criteria: strategic priority, technical and scientific merit, investigator ability and resources, partnership and capacity building, and cost/benefit.

Project Number: 22-300
Project Title: Takotna River Weir Salmon Run Timing and Abundance

Issue Addressed: This project focuses on strategic priority information needs identified for the Kuskokwim Region in the 2022 Fisheries Resource Monitoring Program by providing reliable escapement estimates for Chinook salmon *Oncorhynchus tshawytscha* and chum salmon *O. keta* in the Takotna River. Management of Kuskokwim Area salmon fisheries is complex because of variability in run size, timing, and harvest of mixed stocks, overlapping runs of multiple species, allocation issues, and the immense size of the Kuskokwim River drainage. Chinook salmon of the Kuskokwim River watershed spawn in over 25 distinct areas, with each spawning subpopulation likely adapted to local, sub-watershed, conditions through traits such as juvenile behavior and residence time, and adult spawning duration and timing. These adaptations result in different productive capacities (i.e., average number of adult recruits expected per spawner), different carrying capacities (i.e., maximum number of spawners or juveniles a freshwater habitat can support), and different responses or tolerances to fishing pressure and environmental change. This variability in productivity and adaptation is critical to supporting resilience to environmental change and to dampening variability in fishery harvests. This diversity, or portfolio, of subpopulations with different characteristics allows some stock components to flourish when other components have responded negatively to environmental conditions or harvest pressures.

Specific issues important to Federal management in support of subsistence fisheries include:

- Maintaining salmon diversity/biocomplexity is critically important for Federal subsistence management.

- It is important to maintain the full complement of salmon diversity, including those stocks which are currently less productive or small in size that migrate through Federal waters and help support subsistence needs.

- Weir-based stock assessments typically focus on more abundant or more productive Chinook populations. This focus can introduce bias in the spawner/recruit analysis in an anti-precautionary direction, providing a more optimistic perception of watershed productivity than is warranted

- The Takotna River weir is the only project in the watershed that monitors the dynamics of small populations of salmon species, and therefore functions as a sentinel with a long-term time series for dozens of discrete smaller, less productive populations in the Kuskokwim region.

- Based on these considerations, this project has disproportional benefits and addresses diversity mandates within the Yukon Delta National Wildlife Refuge.

In conjunction with salmon escapement data, there is a need to assess and evaluate the impacts of climate change on the Kuskokwim River ecosystem. Assessment of climate change impacts depends on long-term environmental data to provide a meaningful timeframe for comparison.

Objectives: The overarching project goal is to continue a long-term, ground-based project that will adequately index escapement to the headwaters of the Kuskokwim River, continuing the only long-term data set evaluating Chinook and chum salmon escapement to a headwater tributary, while also continuing the time series of environmental data to provide researchers and managers with indices useful to understanding local impacts of climate change. Given the aspects of local hire and simplified logistics due to having the weir located adjacent to a community, this project is intended to serve as a relatively low-cost assessment platform compared to similar projects. Specific project objectives include:

1. Enumerate the daily passage and characterize the run timing of Chinook salmon through a resistance board weir from July 1 to August 10.

2. Enumerate the daily passage and characterize the run timing of chum salmon, and resident fish species through a resistance board weir from July 1 to August 10.

3. Estimate the weekly age, sex, and length composition of Chinook salmon such that the simultaneous 95% confidence intervals have a maximum width of 0.20.

4. Collect information on seasonal passage of other fish species.

5. Collect environmental data.

6. Serve as a platform to develop local talent in a community-based stock assessment project, conduct community outreach, and engage local Alaska Native and rural communities in fisheries partnership projects.

7. Serve as a platform for future research projects such as tagging studies, collection of genetics data, heat stress monitoring, and monitoring of environmental data.

Methods: A resistance board weir will be installed several hundred meters above the Takotna River Bridge near the community of Takotna. The target operational period of July 1 to August 10 encompasses the bulk of Chinook and chum salmon returns and provides insights into seasonal passage of other fish species. A live trap allows fish to freely pass during counting, or to be retained for collection of age, sex, and length data (ASL) or genetic samples. Daily weir operation will involve a 2-member locally hired weir crew with oversight by a local crew leader or local assistant crew leader. Counts of passing

fish will be made at a frequency of four to eight shifts per day between 0700 and 2400 hours. Counting effort will increase during times of high fish passage to reduce stress to fish held in the live box. Counts by species will be transferred to a logbook, with total daily and cumulative counts and other weir operation information, then transferred to a Google Drive account at the end of each day. The weir will be cleaned daily, or as needed, and inspected for holes with potential missed passage documented; carcasses will be identified and counted by species and sex. Chinook salmon escapement will be sampled daily for ASL in proportion to the observed passage abundance, but with an overall target sample size of 190 fish. To do this, weir crew members will use a short-handled dipnet to remove fish from the live trap and place them into a partially submerged fish "cradle." Sex (determined visually by external examination) and length (mid-eye to tail fork; nearest mm) will be recorded on standardized numbered data sheets that correspond to numbers on gummed scale cards, and fish scales will be removed from the preferred area above the lateral line, cleaned, and placed on the gummed cards.

Partnerships and Capacity Building: The Takotna River hosts the only weir in the Kuskokwim watershed entirely installed and operated by local technicians and supervised by a professional local fisheries biologist. Partnerships are crucial to effective weir installation and operation. The Takotna Tribal Council, Nikolai Edzeno Village Council, and the community of Takotna have partnered with previous Takotna River escapement projects and will be consulted regarding weir operation and potential crew hires. The Alaska Department of Fish & Game (ADF&G) has entered into cooperative agreements with the Kuskokwim River Inter-Tribal Fish Commission (KRITFC) to operate the weir. Furthermore, this weir project will continue the efforts to operate the weir as a community assessment project, which builds local capacity by involving local residents in weir operation and involving both residents and Alaska Native/Village councils in data collection that affects fishery management. Local hires from the communities of Takotna and Nikolai comprised all the staff operating the Takotna River weir during the 2017 and 2020 field seasons, and this trend will continue in this project. Administrative support will be provided by the Takotna Village Council, Bering Sea Fishermen's Association (BSFA), and KRITFC.

Technical Review Committee Evaluation: The investigation plan requests four years of funding to operate a community-based weir project on the Takotna River to index Chinook and Chum salmon escapement to the headwaters of the Kuskokwim River drainage. The Federal nexus is clear, and this project addresses multiple 2022 priority information needs for the Kuskokwim Region. The Takotna River weir provides the only long-term weir data for a headwater tributary of the Kuskokwim River and is one of the few long-term ground-based projects that monitor less abundant/less productive tributaries in the drainage. Escapement data are used as inputs in the Chinook Salmon run reconstruction model and can be used to evaluate the effects of the early season closure on headwater stocks. While the methods for collecting biological data are technically sound, some of the objectives were vague and the data analysis section lacked the detail required to evaluate the proposed analytical procedures. In recent years, this project has been operated entirely by local residents which has demonstrated that a weir can be successfully run by a small community and operated to meet scientific standards. Overall, project costs are low relative to other weirs in the region and in-kind contributions provided by the Kuskokwim River Inter-Tribal Fish Commission exceed the funds requested from the Monitoring Program. Letters of support were received from the Alaska Department of Fish and Game, Bering Sea Fishermen's

Association, Tanana Chiefs Conference, Takotna Tribal Council, and Yukon Delta National Wildlife Refuge.

Project Number: 22-301
Project Title: Kuskokwim River Broad Whitefish Subsistence Harvest and Spawning Abundance

Issue Addressed: This project specifically addresses the following Kuskokwim River Region Priority Information Needs (PINs) identified by the Notice of Funding Opportunity for the 2022 Fisheries Resource Monitoring Program (FRMP): (1) Collect baseline information on the resident fish community to better understand potential impacts and to assess impacts of proposed development projects; (2) Impacts of climate change in continued harvest and use of fish; and impacts of climate change on fish, for example fish migration, spawning, and life cycle.

Objectives:

1. Estimate subsistence harvest rates in the Kuskokwim River for the Broad Whitefish population segment that spawns near McGrath, Alaska.

2. Estimate population demographics including abundance, emigration rates, age, sex, length, and weight for the Broad Whitefish population that spawns near McGrath, Alaska.

    a. Precision of abundance estimates rely heavily on recovery of marked Broad Whitefish from subsistence harvest and spawning season mark-recapture events.

    b. Estimate the proportional age and sex composition of mature Broad Whitefish spawning above McGrath, Alaska such that estimates are within 5% of the actual true population proportions 95% of the time.

    c. Estimate the mean length and weight of mature Broad Whitefish spawning above McGrath, Alaska such that estimates are within 10% of the actual population means 95% of the time.

3. Describe times and areas of Broad Whitefish harvest throughout the Kuskokwim River drainage through tag recovery of marked Broad Whitefish caught by subsistence fishers.

Methods: This study will employ a mark-recapture/mark-recovery modeling framework to estimate population size, harvest rates and population demographics of Broad Whitefish. The project will be implemented for four years, including harvest recovery and live resights after the fourth spawning season. Since Broad Whitefish are suspected of being skip spawners (spawn every other year), sampling for four years ensures that the whole spawning population is available for capture, not just one spawning sub-population. Harvest occurs throughout the Kuskokwim River drainage year around, therefore recovery of marked fish caught by subsistence users can occur at any time. Mark-recapture of fish will occur in a relatively short period of time during the fall spawning migration near McGrath, Alaska–approximately August 20 to October 10. Inferences from this study will pertain solely to the spawning population of

Broad Whitefish near McGrath. Ultimately if successful, a basin wide estimate of harvest/exploitation and abundance of mature spawning Broad Whitefish could be achieved.

Technical Review Committee Evaluation: The proposed project requests four years of funding to estimate population size, harvest rates and population demographics of Broad Whitefish in the Kuskokwim River using mark-recapture/mark-recovery techniques. The Federal nexus is clear, and this project addresses a 2022 priority information need for the Kuskokwim Region. Broad Whitefish are an important subsistence resource in the Kuskokwim River, but local users have expressed concern that they may be over-exploited. If funded, this project could provide some of the most complete information regarding Broad Whitefish in the Kuskokwim River to date, which could be used to establish population baselines and develop management strategies. The Native Village of Napaimute and the Orutsararmiut Native Council play meaningful roles in the project and are essential for achieving study objectives. Capacity will be built with Orutsararmiut Native Council biologists who will learn the intricacies of mark recapture projects and electrofishing techniques. Study costs are high. However, contributing funds will be provided by the Kenai Fish and Wildlife Field Office to offset project costs. In addition, the level of requested funding is justifiable when considering the large geographic scale of the study and the potential diversity of results that will add substantially to the knowledge of Broad Whitefish harvest rates, abundance, and population demographics in the Kuskokwim River. Letters of support were received from the Native Village of Napaimute, Orutsararmiut Native Council, and Yukon Delta National Wildlife Refuge.

Project Number: 22-304
Project Title: George River Salmon Weir

Issue Addressed: We propose to continue operations of a weir on the George River to index Chinook (*Oncorhynchus tshawytscha*), chum (*O. keta*), and coho (*O. kisutch*) salmon escapement to the middle portion of the Kuskokwim River drainage, as well as conduct a high school internship program as part of our long-term efforts to build local capacity. Our proposal is in response to the priority information needs identified in the 2022 FRMP request for proposals to obtain reliable quantitative and/or qualitative estimates of salmon run size, escapement, and harvest in the Kuskokwim River drainage, including Kuskokwim Bay tributaries. This proposal would continue a 25-year dataset used to evaluate the size and composition of Chinook, chum, and coho salmon escapements to the middle Kuskokwim River. Annual monitoring is needed to evaluate if escapements are within the bounds of the established Chinook salmon escapement goal on the George River. In addition, escapement at the George River weir is used to inform a model that estimates total annual abundance and escapement for Kuskokwim River Chinook salmon. The success of the George River weir has made it an integral component of the broader salmon escapement monitoring program on the Kuskokwim River. Apart from its utility to the management of the Kuskokwim River subsistence fishery, the George River weir has been important in fostering community awareness, understanding, and direct involvement in fisheries assessment. Since 2005, the George River weir has been the site of high school mentorship and college internship programs sponsoring hundreds of high school age students and multiple college interns from throughout the Kuskokwim Region. The internship program has proven to be highly successful. In recent years, many of the fisheries technicians and crew leaders working on Kuskokwim River weir projects are past graduates

of the high school and college internship programs. Several are currently pursuing degrees in fisheries science.

Objectives:

Our overall project goals are to index escapement of Chinook, chum, and coho salmon to the middle portion of the Kuskokwim River drainage and provide capacity building and education opportunities for local stakeholders. Specific objectives of this project are to:

1. Estimate the daily and total annual Chinook, chum, and coho salmon escapements from 15 June to 20 September.

2. Collect age, sex, and length (ASL) data from Chinook, chum, and coho salmon using weir traps, such that the number of samples collected will allow for future estimates of age composition with 95% confidence intervals no wider than ±10% (a=0.05, d=0.10).

3. Operate a high school internship program for 10 students for 8 days to foster local interest in natural resource management and field biology and expose high school students to employment and post-secondary education possibilities.

Methods: We will conduct daily visual counts of salmon escapement to the George River from 15 June to 20 September and collect ASL samples from 230 Chinook salmon, 400 chum salmon, and 400 coho salmon throughout the run, in proportion to run abundance. All data will be uploaded to a publicly accessible database and made available weekly at inseason meetings to inform fisheries management decisions. Final results will be published in the ADF&G Fishery Data Series. An 8-day internship will be provided for up to 10 students.

Partnerships and Capacity Building: Staff from ADF&G and NVN will conduct this project in partnership. Of particular interest is the internship program which provides students from communities in the area with the opportunity to interact with biologists, ADF&G staff, and professional educators acting as mentors. Throughout this project, ADF&G and NVN will work together to disseminate project results and related fisheries management issues to middle river communities during quarterly stakeholder newsletters and community meetings in the middle river.

Technical Review Committee Evaluation: The investigation plan requests four years of funding to continue weir operations on the George River to index Chinook, Chum, and Coho salmon escapement to the middle portion of the Kuskokwim River drainage and conduct a high school internship program to build local capacity. The Federal nexus is clear and this project addresses a 2022 priority information need for the Kuskokwim Region. Currently, the George River weir provides the only ground-based index of salmon escapement in the middle portion of the Kuskokwim River. Escapement data from this project are used as inputs in the reconstruction model, which estimates total annual abundance and escapement of Kuskokwim River Chinook Salmon. In addition, age-sex-length data are used to reconstruct brood year returns and monitor population production for Chinook and Coho salmon. The Native Village of Napaimute will conduct an internship program that provides high school students with experiences aimed

at teaching watershed concepts, physical habitat assessment, biological sampling, and data analysis. Project costs are comparable to other weirs in the region and are reasonable for the proposed work. Letters of support were received from the Kuskokwim River Salmon Management Working Group, Orutsararmiut Native Council, and Yukon Delta National Wildlife Refuge.

Project Number: 22-350
Project Title: Bethel Subsistence Harvest Surveys

Issue Addressed: The proposed project will collect detailed quantitative and qualitative subsistence harvest and age-sex-length (ASL) information in the Bethel area to quantify subsistence harvest effort and catch composition during the Chinook salmon (*Oncorhynchus tshawytscha*), chum salmon (*O. keta)*, and sockeye salmon (*O. nerka)* runs. Data collected in this project addresses the 2022 priority information needs by 1) providing reliable quantitative and qualitative estimates of salmon harvests by conducting inseason harvest surveys in the Bethel area from late-May through mid-July and producing inseason harvest estimates, and 2) sharing information between stakeholders and agencies concerning salmon conservation via various outreach methods. This project will also collect Chinook salmon ASL data to measure the quality of escapement in which the state and Federal agencies can utilize for management of the subsistence fishery.

The overarching goal of this project is to provide state and Federal managers and stakeholders with relevant subsistence harvest effort, catch, and composition information collected from a representative subset of families who harvest salmon for subsistence purposes in the Bethel area. Continuous contact with subsistence fishing work groups during the fishing season provides a meaningful opportunity for subsistence users to share their perspectives on the annual salmon runs, harvest needs, and personal impacts of management decisions. This time also allows ONC staff to provide a communication channel between subsistence users and fishery management agencies, by sharing information about management decisions, conservation efforts, and other relevant information. Inseason subsistence harvest data that's collected will be utilized to inform inseason harvest models and decisions while also serving as a time-series that provide insight into trends in gear usage, fishing effort, and subsistence fleet timing. These long-term datasets can ultimately improve our understanding of Chinook salmon subsistence harvest patterns and the resulting impact on escapement and run dynamics. All goals and outcomes will be achieved through a collaborative effort between Orutsararmiut Native Council (ONC) and Alaska Department of Fish & Game (ADF&G) to collect, process, and analyze all data.

Objectives:

1. Determine Bethel area subsistence users' relative change in salmon harvest goals for Chinook, chum, and sockeye salmon compared to the prior year, and monitor weekly progress towards achieving annual salmon harvest goals.

2. Document subsistence fishing activity in the Bethel area, including when families begin subsistence fishing, weekly participation, catch per unit effort by gear type, catch composition to provide reliable quantitative estimates of salmon harvests and utilize this data collected to

produce inseason harvest estimates in collaboration with Kuskokwim River Intertribal Fish Commission (KRITFC).

3. Estimate the annual ASL composition of Chinook salmon harvested in the Bethel area subsistence fishery.

4. Improve information sharing between stakeholders and agencies concerning salmon conservation in the Kuskokwim River drainage.

Methods: Subsistence harvest information and comments made upon salmon conservation and/or management from fishers will be collected through weekly visits to surrounding Bethel fish camps and opportunistic encounters at the Bethel Boat Harbor in the months of June and July by trained ONC Fisheries Technicians. ONC Fisheries Technicians will also provide information updates from fisheries managers and an informational flyer to the fishers they survey to ensure there is two-way information sharing. The harvest data collected will be utilized to produce inseason harvest estimates in collaboration with KRITFC. Harvest data collected each week by ONC technicians in addition to any comments from fishers regarding conservation or management will be composed into weekly reports and presented at weekly Kuskokwim River Salmon Management Working Group (Working Group) meetings to promote information sharing between stakeholder and agencies. ASL information will be obtained through concerted recruitment efforts of fishers in the Bethel area that will voluntarily sample their Chinook salmon harvest and be compensated for their efforts. ADF&G and ONC will host preseason ASL training and train interested samplers in properly collecting samples.

Partnerships and Capacity Building: This project demonstrates capacity building and new leadership taken on by ONC, a tribal government organization. ADF&G and ONC have been partnering for over 20 years to conduct inseason harvest surveys, but it was not until 2018 that ONC became the principal investigator on this project. ONC has built the capacity to have the necessary equipment and staff to lead this project with support from ADF&G as the critical co-PI. ONC has increased capacity through developing professional staff to run the project, developing and educating local youth to move into leadership roles in fisheries management, and training local students with hands-on biological experience at the high school and university levels. ADF&G has the capacity and will continue to archive physical ASL data collected through this project and make the data publicly available via the Arctic Yukon Kuskokwim Database Management System.

In addition to the capacity that ONC has built, ONC and ADF&G collaborate with the KRITFC, Bering Sea Fishermen's Association (BSFA), and the Yukon Delta National Wildlife Refuge (YDNWR) to collect subsistence harvest data to produce inseason harvest estimates. In the 2021 season, ONC and KRITFC are expanding their collective capacity and leadership by having their biologists learn and utilize a new model with the program R, designed by a KRITFC contractor, to produce the inseason harvest estimates that were previously produced by staff at YDNWR. These harvest estimate models directly contribute to inseason fisheries management and are critically important as credible, near real-time indexes of fish harvests. This demonstrates strong tribal leadership in fisheries management and encourages ongoing capacity building.

This project has been well received by local residents in the past and is viewed as an important project supporting management by providing fundamental insights into issues such as the achievement of subsistence needs and the timing of subsistence activities. ONC has long standing ties with fish camp families in conducting the inseason subsistence harvest surveys. The survey instrument utilized in this project ensures protection of privacy, dignity, and confidentiality by all respondents and will continue to do so in the future. This project values and acknowledges local contributions in which all results are conveyed back to participants of the project on a weekly basis. Furthermore, local participation in ASL sampling provides an opportunity for education and outreach on salmon biology and management issues. These interactions are two-way; project participants receive timely fishery updates from agency staff and agency staff receive weekly reports on fishing activities and perspectives on the social effects of management decisions.

Technical Review Committee Evaluation: This four-year project will rely on subsistence salmon fishers in the Bethel area to gain reliable monitoring data on two components of the lower Kuskokwim subsistence fishery: (1) inseason subsistence harvest estimates for salmon and (2) Chinook age-sex-length sampling. Funding would continue work going back to the 1990s; similar research has been funded by the Monitoring Program since 2001. The proposal addresses two priority information needs in the Kuskokwim Region identified in the 2022 Notice of Funding Opportunity. Federal nexus is provided by the Yukon Delta National Wildlife Refuge. Sizes of recent Chinook Salmon runs have been some of the lowest on record, resulting in fishery managers implementing harvest restrictions. Drainage residents are highly dependent on local salmon runs. This project has received Monitoring Program funding since 2001 and has been successfully re-conceived to address comments from the Technical Review Committee and better address information needs in the Kuskokwim Region. The project now includes the objective of calculating catch per unit effort by gear type. The project makes near real-time harvest estimates for the Bethel area available to fishery managers, contributing to better in-season management of the Chinook Salmon run. The project provides a strong and meaningful partnership between the Alaska Department of Fish and Game and the Orutsararmiut Native Council, which administers much of the project.

Project Number: 22-351
Project Title: Kuskokwim Management Area Postseason Subsistence Salmon Harvest Survey

Issue Addressed: We propose to continue operation of the Kuskokwim Management Area (KMA) Postseason Subsistence Salmon Harvest Survey. This proposal is in response to the priority information needs identified in the 2021 Fisheries Resource Monitoring Program (FRMP) request for proposals to obtain reliable quantitative estimates of subsistence salmon harvests in the Kuskokwim River drainage and Kuskokwim Bay tributaries. The proposed work would continue a 29-year dataset of subsistence salmon harvests in the Kuskokwim Area.

Objectives:

1. Administer harvest surveys to document the number of Chinook, chum, sockeye, coho, and pink salmon harvested for subsistence uses by residents of Bethel.

2. Administer harvest surveys to document the number of Chinook, chum, sockeye, coho, and pink salmon harvested for subsistence uses by residents of at least 27 remaining KMA communities.

3. Analyze harvest data to produce community estimates of salmon harvest by species.

Methods: Household harvest data will be collected using a survey instrument. The survey instrument is designed to elicit a variety of data from participating households. The primary goal of the instrument is to record subsistence salmon harvest data. In addition, the survey instrument also asks for basic household information, such as the total number of people living in the household. Moreover, the survey asks about gear types used; harvest locations; lost fish (due to spoilage or otherwise); fish shared, received, or both; fish harvested for dogs; nonsalmon fish harvests; and whether or not a household was able to meet their subsistence salmon needs for the season.

The Division of Subsistence will utilize a consistent harvest estimation methodology for all communities except Bethel. The survey design in each community will be either census (100% survey) or stratified sampling design, depending on community size.

Subsistence harvest of Bethel residents will be estimated by employing a simple random sample harvest survey method. We will use the Bethel city planner's office/fire department occupant dwellings map/list. Before the survey, surveyors will update the map/list by driving through the community to confirm or update its accuracy. Based on the updated map, 30–50% of occupant dwellings will be randomly selected for survey. Rigorous protocols will be implemented to ensure that selected households are contacted if possible. Surveyors will attempt visits to households a minimum of three different times on different dates and different times of day. Households that are not successfully contacted will be set aside and new households will be randomly selected to replace them.

