

2012 FISHERIES RESOURCE MONITORING PLAN



JANUARY 2012

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OVERVIEW

BACKGROUND

Since 1999, under the authority of Title VIII of ANILCA, the Federal government has assumed expanded management responsibility for subsistence fisheries on Federal public lands in Alaska. Expanded subsistence fisheries management has imposed substantial new informational needs for the Federal system.

Section 812 of ANILCA directs the Departments of the Interior and Agriculture, cooperating with the State of Alaska and other Federal agencies, to undertake research on fish and wildlife and subsistence uses on Federal public lands, and to seek data from, consult with, and make use of the special knowledge of local residents engaged in subsistence uses. To increase the quantity and quality of information available for management of subsistence fisheries, the Fisheries Resource Monitoring Program (Monitoring Program) was established within the Office of Subsistence Management. The Monitoring Program was envisioned as a collaborative interagency, interdisciplinary approach to enhance existing fisheries research, and effectively communicate information needed for subsistence fisheries management on Federal public lands.

Although all proposals addressing subsistence fisheries on Federal lands will be considered, the 2012 Request for Proposals was focused on priority information needs developed either by strategic planning efforts or by expert opinion, followed by review and comment by the Subsistence Regional Advisory Councils. The Monitoring Program is administered by region, and strategic plans sponsored by this program were developed by workgroups of fisheries managers, researchers, Federal Subsistence Regional Advisory Council members and other stakeholders for three of the six regions: Southeast, Southcentral (excluding Cook Inlet Area), and Southwest Alaska. These plans identify prioritized information needs for each major subsistence fishery and can be viewed on or downloaded from the Office of Subsistence Management's website: <http://alaska.fws.gov/asm/index.cfm>. Independent strategic plans were completed for the Yukon and Kuskokwim regions for salmon in 2005. For the Northern Region and the Cook Inlet Area, assessments of priority information needs were developed from the expert opinions of the Regional Advisory Councils, the Technical Review Committee, Federal and State managers and staff from the Office of Subsistence Management. Additionally, a strategic plan for research on whitefish species in the Yukon and Kuskokwim river drainages was completed in spring 2011 as a result of efforts supported through Monitoring Program project 08-206.

Cumulative effects of climate change will likely fundamentally affect subsistence fishery resources, their uses, and how they are managed. Therefore, all investigators were asked to consider examining or discussing climate change effects as part of their project. Investigators conducting long-term projects were encouraged to participate in a standardized air and water temperature monitoring program for which the Office of Subsistence Management will provide calibrated temperature loggers and associated equipment, analysis and reporting services, and access to a temperature database. The Office of Subsistence Management has also specifically requested research proposals that would focus on effects of climate change on subsistence fishery resources and uses, and that would describe management implications.

The mission of the Monitoring Program is to identify and provide information needed to sustain subsistence fisheries on Federal public lands, for rural Alaskans, through a multidisciplinary, collaborative program.

To implement the Monitoring Program, a collaborative approach is utilized in which five Federal agencies (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, Regional Advisory Councils, Alaska Native organizations, and other organizations. An interagency Technical Review Committee provides scientific evaluation of proposals and investigation plans. The Regional Advisory Councils provide review and recommendations, and public comment is invited. The Interagency Staff Committee also provides recommendations. The Federal Subsistence Board takes into consideration recommendations and comments from the process, and approves the final monitoring plan.

PROJECT EVALUATION PROCESS

The Technical Review Committee evaluates proposals, and subsequently full investigation plans, and makes recommendations for funding. The committee is chaired by the Fisheries Division Chief of the Office of Subsistence Management and is composed of representatives from each of the five Federal agencies and three representatives from the Alaska Department of Fish and Game. Fisheries and Anthropology staff from the Office of Subsistence Management provide support for the committee.

Four factors are used to evaluate studies:

1. Strategic Priority

Proposed projects should address the following and must meet the first criteria to be eligible for Federal subsistence funding.

Federal Jurisdiction—Issue or information needs addressed in projects must have a direct association to a subsistence fishery within a Federal conservation unit as defined in legislation, regulation and plans.

Conservation Mandate—Risk to the conservation of species and populations that support subsistence fisheries, and risk to conservation unit purposes as defined in legislation, regulation and plans.