Partnerships and Capacity Building: ADF&G and ONC will partner to complete the Bethel portion of the project. This relationship represents close collaboration as principal investigators and has been in place since 1999. This mutually productive partnership has created a level of dialogue, feedback, and synergy that benefits each organization and the public. Formal and informal discussions between project staff and associated communities have helped to create a level of public awareness about salmon management and subsistence harvests. The interaction has also built significantly on the level of trust between the public and ADF&G. Through operation of this project and sharing of the resulting information at management and research forums, ONC and the community of Bethel have gained a feeling of ownership and meaningful involvement in terms of their participation in management decision making processes as they relate to the subsistence salmon fishery. Continuation of this project will strengthen the capacity of the Orutsararmiut Native Council to carry out subsistence fisheries harvest assessment projects in the region. Subsistence fishing households throughout the Kuskokwim River drainage will have an opportunity to talk to staff that come to their house and share personal observations about the subsistence salmon fishery. Households will have an opportunity to identify qualitative aspects the subsistence salmon fishing season such as if a household was able to meet their harvest goals for the season.

Technical Review Committee Evaluation: The primary goal of the project is to estimate the harvest of salmon, by species, for subsistence purposes at 27 communities within the Kuskokwim Management Area, including a meaningful 20-year partnership with Orutsararmiut Native Council. The Federal nexus and high strategic priority are clear. The investigation plan is well-written, no substantial performance issues exist with this continuation project, investigators have adequate training to conduct the research, project costs are reasonable for the work proposed, Division of Subsistence is contributing significant in-kind support.

Project Number: 22-352
Project Title: Local and Traditional Knowledge of Salmon Harvest and Use for Subsistence in the Lower Kuskokwim River Drainage

Issue Addressed: The Alaska Department of Fish and Game (ADF&G) Division of Subsistence is proposing to conduct key respondent interviews and participant observations that explore subsistence fishers' traditional ecological knowledge of Pacific salmon Oncorhynchus spp. (hereinafter salmon) in the lower Kuskokwim River communities of Napakiak, Nunapitchuk, Kasigluk, Tuntutuliak, and Eek. The study will focus on fisher knowledge of salmon patterns of movement through customary and traditional fishing areas and the ways in which fishers use this knowledge to effectively harvest salmon in a section of the lower Kuskokwim River within the Yukon Delta National Wildlife Refuge. Each region of the Kuskokwim River area can be characterized by locally specific fishing patterns, environmental conditions, challenges, and adaptations. This project is designed to investigate lower river patterns, especially as they relate to management and regulatory issues. This study has the goal of collaborating with key respondents in communities of the lower Kuskokwim River to document information regarding their historical and contemporary salmon fishing and processing methods, and how fishers have adapted those methods to changes occurring within the fishery.

A severe decline of Chinook salmon O. tshawytscha abundance in the Kuskokwim River has resulted in unprecedented fishing restrictions. These have had profound effects on subsistence salmon fishing communities in the Kuskokwim Area. Many fishers have described in public meetings, that their households have faced challenges in effectively harvesting and processing enough salmon for use throughout the year. The proposed study has several applications. First, documenting fishers' experiences of these changes and the effects on their households' ability to obtain the salmon they need each year will broaden managers' understanding of the lower Kuskokwim River salmon fishery. The study will provide fishers with the opportunity to systematically describe their novel experiences under an extremely conservative management regime and document how they have adapted fishing and processing techniques. The ethnographic methods of this study will allow subsistence salmon fishing households to share this TEK with management agencies in a way that informs or directs management decisions that better accommodate fishers' needs and experiences. The final reporting for this project will include a summary of recommendations to OSM and USFWS and ADF&G fisheries management staff regarding the continued monitoring of issues and community concerns related to the lower Kuskokwim River subsistence salmon fishery. Finally, a textured description of specific fishing patterns in the lower Kuskokwim River region along with a detailed accounting of local concerns and adaptations will strengthen the communities' engaged participation in research and management processes.

Objectives:

1. Document historical and contemporary salmon fishing methods practiced by subsistence fishers, including how fishers apply their knowledge of fish movements and river morphology to effectively harvest salmon.

2. Document fishers' adaptations to increased restrictions to the subsistence salmon fishing schedule during times of Chinook salmon conservation.

3. Document socioeconomic and cultural impacts to study communities because of restricted subsistence fishing during times of Chinook salmon conservation.

Methods: Researchers will consult with communities prior to and during all phases of the project. Research staff will request guidance from community tribal councils on development of ethnographic data collection methods and selection of knowledgeable key respondents. Community consultations will also include coordinating with tribal councils and other community members to inform them of study progress and results, and to facilitate communication between communities and fishery management agency staff.

During project fieldwork, key respondent interviews and participant observations will document local and traditional knowledge related to the customary and traditional harvests and uses by residents of the five study communities. Research staff will record interviews digitally, document participant observation activities in detailed written notes, and document geographic locations of salmon harvest areas and other places of significance to salmon fishers and their households. Ethnographic interviews will be analyzed using qualitative data analysis software. Ethnographic fieldwork will produce detailed maps in digital and paper formats. Data from maps produced in the field will be analyzed using ArcGIS software.

The Principal Investigators will write a final technical report of two years of ethnographic data collection and analysis that will be published in the ADF&G Division of Subsistence technical paper series, submitted to OSM on or before June 30, 2024. Copies will be sent to the tribal governments and key respondents. Technical report authors will also write a summary report pamphlet and mail a copy to all post office boxholders in each study community in June 2024.

Partnerships and Capacity Building: Following recommendations of tribal councils, project staff will identify a corps of key respondents in each community. Key respondents will aid in the development of participant-observation objectives. Participant-observation field operations can only be planned and executed with significant guidance from participating key respondents. As such, these key respondents will be active contributors to achievement of study objectives. The purpose of such partnerships will be to engage community members in development of research that is relevant to fishers and their communities. Ethnographic interview and participant-observation key respondents will be compensated for their expertise and contribution to the study.

Technical Review Committee Evaluation: The project addresses two priority information needs identified in the 2022 Notice of Funding Opportunity. The study area, the lower Kuskokwim River

drainage, is within the Yukon Delta National Wildlife Refuge. The Federal nexus is clear. Technical and Scientific Merit is lacking, objectives are not clearly stated, and the description of mapping methodology is missing, making the project hard to evaluate. Five local assistants will be hired. Five letters of support were provided.

Project Number: 22-353
Project Title: Natural Indicators of Salmon in the Upper Kuskokwim River

Issue Addressed: This project seeks to understand the historical abundance, distribution, and health of salmon populations in subsistence fishing communities in the upper Kuskokwim River drainage through the documentation and incorporation of local and traditional ecological knowledge (TEK). Principal Investigators will focus ethnographic research on documenting the use of natural indicators of salmon run characteristics to explore patterns in Chinook, chum, sockeye, and coho salmon runs. For the purposes of this project, natural indicators are defined as empirical observations that correlate with specific ecological phenomena. As such, this proposal addresses one of the research needs described in the Priority Information Needs document for the Kuskokwim River region of the Federal Subsistence Fisheries 2022 Fisheries Resource Monitoring Program: Traditional Ecological Knowledge of Fishes. Although the upper portion of the Kuskokwim River drainage is situated upriver and outside of the Yukon Delta National Wildlife Refuge (YDNWR) boundary, the salmon harvested for subsistence by upper river communities pass through waters within or adjacent to federal public lands in the lower and middle river. Management decisions made in the lower and middle sections of the river necessarily affect what happens in the upper river; as a result, appropriate and sustainable management by federal and state agencies must attend to the knowledge and experiences of all subsistence fishers.

Objectives:

1. Document local and traditional ecological knowledge of Chinook, chum, sockeye, and coho natural indicators in three upper Kuskokwim River communities: McGrath, Takona, and Nikolai.

2. Map locally significant salmon habitats (migratory routes, spawning, juvenile rearing, etc.), fishing locations, historical and contemporary fish camps, and other areas of ecological importance used in observing the landscape for natural indicators.

3. Promote capacity building among local communities, management agencies, tribal organizations, and nonprofit governmental organizations.

Methods: For each community, researchers will attempt to conduct three to five group gathering discussions over the course of four to six days. Each gathering will include at least four to six respondents who represent a cross-section of the community, including age, gender, and experiential differences. The group gathering protocol will be designed to elucidate natural indicators and other techniques utilized in locally assessing the run itself as well as harvesting or processing salmon during the run. Based on previous participant observation and TEK-based research, these natural indicators may include such variables as the seasonal prevalence of nonsalmon fish species, the timing of waterfowl migration, the

emergence of specific species of plants and insects, and the date of river freeze-up in the fall or break-up in the spring.

Researchers will also use visual aids such as maps and pictures of fish species and historical photographs to enhance discussion (e.g., Brown et al. 2005). Researchers will make audio recordings of group gatherings and interviews and take photographs when appropriate and if consent is received from respondents. We will also ask respondents to mark fishing areas or other observations regarding salmon natural indicators on USGS 1:250,000 maps. These maps are critical visual representations of local knowledge possessed within a community or across a region; more than simply mapped representations of utilized areas or significant habitats, these maps represent the on-the-ground connections between individuals and the land that characterize subsistence economies.

Partnerships and Capacity Building: Researchers will work closely with local communities throughout the development, data collection, and analysis stages of this study. Community representatives will be directly involved with the development of an interview guide which will be used to facilitate group gathering discussions. Community representatives will also help determine the specific topics of discussion for group gatherings and will take lead responsibilities in identifying potential key respondents who could participate in the research. In addition, community representatives will help identify local community members who would act as local research assistants (LRAs) alongside Division researchers for the purpose of aiding with the research. Upon completion of data analysis and preliminary report writing, Division research staff will return to each participating upper Kuskokwim River community to present preliminary findings and allow for community comments before submission of the final report. At that time, we will also present the Tribal Council and key respondents with the GIS-based maps we have generated and describe the results of our research.

Division researchers' direct collaboration with community representatives and local residents will help to establish and/or build upon effective working relationships that are based on trust and mutual understanding. Invaluable information regarding TEK associated with salmon natural indicators will be documented, and this information will be made available to study communities and managers. Documentation of this information will further help to inform management decisions so that management actions reflect and accommodate the realities of salmon fishing in this unique and largely understudied portion of the Kuskokwim River drainage**.**

Technical Review Committee Evaluation: The project addresses a priority information need identified in the 2022 Notice of Funding Opportunity. Residents of study communities McGrath, Takotna, and Nikolai hold knowledge of fishes not documented in existing literature; however, investigators should provide better justification of the strategic importance of documenting this knowledge. Descriptions of mapping and interviewing methodology are lacking, making the project hard to evaluate. Local hire of research assistants is planned. Five letters of support were provided.

Project Number: 22-354
Project Title: Community-Based Harvest Monitoring Network for Kuskokwim River Chinook Salmon

Issue Addressed: The subsistence Chinook salmon fishery in the Kuskokwim River drainage is the largest in Alaska, historically producing over 50% of Alaska's annual Chinook salmon subsistence harvests. Historically, approximately 90% or more of all Chinook salmon subsistence harvests from the Kuskokwim River drainage occurred within waters of the Yukon Delta National Wildlife Refuge. Communities in the watershed have a very high long-term traditional subsistence dependence on Chinook salmon. Prior to the prolonged Chinook decline beginning the early 2000's, communities in the Kuskokwim River drainage had an average annual subsistence harvest of 88,500 Chinook salmon for the period 1990-2009. In response to this severe and prolonged decline of Chinook salmon, *a primary subsistence species*, the Federal Subsistence Management Program has limited subsistence harvests for Chinook salmon over the past seven years to Federally qualified users under the provisions of the Alaska National Interest Lands Conservation Act (ANILCA) Section 804. Due to the poor run in 2020, it is anticipated that the fishery will again be restricted to Federally qualified users in 2021 and be placed under the management authority of the Federal designated inseason manager.

Subsistence harvest assessments have historically been based on postseason household surveys, with no availability of reliable inseason harvests prior to 2016. Robust harvest estimates for each opening is critically important given the severe lack of high quality inseason data on run abundance and run timing to guide decision-making by federal managers. Through the delivery of near real-time harvest data from lower river subsistence communities, this project addresses a critical information need and directly supports federal management of Chinook salmon subsistence fisheries in federal waters of the Kuskokwim River by providing catch and effort data necessary for inseason estimation of subsistence harvests.

In his project addresses the following priority information needs for the Kuskokwim region as identified by the Yukon-Kuskokwim Delta Regional Advisory Council and the Western Interior Regional Advisory Council:

- *Reliable quantitative and/or qualitative estimates of salmon run size, escapement, and harvest in the Kuskokwim River drainage including Kuskokwim Bay tributaries.*
- *New methods for conducting inseason salmon run assessments in the Kuskokwim River drainage, for example community-based harvest monitoring, sonar, and village test fisheries.*
- *Information sharing between stakeholders and agencies concerning salmon conservation in the Kuskokwim river drainage, for example outreach to villages using the media and other methods.*

Additional support for the need for this project is specified in the letter of support, dated March 10, 2021, from the designated Federal inseason manager, YDNWR Refuge Manager, Boyd Blihovde.

Objectives: The overall project goals are to: (1) continue to develop and implement a framework for a community-based harvest monitoring network to inform inseason management with data on abundances, and species compositions and ratios in subsistence harvests; (2) collect age, sex, and length (ASL) data from Chinook salmon harvested in the lower portion of the Kuskokwim River; and (3) contribute to capacity building and data transparency into the future (Figure 4). It is intended that the monitoring

network protocols developed over the past four years be continued and refined as needed to continue project success. Project objectives are to:

1. Identify participant villages willing to support community-based monitors in interview sampling.

2. Train village monitors to respectfully conduct harvest interviews.

3. Collect subsistence harvest data from subsistence fishing opportunities during early June to the end of the lower river Chinook salmon run in July, including catch by species and fishing effort.

4. Electronically transfer data within 12 hours of the end of a fishing opportunity for compilation to inform managers regarding run strength and composition.

5. Collect biological data (ASL) from Chinook salmon harvested in subsistence fisheries.

6. Through community monitors, relay information on subsistence fishing opportunities to local community members, and relay local concerns to inseason managers

7. Work with other agency and NGO staff to compile, review, and report on inseason and post-season harvest summaries as collected from this and related projects including aerial surveys.

Methods: This project follows a pilot study in 2017–2020 during which the methods, data collection, and capacity building components were fully implemented, and field tested. We propose to hire seven harvest monitors from 4 lower river communities where we have been implementing the project since 2017: Akiak, Kwethluk, Akiachak, Napaskiak, and Tuntutuliak.

The core data collection involves opportunistic interviews conducted by community monitors of subsistence harvesters after returning from fishing. Interviews are confidential in adherence to the Principles for Conducting Research in the Arctic and follow a set of standardized survey questions with answers recorded on waterproof paper. Interview data include aspects such as: date and time trip started and ended, general fishing area, gear used, time with net in the water, catch by species, and comments for managers. Data are uploaded via smart phone app to a data coordinator for quality control before being transferred to a USFWS biometrician who compares interview data, along with data from ONC interviewers in the Bethel area, to aerial survey observations of fishing nets in order to appropriately expand interview catch and effort. Interviewers will also opportunistically sample Chinook salmon for age, sex, and length (ASL) data.

Partnerships and Capacity Building: This project is strongly linked to rural villages on the Kuskokwim River. During its initial pilot project phase over the past four years, this project has made significant direct contributions to capacity building through hiring, training, and mentoring of young village residents working in fisheries monitoring. Through this project, we will build on these early contributions in a number of ways. Prior to the Chinook salmon return, local residents will be hired as community-based monitors to conduct harvest interviews and collect biological data. After individual monitors are identified, hiring protocols are implemented and monitors brought to Bethel for training

involving USFWS, ADF&G, KRITFC, BSFA, and ONC. This includes training and practice with the survey instrument, data transfer by cell phone app, and collection and transfer of ASL data. Monitors will be guided in how to serve as information conduits to relay information on upcoming subsistence opportunities, and to relay concerns of village members to managers. Through this process, we aim to inspire and help equip these young people to further explore careers in fisheries research and monitoring.

Technical Review Committee Evaluation: This project integrates community-based harvest information (surveys and age-sex-length data collection) in the lower Kuskokwim River villages with similar data collected by Orutsararmiut Native Council in the Bethel area (proposal 22-350) and aerial boat surveys to create near real-time harvest data for inseason management of the Kuskokwim River Chinook Salmon subsistence fishery. Because of the pressure on this system, managers need to ensure that inseason data is available for rapid decision-making. The project directly addresses three priority information needs for the Kuskokwim River. Overall, the methods for this project have been well-developed and tested. A previous version of this proposal was submitted in 2020. At that time, the Technical Review Committee raised concerns that the project's technical and scientific merit depended on Orutsararmiut Native Council's surveys also being funded, as well as to the high cost of the project. In comparison to the previous proposal, this proposed project has been developed into a partnership between the lead organization, Kuskokwim River Inter-Tribal Fish Commission, Bechtol Research, and Yukon Delta National Wildlife Refuge. The budget has also been reduced. However, it appears that the project's technical and scientific merit is still in large part based on Orutsararmiut Native Council's project (22-350) also being funded. The project's activities will support local capacity building through training harvest monitors in lower Kuskokwim villages; two-way information transfer will also be facilitated by monitors, who will act as intermediaries between fishers and managers. Letters of support were provided by Bering Sea Fishermen's Association, Orutsararmiut Native Council, and the Yukon Delta National Wildlife Refuge. Letters of support were not provided by the candidate villages to be included.

SOUTHWEST ALASKA REGION

Priority Information Needs

The 2022 Notice of Funding Opportunity for the Southwest Alaska Region identified the following five priority information needs:

- Reliable estimates of escapement, quality of escapement, and environmental impacts addressing decline of Chinook and Sockeye salmon for the Chignik River area and associated impacts to subsistence harvest opportunities.

- Reliable estimates of Chinook Salmon escapement and evaluation of quality of escapement measures in Alagnak River, Big Creek, Meshik River, Naknek River, and Togiak River, including elements of potential egg deposition, sex and size composition of spawners, and spawning habitat quality and utilization for determining the reproductive potential of spawning stocks.

- Using scale analyses of fresh and saltwater growth patterns over multiple years, examine how recent changes in the Gulf of Alaska affect growth and survival of Sockeye Salmon within their range and habitats of the Kodiak/Aleutian drainages (Buskin and McClees drainages) and/or the Bristol Bay/Alaska Peninsula drainages (Chignik, Nushagak, Naknek, and Togiak drainages). The Chignik drainage is of particular concern.

- Reliable estimates of subsistence harvest and uses. Of particular interest are harvest trends in the communities of (Bristol Bay) Manokotak, Nondalton, (Kodiak) Chignik, Ouzinkie, the settlement Aleneva on Afognak Island, Port Lions, (Aleutians/AK Pen), Adak, Akutan, Atka, False Pass, Nelson Lagoon, Nikolski, St. Paul, and St. George.

- Abundance and assessment of critical subsistence salmon stocks in priority areas such as the Buskin River.

Proposals Submitted for the Southwest Alaska Region

Seven proposals were submitted for funding in the Southwest Alaska Region.

Table 4. Projects submitted for the Southwest Alaska Region, 2022 Monitoring Program, including total funds requested and average annual funding requests.

Project	Title	Total Request	Avg. Annual
22-400	Buskin River Sockeye Salmon Stock Assessment and Monitoring	$490,530	$122,632
22-401	Chignik River Subsistence Harvest Surveys and Escapement Indexing	$601,223	$150,305
22-402	Improving Lake Clark Sockeye Salmon Escapement Monitoring in a Changing Climate	$108,845	$108,845
22-451	Networks of Net Work: Subsistence Harvest Trends of Aleutian and Alaska Peninsula Communities on Federal Lands and Waters	$184,905	$46,226

Project	Title	Total Request	Avg. Annual
22-452	False Pass and Nelson Lagoon Subsistence Harvest Monitoring and Traditional Ecological Knowledge (TEK) Investigation	$279,913	$93,304
22-453	Subsistence Harvests and Uses of Salmon and Other Wild Resources in Manokotak, Alaska	$208,382	$52,096
22-454	Reliable estimates of subsistence harvests and uses in Ouzinkie and Port Lions	$323,870	$107,957
	Total	**$2,197,668**	**$681,365**

In addition to these proposed projects, the following two projects are currently being funded by the Monitoring Program in the Southwest Alaska Region:

- 20-400 McLees Lake Sockeye Salmon Escapement
- 20-450 Kodiak Road System Subsistence Salmon and Nonsalmon

Regional Advisory Council Comments

Kodiak Aleutians Subsistence Regional Advisory Council

The Council voiced its support of the partnership between the Bristol Bay and Kodiak/Aleutians Regional Advisory Subsistence Councils to draft priority information needs for the region. The Council also expressed support for continuing the Chignik River weir, McClees Lake weir, Buskin weir, and the proposed subsistence harvest surveys in Ouzinkie and Port Lions. Lastly, the Council supports a continued investigation into the age-classes missing from various runs and urges investigators to consider using age-analyses to determine other factors influencing adult returns of salmon.

Bristol Bay Alaska Subsistence Regional Advisory Council

The Council expressed support for the Chignik River Subsistence Harvest Surveys and Escapement Indexing, Lake Clark Sockeye sonar purchase, and Subsistence Harvests and Uses of Salmon and Other Wild Resources in Manokotak. Regarding Project 22-453 in Manokotak, Council members expressed that subsistence users are relying more heavily on fish because of caribou closures.

Interagency Staff Committee Comments

The Interagency Staff Committee supports the Technical Review Committee's assessment of the 2022 Southwest Region proposals and approves of the projects forwarded for funding. The Interagency Staff Committee is gratified to note that if this suite of projects is funded, it would go a long way in addressing a long-standing concern of the Kodiak Aleutians Subsistence Regional Advisory Council for a more equitable distribution of Monitoring Program projects than in the past. We note that the Bristol Bay Regional Advisory Council supported all the projects proposed for their region, including 22-402, which was not forwarded for funding by the Technical Review Committee. The proposed projects recommended for funding address a significant portion of the priority information needs for the region.

Executive Summaries and Technical Review Committee Evaluations

The investigators' executive summaries of their investigation plans are provided below. All executive summaries reflect what was submitted to the Technical Review Committee for review, with only minor formatting changes completed by the Office of Subsistence Management to ensure readability and accessibility. The executive summaries include synopses of the issue addressed, the objectives, the methods, and the partnership/capacity building. Following each executive summary is the Technical Review Committee's evaluation of the investigation plan. The Technical Review Committee assessed investigation plans based on the set criteria: strategic priority, technical and scientific merit, investigator ability and resources, partnership and capacity building, and cost/benefit.

Project Number: 22-400
Project Title: Buskin River Sockeye Salmon Stock Assessment and Monitoring

Issue Addressed: This proposal seeks funding to operate a fish enumeration weir on the Buskin River in Kodiak, Alaska. The Buskin River supports a federal subsistence fishery occurring within the Alaska Maritime National Wildlife Refuge which annually harvests relatively large numbers of sockeye salmon during May, June, and July. Salmon from the Buskin River drainage have been identified by the Federal Subsistence Board as a resource important for customary and traditional use by the residents of Kodiak. Annual operation of a salmon escapement weir at the Buskin Lake outlet will ensure that maximum harvest opportunities for federal subsistence users are sustained.

Objectives:

1. Census the sockeye salmon escapement into Buskin Lake from approximately May 15 to July 31.

2. Estimate the age composition of the sockeye salmon run to Buskin Lake such that the estimates are within 7.5 percentage points of the true value 95% of the time.

3. Measure sockeye salmon scales for freshwater and saltwater growth phases.

4. Update the Buskin River brood table and reevaluate the sockeye salmon BEG.

5. Provide education and career development opportunity for Alaska Natives and federally qualified subsistence users.

Methods: Sockeye salmon escapement will be enumerated annually through a weir at the outlet of Buskin Lake from May 15 through July 31. Fishery management actions taken inseason affecting subsistence, sport, and commercial fisheries will be based on comparison of cumulative weir counts to historical time of entry in order to project run strength and total escapement. Additionally, sockeye salmon will be sampled for age, sex and length (ASL), providing estimates of return by age for the Buskin River Watershed. Analyses of the return and age data collected since 1993 have allowed development of a brood table with estimates of total return having a relative precision of about 10%. Continued collection of age data at this level of sampling will allow for continuation of the brood table and future re-evaluation of the BEG. Scales will be measured as a surrogate for fish growth during

different life phases and measurements will be correlated with climate indices and improved forecasting resolution will be explored.

Partnerships and Capacity Building: During each year of the project ADF&G will continue a high school student internship program established in 2003 to provide education and career development opportunity for federally qualified subsistence users. Student interns recruited locally for the project will gain knowledge important to their academic and career development by learning the principles involved in fisheries management and research and obtaining hands-on experience in fisheries data collection methods and techniques. The ADF&G and Kodiak National Wildlife Refuge office of the U.S. Fish and Wildlife Service (USFWS) have established a cooperative agreement to utilize the Buskin River weir as an educational tool for the service's 'Summer Science and Salmon Camp' program, which provides a science-based venue for local youths to learn the importance of salmon for subsistence and other uses comprising an integral part of the Kodiak lifestyle.

Technical Review Committee Evaluation: This project addresses two of the priority information needs listed in the 2022 Notice of Funding Opportunity for the Southwest Alaska Region and is a continuation of work funded through the Monitoring Program since 2000. The project continues to provide estimates of Sockeye Salmon spawning escapement into the Buskin River through operation of a weir for four years and obtain information on residency and traditional fishing sites from subsistence fishery participants. The project has decided to remove the second Lake Catherine/Louise weir that used to be funded under the Monitoring Program. The Sockeye Salmon run to Buskin River supports what is usually the largest subsistence fishery in terms of both harvest and permits issued in the Kodiak Management Area. The ADF&G Kodiak office has a proven record of successfully conducting and completing these past projects. Data collected at this weir since 2000 has been used by the State to assess and modify spawning escapement goals and improve run forecasts. This has allowed State and Federal managers to better manage subsistence harvests and avoid unnecessary restrictions. Past investigators have made strong efforts to improve capacity building, with impressive results from the high school student intern program. At present, this project has resulted in 23 of 30 former interns returning to work for the Department. While the requested funding for the proposed work appears reasonable to accomplish project objectives, this project, given its long history and being located near the ADF&G Kodiak office and on a road system, should be more efficient and cost effective as time goes by. Adding an underwater video recording system to count fish might greatly reduce costs for future years. Additionally, the project could be enhanced by engaging with local tribes to help administer and implement the weir project. The budget does not show the 150-hour contribution from the Kodiak Area Native Association.

Project Number: 22-401
Project Title: Chignik River Subsistence Harvest Surveys and Escapement Indexing

Issue Addressed: This project focuses on two of the identified priority information needs for the Southwest Region of the 2022 Fisheries Resource Monitoring Plan Priority Information Needs:

1. Reliable estimates of escapement, quality of escapement, and environmental impacts addressing Chinook and sockeye salmon stock declines in the Chignik River area and associated impacts to subsistence harvest opportunities.

2. Reliable estimates of subsistence harvest and uses. Of particular interest are harvest trends in the Bristol Bay communities of Manokotak and Nondalton, the Chignik area, and the Kodiak area communities of Ouzinkie, the settlement Aleneva on Afognak Island, and Port Lions, and the Aleutians and Alaska Peninsula area communities of Adak, Akutan, Atka, False Pass, Nelson Lagoon, Nikolski, St. Paul, and St. George.

Recent returns of both sockeye and Chinook salmon to Chignik River have been below established escapement goals. Salmon escaping into the Chignik River water shed are enumerated at the Chignik River weir, operated by ADF&G. Ten-minute expanded counts are used to index escaping salmon; a 10-minute count is conducted every hour and multiplied by six to obtain an hourly escapement index. This method has been shown to be reliable for sockeye salmon indexing when compared to a complete census, as sockeye salmon pass in large numbers, and individual observation events (a single fish passing) number in the hundreds of thousands per year. Chinook salmon observation events are much rarer, with yearly individual observation events per year usually numbering in the hundreds. Expanded counts for Chinook salmon may lack both precision and accuracy.

Subsistence harvest estimates are lacking in the Chignik Area. Surveys conducted by ADF&G in 2012 indicate that 61 Chinook salmon were harvested for subsistence, however state subsistence permits only indicate that 37 Chinook salmon were harvested. Federally qualified subsistence users (FQSU) are issued on average three federal subsistence permits a year, and the reported harvested per year on federal subsistence permits varies from between zero to five. Subsistence fish harvest is likely going underreported due to lack of knowledge of reporting requirements, lack of access to subsistence permits, or both.

ADF&G is mandated to manage for subsistence opportunity by ensuring an in-river run goal (IRRG) is met each year for subsistence purposes. The IRRG mandates that 10,000-sockeye salmon must escape past the weir specifically for subsistence purposes in both August and September (20,000-sockeye salmon). In recent years, the weir has been removed in mid- to late-August, making it difficult to determine if the IRRG has been met in August and September.

Objectives:

The overall goal of this project is to obtain better escapement indices for Chinook salmon, escapement metrics (age, sex, and length information) for Chinook and sockeye salmon into late August, and subsistence harvest information from FQSU fishing in federal waters of the Chignik area. The specific objectives are:

1. Enumerate all Chinook salmon that pass through the Chignik River weir during the central 80% of the Chinook salmon run using video cameras and FishTick^{TM} software. These counts will be compared to the traditional method of enumerating salmon (10-minute expansion).

2. Extend operation of the Chignik River weir, counting Chinook, sockeye, pink, coho, and chum salmon from August 1 to the latest date possible to obtain the most accurate estimate of escapement and provide the maximum number of observations. Exact removal date will be

determined by tidal height. Extending the weir operations will also allow ADF&G staff to continue collecting metrics from both Chignik River Chinook and sockeye salmon.

3. Collect in-season federal subsistence harvest data from FQSU in the Chignik area from mid-June - November using a Chignik area local hire.

Methods: Objective 1: From approximately June 20 through approximately August 15 all Chinook salmon that pass through the Chignik River weir will be recorded 24-hours a day using an underwater video camera and lights. Computer software (FishTick^{TM}) will examine the video recordings and provide a complete census of Chinook salmon passage. This complete computer-generated census will be compared to both the standard 10-minute expanded counts, and a complete video census conducted by an ADF&G employee using linear regression.

Objective 2: The operation of the Chignik River weir will be extended as late as possible into August to provide the most information possible about the end of the sockeye salmon run at Chignik River, as well as other species. Indexing of escaping salmon will continue through this time, as will weekly sampling; a minimum of 240 sockeye salmon will be sampled weekly, and Chinook salmon will be sampled opportunistically. Age, sex, and length information will be collected from sampled fish. Age, sex, and length information will be collected in accordance with published ADF&G operational plans for escapement sampling.

Objective 3: To obtain reliable estimates of subsistence salmon harvested in federally managed waters, the USFWS and the CIC will partner to hire and train a seasonal fisheries technician. This technician will be trained to issue federal subsistence permits to qualified subsistence users, and will conduct weekly surveys from May through November, interviewing FQSU about subsistence harvest effort.

Partnerships and Capacity Building: ADF&G, the CIC, and USFWS are committed to the project to develop a robust partnership with goals to provide real time data to federal and state in-season managers.

This project promotes partnership and capacity building in two ways:

1. Direct employment and training opportunities for rural Alaskans working on fisheries monitoring and assessment projects.

2. Providing valuable in-season Federal subsistence harvest data from willing participants.

The USFWS will work with the Chignik Coalition and ADF&G to develop a harvest monitoring sampling plan that will meet the needs of all parties involved. The Chignik Coalition will be a valuable partner for defining how sampling can be completed without disrupting local harvest patterns and use.

The Chignik Coalition will play a key role in this project. Without their partnership and experience in the area it would be difficult for the USFWS to be able to collect the harvest information in a timely manner. The employee hired by the Chignik Coalition will have local connections with the village, which will help allowed weekly collection of FQSU harvest information; a USFWS technician would have more

difficulty gathering subsistence harvest information. The coalition will gain experience in managing employees in these types of projects and will be better suited to compete for funding of similar projects in the future.

Technical Review Committee Evaluation: This is an ambitious project to conduct both a stock, status and trends component using a weir and motion-detection camera equipment to enumerate salmon in the Chignik River and compare these results to previous years that deployed a different technique using extrapolation. Additionally, the projects third objective addresses a harvest monitoring component by conducting subsistence harvest surveys for the Monitoring Program. Combined, these two approaches directly address two of the priority information needs listed in the 2022 Notice of Funding Opportunity for the Southwest Alaska Region. If successful, this project would advance the techniques deployed to estimate the escapement of salmon in the Chignik River, which has been on a steady decline since 2018 and is beginning to prompt sincere attention towards monitoring, especially during years of low abundance. This proposal also seeks to keep the weir in operation later into the season and capture more of the late-run Sockeye Salmon, which directly addresses the need for ADF&G to manage for subsistence opportunity by ensuring an in-river run goal is met each year for subsistence purposes. In recent years, the weir has been removed in mid- to late-August, making it difficult to determine if the in-river run goals have been achieved.

Project Number: 22-402
Project Title: Improving Lake Clark Sockeye Salmon Escapement Monitoring in a Changing Climate

Issue Addressed: This project proposes to improve monitoring of the Newhalen/Lake Clark Sockeye Salmon escapement by expanding sonar coverage. The Lake Clark drainage is located within the federally managed Lake Clark National Park and Preserve (LACL), and Sockeye Salmon are the most important subsistence resource for federally qualified subsistence users in the area. Escapement monitoring on the Newhalen River was previously funded by the Office of Subsistence Management from 2000 to 2011 and is currently funded by the National Park Service. Obtaining reliable estimates of spawning escapement over time is the number one priority identified by the Subsistence Fisheries Resource Monitoring Program for Bristol Bay and specifically identified for Lake Clark stocks in most years. Expanding sonar coverage will provide a more reliable estimate of the Newhalen/Lake Clark escapement, especially during years with poor water clarity (e.g., 2009 and 2019 when counts were stopped because of poor visibility). Further, this project will provide equipment that will be used by LACL in the future to monitor this important subsistence resource. Project deliverables will include presentations to LACL Subsistence Resource Commission and Bristol Bay Regional Advisory Council, a progress, annual, and final report, providing data on daily and annual Lake Clark escapements, return time, comparison between methodologies, and Sockeye Salmon age and size composition. This information will be used to evaluate current stock status and trends and assess whether escapement is adequate to meet subsistence needs.

Objectives:

1. Estimate Lake Clark Sockeye Salmon escapement

2. Compare escapement estimates from tower and sonar counts and assess relationships with environmental co-variates

3. Determine age, sex, and length of the Lake Clark Sockeye Salmon escapement

Methods: Sockeye salmon will be counted as they ascend the Newhalen River. Standard ADF&G counting tower and sonar protocols will be used to enumerate fish. Age and size data will be collected from sockeye salmon in collaboration with the subsistence community of Nondalton.

Partnerships and Capacity Building: The LACL Natural Resources Program has an established history of partnerships and capacity building. Please review FIS files from past projects for the history of communications and collaborations. Our program is dedicated to improving management of subsistence fisheries by providing data on status and trends of sockeye salmon to subsistence users and managers in the region. Our capacity building efforts have focused on education and job opportunities related to sockeye salmon and dissemination of acquired information to all stakeholders. Since 2004, we have intermittently partnered with Bristol Bay Native Association to assist with the hiring, recruitment, and training of local residents on our projects.

Technical Review Committee Evaluation: This project does not directly address any of the priority information needs listed in the 2022 Notice of Funding Opportunity for the Southwest Alaska Region. Adding a second sonar to this project would allow for a more complete escapement estimate, however with no species apportionment techniques being used and the assumption of no species overlap leaves uncertainty with the estimates. Additionally, proper site selection for a sonar is necessary for proper ensonification and the proposal does not indicate a proper site for the sonar has been investigated and no details were given to ensure fish would not be double counted on the second sonar.

Project Number: 22-451
Project Title: Networks of Net Work: Subsistence Harvest Trends of Aleutian and Alaska Peninsula Communities on Federal Lands and Waters

Issue Addressed: This proposal addresses the *Priority Information Needs* identified in the Southwest Alaska section of the 2022 Notice of Funding Opportunity for reliable estimates of subsistence harvests, uses, and harvest trends in the Aleutian and Alaska Peninsula communities of Adak, Akutan, Atka, False Pass, Nelson Lagoon, and Nikolski. This project will address the harvest of all wild resources in these communities, provide reliable estimates of subsistence harvests and uses, examine trends in species use using data from previous surveys, characterize sharing networks of resources, access issues, sport activities, community needs, economic trends, and climatic and other environmentally associated factors. This is a relatively under-documented region of Alaska but a critical area where residents regularly engage with resource management conflicts, federal fishery fleets, climatic events, management changes, and other natural resource issues for which current data can assist local and managerial decision-making processes.

This project focuses on the smaller communities (<50 households each) that are vulnerable to a number of forces out of direct local control. These villages' populations have been in flux or steady decline. Young

families might lose incentive to remain in the communities without viable schools (due to the state enrollment requirement), healthy access to wild foods, and a supportive economy. Households have reported diverse subsistence strategies but increasing difficulty accessing certain foods because of climate change, quality of the foods, costs, equipment failures, health, work schedules, among many factors. Current subsistence harvest data is needed because of the changing nature of the environment and communities themselves.

Objectives: The overarching goals of this project are to document subsistence harvest estimates and track trend data for each community to capture change through time. Other goals are to understand social networks of food harvesting and sharing, and how these data can be useful to communities and management. Environmental changes, socioeconomic issues, and other factors influencing access to subsistence will also be investigated. The objectives are:

1. Gather harvest estimates, methods, context, and locations of all subsistence species in the study communities for calendar year 2022 or a recent 12-month period.

2. Explore sharing and distribution patterns of species and products between individuals, households, and communities. Use social networks of wild food exchange to model sustainability and resilience of households and communities. Provide Federal subsistence managers with a description and analysis of this social map of harvesting and demonstrate how models can support subsistence allocations and management.

3. Determine, using all available qualitative and quantitative data, trends in harvesting, access, and uses over time.

4. Discover and investigate local subsistence related priorities set forth by communities, for example, a proposed new caribou management plan for Adak Island.

5. Contextualize subsistence fisheries in the broader regional economy, emphasizing the portion on Federal lands and waters.

6. Discover community subsistence concerns, observed changes in species abundances and locations, and observed environmental/climatic changes. Significant changes in the Bering Sea and Aleutian Islands in fisheries, climate, salinity, primary productivity, temperature, sea ice distribution, invasive species, among many, require fresh quantitative and qualitative data on the role of these changes to subsistence users.

7. Project environmental scenarios and demographic conditions to forecast potential strength and weaknesses of human communities. The production of these data is of strategic importance for local people when positioning themselves for future harvest access.

Methods: The project will secure permissions from each of the six study communities, meet with community leadership to discuss and modify priorities and objectives as needed, conduct household level comprehensive surveys and interviews in each community (estimated at 158 total households) that

document subsistence harvesting, sharing, household economics, and environmental observations. It will also map spatial harvest and use data. Sharing networks of wild foods and labor will be documented and examined for strengths and vulnerabilities to offer a richer understanding of subsistence dynamics. These data will be compared to subsistence data from previous studies in the region to examine trends. Interviews will also document observed and experienced trends, community subsistence concerns.

Partnerships and Capacity Building: The PI and assistants will work through the tribal councils and city authorities in each community to refine objectives and methods. The PI has a long-term, positive relationship with these municipal and tribal organizations and community members. The project will contract with local research assistants and leadership to gather and interpret data where appropriate, review the survey instrument and methods, and review of reports and publications resulting from the research. We will enlist local organizational support through the tribal councils to increase survey and interview response rates. Training local assistants will support their hire for future studies and to apply for these types of grants themselves. Informed consent forms for each survey/interview will also be read over with the study participants so that the goals of the study and the rights of the research subject are clear. We will provide information about the study at every step, including initial meetings with the tribal councils and city governments, formal presentations to the public, and personally to each interviewee/survey respondent. Tribal councils and local representatives will assist in identifying the appropriate times and conditions for conducting the surveys.

Technical Review Committee Evaluation: This four-year project directly addresses a Monitoring Program information need by estimating the subsistence harvest and use of wild resources in the Aleutian and Alaska Peninsula communities of Adak, Akutan, Atka, False Pass, Nelson Lagoon, and Nikolski. All six communities were surveyed by Dr. Reedy for the 2010 and 2012 study years, but this proposed project would contribute harvest information consistent with the Community Subsistence Information System, publicly accessible database that summarizes and exports all results from comprehensive subsistence surveys conducted by the Alaska Department of Fish and Game, Division of Subsistence. The principal investigator does not represent a rural organization and no co-investigator or agency partnerships are identified. The investigator will work with local organizations to hire and train local research assistants and survey respondents will be remunerated at $50 per household survey. No work on the proposed study would begin until formal tribal and community approvals are secured.

While the principal investigator has a proven track record of conducting and completing Monitoring Program projects (12-450 & 16-452) and successfully applying ethnographic methodology, the technical and scientific merit of this project is questionable. The goals and objectives are poorly structured, and the cost benefit of the project is hard to estimate when all documents provided present a *different* budget total. The Investigation Plan and Budget Narrative claim a project total of $214,815; the Summary Section of the Budget Table claims a project total of $184,905; and the Budget Detail presents proposed total costs across each study year that when added together equals $265,050.

Project Number: 22-452
Project Title: False Pass and Nelson Lagoon Subsistence Harvest Monitoring and Traditional Ecological Knowledge (TEK) Investigation

Issue Addressed: This project responds to two information needs identified in the 2022 Fisheries Resource Monitoring Program call for proposals prepared by the Office of Subsistence Management and the two Southwest Alaska Regional Advisory Councils by: 1) providing "reliable estimates of subsistence harvest and uses" for the lower Alaska Peninsula and Eastern Aleutian Island communities of False Pass and Nelson Lagoon; and 2) documenting the "impacts of climate change on salmon and the environment." This study will fill a much-needed data gap in the available dataset for the harvest and use of salmon and nonsalmon fishes, within the context of total subsistence resources harvested, for the communities of False Pass and Nelson Lagoon. In addition, the study will document traditional and contemporary subsistence harvest and use areas, document traditional ecological knowledge (TEK) observations related to the effects of environmental change on salmon populations and subsistence activities and evaluate the accuracy of the subsistence salmon permit system. The data from this study will be useful for regulatory bodies such as the Alaska Board of Fisheries (BOF) and the Federal Subsistence Board (FSB) in their assessments of whether subsistence needs are being met and to inform federal and state managers and regulatory bodies on subsistence regulations, especially in light of documented coastal erosion that affects fishing practices (Kluberton 2016).

Access to all five species of Pacific salmon found in Alaska is essential for the residents of False Pass and Nelson Lagoon; however, the two most utilized species are coho salmon *Oncorhynchus kisutch* and sockeye salmon *O. nerka*. Harvest and use of subsistence salmon by residents of False Pass and Nelson Lagoon occurs within the boundaries of the Alaska Maritime National Wildlife Refuge, the Izembek National Wildlife Refuge, and the Alaska Peninsula National Wildlife Refuge. In the past, these communities relied on a wide variety of resources for subsistence, with an emphasis on large quantities of caribou and salmon, but access to caribou populations has decreased over the past several decades with declined abundance and hunting restrictions, which has contributed to an increased harvest and reliance on salmon in False Pass and Nelson Lagoon over the last three decades (Reedy-Maschner and Maschner 2012). However, any changes in salmon harvest estimates resulting from changes in overall resource availability have not been documented. The most recent Alaska Department of Fish & Game (ADF&G) comprehensive subsistence surveys occurred over 30 years ago: for Nelson Lagoon the last survey occurred in 1987, and the most recent survey was in 1988 for False Pass.

Annual salmon harvest data are a fundamental input for sustainable management and evaluating if subsistence needs are being met, and for illustrating how subsistence harvests change over time. ADF&G has collected salmon harvest data through permits for the Alaska Peninsula Management Area (Area M) annually since 1985. In 2000, a collaborative working group with representatives of ADF&G, the United States Fish and Wildlife Service (USFWS), and the Alaska Inter-Tribal Council evaluated the current harvest monitoring programs for salmon statewide. This collaborative investigation found the subsistence permit system alone in the Alaska Peninsula area has not provided information sufficient for effective management (Fall and Shanks 2000). More recent studies conducted by the Division of Subsistence in Alaska Peninsula community of Port Heiden and communities in the Chignik Management Area

compared household survey data to permit data and found permit data significantly underestimated subsistence harvests (Fall et al. 2020; Hutchinson-Scarbrough et al. 2016; Jones and Cunningham 2020). Without accurate harvest estimates, the FSB and the BOF lack the data they need to determine if reasonable opportunities for subsistence are being provided for residents to meet their needs as defined by amount reasonably necessary for subsistence (ANS) findings.

State of Alaska fisheries managers for the Alaska Peninsula Management Area identify data gaps and an inability to accurately assess subsistence salmon harvests estimates in False Pass and Nelson Lagoon due to low participation rates by residents.[2] Earlier subsistence studies documented that salmon are harvested using subsistence gear, obtained for home use from commercial harvests, and harvested by rod and reel in smaller quantities (Fall et al. 1996; Reedy-Maschner and Maschner 2012). Commercial salmon permit holders fishing in the Alaska Peninsula Area and Aleutian Islands are allowed to remove salmon from legally harvested commercial harvests for personal use, generally referred to as "home-pack" (5 AAC 39.010 (a)(b)). With some exceptions, the BOF does not recognize removal from commercial harvest or harvest by rod and reel as subsistence harvest methods in the Alaska Peninsula and Aleutian Island regions (5 AAC 01.420); however, rod and reel is recognized by the FSB for federally qualified residents in federal jurisdictions of the Alaska Peninsula management area.[3] The existing subsistence permit system does not require reporting of salmon obtained through commercial catches, or methods of harvest, including rod and reel.

This project will utilize face-to-face household surveys, in-depth mapping biographies, and key respondent interviews to investigate how changes in community demographics, the local environment, regulations, and resource availability have altered subsistence practices over the past several decades. This proposed project will: 1) update subsistence salmon and other wild resources harvest and use estimates in False Pass and Nelson Lagoon for the calendar year 2023; 2) evaluate the current subsistence salmon permit system and make recommendations for a revised harvest monitoring program based on study findings; and 3) document TEK observations related to the effects of environmental change on salmon populations and subsistence pursuits by False Pass and Nelson Lagoon residents.

Conducting a comprehensive study of all wild resources will provide important contextual information about how salmon harvest and use fits into an overall picture of subsistence practices in False Pass and Nelson Lagoon. Specifically, salmon data will include information about harvest and use of all species harvested for home use by date, harvest location, and gear type, including subsistence nets, removal from commercial harvests, harvest by rod and reel, or other methods. These data will contribute toward a fuller understanding of subsistence harvesting than is currently available through the permit system alone: it

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2. Elizabeth Fox and Robert Murphy, ADF&G Area Management Biologists, Alaska Peninsula and Aleutian Islands, Personal Communication, February 25, 2021.

3. U.S. Fish and Wildlife Service, Office of Subsistence Management. Federal Subsistence Management Regulations for the Harvest of Fish and Shellfish on Federal Public Lands and Waters in Alaska: Effective 1 April 2019–31March 2021. Anchorage: Federal Subsistence Board, Office of Subsistence Management, 2019. https://www.doi.gov/sites/doi.gov/files/uploads/2019-21_fisheries_regs_book_web.pdf.

will improve managers' understanding of subsistence salmon harvests and provide the necessary data to assess the accuracy of the current permit system. Although managers are concerned about low reporting, there has never been an investigation into how the subsistence salmon permit program is working in the communities of False Pass or Nelson Lagoon. It will also address data gaps critical to informing federal and state regulatory processes—most importantly, an assessment of ANS and reasonable opportunity to access and harvest salmon. The documentation of TEK will aid in contextualizing harvest estimates and collate the observations of changes linked to climate on local salmon populations and subsistence activities. For example, much of the shoreline within the three National Wildlife Refuges in the study area is exhibiting signs of coastal erosion. Coastal erosion and other climate related phenomena may be altering subsistence activities and causing area residents to adapt subsistence harvest practices. The results of this study will increase federal and state fisheries managers' understanding of community-based subsistence fisheries, especially considering the rapidly changing environmental conditions occurring in the region.

Objectives: The goal of the project is to better understand contemporary harvest trends of salmon and other wild resources in the context of environmental, socioeconomic, and regulatory changes. To accomplish this, the project has three objectives.

1. Estimate subsistence salmon and other wild resources harvest amounts and locations by False Pass and Nelson Lagoon residents for study year 2023.

2. Evaluate the subsistence salmon permit system and make recommendations for improvement based on study findings.

3. Document traditional ecological knowledge (TEK) observations related to the effects of environmental change on salmon populations and subsistence activities by False Pass and Nelson Lagoon residents.

Methods: This study will take place in two communities, False Pass and Nelson Lagoon, and will integrate four social science data gathering methods to estimate the harvest and use of salmon and other wild resources used for subsistence by community residents, evaluate the salmon permit system, and document TEK related to observed effects of environmental change. These methods are: 1) Map Biographies, 2) Participant Observation, 3) Key Respondent Interviews (KRIs), and 4) Comprehensive Household Harvest Surveys. The data gathering methods for this project were designed to be integrated so that data collected using one method informs the development and implementation of other methods. The household harvest surveys will serve as the basis for accomplishing Objective 1. Map biographies, KRIs and participant observation will also provide supplemental quantitative and qualitative material to accomplish Objective 1. Objective 2 will be achieved using data from the household harvest surveys to compare with the subsistence salmon permits. Data from all four methods will be used to address Objective 3; however, the KRIs will serve as the primary data source for this objective.

Partnerships and Capacity Building: This project was developed in consultation with the False Pass Tribal Council, the Nelson Lagoon Tribal Council, The Aleutian Pribilof Islands Association, ADF&G Division of Commercial Fisheries, and USFWS refuge managers for the Alaska Maritime NWR and

Alaska Peninsula NWR. During the planning and implementation phase of the project, researchers will remain in contact with local tribal councils to obtain assistance with survey development, interview protocols, and logistics. Approximately three LRAs in each community will be trained and hired to help coordinate local logistical support and participation in project activities. LRAs will be compensated for their time and will be trained in survey administration and mapping as well as more broadly in the objectives and methods of the project. This project seeks to facilitate information sharing between community residents and management agencies. Through the surveys and interviews, community members will have the opportunity to share their knowledge of wild resources used for subsistence and their experiences accessing these resources. Information regarding the logistics of obtaining and using a subsistence salmon permit will be directly addressed by this project. In return, researchers will disseminate this information in a technical report and make recommendations to resource managers for revisions to the harvest monitoring program based on these study findings. The data and resulting technical report from this project will be available to the public and can be used by individuals, communities, and local and regional advisory committees and councils to advocate for subsistence practices before the Federal Subsistence Board and the Alaska boards of Fisheries and Game.

Technical Review Committee Evaluation: This three-year project will estimate the subsistence harvest and use of wild resources in False Pass and Nelson Lagoon, evaluate the subsistence salmon permit system, and document local observations of environmental change to assess impacts on salmon populations and subsistence activities. The project directly addresses two Monitoring Program priority information needs for 2021 and Federal nexus is provided through the Izembek, Alaska Peninsula, and Alaska Maritime National Wildlife Refuges. The project research design employs proven ethnographic methodologies that are commonly utilized by the Division of Subsistence for most harvest estimate research. For this project investigators will conduct map biographies, participant observation, key respondent interviews, and systematic household surveys. The research design begins with participant observation and mapping biographies which allows the researchers to establish relationships with community members and develop insight into local practice while aiding in the refinement of the survey instrument and key respondent interview questions. Community consultation is integrated throughout most stages of the project design. The average annual cost of the project is reasonable considering the rural location of the communities and the work proposed over a three-year period as opposed to four years. Extending the project timeline to allow for a longer timeframe to collect, reduce, and report data is suggested.

The Alaska Department of Fish and Game, Division of Subsistence is the principal investigator and no other partnerships are proposed, however letters of support were submitted by the False Pass Tribal Council, Nelson Lagoon Tribal Council, Alaska Department of Fish and Game, Division of Commercial Fisheries, U.S. Fish and Wildlife Service Anchorage Fish and Wildlife Conservation Office, U.S. Fish and Wildlife Service Izembek National Wildlife Refuge, and The Aleutian Pribilof Islands Association.

Project Number: 22-453
Project Title: Subsistence Harvests and Uses of Salmon and Other Wild Resources in Manokotak, Alaska

Issue Addressed: This project responds to two information needs identified in the 2022 Fisheries Resource Monitoring Program call for proposals by providing "reliable estimates of subsistence harvest and uses" for the community of Manokotak, and by documenting the "impacts of climate change on salmon and the environment." This collaborative research project will collect subsistence harvest data for salmon and other important wild resources by residents of Manokotak, document traditional ecological knowledge (TEK) regarding local salmon populations and environmental changes, and partner with the Manokotak Nunaniq School to facilitate a community-based, participatory research effort by including students in research efforts and incorporating subsistence activities and knowledge into the classroom.

The five species of salmon found in Alaska are utilized for subsistence purposes in Manokotak, but the most targeted are sockeye, Chinook, and coho salmon. Both salmon spawning and rearing habitats, as well as subsistence harvest and use of salmon by the community of Manokotak occurs within the Federal Conservation System boundaries of the Togiak National Wildlife Refuge. The wild salmon migrating to this area support one of the largest subsistence fisheries with a Federal nexus and jurisdiction in Bristol Bay. The salmon returning to the Igushik River are essential to the vitality of the community.

Salmon remain a fundamental subsistence resource for the community of Manokotak and management of the subsistence salmon fishery relies on sound, current data. A Division of Subsistence survey from 1985 documented that Manokotak residents harvested 41,847 lb of salmon, or 136 lb per capita. In 1999, a Division of Subsistence survey documented that Manokotak residents harvested 46,353 lb of salmon, or 117 lb per capita. In 2008, the Division of Subsistence conducted another comprehensive survey and found that residents of Manokotak harvested an estimated 51,214 lb of salmon, or 135 lb per capita. That project found that many residents continued to preserve large quantities of salmon through traditional methods and that salmon were the most used and harvested category of wild resources. However, that study occurred 14 years ago; there is a need for updated subsistence harvest estimates because of rapidly changing environmental and sociocultural phenomenon occurring in the region. In the summer of 2019, tens of thousands of salmon were found dead in the Igushik River because of unusually high-water temperatures. The 2019 salmon die off coincided with early melting snowpack and record-breaking temperatures in the Manokotak area. This visual manifestation of climate effects on the local salmon population created concerns among Manokotak residents. In addition to concerns about the changing environment, community members expressed the desire to provide more opportunities for Manokotak's youth to learn about and engage in subsistence activities and traditional food processing. Andrewski Toyukak, the President of the Manokotak Village Council, suggested student involvement in subsistence research would help create an opportunity for cultural transmission of TEK and subsistence knowledge.

This study seeks to document contemporary salmon harvest and use patterns in addition to gathering data that will provide a broader understanding of subsistence in Manokotak. This will be accomplished through administration of a comprehensive household harvest survey for calendar year 2022 and conducting key respondent interviews to contextualize those harvest data. Involving Manokotak youth in

the subsistence research efforts will provide opportunities for youth to better understand how research informs management and regulation. This project is designed to obtain several different types of information about the effect of climate change on salmon populations, the local environment, and subsistence activities, while also providing more reliable estimates of the harvest and use of salmon and other wild resources by Manokotak residents. The documentation of TEK will produce detailed and specific place-based observations providing contextual explanations for subsistence harvest estimates and observed changes in salmon populations by area residents. This research will increase our understanding of salmon harvest patterns in the Togiak National Wildlife Refuge and assist federal, tribal, and state resource managers to ensure adequate subsistence opportunities are available. Additionally, this research will be available to regulatory boards, residents of Manokotak, and other Alaskans who are engaged in the regulatory process.

Objectives: The overarching goal of this research is to provide improved harvest estimates and increase understanding of subsistence harvest and use patterns, especially of salmon, by residents of Manokotak within the context of environmental change. This project has the following objectives:

1. Document the perceived effects of climate change on salmon populations, the local environment, and subsistence activities utilizing traditional ecological knowledge (TEK) and local ecological observations.

2. Document reliable estimates of the harvest and use of salmon and other wild resources used for subsistence by Manokotak residents during the 2022 calendar year.

3. Facilitate a community-based participatory research effort to produce a student-authored manuscript about Manokotak's past and present subsistence practices through a partnership with the Manokotak Nunaniq School.

Methods: This study will take place in the community of Manokotak and will integrate three social science data gathering methods to document TEK related to observed effects of climate change on salmon populations, the local environment, and subsistence activities and to estimate the harvest and use of salmon and other wild resources used for subsistence by Manokotak residents. These methods are: 1) Key Respondent Interviews (KRIs), 2) Comprehensive Household Harvest Surveys, and 3) Harvest and Use Area Mapping. Objective 1 will be accomplished by utilizing KRIs to gather qualitative data and will also use data from the comprehensive household harvest surveys. The household harvest surveys, and harvest mapping will serve as the basis for accomplishing Objective 2. KRIs will also provide supplemental qualitative material to accomplish Objective 2. Objective 3 will be achieved alongside Manokotak students while conducting KRIs on a topic related to cultural and traditional subsistence practices and production.

Partnerships and Capacity Building: This project was developed and will be carried out collaboratively by ADF&G Division of Subsistence and BBNA. One of the main objectives of this project is to facilitate information sharing by involving the most inclusive group possible of Manokotak residents in this study. Therefore, an aspect of this project will involve high school student research and will be carried out through a partnership between project staff and the staff from the Manokotak School. As stated in the

letter of support from the school, teachers will collaborate with project staff, local subsistence stakeholders, and community elders to develop workshops, help facilitate cultural and traditional subsistence practices, and help with the production of student projects as part of the school's Experience Week (E-week). In addition, this project seeks to provide a meaningful professional development opportunity through a BBNA internship by hiring a college student from the University of Alaska Fairbanks Bristol Bay Campus to assist with field research for this project. Finally, Local Research Assistants (LRAs) will be hired in Manokotak to help with KRI logistics and administration of the comprehensive household harvest surveys and to help coordinate local logistical support and participation. Researchers will work closely with selected LRAs to provide technical training. Duties for the LRA include: 1) assist with creation of community household list for survey sample, 2) assist with post-season harvest surveys, 3) arrange key respondents for TEK interviews, and 4) Assist with community review meetings.

Technical Review Committee Evaluation: This four-year project proposes to update harvest estimates and increase understanding of subsistence harvest and use patterns, especially of salmon, by residents of Manokotak within the context of environmental change. The project directly addresses two Monitoring Program priority information needs for 2021 and Federal nexus is provided through the Togiak National Wildlife Refuge. The project research design employs proven ethnographic methodologies that are commonly utilized by the Division of Subsistence for most harvest estimate research. For this project investigators will administer a comprehensive household survey for the calendar year of 2022, map harvest and use areas using Collector for ArcGIS on an iPad and conduct key respondent interviews. Because key respondent interviews will be conducted at different stages and for different purposes throughout the project, more than the 10 interviews identified are recommended. The cost of the project is more than reasonable for the work proposed across all project years.

This project represents an ongoing partnership between the Alaska Department of Fish and Game and the Bristol Bay Native Association who have successfully completed numerous Monitoring Program projects together over the last 15 years. Both organizations have the capacity to conduct research, meet deadlines, and project deliverables. Significantly, project investigators have already consulted with the Manokotak Village Council on the project design and received letters of support from the Manokotak Nunaniq School, the Manokotak Village Council, and the Togiak National Wildlife Refuge. Project investigators will work closely with the Manokotak Nunaniq School to integrate school age youth into the project and local research assistants will be hired.

Project Number: 22-454
Project Title: Reliable estimates of subsistence harvests and uses in Ouzinkie and Port Lions

Issue Addressed: This project responds directly to an information need identified in the "Priority Information Needs" document prepared by the Office of Subsistence Management and the Kodiak/Aleutians Subsistence Regional Advisory Council by providing updated "reliable estimates of subsistence harvest and uses" in the northern Kodiak area communities of Ouzinkie and Port Lions. Residents of Ouzinkie and Port Lions rely on a variety of subsistence resources, especially salmon runs from the Afognak River on Afognak Island. This fishery operates primarily in nearshore marine waters

within the Alaska Maritime National Wildlife Refuge but falls under the jurisdiction of the Kodiak National Wildlife Refuge. This project will produce reliable estimates of subsistence harvests and uses of salmon and other resources through comprehensive household harvest surveys, resource mapping, and key respondent interviews.

Reliable estimates of subsistence harvest and uses of salmon and other resources in Ouzinkie and Port Lions address several critical linked issues with multiple applications for managers and other stakeholders. First, numerous members of the Kodiak/Aleutians Subsistence Regional Advisory Council expressed the importance of collecting updated harvest data for Ouzinkie and Port Lions at the September 2020 council meeting. The Division of Subsistence last conducted comprehensive harvest surveys in Ouzinkie and Port Lions in 2003, making them the most outdated Kodiak area communities to be surveyed (Kodiak road-connected communities were the most outdated, but will be surveyed in 2022 for the 2021 harvest year). Comprehensive household harvest surveys produce the only dataset that estimates a community's annual use of subsistence resources; they also provide valuable insight into harvest and use participation rates, sharing of wild resources, food security levels, and the demographic and socioeconomic factors that influence patterns observed in harvest and use data. Updated subsistence data are timely in light of recent declines in salmon harvest estimates. The total reported subsistence salmon harvest in the Kodiak Management Area for 2018 (17,459 salmon) and 2019 (12,688 salmon) fell well below the prior 5-year and 10-year averages (22,988 and 26,844 salmon, respectively) based on returned state subsistence permits. The Sun'aq Tribe of Kodiak's recent study on tribal seafood consumption, described in more detail below, concluded that Kodiak Tribes consume seafood at rate 10 times greater the rate of the U.S. population, and that salmon was the seafood consumed most frequently and in the greatest quantities (Lance et al. 2019). In combination, the documented importance of salmon consumption for Kodiak Tribes and the significant drop in reported harvests underline the need for updated and reliable harvest estimates with important contextual information to help explain the recent decline. Finally, comprehensive surveys include updating spatial data of subsistence use areas. These data provide information that is critical for responding to the increase in aquaculture and development proposals that could affect vital subsistence use areas. This study will provide reliable harvest and use estimates while documenting local knowledge and the environmental and social factors that influence subsistence harvests of salmon and other resources.

Objectives: The goal of this project is to complete updated salmon and other subsistence resource harvest estimates for the entire Kodiak Management Area. Reliable estimates are needed to inform management decisions of this complex fishery, and to address reasons for the recent decline in reported subsistence salmon harvests. This will be accomplished through the following objectives: (1) Produce reliable estimates of salmon and other resources harvested and used for subsistence in Port Lions and Ouzinkie; (2) Create comprehensive spatial maps of subsistence harvest areas used by residents of Port Lions and Ouzinkie; and (3) Document local observations of subsistence harvesting practices and potential changes in subsistence resource populations, harvesting trends and areas used.

Methods: This research project will integrate three social science data gathering methods to address the study objectives: comprehensive household harvest surveys (Objective 1), harvest and use area mapping (Objective 2), and key respondent interviews (Objective 3).

Objective 1: Researchers and local research assistants will work in teams to conduct in person surveys in Ouzinkie and Port Lions using a full census sample. Surveys will collect information about each household's participation in subsistence and commercial fishing activities, the harvest and use of fish and other wild resources, sharing of resources, basic demographic and economic information, and food security. All information will be voluntary and anonymous.

Objective 2: Researchers will document geographic data concerning areas used for search and harvest activities for each resource category for the study year using Collector for ArcGIS on an iPad. There is no individual identifying information attached to the final maps; individual data points are combined to display general harvest areas, so that specific harvest locations are not revealed.

Objective 3: Researchers will document local observations of changes in subsistence resource populations, harvesting trends, and areas used through up to 10 semi-structured, open-ended interviews. Interviews will be guided by a formal interview protocol developed in collaboration with tribal governments and the Kodiak National Wildlife Refuge. Recorded interviews will be transcribed and uploaded to QSR International's NVivo 12 Pro for qualitative data analysis.

This project will be guided by the research principles adopted by the Alaska Federation of Natives in its Guidelines for Research, the National Academy of Science's "Principles for Conducting Research in the Arctic," Ethical Principles for the Conduct of Research in the North (Association of Canadian Universities for Northern Studies 2003), and the Alaska confidentiality statute (AS 16.05.815). Consistent with these principles, Ouzinkie and Port Lions tribal councils will review survey forms and interview protocols, and researchers will conduct community scoping meetings to raise awareness of the project and actively involve residents. Local research assistants (LRAs) will be hired to assist with surveys and key respondent interviews. Public data review meetings will be held to share preliminary results of the project and solicit comments and feedback. A project summary will be provided to all residents, and final study findings will be publicly available online through the Community Subsistence Information System (CSIS).

Partnerships and Capacity Building: The active involvement of U.S. Fish and Wildlife Service staff and tribal members will strengthen the proposed research. ADF&G will partner with the Kodiak National Wildlife Refuge to enhance research capacity and for a deeper understanding of federal fisheries issues in the Kodiak Management Area. Refuge involvement will include participating in survey development and review; identifying federal fisheries issues of concern that should be explored in key respondent interviews; providing staff support for community meetings and survey administration in Ouzinkie and Port Lions, exploring outreach opportunities for sharing subsistence, and participating in the final report review. This project will also benefit from active partnership with the Ouzinkie Corporation, Native Village of Ouzinkie, and Native Village of Port Lions. All entities will participate in reviewing survey drafts and key respondent interview protocols and identifying local research assistants and key respondents. All four entities have provided letters of support for this project.

Technical Review Committee Evaluation: The proposed three-year project would consist of subsistence surveys, subsistence use mapping, and key informant interviews on salmon use in the communities of

Port Lions and Ouzinkie. This data has not been collected since 2003 and is vital for Federal subsistence management in the region. Funding for this project would complement ongoing subsistence surveys in other rural communities in the Kodiak Archipelago. This project directly addresses the 2022 Kodiak/Aleutians priority information need. The proposal's objectives are clear, measurable, and achievable. Kodiak National Wildlife Refuge provides Federal nexus. Letters of support were submitted by Ouzinkie Corporation and Ouzinkie and Port Lions tribal councils, as well as Kodiak National Wildlife Refuge.

SOUTHCENTRAL ALASKA REGION

Priority Information Needs

The 2022 Notice of Funding Opportunity for the Southcentral Alaska Region identified the following five priority information needs:

- Reliable estimates of abundance, run timing, spawning site fidelity, timing, and age, sex, and length composition for Chinook and Coho Salmon that stage or spawn in waters of Kenai Peninsula drainages under Federal subsistence fishery jurisdiction.

- Reliable estimates of Chinook, Coho, and Sockeye salmon escapements (for example projects utilizing weir, sonar, and/or mark-recapture methods) into the Copper River drainage and delta systems.

- Develop, test, and implement methodologies for monitoring escapement and/or mortality of Sockeye Salmon in the Copper River drainage and delta systems, including assessment of predation (for example by seals, bears, and eels/lampreys).

- In-season estimates of salmon harvest in the Copper River drainage through a harvest reporting/collection system.

- Estimates of Copper River Sockeye Salmon smolt out migration and ocean survival.

Proposals Submitted for the Southcentral Alaska Region

Two proposals were submitted for funding in the Southcentral Alaska Region.

Table 5. Proposals submitted for the Southcentral Alaska Region, 2022 Monitoring Program, including total funds requested and average annual funding requests.

Project	Title	Total Request	Avg. Annual
22-504	Copper River Chinook Salmon Inriver Abundance	$860,000	$215,000
22-551	Estimating in-season harvest and effort by fish-wheel users in the upper Copper River	$370,152	$92,538
	Total	**$1,230,152**	**$307,538**

In addition to the above proposed projects, the following two projects are currently being funded by the Monitoring Program in the Southcentral Alaska Region:

- 20-501 Klutina River Sonar

- 22-502 Tanada Creek Sockeye Salmon Weir

Regional Advisory Council Comments

Southcentral Alaska Subsistence Regional Advisory Council

The Council supports both projects submitted for the region. The Council voiced the need for continuing the Native Village of Eyak inseason abundance of Chinook on the Copper River until the State can refine the sonar counts for estimating Chinook Salmon abundance. Harvest data generated from the Upper Copper River Harvest project would greatly help managers when Chinook Salmon runs are low. The Council also wished to ensure that Kasilof Coho Salmon and Kenai River Chinook Salmon be added to the next list of Monitoring Program priority information needs so that investigators can research why the runs continue to decline.

Interagency Staff Committee Comments

The Interagency Staff Committee supports the Technical Review Committee's assessment of the 2022 Southcentral Region proposals. The Native Village of Eyak Chinook Salmon Abundance proposal the Technical Review Committee has forwarded for funding is an excellent project with good partnership and capacity building and provides essential information for management in the Copper River and addresses an important research priority need for the region. The Interagency Staff Committee also recognizes the Southcentral Alaska Subsistence Regional Advisory Council's emphasis on the importance of Kasilof Coho Salmon and Kenai River Chinook Salmon and look forward to a greater diversity of proposals during the next cycle.

Executive Summaries and Technical Review Committee Evaluations

The investigators' executive summaries of their investigation plans are provided below. All executive summaries reflect what was submitted to the Technical Review Committee for review, with only minor formatting changes completed by the Office of Subsistence Management to ensure readability and accessibility. The executive summaries include synopses of the issue addressed, the objectives, the methods, and the partnership/capacity building. Following each executive summary is the Technical Review Committee's evaluation of the investigation plan. The Technical Review Committee assessed investigation plans based on the set criteria: strategic priority, technical and scientific merit, investigator ability and resources, partnership and capacity building, and cost/benefit.

Project Number: 22-504
Project Title: Copper River Chinook Salmon Inriver Abundance

Issue Addressed: Since 2003, the Native Village of Eyak's (NVE) Department of the Environment and Natural Resources (DENR) has used research fishwheels and mark-recapture techniques to estimate the annual inriver abundance of adult Chinook salmon (*Oncorhynchus tshawytscha*) through Baird Canyon on the lower Copper River, prior to any mainstem emigration. This previously funded FRMP study (2003-2021) qualifies for continued funding because 1) the inriver abundance estimate is necessary for effective management of the six unique federal and state managed subsistence fisheries of the Copper River (see attached letters of support from state and federal fishery managers); 2) it continues an

uninterrupted long-term population stock status and trend monitoring program; and 3) it directly address the 2022 Southcentral Alaska Priority Information Need "Reliable estimates of Chinook salmon escapements into the Copper River drainage and delta systems."

When combined with federal and state harvest from fisheries occurring below this project's marking site, the inriver abundance estimate provides fishery managers with a total returning run size estimate (Botz and Somerville 2017). The returning run size dataset has allowed state and federal fishery managers to establish early season harvest management strategies and compute an annual run size forecast. This preseason forecast has provided stakeholders with predictions on run strength and potential for harvest. Furthermore, run size data is used to assess harvest in proportion to the run among the various fisheries targeting Chinook salmon, providing an important measurement to ensure subsistence priority is maintained above all other fisheries (commercial, sport, personal use).

An equally important metric obtained through the collection of inriver abundance data is system-wide spawning escapement. Since 2003 spawning escapement has been measured by subtracting harvest occurring upriver of this project's recapture site from the inriver abundance estimate (Botz and Somerville 2017). This data is used for developing harvest management strategies, while monitoring population status, and providing data for fisheries regulatory decisions. The in-season data collected through this project is one of several metrics used to issue emergency orders and harvest announcements for subsistence, personal use, commercial, and sport fisheries, thus ensuring subsistence allocation preference can be maintained in-season during periods of low abundance (Somerville 2017).

Project-derived estimates of spawning escapement are used to evaluate whether in-season fishery management decisions were effective at achieving the Sustainable Escapement Goal (SEG) of 24,000 or more Chinook salmon. The SEG represents the minimum threshold value needed for sustainable Chinook salmon harvest, recommended by ADF&G, and established by the State of Alaska Board of Fisheries in 2002 (Bue et al. 2002). Using data from this project the SEG is reviewed every 3 years by fisheries managers and the Board of Fish (Haught et al. 2017). Additionally, fisheries allocation assessments can be conducted in federal and state fisheries regulatory cycles by comparing Chinook salmon population data with cumulative harvest data, which is critical for maintaining federal and state mandated subsistence fisheries priority on a Chinook salmon population considered a fully allocated resource (Botz and Somerville 2017).

Population monitoring becomes critically imperative during periods of low abundance, which has persisted for the Copper River Chinook salmon population since 2008. Prior to 1999 Chinook salmon abundance estimates were unknown but from 1999-2007 annual run size averaged 82,986 Chinook salmon, since 2008 average annual run size has been reduced by 43% to 47,398 Chinook salmon (2008-2020). Combined user group annual harvest averaged 56,645 Chinook salmon from 1997-2007, since 2008 combined user group annual harvest has averaged 18,757 Chinook salmon (2008-2020), representing a 61% reduction. Management of *all* Copper River Chinook salmon fisheries, including federal and state subsistence, are wholly dependent upon the ability to estimate annual inriver abundance, from which system-wide spawning escapement and total returning run size are derived

Objective: To estimate the annual in-river abundance of Chinook salmon returning to the Copper River from 2022 to 2025 such that the estimates are within 25% of the true value 95% of the time.

Methods: This study will estimate the annual in river abundance of Copper River Chinook salmon at Baird Canyon (rkm 66) using established (Smith 2004 – Piche´ et al. 2019) and independently verified (Savereide 2005) two-sample mark-recapture methods (Ricker 1975; Seber 1982). A total of four live-capture fishwheels will be operated continuously in the Copper River from May through July each year. Two fishwheels will operate in Baird Canyon (rkm 66), all Chinook salmon captured will be tagged (dorsal TBA-PIT tag & right operculum hole punch) and released to continue their upriver migration. Prior to any emigration or significant harvest, a recapture effort will occur with two fishwheels operated near Canyon Creek (rkm 157), just below the Upper Copper River District lower boundary. All Chinook salmon will be inspected for presence of a tag and right operculum hole punch. Inspected fish will receive a left operculum hole punch and released to continue their upriver migration. Chinook salmon will be measured for length and a subset will be sampled for genetics, age, sex as requested by fishery managers. Sample locations have been consistent since 2003. Standard mark-recapture assumption tests will indicate presence or absence of bias and stratification needs for analysis. Catch data is used as an inseason index for management purposes and will be updated daily to the project website. Fishery managers have full access to the RAW real-time dataset inseason and a dataset that has cleared QA/QC protocols post season. The public will have access to daily inseason summary data online.

Partnerships and Capacity Building: Several concurrent studies utilize NVE's fishwheel platform alongside the mark-recapture program. These studies benefit greatly from the Chinook salmon monitoring program, providing a well-established remote research facility, and an in-river, staffed sampling platform for Copper River salmon research, adding to the value of the program and increasing the positive impact of NVE's efforts and the Fisheries Resource Monitoring Program. Currently NVE and ADF&G are utilizing the mark-recapture platform to conduct a stock specific run timing and distribution study on Copper River Chinook salmon (2019-2021; AKSSF-54002-B) providing distribution data across the 6 major spawning tributaries as well as precise spawning location data and stock specific run timing past Baird Canyon. A coded-wire tagging program led by ADF&G Division of Sportfish utilizes the NVE fishwheels for inspection of adipose clips indicating the presence of a coded-wire tag in an effort to estimate survival from smolt to adult, providing the first data on ocean survival for Copper River Chinook salmon and scheduled to continue through 2025. Since 2018 Dr. Pete Rand (Prince William Sound Science Center) has utilized the NVE fishwheel sampling platform for sockeye salmon capture and tagging to assess energetic content and track migratory success. The study is investigating the presence of pathogens within the sockeye salmon populations as well as impacts of a reduction in body size on migratory success within the Copper River watershed.

This highly successful long-term monitoring program has provided the opportunity for the Native Village of Eyak to continue an integral role in Copper River salmon research and management data collection. The Copper River Chinook salmon has been utilized by the Eyak since time immemorial. Ensuring healthy robust salmon populations thrive in the Copper River is an honor and a responsibility we share.

Technical Review Committee Evaluation: Native Village of Eyak request funding for continuation of project 18-504, which provides the only available statistically valid estimate of Chinook Salmon migrating up the Copper River each year. This request is said to be the last, as advancements are made in the lower river to use an ARIS sonar to apportion fish based on size. Native Village of Eyak has shown numerous years of successful project administration, implementation and project deliverables were well crafted and on time. Estimates of the Chinook Salmon abundance produced from the mark-recapture project are used to determine whether the Copper River Chinook Salmon escapement goal is achieved. Federal and State managers use the information to make decisions regarding the fishery. Chinook Salmon continue to be an important resource to the many user groups throughout the drainage. Through the continued escapement monitoring, this project addresses the immediate subsistence concern of declining Chinook Salmon returns to the Copper River and allows time for Alaska Department of Fish and Game to refine their size-apportionment techniques at Miles Lake to someday estimate Chinook abundance with a less costly approach.

Native Village of Eyak has a history of completing Monitoring Projects and providing meaningful data to inseason management with their online database approach, which allows anyone to see daily totals of fish caught, tagged and recaptured. Letters of support were submitted by the Alaska Department of Fish and Game Division of Commercial Fisheries, Alaska Department of Fish and Game Division of Sport Fish, and the Wrangell-St. Elias National Park and Preserve Superintendent. The total cost of Monitoring Program funding requested is $860,000, which only covers roughly half of the total needed for the project. Multiple sources of funding has been used successfully in the past, and if again successful, would allow the continuation of the project. Native Village of Eyak is pursuing several avenues to obtain funding to cover the balance of the project costs. This is an expensive project to run, and the proponents have cut as many costs as possible while trying to maintain the same level of data quality. The requested funds are reasonable across all agreement periods and reasonable for the proposed products, but the larger question remains of where the additional funds required to run the projects are going to come from. Regardless of proposal ranking, the project will require additional funds to move forward. The principal investigator believes the additional sources in funding will be realized before the Monitoring Program has determined its projects to fund.

Project Number: 22-551
Project Title: Estimating in-season harvest and effort by fish-wheel users in the upper Copper River

Issue Addressed: This mixed-method pilot study seeks to monitor harvest and effort in the upper Copper River federal fish-wheel salmon fishery. Fishing time and harvest amounts will be recorded for a sample of fish-wheel users in the Glennallen subdistrict, and will be used to estimate catch per unit effort (CPUE), an index of. These data will provide a baseline that could eventually provide a long-term indicator of fish-wheel catch rates. Researchers will evaluate whether harvest reported by participating fish-wheels can be reliably expanded to the entire fish-wheel fleet in the Glennallen subdistrict. Because many variables impact the efficacy of fish-wheels, researchers will investigate, analyze and document the range of factors that influence fish-wheel harvest and effort each season.

This project would also help to determine whether the federal subsistence fishery is providing its users with reasonable opportunity and expectation of success. Sockeye runs have shown a declining trend since approximately 2016, with historically weak runs in 2018 and 2020. Federal sockeye harvest in 2020 has been estimated at 16,144, only 72% of the five-year average and 77% of the ten-year average. Unfortunately, no quantitative data have yet been collected specifically on the question of federal fishers' abilities to meet their needs.

The project will address the following 2022 priority information needs (PINs) for Southcentral Alaska:

- Develop, test, and implement methodologies for monitoring escapement and/or mortality of Sockeye Salmon in the Copper River drainage and delta systems, including assessment of predation (for example by seals, bears, and eels/lampreys).

- In-season estimates of salmon harvest in the Copper River drainage through a harvest reporting/collection system.

Objectives:

1. Obtain a sample of participating fish-wheel users in different sections of the Glennallen subdistrict to produce an index of effort each week during the fishing season.

2. Evaluate harvest levels by participating fish-wheel users and determine whether or not this method can be meaningfully expanded to the fish-wheel fleet as a whole.

3. Evaluate the extent to which federally qualified users' subsistence needs are being met.

4. Collect qualitative data on factors that may influence fishing effort and harvest rates among participating fish-wheel users in the Glennallen subdistrict

Methods: At the beginning of each season, researchers will recruit approximately 10 fish-wheel users, predominantly from the federal fishery, along each of three reaches of the Glennallen subdistrict. These participants will be asked to record the times their fish-wheels are running, and the number of fish of each species they caught each day. Researchers will contact respondents each week to obtain data, using these to calculate CPUE, an index of harvest over the time a given unit of gear is actively fishing. Once post-season harvest data become available the spring following each fishing season, researchers will determine whether CPUE data from this can be expanded to produce a comparable harvest estimate.

Every two weeks, project staff will survey participating fish-wheel users to ascertain their progress toward meeting their harvest goals for the year. These surveys will also ask participants to report, and rank, the most significant factors influencing their harvest during each period. A short follow-up survey, administered to each participant after the end of the season, will primarily focus on determining the extent to which participants were able to meet their goals and needs that season. After these data have been analyzed, we will conduct 3 – 5 ethnographic interviews with knowledgeable key respondents to help contextualize and interpret these data, and to identify any potential gaps or areas for misinterpretation.

Partnerships and Capacity Building: This project has the potential to meaningfully engage Ahtna tribal members and other Copper Basin residents in fisheries research, contributing to increased local awareness of science and management. Conversely, its ethnographic component will contribute toward providing scientists and managers with harvest monitoring traditional ecological knowledge. Concerns that AITRC has heard from tribal members—centered on the sustainability of subsistence resources and tribal members' continued ability to meet their subsistence needs—has informed the development of this investigation plan. For this reason, recruitment of project participants will prioritize tribal members and other people from communities with a customary and traditional connection to Copper River salmon. By recruiting local fishers to collect biological and sociological data, this project invites them to engage in citizen science.

AITRC will present project results and lessons learned to regional advisory councils (EIRAC and SCRAC), and the communities in the local area each winter to share project results, observations, challenges, and recommendations. We will invite representatives from Ahtna tribal councils, and other Copper Basin communities to join this conversation. We hope these conversations will increase in value as the project matures, ultimately contributing to improved Copper River Fisheries Management.

Technical Review Committee Evaluation: This pilot project will develop and implement inseason harvest monitoring of Sockeye and Chinook Salmon catch by fish wheel in the Glennallen subdistrict. Harvest goals, catch, and catch per unit effort will be assessed, with the goal of understanding whether results can be extrapolated to the entire Glenallen fish wheel fleet. Salmon comprise a majority of the annual wild food harvest in most communities along the Copper River drainage. The proposed study seeks to address the 2022 priority information needs. Fish wheel operators are already required to record their harvest in order to report post-season, so the primary additional recording introduced by this project is documentation of fish wheel run time. The sampling strategy for this project would be purposive, which is not ideally suited for expanding the fish caught by those fishers included in the study to the wider fleet and for estimating total inseason harvest.

A project based on harvest monitoring by Federally qualified subsistence users in the Glenallen Subdistrict will inevitably leave out non-Federally qualified user harvest, but a fuller partnership with Alaska Department of Fish and Game and Wrangell-St. Elias National Park could contribute towards this pilot harvest monitoring project resulting in more useable data. With only a portion of the harvest represented, it is inevitable that the investigator's estimate will be lower than post-season reports, but there will be no way to assess the reasons for this gap. Distinctions regarding catch by gear type are not routinely captured in Federal subsistence fishery data, so unless changes are made in the Federal permit reporting system, there will be no way to compare catch by fish wheel calculated by this project in the Glenallen subdistrict with catch by fish wheel in post-season surveys.

SOUTHEAST ALASKA REGION

Priority Information Needs

The 2022 Notice of Funding Opportunity for the Southeast Alaska Region identified the following nine priority information needs:

- Reliable estimates of Sockeye Salmon escapement and in-season harvest and estimates of stream discharge in the following systems: Kanalku, Klawock, Hetta, Falls Lake, Sarkar, Kook, Neva, Karta, Hatchery, Eek, Kah Sheets, Klag, Gut, Kutlaku, Salmon Bay, Sitkoh, Hoktaheen, Alecks Creek, Lake Eva, and Lake Leo.
- Escapement indexes for Eulachon at the Unuk River and Yakutat Forelands.
- Population assessment for Eulachon for northern Southeast Alaska.
- Traditional ecological knowledge of how each community distributes harvest between Sockeye Salmon systems available to them.
- Reliable estimates of salmon populations and harvests in the sport and subsistence fisheries at Kah Sheets and Alecks Creek.
- Ethnographic study of the Yakutat subsistence salmon fishery.
- Reliable estimates of subsistence Sockeye Salmon harvest in the Klawock River drainage.
- Develop escapement goals for Sockeye Salmon systems with long term escapement data sets.
- Update community household fish harvest surveys.

Proposals Submitted for the Southeast Alaska Region

15 proposals were submitted for funding in the Southeast Alaska Region.

Table 6. Projects submitted for the Southeast Alaska Region 2022 Monitoring Program, including total funds requested and average annual funding requests.

Project	Title	Total Request	Avg. Annual
22-600	Yakutat Eulachon at the Landscape and Local Scale	$117,780	$29,445
22-601	Stikine River Inseason Subsistence Salmon Harvest	$178,311	$44,577
22-602	Falls Lake Sockeye Salmon Stock and Subsistence Harvest Assessment	$583,232	$145,808
22-603	Gut Bay Sockeye Salmon Stock and Subsistence Harvest Assessment	$589,997	$147,499

Project	Title	Total Request	Avg. Annual
22-604	Hetta Lake Sockeye Salmon Stock Assessment	$641,518	$160,379
22-605	Eva Lake Sockeye Salmon and Subsistence Harvest Assessment	$609,971	$152,492
22-607	Neva Lake Sockeye Salmon Stock Assessment	$487,401	$121,850
22-608	Kanalku Lake Sockeye Salmon Stock Assessment	$195,047	$48,761
22-609	Sitkoh Lake Sockeye Salmon Stock Assessment	$362,742	$90,685
22-610	Klag Lake Sockeye Salmon Stock Assessment	$758,511	$189,627
22-611	Sockeye Salmon Quantitative DNA (eDNA) Stock Monitoring	$216,959	$54,239
22-612	Northern Southeast Alaska Eulachon Population Dynamics Monitoring	$840,523	$210,130
22-613	Unuk River Eulachon Population Assessment	$185,356	$46,339
22-650	Updating Icy Straight Community Household Subsistence Harvest Surveys and Documenting Subsistence Harvest Patterns	$377,961	$125,987
22-651	Estimating Inseason Harvests of Klawock River Salmon Subsistence Fishery	$177,667	$44,416
	Total	**$6,322,976**	**$1,580,737**

In addition to the above proposed projects, the following project is currently being funded by the Monitoring Program in the Southeast Alaska Region:

- 20-600 Eek/Kasook Lakes Sub. Sockeye Salmon Stock Assessment

Regional Advisory Council Comments

Southeast Alaska Subsistence Regional Advisory Council

The Council was limited on time and opted to skip this item on their agenda.

Interagency Staff Committee Comments

The Interagency Staff Committee supports the Technical Review Committee's assessment of the 2022 Southeast Region proposals and recommends the projects be funded in the order of rank. The proposed projects recommended for funding address a significant portion of the priority information needs for the region.

Executive Summaries and Technical Review Committee Evaluations

The investigators' executive summaries of their investigation plans are provided below. All executive summaries reflect what was submitted to the Technical Review Committee for review, with only minor formatting changes completed by the Office of Subsistence Management to ensure readability and accessibility. The executive summaries include synopses of the issue addressed, the objectives, the methods, and the partnership/capacity building. Following each executive summary is the Technical Review Committee's evaluation of the investigation plan. The Technical Review Committee assessed investigation plans based on the set criteria: strategic priority, technical and scientific merit, investigator ability and resources, partnership and capacity building, and cost/benefit.

Project Number: 22-600
Project Title: Yakutat Eulachon at the landscape and local scale

Issue Addressed: Eulachon (*Thaelicthys pacificus),* an anadromous smelt, are an important subsistence resource for rural residents of the southeast Alaska. Many Eulachon stocks in the southern part of their range have declined significantly. Some stocks in southeast Alaska have exhibited this trend in recent years.

Historically, little was documented about Eulachon along the Yakutat Forelands. More recently, however, a 2010-2013 Fisheries Resource Monitoring Program (FRMP) funded study (10-603) documented baseline information on the consistency, timing, and relative abundance of spawning along major river systems on the Yakutat Forelands, indicating the significance of the Forelands as Eulachon spawning habitat. Observations from local subsistence users indicate a potential decline in recent years.

Goal and Objectives: The goal of this project is to provide updated baseline stock assessment for Eulachon on the Yakutat Forelands. This project will improve our understanding of the status of these stocks in order to maximize subsistence opportunity for Federally qualified subsistence users in Yakutat, as well as build fisheries monitoring and management capacity at the Yakutat Tlingit Tribe (YTT). This goal will be achieved through the following objectives:

Objective 1: Compare the current status of Eulachon stocks on the Yakutat Forelands to observations compiled during a previous survey effort (2010-2013).

Objective 2: Verify aerial presence/absence observations with on the ground sampling.

Objective 3: Document Eulachon abundance in the lower Situk River.

Objective 4: Evaluate Environmental DNA (eDNA) sampling as a method to quantify Eulachon abundance in the Situk-Ahrnklin System.

Objective 5: Document harvest and harvest methods and compile local Eulachon observations.

Partnerships and Capacity Building: Developing conservation concerns about local salmon stocks have highlighted the need for building fisheries monitoring and management capacity at the Yakutat

Tlingit Tribe (YTT). This effort began in 2020 with the recruitment of a Tribal fisheries biologist under the USFWS Partners in Fisheries Monitoring grant

In addition to collecting important information about a significant set of Eulachon stocks, this project will give Tribal personnel hands-on exposure to variety of fisheries techniques: aerial survey, float survey, beach seining, harvest interviews, and eDNA sampling. This experience will build capacity for YTT to design additional monitoring projects and better evaluate agency studies and management decisions. Developing indigenous management capacity will help the community remain resilient in the face of challenges like climate change and shifting agency initiatives or personnel.

Anticipated Outcomes: This project will build on information collected during the previous FRMP funded project to provide updated baseline stock assessment information for the Yakutat Forelands. The project will compare the status of Eulachon stocks across the Forelands to the previous study and gather information about Eulachon abundance and harvest in the Situk River subsistence fishery. This information is needed to better understand the status of these stocks to maximize subsistence opportunity for Federally qualified subsistence users in Yakutat.

The funding request in this proposal represents a framework on which additional projects can be built. The eDNA methods described here will be coordinated with ongoing and planned studies by the Chilkoot Indian Association. The long-term goal is not only to evaluate local eulachon stocks, but to build regional capacity to monitor eulachon using repeatable quantitative methods.

Technical Review Committee Evaluation: This project addresses the Council's priority information need identified in the 2022 Notice of Funding Opportunity. Investigators will assess Eulachon stocks occurring in the Yakutat Forelands using a variety of methods including aerial, foot, and float surveys, and eDNA sampling. This project will incorporate an eDNA component that may allow investigators to relate eDNA of Eulachon to visual abundance estimates obtained through float surveys in the Situk River, the main Eulachon fishery for Federally qualified subsistence users of the Yakutat community. This project will provide updated baseline Eulachon stock assessment information for the Yakutat Forelands.

Assessment of the species in the Yakutat Forelands is both timely and important. On March 18, 2010 the southern distinct population segment of Eulachon was listed as threatened under the U.S Endangered Species Act. Given observed trends in Eulachon declines elsewhere in Alaska, this work has wide geographic management implications. The methods proposed for completion of the stated objectives use proven science and logistics. The co-investigator includes the Tribal organization in the community that traditionally uses Eulachon. The project builds capacity within the Yakutat Tlingit Tribe with the expectation that fieldwork will transition to the Tribal organization, with the U.S. Forest Service retaining project oversight, aerial surveys, and reporting responsibilities. This project would continue and enhance the meaningful role that local residents play in management of local Monitoring Fund projects. The costs of the project are realistic and in line with similar projects in the area.

Project Number: 22-601
Project Title: Stikine River Inseason Subsistence Salmon Harvest

Issue Addressed: The Stikine River Federal subsistence fishery provides an important source of salmon for the residents of Petersburg and Wrangell. The Federal subsistence Sockeye Salmon fishery was established in 2004 with an average annual harvest of 1,226 fish. All U.S. fisheries share an allowable catch dictated by the U.S.-Canada Pacific Salmon Treaty and the Transboundary River Panel. However, Stikine River Sockeye Salmon escapement and harvest has been decreasing since a peak in 2016. Recent low returns of Chinook and Sockeye Salmon have resulted in pre-season and in-season closures, respectively. Standardized in-season harvest monitoring is necessary to inform State and Federal fisheries management. Without standardized estimates of harvest and effort, managers will be forced to manage the fishery more conservatively, which could result in lost harvest opportunity for users.

Objectives:

1. Conduct weekly on-site subsistence fishery surveys recording number and location of active fishing nets and, when present, collecting harvest and fishing effort data from harvesters;

2. Sample 10 percent of participating households through phone surveys during each week of the Chinook and Sockeye Salmon fishery recording current harvest, effort, and qualitative assessments of their progress toward achieving their annual subsistence needs for salmon;

3. Test the efficacy of in-season harvest and fishing effort monitoring by comparing cumulative weekly estimated harvest to the post season total harvest reported on subsistence salmon permits;

4. Build capacity of Wrangell Cooperative Association to participate in fisheries management.

Methods:

Objective 1: Weekly estimates of salmon harvest and effort will be calculated using net count surveys and harvester interviews. During the salmon season, the crew will conduct weekly net counting surveys and conduct harvest and effort surveys opportunistically when harvesters are present on the river. Surveys will consist of an interview instrument designed to collect both quantitative data (e.g. total harvest, trip harvest, hours fished during trip) and qualitative data (e.g. perceived effort, quality of fish, access to fish). The quantitative section of the survey will be used to determine Catch Per Unit Effort (CPUE). The CPUE calculation along with the net count survey will provide an estimate of harvest, an index of effort, and information about run timing.

In addition to collecting information from harvesters, surveyors will use the opportunity to share relevant information from State and Federal fishery managers. Surveyors will carry the lasted news releases and be informed of the latest run estimates, forecasts, and harvest reports. A priority of the project is to promote two-way information sharing and allow harvesters an opportunity to easily voice concerns or questions throughout the season.

Objective 2: Phone surveys will use the same survey instrument as the on-site harvester interviews. Consent will be obtained prior to conducting an interview and an updated list of consenting harvesters will be maintained. Names will not be recorded as part of any survey. The contact list will be randomized

by permit number to avoid contacting the same harvesters every time. Key respondents may volunteer to be contacted regularly for updated environmental and fishy conditions.

Objective 3: Effort and CPUE will be sampled each week and expanded to estimate weekly harvest. At the end of the season the sum of weekly harvest estimates will be used as an estimate of total harvest and compared to the total post season harvest reported on permits. The accuracy of harvest estimates is unknown and may simply be useful as an index if the accuracy is poor. Estimates of effort and CPUE are important in informing in-season management action and validating ADF&G run estimates.

Objective 4: Through the funding of this project WCA will purchase equipment such as a jet boat, safety gear, and handheld tablets that will allow them to further develop independent capability. Wrangell Cooperative Association will hire local personnel to participate in the survey program. New surveyors will receive boat training specific to the Stikine River, 1st Aid and CPR training, and will be encouraged to participate in available USFS safety trainings. The WCA staff will receive training from the USFS staff on the Esri ® (ArcGIS Online®, Collector®, and Survey123®) and Microsoft® suite of software for use during data collection and reduction. The WCA will develop general and project specific trainings over the funding period of the project. Training and equipment associated with this project will build the institutional knowledge and the capacity of WCA to develop an independent environmental program.

Partnerships and Capacity Building: This proposal was developed in partnership between the USFS and WCA with consultation from ADF&G. A primary objective of the project is to build the capacity of WCA to participate in in-season fisheries management. Currently, WCA lacks the capacity to fully implement a fishery monitoring project due to a lack of equipment and trained fisheries personnel. Through a partnership with the USFS and funding associated with this project, WCA will receive the equipment, training, and experience necessary to conduct fisheries monitoring and develop an autonomous environmental program.

Technical Review Committee Evaluation: This project does not address a priority information need identified in the 2022 Notice of Funding Opportunity but does provide some justification for the need for this research. Salmon subsistence harvests within the Alaska portion of the Stikine River drainage primarily occurs within the Tongass National Forest. The Federal nexus is clear. Aspects of the Project Design could be more clearly stated. The project represents a partnership between the U.S. Forest Service and Wrangell Cooperative Association. The addition of social science expertise and methodology and more commitment to training and oversight of field staff would strengthen the project. The budget is reasonable for the work planned. One letter of support was provided.

Project Number: 22-602
Project Title: Falls Lake Subsistence Sockeye Salmon Stock and Harvest Assessment

Issue Addressed: Sockeye Salmon (*gaat, Oncorhynchus nerka*) returning to Falls Lake are heavily utilized by residents of Kake, Alaska in a subsistence fishery occurring as early as mid-June and lasting through mid-August. In the years 2001-2020 an average of 4,144 (SD = 2,353; range = 1,053 - 10,307) Sockeye Salmon returned to the marine terminal area. Exploitation rate is highly variable and, in some

years, up to 70% of the terminal run has been harvested. The average exploitation rate for 2001-2020 was 33% (SD = 16%; range = 14 - 70%). Subsistence harvest has declined substantially from its peak in the early 2000s. Annual stock assessments are essential due to the high variability of annual terminal abundance coupled with the potential for a high exploitation. It should be noted that 2020 was the lowest terminal run on record for Falls Lake, demonstrating the need for continued monitoring. In-season data generated by the project supports management decisions to conserve the population and maximize subsistence harvest opportunities. Without an assessment of Sockeye Salmon abundance and subsistence harvest, managers would be forced to manage the fishery more conservatively (e.g., lower harvest limits and a shorter season), which could result in lost harvest opportunity for users.

Objectives:

1. Estimate the escapement of Sockeye Salmon into Falls Lake with a coefficient of variation less than 15%.

2. Estimate the age, sex and length distribution of Sockeye in the Falls Lake escapement with a coefficient of variation less than 10%.

3. Estimate the subsistence harvest of Sockeye Salmon in the marine area around Falls Lake Creek with a coefficient of variation less than 15%.

4. Collect daily stream temperature data and estimate daily stream discharge at Falls Lake according to standard USGS protocols.

Methods: Objective 1: The abundance of Sockeye Salmon entering the lake will be estimated by standard mark-recapture methods. A fish trap will be constructed just above the Falls Lake fish ladder to capture a sample of the population migrating into Falls Lake. All fish in the trap will be marked with an adipose fin clip and will be released immediately below a net weir equipped with an underwater video chute. The motion detected video footage will be used to sample Sockeye Salmon for marks as part of a mark recapture estimate.

Objective 2: Standard methods will be used to collect age, sex, and length data. A subset of Sockeye Salmon in the trap will have three scales removed and sent to the Alaska Department of Fish and Game Mark, Tag, and Aging Laboratory in Douglas, AK. Length will be measured from mid-eye to tail fork and sex determined by standard morphological characteristics.

Objective 3: Harvesters observed in the marine terminal area will be interviewed using a standard single-staged sampling design. All interviews will be confidential, and harvest and effort data will be stratified by gear type.

Objective 4: Stream temperature and discharge data will be collected by following standard US Geological Survey protocols. Data loggers will collect temperature and water level data every thirty minutes. Streamflow estimates will follow the Midsection Method, with weir personnel using a flow meter, wading rod, and stream tape to estimate flow at many points across the stream.

Partnerships and Capacity Building: The USFS staff will provide general project oversight, sample design and analysis, reporting, budget management, and proposal development. The OVK staff will provide input on community issues, natural resource issues, and future direction of the project, employ field technicians, and manage a budget for personnel, supplies, and logistical support (e.g., transportation). The partnership between OVK and the USFS has led to the ongoing success of other Sockeye Salmon monitoring projects in the area. OVK staff will gain skills and knowledge that can be used in combination with Traditional Ecological Knowledge to help OVK manage its traditional resources.

Technical Review Committee Evaluation: This project addresses the Council's priority information need identified in the 2022 Notice of Funding Opportunity. The project proposes to collect Sockeye Salmon age, sex, and length data, estimate the subsistence harvest of Sockeye Salmon from the system, and use mark-recapture with a video net weir to estimate the escapement into Falls Lake. Falls Lake is the primary Sockeye Salmon stock used by residents of Kake. In previous years of the study, investigators found that returns to the terminal area are highly variable, and that a substantial portion of the run can be harvested in the subsistence fishery. The methods proposed have been used successfully on this project for several years, and the investigators have a track record of successfully meeting the project's objectives. The mark-recapture component would provide for validated weir counts and scale sample sizes should provide enough samples to meet precision goals. Harvest monitoring will provide a much better estimate of harvest than permit data. The investigators include the Tribal organization in the community that traditionally uses Falls Lake Sockeye Salmon, and the project would continue and enhance the meaningful role that local residents play in management of local Monitoring Program projects. The costs of the project are realistic and in line with similar projects in the area.

Project Number: 22-603
Project Title: Gut Bay Subsistence Sockeye Salmon Stock and Harvest Assessment

Issue Addressed: Sockeye Salmon is one of the most important traditional foods for the community of Kake. Gut Bay is currently one of three primary systems used for subsistence harvest of Sockeye Salmon (*gaat*, *Oncorhynchus nerka*) by residents of Kake. Sockeye escapement, biological structure, and harvest intensity at Gut Bay are not well understood. Permits returned to the Alaska Department of Fish and Game show that the number of Sockeye harvested at Gut Bay can vary by an order of magnitude. Escapement estimates are needed to ensure sustainable management of Gut Bay Sockeye Salmon. Previous studies were unsuccessful at using beach seine surveys on the spawning grounds to estimate escapement into Gut Bay Lake and ultimately recommended that a weir project be implemented to address concerns about annual harvest and the methods used to harvest Sockeye. Reliable escapement and in-season subsistence harvest estimates at Gut Bay were identified as Priority Information Needs by the Fisheries Resources Monitoring Program (FRMP), Southeast Region. Escapement and harvest data will allow managers to better conserve the population and maximize subsistence harvest.

Objectives:

1. Estimate the escapement of Sockeye Salmon into Gut Bay with a coefficient of variation less than 15%.

2. Estimate the age, sex and length distribution of Sockeye in the Gut Bay escapement with a coefficient of variation less than 10%.

3. Estimate the subsistence harvest of Sockeye Salmon in the marine area around Gut Bay with a coefficient of variation less than 15%.

4. Collect daily stream temperature data and estimate daily stream discharge at Gut Bay according to standard USGS protocols.

Methods: Objective 1: A rigid picket weir will be installed above the high tide line. Salmon will be identified to species and enumerated. The weir count will be validated by standard mark-recapture methods. A net weir equipped with an underwater video chute will be installed upstream of the picket weir. The motion detected video footage will be used to sample Sockeye Salmon for marks.

Objective 2: Standard methods will be used to collect age, sex, and length data. A subset of Sockeye Salmon in the trap will have three scales removed and sent to the Alaska Department of Fish and Game Mark, Tag, and Aging Laboratory in Douglas, AK. Length will be measured from mid-eye to tail fork and sex determined by standard morphological characteristics.

Objective 3: Harvesters observed in the marine terminal area will be interviewed using a standard single-staged sampling design. All interviews will be confidential, and harvest and effort data will be stratified by gear type.

Objective 4: Stream temperature and discharge data will be collected by following standard US Geological Survey protocols. Data loggers will collect temperature and water level data every thirty minutes. Streamflow estimates will follow the Midsection Method, with weir personnel using a flow meter, wading rod, and stream tape to estimate flow at many points across the stream.

Partnerships and Capacity Building: The USFS staff will provide general project oversight, sample design and analysis, reporting, budget management, and proposal development. The OVK staff will provide input on community issues, natural resource issues, and future direction of the project, employ field technicians, and manage a budget for personnel, supplies, and logistical support (e.g., transportation). The partnership between OVK and the USFS has led to the ongoing success of other Sockeye Salmon monitoring projects in the area. OVK staff will gain skills and knowledge that can be used in combination with Traditional Ecological Knowledge to help OVK manage its traditional resources.

Technical Review Committee Evaluation: This project addresses the Council's priority information need identified in the 2022 Notice of Funding Opportunity. The project proposes to collect baseline information on run timing, strength, and stock characteristics of Sockeye Salmon returns to Gut Bay, in the Southern Baranof Wilderness Area of Baranof Island. The project's objectives are clear, measurable, and achievable. Two weirs and mark-recapture techniques will be used in this project design. The methodology will provide a minimum escapement number from video counts, which may be validated by the mark-recapture estimate. Subsistence harvest will be estimated using an onsite interview survey of

subsistence fishers. Stream temperature and discharge will be determined following standard protocols. The investigators include the local village organization, and the project would continue and enhance the meaningful role that local residents play in management of local Monitoring Program projects. The project costs are realistic and commensurate with similar projects in the region.

Project Number: 22-604
Project Title: Hetta Lake Subsistence Sockeye Salmon Stock Assessment Project

Issue Addressed: The Hydaburg Cooperative Association (HCA) is proposing to continue work on documenting subsistence harvest of sockeye salmon in traditionally and culturally important sockeye systems in their traditional territory, as well as continue to estimate escapement of sockeye salmon into their number one important subsistence systems, Hetta Lakee. This information will continue to allow HCA and resource management agencies to monitor sockeye salmon returns in order to make in-season management decision for subsistence harvest and commercial fisheries. In addition, data will be used in the long-term management of sockeye salmon in order to continue to provide for a subsistence priority for federally qualified subsistence users.

Objectives:

1) Census the sockeye salmon harvest by subsistence fishers in the terminal areas of Hetta, Eek, Kasook, and Hunter Bay using completed-trip interviews of all fishers on the fishing grounds or immediately upon returning to Hydaburg from the fishing grounds.

2) Count the number of sockeye salmon and other salmon species returning to Hetta Lake through a bipod weir.

3) Estimate the age composition of the sockeye salmon escapement so that the coefficient of variation is 10% or less for the two major age classes and describe the size distribution of each age class by sex.

Methods: Each year, crew members and the project manager will monitor the subsistence grounds and interview all fishers once their harvest for the day is complete. Information collected during each interview will include date, area fished, interview location, time of interview, gear used, number of hours fished, number of net sets, catch by species, and comments.

A channel spanning bipod weir will be constructed on the outlet stream of Hetta Lake, with a trap constructed to capture fish migrating upstream to spawn. The weir will operate from June through September of each year, and all fish crossing the weir will be identified and counted. Approximately 600 fish will be sampled for age, sex and length data. Fish will be measured and sexed on site. Scales will be removed and sent to ADFG to be read to determine age. Data will be analyzed to estimate the spawning population of sockeye. Weekly in-season reports of harvest and weir counts will be shared with state and federal agencies. Annual reports will be produced after each field season, and a final report including all four seasons will be produced at the end of the project.

Partnerships and Capacity Building: Since 2001, HCA has worked with Alaska Department of Fish and Game and the U.S. Forest Service to build capacity on Fisheries Resource Monitoring Program projects with a goal of becoming the principal investigator. In 2010, HCA became the principal investigator for the Hetta Lake Subsistence Sockeye Salmon Stock Assessment Project and in 2015 began stock assessment work at Eek Lake as a principal investigator. ADFG will continue to offer scale reading services to the project and remain involved through permitting of the project, as well as using in-season data for managing a commercial fishery for all of Cordova Bay. The HCA also continues to work with and build trust with Hydaburg residents, and others on Prince of Wales Island, through education and outreach and asking for continued support for in-season management decision on sockeye salmon harvest.

Technical Review Committee Evaluation: This project addresses the Council's priority information need identified in the 2022 Notice of Funding Opportunity. This project proposes to continue assessment of Sockeye Salmon returns to Hetta Lake on Prince of Wales Island. Sockeye Salmon escapement and harvest data collected from Hetta Lake has been useful in documenting trends and aiding in-season management. The investigation plan for this project has not changed substantially from past Monitoring Program funding cycles and aside from a few suggestions, the objectives and methods are clear measurable, and achievable. The investigators have a good record of satisfactorily completing multiple Monitoring Program projects and timely completion of deliverables and products. The project would continue and enhance the meaningful role that Hydaburg residents play in management of local Monitoring Program projects. The principal investigator is a local Alaska Native resident of Hydaburg and is the acting tribal administrator for the Hydaburg Cooperative Association. He is responsible for overseeing the entire project with technical assistance from the co-investigator. Local residents will be hired to run the field portion of the project. Technical capacity will be built through training local residents while sampling capacity will be built through project equipment purchases, replacement and upkeep. The budget is above average for similar projects in Southeast Alaska but reasonable considering the work to be completed and products delivered. Letters of support from the Organized Village of Kasaan, Alaska Department of Fish and Game, and the U.S. Forest Service are included for this project.

Project Number: 22-605
Project Title: Lake Eva Subsistence Sockeye Salmon Stock and Harvest Assessment

Issue Addressed: Lake Eva is located on northeast Baranof Island, approximately 32 km from the community of Angoon. Sockeye Salmon have long been a highly prized and key resource for Tlingit people in Southeast Alaska. Traditional Ecological Knowledge and archeological findings at a *Teikweidí* settlement suggest that Lake Eva has been an important Sockeye Salmon (*gaat*, *Oncorhynchus nerka)* and berry harvest site for over five thousand years. Kanalku Lake, Angoon's primary subsistence Sockeye Salmon site, has seen severe declines in abundance, forcing the community to harvest from other systems. Residents of both Angoon and Sitka have dramatically increased their harvest of Lake Eva Sockeye Salmon since 2017 and little is known about the population's abundance, run timing, or structure, warranting a monitoring project to ensure the population is sustainably harvested.

Objectives:

1. Estimate the escapement of Sockeye Salmon into Lake Eva with a coefficient of variation less than 15%.

2. Estimate the age, sex and length distribution of Sockeye in the Lake Eva escapement with a coefficient of variation less than 10%.

3. Estimate the subsistence harvest of Sockeye Salmon in the marine area around Lake Eva with a coefficient of variation less than 15%.

4. Collect daily stream temperature data and estimate daily stream discharge at Lake Eva according to standard USGS protocols.

Methods: Objective 1: A rigid picket weir will be installed approximately halfway between the lake outlet and salt water. Salmon will be identified to species and enumerated. The Sockeye Salmon weir count will be validated by standard mark-recapture methods. Sockeye Salmon staging in the lake near the spawning stream will be captured by beach seine and sampled for marks. All Sockeye Salmon captured in a beach seine will be given a secondary mark to sample without replacement.

Objective 2: Standard methods will be used to collect age, sex, and length data. A subset of Sockeye Salmon in the trap will have three scales removed and sent to the Alaska Department of Fish and Game Mark, Tag, and Aging Laboratory in Douglas, AK. Length will be measured from mid-eye to tail fork and sex determined by examining morphological characteristics.

Objective 3: Harvesters observed in the marine terminal area will be interviewed using a standard single-staged sampling design. All interviews will be confidential, and harvest and effort data will be stratified by gear type.

Objective 4: Stream temperature and discharge data will be collected following standard US Geological Survey protocols. Data loggers will collect temperature and water level data every thirty minutes. Streamflow estimates will follow the Midsection Method, with weir personnel using a flow meter, wading rod, and stream tape to estimate flow at many points across the stream.

Partnerships and Capacity Building: The USFS staff will provide general project oversight, sample design and analysis, reporting, budget management, and proposal development. The ACA staff will provide input on community issues, natural resource issues, and future direction of the project, employ field technicians, and manage a budget for personnel, supplies, and logistical support (e.g., transportation). The partnership between ACA and the USFS has led to the ongoing success of other Sockeye Salmon monitoring projects in the area. ACA staff will gain skills and knowledge that can be used in combination with Traditional Ecological Knowledge to help ACA manage its traditional resources.

Technical Review Committee Evaluation: This project addresses the Council's priority information need identified in the 2022 Notice of Funding Opportunity. This project proposes to use a mark-recapture study and a picket weir to estimate the escapement of Sockeye Salmon into Lake Eva, collect age-sex-length data, estimate stream discharge, and estimate the subsistence harvest of Sockeye Salmon from the system. This is a primary stock used by residents of Angoon, and it is also by non-rural residents of Sitka and Juneau. There is no history of Monitoring Program funded projects occurring at this location. The methods proposed have been used successfully with other Monitoring Program funded projects in Southeast Alaska, and the investigators have a track record of successfully meeting project objectives. The mark-recapture component would provide for a validated weir count but using swim-through redundant video weirs would likely be more fish-friendly without compromising data integrity. Throughout Year 1 of the project, investigators will reconnaissance the area to assess feasibility of installing a video net weir during all subsequent years of the funding cycle. The investigators include the local village organization, and the project continues to enhance the meaningful role that local residents play in management of local Monitoring Fund projects. The Angoon Community Association is a partner on this project.

Project Number: 22-607
Project Title: Neva Lake Sockeye Salmon Stock Assessment

Issue Addressed: This project addresses the priority information need for reliable estimates of Sockeye Salmon escapement and in-season harvest and estimates of stream discharge in a list of Southeast Alaska systems including Neva Lake. Sockeye Salmon returns to Neva Lake (**Error! Reference source not found.**) have long been an important subsistence resource for Tlingit families living in Excursion Inlet, Hoonah, and other areas of northern Southeast Alaska (de Laguna 1960; Schroeder and Kookesh 1990; Goldschmidt and Haas 1998; Ratner and Dizard 2005; Langdon 2006). The lake is the most convenient source of Sockeye Salmon for rural communities in Icy Strait, including Hoonah, Gustavus, and Excursion Inlet.

Neva Lake has also been the focus of recent management actions to protect the health of the stock. In 2016, the Alaska Department of Fish and Game reduced the annual Sockeye Salmon bag limit from 40 fish to 10 fish, in response to declining escapements. In 2019, the Federal Subsistence Board restricted the harvest of Sockeye Salmon in the Federal waters of Neva Lake, Neva Creek and South Creek to qualified rural residents (OSM 2019; 84 Fed. Reg. 39744-39754 [August 12, 2019]). Since then, the escapements to the lake have improved, while the reported subsistence harvest has declined. The escapement estimates obtained by this project will be critically important to State and Federal biologists evaluating the effectiveness of these actions, assuring the health of this resource, and maintaining the availability of Neva Lake Sockeye Salmon to local subsistence users.

Objectives:

1. Count (census) the annual escapement of adult and jack Sockeye Salmon into Neva Lake using video weirs.

2. Determine, with 90% certainty, if at least 90% of the Sockeye Salmon spawners in Neva Lake are freshwater age-1.

3. Measure and record the temperature and discharge of Neva Creek during the Sockeye Salmon spawning migration.

Project Activities and Methods:

Escapement Count. This proposal is to continue operation of remotely monitored video weirs at the outlet of Neva Lake. Video from the weirs will be transmitted to a recording station in Excursion Inlet, where project personnel will use a computer with Blue Iris surveillance software to count Sockeye Salmon and other species entering the lake as we have since 2016.

Video from the underwater cameras will be transmitted to a remote recording station in a crew cabin in Excursion Inlet. In the cabin, a computer running Blue Iris surveillance software records motion-triggered video clips which can be reviewed by the crew to count fish passing through the weirs. A high-speed wireless connection between Excursion Inlet and Hoonah connects the monitoring network to the internet. Each morning, project personnel will review the motion-triggered video files to count the escapement of Sockeye Salmon into the lake.

Age, Sex, and Length Sampling. A seasonal goal of 60 to 120 adult Sockeye Salmon will be captured in the Neva system using beach seine or dip net gear, sampled for age (scales), sex, and length (ASL) data, and released. A sample of 60 fish will allow us to determine, with 90% certainty, if at least 90% of the fish are ≤ freshwater age-1. The freshwater ages can be used to determine if there are any appreciable numbers of fish ≥ freshwater age-2, which might indicate if and when parent year escapements are high enough to fill (or exceed) the lake's rearing capacity.

Temperature and discharge. A permanent stream gage station will be established downstream of the lake outlet. As often as practical, we will measure the stage and stream discharge at the gage station, so that we can establish a stage-discharge curve for the stream. We will also install a Hobo U-20 water level and temperature logger at the station, which will record continuously throughout the year.

Partnerships and Capacity Building: The Hoonah Indian Association, ADF&G, and Forest Service began cooperating on Fisheries Resource Monitoring Program, Stock Status and Trend, projects at Neva Lake in 2002. Field personnel are all hired and employed by HIA and HIA has successfully filled these positions with local hires. HIA employees will participate in USFS safety training and have on-the-job training in how to sample fish and how to operate video weir, computer, networking, and solar power systems.

Technical Review Committee Evaluation: This project addresses the Council's priority information need identified in the 2022 Notice of Funding Opportunity. The Neva Lake Sockeye Salmon stock assessment is a cooperative project between the U.S. Forest Service and the Hoonah Indian Association which has been funded through the Monitoring Program since 2002. The community of Hoonah is a co-investigator and has direct dependence on Neva Lake for their subsistence Sockeye Salmon needs.

Information from the first few years of the project led to higher subsistence harvest limits. Subsequent information generated by the project led to harvest limits being lowered in response to decreasing annual escapements coupled with increasing subsistence effort. This project would provide additional annual escapement counts and biological information about the population that is useful for management of the fishery. The objectives are clear, measurable, and achievable and the investigators have a proven ability to complete Monitoring Program projects on time with satisfactory deliverables. The Hoonah Indian Association would continue and enhance their meaningful role in accomplishing the objectives of this project and several local fisheries technicians would be employed.

Project Number: 22-608
Project Title: Kanalku Lake Sockeye Salmon Stock Assessment

Issue Addressed: This project addresses the priority information need for reliable estimates of Sockeye Salmon escapement and in-season harvest and estimates of stream discharge in a list of Southeast Alaska systems including Kanalku Lake. Kanalku Lake is Angoon's preferred source for Sockeye Salmon and has a documented history of use dating back for at least 1,000 years. Kanalku' s accessibility and popularity have made it one of the most vulnerable and politically sensitive subsistence resources in Southeast Alaska.

Over the past few decades, the Sockeye Salmon run and subsistence fishery at Kanalku has been the focus of many management actions and political controversies. These include a voluntary closure of subsistence harvest; a request for extraterritorial Federal jurisdiction over local salmon fisheries; an effort by the Forest Service to improve fish passage by blasting a partial barrier falls; and multiple changes in bag and possession limits, to name a few. The importance of this stock to Angoon's food security and culture, its small size and susceptibility to harvest pressure, and the potential vulnerability to climate change make it a top priority for stock assessment and monitoring. Since the end of the most recent stock assessment project in 2017, the only indication of run strength at Kanalku has been the reported harvest on returned permits.

The proposed project will reinstate timely monitoring of Sockeye Salmon escapement to Kanalku Lake, providing managers the information needed to preserve the resource for the people of Angoon. It uses the most cost effective means possible, avoiding the expense and impact of a weir and staffed camp in a wilderness area.

Objectives:

1. Estimate the number of Sockeye Salmon spawning in Kanalku Lake, so the estimated coefficient of variation is less than 15%.

2. Determine, with 90% certainty, if at least 90% of the Sockeye Salmon spawners in Sitkoh Lake are ≤ freshwater age-1.

3. Measure and record the discharge and temperature of the Kanalku Lake outlet stream during the Sockeye Salmon spawning migration.

Project Activities and Methods:

Escapement count. The study design for the escapement estimate will adopt the methods used by Conitz and in their work in Kanalku Lake. These projects used standard mark-recapture techniques to estimate the spawning population in a defined study area multiple times over the course of the spawning season. These estimates were then used to estimate the total number of fish spawning in the lake over the entire season.

Each sampling event will consist of two days of sampling. On the first day, the crew will capture fish on the study area spawning grounds with a beach seine. All fish captured will be given a left opercular punch with a shape assigned to that sampling event. On the second day of sampling, the crew will repeat the beach seining, inspect each captured fish for marks, and mark them with a right opercular punch to indicate the fish has been sampled. A Petersen estimate for the day will be generated from the number of fish marked and the subsequent recaptures. Marks recovered from prior sampling events will be used to generate the super population estimate for the season.

Age, Sex, and Length Sampling. A seasonal goal of 60 to 120 adult Sockeye Salmon will be captured in the Kanalku system using beach seine or dip net gear, sampled for age (scales), sex, and length (ASL) data, and released. A sample of 60 fish will allow us to determine, with 90% certainty, if at least 90% of the fish are ≤ freshwater age-1. The freshwater ages can be used to determine if there are any appreciable numbers of fish ≥ freshwater age-2, which might indicate if and when parent year escapements are high enough to fill (or exceed) the lake's rearing capacity.

Temperature and discharge. A permanent stream gage station will be established downstream of the lake outlet. As often as practical, we will measure the stage and stream discharge at the gage station, so that we can establish a stage-discharge curve for the stream. We will also install a Hobo U-20 water level and temperature logger at the station, which will record continuously throughout the year.

Partnerships and Capacity Building: Field personnel are all hired and employed by ACA, which has successfully filled these positions with local hires. Projects funded by FRMP have provided employment opportunities in Angoon throughout the years of partnership. ACA employees participate in USFS safety training and have on-the-job training in how to sample fish and how to operate video weir, computer, networking, and solar power systems.

Technical Review Committee Evaluation: This project addresses the Council's priority information need identified in the 2022 Notice of Funding Opportunity. The project will reinstate monitoring of Kanalku Lake Sockeye Salmon, Angoon's preferred source for Sockeye Salmon. This project will use mark-recapture to estimate the escapement of Sockeye Salmon into Kanalku Lake; collect age, sex, length data; and estimate discharge and temperature of the Kanalku Lake outlet stream. The investigators include the local village organization, the Angoon Community Association, and the project would continue and

enhance the meaningful role that local residents play in management of local Monitoring Fund projects. The Angoon Community Association provided a letter of support for this project. The costs of the project are realistic.

Project Number: 22-609
Project Title: Sitkoh Lake Sockeye Salmon Stock Escapement

Issue Addressed: This project addresses the priority information need for reliable estimates of Sockeye Salmon escapement and in-season harvest and estimates of stream discharge in a list of Southeast Alaska systems including Sitkoh Lake. Sockeye Salmon runs to Sitkoh Lake have long been an important subsistence resource for residents of Angoon and other rural communities in northern Southeast Alaska. Stock assessment projects monitoring the escapement of Sockeye Salmon to Sitkoh Lake have occurred since the 1990s. Between 2000 and 2010, escapements to Sitkoh Lake were typically 8,000 – 12,000 fish but have declined steeply since then. From 2017 through 2019, 2,000 fish or fewer were estimated to be spawning in the lake. The most recent estimate of almost 10,000 fish in 2020 shows promise of a rebound from the past few years.

The recent years with low escapements coincided with dryer than normal summers and low streamflow, which appeared to hamper the spawning migration for Sockeye Salmon. A better understanding of the relationship between stream discharge and fish passage during the spawning migration will be crucial to successful management, especially in the face of ongoing climate change.

This project is important to assure that escapements are adequate to provide sustainable subsistence opportunity and to assess consequences of management actions related to both fishing and land use activities. This monitoring project should continue given the intensity of commercial and subsistence fishing on this stock, the importance of this subsistence resource to the community of Angoon, and the cost effectiveness of this project.

Objectives:

1. Count (census) the daily and annual escapement of Sockeye Salmon into Sitkoh Lake using a remotely monitored video weir.

2. Determine, with 90% certainty, if at least 90% of the Sockeye Salmon spawners in Sitkoh Lake are ≤ freshwater age-1.

3. Measure and record the temperature and discharge of Sitkoh Lake Creek during the Sockeye Salmon spawning migration.

Methods:

Escapement count. Sockeye Salmon entering Sitkoh Lake will be counted using a remotely monitored video weir. The weir will be equipped with a video chute that allows free passage of fish and other animals through the weir. Multiple video cameras will be mounted in the video chute, providing different views of passing fish.

Live video from the underwater cameras, and from surveillance cameras at the Sitkoh weir site, will be wirelessly linked to computers at the ACA office in Angoon. Project personnel will use the Blue Iris surveillance software to save and review motion-triggered video clips and get hourly and daily counts of fish, by species, entering Sitkoh Lake. We will remotely monitor the project site and electronics over the internet to make sure that the weirs are functioning properly

The remote monitoring technology planned for use at Sitkoh has been developed and refined at the Sitkoh Lake and Neva Lake projects over the past few years. The video cameras, surveillance cameras, and networking equipment used have also been tested and used reliably over the past few years. Most importantly, it greatly improved the efficiency and reliability of counting fish by allowing simultaneous review of two or more cameras.

Age, sex, and length sampling. A seasonal goal of 60 to 120 adult Sockeye Salmon will be captured in the Sitkoh system using beach seine or dip net gear, sampled for age (scales), sex, and length (ASL) data, and released. A sample of 60 fish will allow us to determine, with 90% certainty, if at least 90% of the fish are ≤ freshwater age-1. The freshwater ages can be used to determine if there are any appreciable numbers of fish ≥ freshwater age-2, which might indicate if and when parent year escapements are high enough to fill (or exceed) the lake's rearing capacity.

Temperature and discharge. A permanent stream gage station will be established downstream of the lake outlet. As often as practical, we will measure the stage and stream discharge at the gage station, so that we can establish a stage-discharge curve for the stream. We will also install a Hobo U-20 water level and temperature logger at the station, which will record continuously throughout the year.

Partnerships and Capacity Building: The ACA and USDA Forest Service have been cooperating on stock assessment projects for many years. Field personnel are all hired and employed by ACA, which has successfully filled these positions with local hires. Projects funded by FRMP have provided employment opportunities in Angoon throughout the years of partnership. ACA employees participate in USFS safety training and have on-the-job training in how to sample fish and how to operate video weir, computer, networking, and solar power systems.

Technical Review Committee Evaluation: This project addresses the Council's priority information need identified in the 2022 Notice of Funding Opportunity. This would be a continuation of a project funded in some form through the Monitoring Program from 2001-2006 and since 2010. The investigation plan for this project has not changed substantially from past Monitoring Program funding cycles. The investigators have a good record of completing Monitoring Program projects and submitting timely deliverables. The co-investigator is a local community organization responsible for contract administration and overseeing the field component of the project with technical assistance from U.S. Forest Service partners. Local residents will be hired and receive training from U.S. Forest Service staff on project implementation and safety. The budget is reasonable considering the work to be completed and products delivered. The Angoon Community Association is a partner on this project and provided a letter of support.

Project Number: 22-610

Project Title: Klag Lake Sockeye Salmon Stock Assessment

Issue Addressed: Klag Lake is one of the most important sources of sockeye salmon (*Oncorhynchus nerka*) for the community of Sitka. However, escapement has been steadily declining in the last 10 years at Klag Lake. The past six years (2015-2020) have seen six of the seven lowest escapements on record, with 2018 having the lowest escapement of 2,444 sockeye salmon. Despite declining escapement and a reduction in subsistence harvests since monitoring was implemented in 2001, Klag Bay has a higher exploitation rate than other systems. The sockeye Klag Lake are extremely dependent upon high flows to escape into freshwater and the bathymetry of the bay and current harvest methods and limits allow for substantial numbers of sockeye to be efficiently harvested without any appreciable escapement. The Klag Lake Sockeye Salmon Stock Assessment Project will provide managers with daily escapement and harvest data to allow for in-season management decisions critical to sustainable management of the Klag Lake sockeye stock.

Objectives:

1. Enumerate the escapement of sockeye salmon at Klag Bay.

2. Describe the run timing, or proportional daily passage, of sockeye salmon through the weir.

3. Estimate the sex and age composition of sockeye salmon such that the coefficient of variation is 7.5% or less.

4. Estimate harvest by subsistence and sport fishermen at Klag Bay so that the coefficient of variation is 15% or less.

Methods: A rigid weir will be installed in the outlet stream of Klag Lake and escapement data will be recorded for all salmonids passing through the weir. A minimum of 462 sockeye salmon will be sampled for age, length, and sex data. Crew personnel will sample a running total of 10% to ensure sample goals are met and representative of the run despite low flow events. Mark-recapture methods will be used to validate the weir estimate for sockeye. A running total of approximately 20% of all sockeye at the weir will receive an adipose fin clip. Dead or spawned out fish will be sampled for marks on the spawning grounds; all sampled fish will receive a pelvic fin clip to ensure sampling without replacement. Creel surveys will be conducted with all fishing parties observed in Klag Lake. Escapement and harvest data will be reported to managers on a daily basis via satellite device to ADFG biologists.

Partnerships and Capacity Building: The Sitka Tribe of Alaska is the principal investigator for the project and has worked closely and successfully with the Alaska Department of Fish & Game and the US Forest Service. Most previously funded Fisheries Resource Monitoring Program projects were not led by Alaska Native organizations, so tribal leadership of the Klag Lake Sockeye Salmon Stock Assessment Project is noteworthy.

Technical Review Committee Evaluation: This project addresses the Council's priority information need identified in the 2022 Notice of Funding Opportunity. The Sitka Tribe of Alaska is the sole

investigator for this project. This project has been funded through the Monitoring Program since 2001 and has provided valuable information for the management of the resource. The objectives and methods outlined in the investigation plan are clear, measurable, and achievable and have been used successfully at other Monitoring Program projects. Local Natives will be targeted to fill seasonal fisheries technician positions. Four letters of support were provided for this project.

Project Number: 22-611
Project Title: Tongass National Forest Sockeye Salmon Quantitative eDNA Stock Monitoring

Issue Addressed: The Tongass National Forest has over 100 Sockeye Salmon (*Oncorhynchus nerka*) producing systems. Collecting up to date stock assessments on each of these systems is impossible since Sockeye Salmon monitoring projects are logistically challenging, labor intensive, and expensive. It is becoming increasingly necessary to implement cost effective methods of monitoring Sockeye Salmon. Quantitative eDNA sampling could allow managers to monitor more systems for less money if properly tested at established monitoring sites and validated with traditional enumeration techniques. The use of existing FRMP weir sites provides cost saving infrastructure from which to measure the value of eDNA as a monitoring tool within the Tongass National Forest. The Organized Village of Kake (OVK) and Hydaburg Cooperative Association (HCA) have expressed support testing this technology at their existing monitoring sites.

Objectives:

1. Test the relationship between estimated Sockeye Salmon escapement and eDNA concentrations within three systems;

2. Determine the efficacy of quantitative eDNA as an estimate or index for annual Sockeye Salmon escapement;

3. Compare the relationship between estimated Sockeye Salmon escapement and eDNA concentrations between systems.

Methods:

Objective 1: Concentrations of eDNA will be sampled daily at each selected weir site for the duration of the Sockeye Salmon season. Samples will be taken from the same sampling location prior to weir operations each morning to avoid contaminating samples with upstream activities. Duplicate 1-L stream water samples will be collected at each site and filtered through a 0.45µm cellulose nitrate filter using a battery-powered peristaltic pump. If flow ceased due to clogging, filtered water will be measured to the nearest 5 ml using a 1-L graduated cylinder and eDNA concentration will be corrected for volume. Filters will be preserved in silicone desiccant beads and sent to the USFS Rocky Mountain Research Station (RMRS) in Missoula, Montana, for processing. The sum of daily peak concentration and the total eDNA area under the curve concentrations will be compared to the daily and total Sockeye Salmon weir counts, respectively. Concentrations of eDNA will be modeled with flow and stream temperature to determine the best fit.

Objective 2: Models of flow corrected eDNA concentration and Sockeye Salmon escapement will be developed for each of the selected Sockeye Salmon systems each year of the project. Annual models will be combined in each system to identify any interaction effect between year and flow corrected eDNA concentration. If there is no significant interaction, then it would suggest that eDNA concentrations are consistent across years and may be used to compare Sockeye Salmon abundance between years within a single system.

Objective 3: Models developed for each Sockeye Salmon system will be combined to test for interaction effects between system and flow corrected eDNA concentration. Models from neighboring systems may have the highest likelihood of consistent eDNA concentrations. However, all iterations will be run to determine if eDNA concentrations in one system has any predictive value in another system.

Partnerships and Capacity Building: All of the staffed FRMP Sockeye Salmon weirs on the forest are operated by or have partnerships with Native organizations. The proposed project is designed to develop the capacity of existing partners to conduct eDNA monitoring. A quantitative eDNA monitoring program has the potential to increase the participation of new and existing partners in the Tongass FRMP. Cost effective monitoring techniques, such as eDNA sampling, have the potential to increase the number of monitoring sites and capacity of partners across the forest. The Forest uses eDNA to monitor amphibians, function of fish pass/fish barriers, invasive species, and rare species. Developing the capacity for these partners to complete both presence-absence and quantitative eDNA sampling greatly increases the available monitoring funding and workload.

Technical Review Committee Evaluation: This project does not address a priority information need identified by the Council. However, if proven successful, this technique may provide a less labor intensive and more cost-effective method for determining reliable estimates of Sockeye Salmon escapement. This project will use environmental DNA (eDNA) to assess the relationship between known estimates of Sockeye Salmon and eDNA concentrations to gather escapement trends on a greater number of systems across the forest. The sole investigator agency is the U.S. Forest Service although fieldwork will be completed by local hires through other Monitoring Program funded weir projects at Falls Lake, Hetta Lake and Gut Bay. The project is designed to develop the capacity of existing partners to conduct eDNA sampling and provide resource managers the ability to monitor Sockeye Salmon escapement in systems without current monitoring projects in place.

Project Number: 22-612
Project Title: Northern Southeast Alaska Eulachon Population Dynamics Monitoring

Issue Addressed: A subsistence lifestyle is the backbone of Alaskan native culture. A key component of that subsistence lifestyle for many coastal tribes has been the eulachon (*Thaleichthys pacificus)*. Eulachon are a small anadromous smelt with a highly nutritious fat content (20%) that represent an important nutritional resource at the base of the food web (Moody, 2008), producing an important oil for medicine, food, and fuel and a high value trade due to its relative scarcity and desirability (Betts 1994).

The majority of eulachon populations have been declining since the 1990s (Hay et al. 2000). In 2010 the National Marine Fisheries Service (NMFS) listed the southern distinct population segment (DPS) in

Washington, Oregon, and California as threatened under the Endangered Species Act (NOAA, 2010). While some of the declines have been well documented, most populations of eulachon are either unknown or anecdotal (Betts, 1994). Eulachon abundance throughout southeast Alaska has unexpectedly and precipitously declined in key subsistence fisheries in recent years (Southeast Region Planning Workgroup, 2006).

To complicate eulachon population monitoring, unlike salmonids, they do not necessarily return to their natal river to spawn, but rather select a river within a region (Flannery, et al. 2009). Thus a decline in spawning biomass in any one river system does not necessarily represent a decline in the eulachon population. This lack of knowledge combined with variable spawning biomass and low fidelity to natal rivers complicates management decisions and necessitates population monitoring techniques that can be implemented regionally.

The lack of eulachon population information and the cultural and subsistence value of the species led the Chilkoot Indian Association (CIA) to partner with the Takshanuk Watershed Council (TWC) to begin a eulachon mark-recapture population estimate on the Chilkoot River in 2010 (Figure 1). This population estimate was expanded in 2014 with the addition of environmental DNA (eDNA) data collection through a partnership with Dr. Taal Levi and Oregon State University (OSU). Due to the regional population structure of eulachon this study was expanded in 2016 to the Taiya and Skagway Rivers through a partnership with Skagway Traditional Council (STC). Through funding from the Bureau of Indian Affairs in 2017 this study was further expanded to collect eDNA data at 10 rivers in northern Southeast Alaska as well as the continuation of the Chilkoot mark-recapture population. Development and testing of low-cost long-term monitoring methods, such as environmental DNA (eDNA), is needed to facilitate long-term monitoring of this critical subsistence resource in order to enable detection of changes in population or phenology.

The overall goal of this proposal is to build the capacity of tribal governments to develop a regional tribally-based eulachon population monitoring network to analyze annual spawning biomass and run timing of eulachon. This will be accomplished through addressing the following objectives.

Objective 1: Determine eulachon spawning biomass at a region-wide scale in northern Southeast Alaska utilizing mark-recapture methods and environmental DNA (eDNA)

A. eDNA (Chilkoot, Chilkat, Ferebee, Taiya, Skagway, Katzehin, Lace, Antler, Mendenhall, and Eagle). Investigators: CIA, TWC, OSU, STC

B. Mark-recapture (Chilkoot) Investigators: CIA, TWC

Objective 2: Conduct a comprehensive subsistence harvest survey within the communities of Haines, Klukwan, and Skagway to estimate annual harvest amount and number of households harvesting eulachon.

Objective 3: Determine the spatial and temporal dynamics of eulachon spawning including run timing and environmental covariate

Objective 4: Present research findings to the Southeast Subsistence Advisory Committee, the Southeast Form on the Environment, and the North Pacific Research Board annual Marine Science Symposium.

Objective 5: Develop a regional eulachon working group to 1) establish a long-term monitoring plan, 2) produce a region-wide eulachon status report.

Technical Review Committee Evaluation: The goal of this proposal is to develop a monitoring strategy for Eulachon populations in northern Southeast Alaska. The Southeast Subsistence Regional Advisory Council identified that a *population assessment for Eulachon for northern Southeast Alaska* is a priority information need. The spawning biomass of Eulachon will be assessed using both mark-recapture methods and quantitative eDNA in the Chilkoot River, and eDNA alone at ten other locations in the Lynn Canal area. The use of quantitative eDNA to assess fish abundance is an emerging science, but the project partners have been using it for several years with some encouraging results. The plan would be improved by addition of a mechanism to calibrate the eDNA results at the other 10 sites. The project partners include several Tribal agencies, non-profit agencies, a university and the development of capacity in those agencies is a goal of the project. The expenses for the project are considerable, due to its ambitious scope. If the use of eDNA proves to be an effective way to monitor Eulachon populations, it could provide future advancement that could be used at other locations, and greatly improve the cost effectiveness of future monitoring efforts.

Project Number: 22-613
Project Title: Unuk River Eulachon Population Assessment

Issue Addressed: Eulachon (*Thaelicthys pacificus)* systems in Southeast Alaska are typically large glacial rivers located on the mainland. The Unuk River has been a primary commercial/subsistence fishing location for Eulachon in Southeast Alaska. The Unuk River, which drains into Burroughs Bay in Behm Canal, is located approximately 55 nautical miles northeast of Ketchikan on the Tongass National Forest. Other drainages in the Ketchikan area where Eulachon have been noted and harvested include: Klahini River, Chickamin River, Wilson & Blossom Rivers, and Carroll Inlet/Creek. Most of these drainages, except for Carroll Inlet/Creek, are located in the Misty Fjords National Monument Wilderness and can only be access by air or boat.

The spring Eulachon run provides food for congregating marine mammals, fish, and birds. Eulachon also provide the first subsistence opportunity of the year for many people. The Unuk River supported subsistence, personal use, and commercial fisheries for many years. The first documented commercial harvest of Unuk River Eulachon occurred in 1940 and continued sporadically until 2001 when the State managed commercial fishery was shut down. The Federal subsistence fishery continued until 2005. Since 2005, the fishery has been closed by both State and Federal managers due to poor Eulachon returns.

The majority of the harvest in District 1 has occurred in the lower stretches of the Unuk River with very little documentation of harvest from the other listed locations. Although prior to 2001, historical Eulachon harvest had taken place under commercial regulations, the subsistence fishery under Federal management is just as important in the eyes of the subsistence user as provisions allow for customary trade of the

resource. The primary purpose of this harvest has been to distribute Eulachon to the communities of Saxman, Metlakatla, Ketchikan and other outlying areas. Due to the great distance of the Unuk River from these communities, local users depended on the commercial harvesters for their yearly Eulachon. The ADFG Division of Subsistence documented in 1987 that 27% of residents in the rural community of Metlakatla utilize Eulachon.

Objectives:

1. Document run timing and spawning locations, and estimate biomass of Eulachon in the Unuk River, Chickamin, Klahini, Wilson, Blossom Rivers and in Carroll Inlet/Carroll Creek;

2. Estimate age-sex-length (ASL) distribution of the Eulachon escapement with a coefficient of variation less than 10%;

3. Document harvest methods, harvest levels, and run timing by on-site observations;

4. Expand the capacity of KIC to conduct future Eulachon monitoring.

Methods:

Objective 1: The project will deploy two satellite network cameras in the project area prior to the Eulachon run with the goal of focusing ground crew and aerial survey efforts. The cameras will be monitored remotely from the Ketchikan Ranger District office to identify Eulechon predator abundance. Crew transport flights will also be used for aerial surveys whenever possible. Aerial surveys will be recorded using duplicate downward facing mounted video cameras (GoPro®) for review and analysis. A ground crew will live on site and survey all six areas one or more times a day. Surveys will consist of at least two crew members walking, boating, or snorkeling the river to estimate Eulachon biomass.

Objective 2: Age, sex, and length will be obtained from sampled Eulachon using standard methods. Age will be determined from otoliths at the ADF&G Mark, Tag, and Aging Laboratory and sex will be determined from established morphological characteristics. Fish lengths will be measured from the tip-of-the-snout to the fork-of-the-tail to the nearest mm and weight will be measured to the nearest 0.01g. Weight will vary with spawning condition and will pooled by condition and sex.

Objective 3: Harvest and effort will be sampled during open Eulachon seasons on the Unuk River. The ground crew will document harvest location, total harvest, and catch per unit effort, and any harvester observations. Total harvest will be recorded on all Federal subsistence Eulachon harvest permits and returned post-season.

Objective 4: The USFS will provide pre-season training during the four-year funding cycle. The KIC surveyor training will focus on field safety, knowledge and comprehension of the survey and sampling techniques, standardized estimates of school size and density, development of logistical and organizational skills for survey implementation and data management in the field.

Partnerships and Capacity Building: This project proposal is the result of a partnership between the USFS and KIC and consultations with Metlakatla Indian Community and Organized Village of Saxman. The goal of developing training, survey protocols, and partnerships will be to increase the capacity of all agencies and organizations involved in future Unuk River Eulachon monitoring. This project aims to increase KIC's capacity to perform biological monitoring through equipment and institutional knowledge gained throughout the project timeline.

Technical Review Committee Evaluation: This project addresses the Council's priority information need identified in the 2022 Notice of Funding Opportunity. Returns and harvest of Unuk River Eulachon have declined severely since 1999. The Eulachon commercial fishery was closed in 2001, and from 2004-2010, virtually no Eulachon returned to the Unuk River. The Federal fishery has been closed pre-season by the Federal in-season managers annually since 2006. This project would use a combination of aerial surveys, video surveillance, and foot, boat, and field surveys to provide a qualitative index and biomass estimate of Eulachon returning to the Unuk River. In the event of an opener, Eulachon harvest and effort will be sampled during open Eulachon seasons in the Unuk River. This project develops partnerships and builds capacity with multiple agencies and groups including the U.S. Forest Service, Ketchikan Indian Community, Alaska Department of Fish and Game, the Organized Village of Saxman and the Metlakatla Indian Community.

Project Number: 22-650
Project Title: Providing updated community harvest information and documenting subsistence harvest patterns in three northern Southeast Alaska communities.

Issue Addressed: The project proposes to update subsistence harvest and use information for the communities of Pelican, Gustavus, and Tenakee Springs in direct fulfillment of the priority information need articulated for the Southeast Region in the OSM document, which was to "Update community household fish harvest surveys." All three communities are fishing communities with historically high participation and dependence on commercial fisheries and subsistence resources. The most recent comprehensive noncommercial harvest and use information available for these three communities dates to 1987. Nearly all the residents of these three communities use salmon or nonsalmon fish.

ADF&G requires mandatory harvest reporting for most species that require a permit or harvest tickets, such as salmon or large game. Additionally, ADF&G conducts biannual voluntary halibut harvest surveys and occasional marine mammal harvest surveys. The methods used to collect these permit data provide only harvest numbers; estimates are not always accurate, and they decouple harvest from the broader context in which the resources are harvested. For example, permits do not document information about household demographics, sharing practices, or qualitative assessments about the harvests, all of which provide important explanatory context. Moreover, permits cover only a small subset of the variety of wild resources that are used by communities. The full context for subsistence harvests is necessary to adequately evaluate changes in the harvest of any particular species.

Over the 30 years since the last comprehensive harvest survey, these communities have experienced significant demographic, economic, and regulatory changes which have likely affected their subsistence

harvest and use patterns. Pelican has lost more than half of its population while Tenakee Springs and Gustavus have grown, by one-third and 200%, respectively. Economic opportunities in the communities have shifted. Local participation in the timber industry and in commercial fisheries has declined while tourism (especially in Glacier Bay National Park, established in 1980) has grown. Additionally, the federal government established a federal subsistence halibut fishery in Alaska in 2003. To date, there has been no investigation into how this new regulation has modified household use of salmon or other kinds of fish, but recent surveys in other Southeast Alaska communities suggest that halibut harvests may have replaced some salmon harvests. A lack of information on the use of subsistence resources in the proposed study communities creates obstacles for communities, managers, and regulatory boards to advocate for or make informed decisions that are in the best interests of the communities and that continue to provide a subsistence priority.

Objectives: The objectives of this project are to: 1) Produce reliable estimates of the harvests and uses of wild resources for study year 2023 by residents of Gustavus, Tenakee Springs, and Pelican; 2) Record the geographic extent of search and harvest areas for wild resources by residents of Gustavus, Tenakee Springs, and Pelican during the study year; and 3) Document observations of subsistence harvesting practices, harvest trends, and areas used for subsistence activities over time.

Methods: At the outset of the project, the PI will hold scoping meetings in each of the proposed study communities to discuss the project's goals, objectives, methods, and how the collected data can be used. Researchers will conduct field work employing two integrated social science data gathering methods: household harvest surveys and key respondent interviews.

Researchers will use voluntary household harvest surveys with a mapping component to address objectives 1 and 2. The Division of Subsistence has used harvest surveys for over 40 years to collect information about the use and harvest of resources by Alaska residents that has been the foundation of accurate subsistence harvest data useful to the Federal Subsistence Board and the Alaska Board of Fisheries. Based on standard Division of Subsistence sampling strategies, researchers will attempt a census of Tenakee Springs (72 households) and Pelican (41 households) and a 40% sample of the 212 households in Gustavus. Project staff will hire local research assistants (LRAs) and train them in survey administration; ADF&G staff and LRAs will conduct the surveys in teams. The PI, working with Division of Subsistence Information Management staff, will design the household survey to collect information about a household's participation in subsistence activities, the harvest and use of wild resources, demographics and economic information, as well as questions about the food security of the households. During the household surveys, researchers will document the geographic extent of the search and harvest activities for the study year for each resource category. Researchers will record the points, lines and polygons reported by the respondent along with related information such as the species sought, the season of harvest, methods of access to the site, and gear used.

Through recommendations of the local government, LRAs, and others in the community, the PI will attempt to interview knowledgeable residents from each study community. Respondents will be a mix of ages and genders, will have current or past experience with subsistence activities, and ideally will be long-time residents of the area. The PI will develop a list of topics and questions to prompt discussion

following the community scoping meeting and consultation with the ADF&G area biologist and local city councils. General topics likely to be discussed include local traditional knowledge (LTK) concerning salmon runs, populations, habitat, and harvest. Interviewers will also use maps to encourage discussion and to record temporal changes in harvest locations since the previous comprehensive survey. Interviewers will attempt 2–10 interviews in each community, depending on population size.

When draft project results are available, researchers will return to the communities to hold a review session with residents to present the preliminary data, address any concerns residents have with the data, and resolve any discrepancies noted. The data presented will include tables and figures created from the household survey analysis, maps of harvest areas for different resource categories for the study year, and composite maps of harvest areas resulting from the key respondent interviews.

Partnerships and Capacity Building: Individuals, communities, and local and regional councils can use information collected through this project to advocate for subsistence practices before the Federal Subsistence Board, Alaska Board of Fisheries or Board of Game. During the planning and implementation phase of the project, researchers will stay in contact with local government councils, asking for assistance with survey development, interview protocols, and logistics. During the project, if researchers become aware of issues in any of the communities that could be addressed through the state or federal regulatory processes, researchers can assist the local tribal council, regional association, Subsistence Regional Advisory Councils and ADF&G Fish and Game Advisory Committees or residents in navigating that process. In addition, during the scoping and review meetings, examples of subsistence harvest data being used by communities to improve regulations will be shared. The regulatory process can be a confusing and difficult one to navigate; partnerships developed through intensive survey efforts in communities have proven to be beneficial to all parties involved, both during the survey but also years after.

Local research assistants (LRAs) will be hired in each community—3 in Pelican, 4 in Tenakee Springs, and 5 in Gustavus. Researchers will train the LRAs in survey administration and mapping, as well as more broadly in the role of ADF&G and the US Forest Service in managing the land and natural resources used by community residents. The PI will identify key respondents in consultation with the local government and residents.

Technical Review Committee Evaluation: The proposed research addresses a priority information need in the 2022 Notice of Funding Opportunity. In 2019, the Federal Subsistence Board closed the Neva Lake system, used by residents of Gustavus, to non-Federally qualified users due to low salmon abundance resulting in reduced harvest limits. The proposed project will investigate this fishery. While the salmon fishery occurs mostly in marine waters outside of Federal jurisdiction, salmon are migrating to natal streams within the Tongass National Forest. This project will enable evaluating reliability and validity of harvest monitoring methods used to estimate salmon harvest by the Alaska Department of Fish Game. The investigator will study the harvest and use of all wild resources, including fish. This allows the investigation of fish use within the context of overall wild resource uses and can provide valuable information to management but also increases the budget by adding data collecting and analysis of

resources not part of the priority information need, which was to update information on harvest and use of fish.

Project Number: 22-651
Project Title: Estimating inseason harvests of the Klawock River subsistence salmon fishery

Issue Addressed: This project responds to the Priority Information Need of "Reliable estimates of subsistence Sockeye Salmon harvest in the Klawock River drainage." The Klawock Lake stakeholder group recommended a project to estimate inseason subsistence harvests as one of its priorities in its action plan to promote healthy and sustainable sockeye salmon populations in Klawock Lake.

Salmon are one of the most widely used subsistence species on Prince of Wales Island and the Klawock River is a major source of subsistence sockeye salmon. The Klawock River runs through the Tongass National Forest and supports both a state and federal subsistence salmon fishery. The Klawock River sockeye salmon subsistence fishery has significant participation by subsistence users, mostly from the communities of Klawock and Craig, but also from throughout Southeast Alaska. However, the sockeye salmon run in the Klawock River has declined over the past few decades and is significantly smaller than it was historically; the 2013 run had the lowest documented escapement in the last two decades. Based on permit returns, recent subsistence harvests have also declined. Unfortunately, the reasons for the decline are not well understood but could be due to a combination of anthropomorphic and natural causes, such as human population growth of nearby communities and associated infrastructure, logging, and road construction around the lake, as well as hatcheries, all of which have likely made the system particularly vulnerable.

Managers glean information about stock health and abundance through harvest data. Fishing permits are required for both the state and federal fisheries. Fishers must document amounts and locations of fish harvested. Harvest reporting is mandatory; however, the current system has several drawbacks. First, reported harvests on permits are likely low. Concern that the subsistence permit program may underestimate harvests has long been acknowledged, and comparisons of permit data to other sources of harvest data, such as household harvest survey programs, have shown sometimes substantial discrepancies. ADF&G conducted inseason monitoring of the Klawock River fishery such as is being proposed here from 2001 through 2008. During these studies, researchers found that harvests reported on subsistence permits averaged 71% (ranging from 47% to 80%) of the harvest estimated from the inseason monitoring program. Also, harvest amounts from permits are not available to managers until the year following a fishing season; as a result, managers cannot monitor sustainable harvests in season and risk overharvests which may threaten the health of the stock.

Objectives: The goal of this project is to provide improved and timely subsistence salmon harvest estimates for the Klawock Lake system and to increase participation in the subsistence salmon permit program. The objectives in pursuit of this goal are to 1) Estimate the subsistence harvest of sockeye and other salmon in the subsistence fishery in Klawock Inlet and the Klawock River estuary in the summers of 2022, 2023, and 2024; 2) Conduct a comparison of permit returns with inseason harvest estimates for each year of the study and compare those results with comparisons made during the previous inseason

monitoring project from 2001-2008; and 3) Administer a user survey to measure fishers' experience and perspective on the new on-line system of obtaining subsistence salmon permits and reporting harvest data.

Methods: This project will be guided by the research principles adopted by the Alaska Federation of Natives in its Guidelines for Research and by the National Science Foundation, Office of Polar Programs in its Principles for the Conduct of Research in the Arctic, as well as the Alaska confidentiality statute (AS 16.05.815). These principles stress community approval of research designs, informed consent, anonymity of study participants, community review of draft study findings, and the provision of study findings to each study community upon completion of the research.

To meet the goals of the project, researchers will employ inseason creel surveys during the Klawock River subsistence salmon fishery for three consecutive years and a one-time mail-out survey. Researchers will maintain communication with subsistence fishers and the community more broadly throughout the duration of the project through formal meetings and through informal channels.

Objective 1: Researchers will employ voluntary on-site creel surveys of all Klawock River fishers, following the methods and analysis used successfully to estimate subsistence harvests in the Klawock sockeye salmon fishery from 2001-2008. Researchers will hire and train two local residents to conduct the surveys with all fishing parties participating in the subsistence fishery. Survey participation will be voluntary. No identifying information will be recorded during the survey. Researchers will share summarized weekly data with fisheries managers and seasonal summaries with the community.

Objective 2: ADF&G researchers will compare harvest estimates from the creel surveys with estimates from returned permits. Independent sample t-tests will be performed to evaluate whether these two approaches resulted in a statistically significant estimate. The data will also be compared at the household level with Gini coefficients and box and whisker plots to illustrate similarities or differences in the two populations. Researchers will evaluate the results of the permit comparison to the results of the permit comparison done as part of the prior ADF&G inseason harvest monitoring project.

Objective 3: PI Sill will develop a brief survey instrument to address Objective 3. The survey will ask about the respondent's permit status, methods of obtaining a permit, use of the permit, evaluation of the ease of the current permit system, and other comments or concerns about the system. During the first year of the project, ADF&G will mail the survey to all Klawock households (approximately 297 households) and Craig households who have fished the Klawock River in the past 4 years (approximately 40 households), along with an explanatory letter. Klawock Heenya Corporation will post announcements about the survey on the community Facebook page and the survey technicians will have copies of the survey to distribute to active fishers. There will also be an option to fill out the survey online.

Partnerships and Capacity Building: Multiple partnerships and the active involvement of community members will strengthen the proposed research. The Division of Subsistence will partner with Klawock Heenya Corporation and Cathy Needham. These partnerships will greatly enhance the research capacity of the project by adding a deeper understanding of Klawock River issues, seeking to integrate tribal members into the research, and providing logistical support. Hiring and training local residents as the inseason surveyors will increase the success of the project as well as help maintain community ownership

of the project, develop local capacity, and provide local economic benefits. When all project field work is complete, a review meeting of the project results and a discussion of permit comparisons will occur with fishers.

Local and regional councils can use the information collected through this project to advocate for subsistence practices before the Alaska state Board of Fisheries or Board of Game, or the Federal Subsistence Board. During the planning and implementation phase of the project, researchers will stay in contact with the local councils, and work cooperatively with project partners. During the project, if researchers become aware of issues that could be addressed through the state or federal regulatory processes, researchers can assist the local council, regional association, Advisory Committees, or residents in navigating that process. In addition, during the scoping and review meetings, examples of subsistence harvest data being used by communities to improve regulations will be shared. The regulatory process can be a confusing and difficult one to navigate; partnerships developed through intensive survey efforts in communities have proven to be beneficial to all parties involved, both during the survey but also years after.

Technical Review Committee Evaluation: This project addresses a priority information need identified in the 2022 Notice of Funding Opportunity. Objectives are clearly stated, and the investigation plan is well-written. Investigators seek to evaluate the recent change in State subsistence permit system to an online delivery and harvest reporting system. More in-depth discussion of methods would strengthen the merit of this project. The project is a partnership between Division of Subsistence and Klawock Heenya Corporation; however, the Corporation does not appear to have a significant role in the project. Two letters of support were provided.

MULTI-REGIONAL

Priority Information Needs

The multi-regional category is for projects that are applicable in more than one region. The 2022 Notice of Funding Opportunity identified the following priority information need:

- Impacts of climate change on salmon and the environment

Proposals Submitted for the Multi-Region

No proposals were submitted for funding in the multi-regional category.

FEDERAL SUBSISTENCE BOARD ACTION

At their meeting on February 1, 2022, the Federal Subsistence Board took up the Monitoring Program's 2022 Monitoring Plan. Following a presentation of the Monitoring Plan, the Federal Subsistence Board moved to accept the recommendations for funding for the 2022 Fisheries Resource Monitoring Plan based on the Technical Review Committee ranking, the Regional Advisory Council comments, and the Interagency Staff Committee comments.

Table 7. Funding Recommendations 2022 Fisheries Resource Monitoring Plan based upon the Technical Review Committee rankings, Regional Advisory Council comments, Interagency Staff Committee comments, and Federal Subsistence Board recommendation.

Project	Title	Organization	Total	Avg. Annual	1st Year Cost
22-101	Kotzebue Sound Sheefish-Describing Coastal Movement, Temperature Preference, and Potential Range Expansion	Wildlife Conservation Society	$232,911	$77,637	$154,515
22-103*	Unalakleet River Chinook Salmon Escapement Assessment-Continuation	Alaska Department of Fish and Game	$706,329	$176,582	$173,204
22-104*	Selawik River Inconnu Spawning Population Age Structure Evaluation and Spawner Recruitment Response to a 2004 Permafrost Thaw Slump	United States Fish and Wildlife Service	$281,534	$93,844	$0
22-150	Traditional Ecological Knowledge of Salmon in the River Drainages of Kotzebue Sound	Alaska Department of Fish and Game	$282,092	$141,046	$117,642
22-201*	East Fork Andreafsky River Weir Chinook and Summer Chum Salmon Abundance and Run Timing Assessment	United States Fish and Wildlife Service	$701,347	$175,336	$162,978
22-202*	Gisasa River Weir Chinook and Summer Chum Salmon Abundance and Run Timing Assessment	United States Fish and Wildlife Service	$343,652	$171,826	$168,695
22-204	Western Alaska Coho Salmon Genetic Baseline Development	Alaska Department of Fish and Game	$116,782	$58,391	$52,348
22-251	Presence and Use of Salmon in the Pastolik and Pastoliak Rivers	Alaska Department of Fish and Game	$204,603	$68,201	$7,780

Project	Title	Organization	Total	Avg. Annual	1st Year Cost
22-252	Humpback Whitefish and other Nonsalmon Fishes Traditional Ecological Knowledge and Biological Sampling in the Upper Koyukuk Region	Alaska Department of Fish and Game	$231,952	$115,976	$126,629
22-300	Takotna River Weir Salmon Run Timing and Abundance	Kuskokwim River Intertribal Fisheries Commission	$176,256	$44,064	$42,515
22-301	Kuskokwim River Broad Whitefish subsistence harvest and spawning abundance	United States Fish and Wildlife Service	$800,084	$200,021	$174,380
22-304*	George River Salmon Weir	Alaska Department of Fish and Game	$733,900	$183,475	$214,882
22-350*	Bethel Subsistence Harvest Survey	Orutsaramiut Native Council	$372,134	$93,033	$91,388
22-351*	Kuskokwim Management Area Postseason Subsistence Salmon Harvest Survey	Alaska Department of Fish and Game	$859,011	$214,752	$214,571
22-352	Local and Traditional Knowledge of Salmon Harvest and Use for Subsistence in the Lower Kuskokwim River Drainage	Alaska Department of Fish and Game	$366,440	$122,147	$132,792
22-353	Natural Indicators of Salmon in the Upper Kuskokwim River	Alaska Department of Fish and Game	$180,055	$60,018	$71,190
22-354	Community-Based Harvest Monitoring Network for Kuskokwim River Chinook Salmon	Kuskokwim River Intertribal Fisheries Commission	$254,795	$63,968	$61,965

Project	Title	Organization	Total	Avg. Annual	1st Year Cost
22-400*	Buskin River Sockeye Salmon Stock Assessment and Monitoring	Alaska Department of Fish and Game	$490,530	$122,632	$64,261
22-401*	Chignik River Subsistence Harvest Surveys and Escapement Indexing	Alaska Department of Fish and Game	$601,223	$150,305	$153,671
22-452	False Pass and Nelson Lagoon Subsistence Harvest Monitoring and Traditional Ecological Knowledge (TEK) Investigation	Alaska Department of Fish and Game	$279,913	$93,304	$48,097
22-453	Subsistence Harvests and Uses of Salmon and Other Wild Resources in Manokotak, Alaska	Alaska Department of Fish and Game	$208,382	$52,095	$8,195
22-454	Reliable estimates of subsistence harvests and uses in Ouzinkie and Port Lions	Alaska Department of Fish and Game	$323,870	$107,957	$145,621
22-504*	Copper River Chinook Salmon Inriver Abundance	Native Village of Eyak	$860,000	$215,000	$215,000
22-604*	Hetta Lake Sockeye Salmon Stock Assessment	Hydaburg Cooperative Association	$641,518	$160,379	$165,829
22-607*	Neva Lake Sockeye Salmon Stock Assessment	United States Forest Service	$487,401	$121,850	$118,122
22-609*	Sitkoh Lake Sockeye Salmon Stock Assessment	United States Forest Service	$362,742	$90,685	$92,749
22-610*	Klag Lake Sockeye Salmon Stock Assessment	Sitka Tribe of Alaska	$758,511	$189,627	$202,039
22-612	Northern Southeast Alaska Eulachon Population Dynamics Monitoring	Chilkoot Indian Association	$840,523	$210,130	$207,062
22-650	Updating Icy Straight Community Household Subsistence Harvest Surveys and Documenting Subsistence Harvest Patterns	Alaska Department of Fish and Game	$377,961	$94,490	$9,610

Project	Title	Organization	Total	Avg. Annual	1st Year Cost
22-651	Estimating Inseason Harvests of Klawock River Salmon Subsistence Fishery	Alaska Department of Fish and Game	$177,667	$44,416	$12,256
				2022 Funding Total	**$3,409,986**

Table 8. Summary of 2022 Monitoring Plan funding with regional allocations, agency funds, harvest monitoring/traditional ecological knowledge (HMTEK) and stock, status, trends (SST) breakdown.

Region	DOI Funds 1st Year	%	Guide-line %	USDA Funds 1st Year	%	Guide-line %	HMTEK	SST	Federal Agency	State Agency	Tribal or Rural Organ-ization	Other Organ-ization
Northern	$445,361	17%	17%	$0	0%	0.0%	$117,642	$327,719	$0	$290,846	$0	$154,515
Yukon	$518,430	20%	29%	$0	0%	0.0%	$134,409	$384,021	$331,673	$186,757	$0	$0
Kuskokwim	$1,003,683	39%	29%	$0	0%	0.0%	$571,906	$431,777	$174,380	$633,435	$195,868	$0
Southwest	$419,845	16%	15%	$0	0%	0.0%	$201,913	$217,932	$0	$419,845	$0	$0
Southcentral	$215,000	8%	5%	$0	0%	32.5%	$0	$215,000	$0	$0	$215,000	$0
Southeast	$0	0%	0%	$807,667	100%	62.5%	$21,866	$785,801	$210,871	$21,866	$574,930	$0
Multi-Region	$0	0%	5%	$0	0%	5%	$0	$0	$0	$0	$0	$0
Total $	**$2,602,319**			**$807,667**			**$1,047,736**	**$2,362,250**	**$716,924**	**$1,552,749**	**$985,798**	**$154,515**
Total %			**100%**			**100.0%**	**31%**	**69%**	**21%**	**46%**	**29%**	**5%**