Allocation Priority—Risk of failure to provide a priority to subsistence uses.

Data Gaps—Amount of information available to support subsistence management (higher priority given where a lack of information exists).

Role of Resource—Contribution of a species to a subsistence harvest (e.g., number of villages affected, pounds of fish harvested, miles of river) and qualitative significance (e.g., cultural value, unique seasonal role).

Local Concern—Level of user concerns over subsistence harvests (e.g., upstream vs. downstream allocation, effects of recreational use, changes in fish abundance and population characteristics).

2. Technical-Scientific Merit

The project must meet accepted standards for design, information collection, compilation, analysis, and reporting. Projects should have clear study objectives, an appropriate sampling design, correct statistical analysis, a realistic schedule and budget, and appropriate products, including written reports. Projects must not duplicate work already being done.

3. Investigator Ability and Resources

Investigators must have the ability and resources to successfully complete the proposed study. This will be evaluated considering ability in terms of education and training, related work experience, publications, reports, presentations, and past or ongoing work on Monitoring Program studies; and considering resources in terms of office and laboratory (if relevant) facilities, technical and logistic support, and personnel and budget administration.

4. Partnership-Capacity Building

Partnerships and capacity building are priorities of the Monitoring Program. ANILCA mandates that the Federal government provide rural residents a meaningful role in the management of subsistence fisheries, and the Monitoring Program offers tremendous opportunities for partnerships and participation of local residents in monitoring and research. Investigators are requested to include a strategy for integrating local capacity development in their investigation plans. Investigators must complete appropriate consultations with local villages and communities in the area where the project is to be conducted. Letters of support from local organizations add to the strength of a proposal. Investigators and their organizations should demonstrate their ability to maintain effective local relationships and commitment to capacity building.

POLICY AND FUNDING GUIDELINES

Several policies have been developed to aid in implementing funding.

- Proposals of up to four years duration may be considered in any year's monitoring plan.
- Studies must be non-duplicative with existing projects. Most Monitoring Program funding is dedicated to non-Federal sources.
- Activities not eligible for funding under the Monitoring Program include: a) habitat protection, restoration, and enhancement; b) hatchery propagation, restoration, enhancement, and supplementation; c) contaminant assessment, evaluation, and monitoring; and d) projects where the primary objective is capacity building (e.g., science camps, technician training, intern programs). These activities would most appropriately be addressed by the land management agencies.
- When long-term projects can no longer be funded by agencies, and the project provides direct information for Federal subsistence fisheries management, the Monitoring Program may fund up to 50% of the project cost.

Finances and Guideline Model for Funding

The Monitoring Program was first implemented in 2000, with an initial allocation of \$5 million. Since 2001, a total of \$6.25 million has been annually allocated for the Monitoring Program. In 2010, the total funding was reduced to \$6.05 million. The Department of the Interior, through the U.S. Fish and Wildlife Service, has provided \$4.25 million. The Department of Agriculture, through the U.S. Forest Service, provided \$1.80 million annually, but amount of 2012 funds available for new projects is uncertain. The U.S. Forest Service anticipates having sufficient funds for ongoing projects in 2012, but would not be able to fund any of the 2012 project investigation plans submitted for the Southeast Alaska Region unless additional Department of Agriculture funding becomes available.

The Monitoring Program budget funds continuations of existing projects (year-2, 3 or 4 of multi-year projects), and new projects in the biennial year. The Office of Subsistence Management issued

requests for proposals on an annual basis until 2008, and then shifted to a biennial basis. Therefore, the next request for proposals after 2012 will be for 2014 proposals. Budget guidelines are established by geographic region and data type, and for 2012, \$2 million is projected to be available for new starts. Proposals are solicited according to the following two data types:

5. Stock Status and Trends Studies (SST).

These projects address abundance, composition, timing, behavior, or status of fish populations that sustain subsistence fisheries with linkage to Federal public lands. The budget guideline for this category is two-thirds of available funding.

6. Harvest Monitoring and Traditional Ecological Knowledge (HM-TEK).

These projects address assessment of subsistence fisheries including quantification of harvest and effort, and description and assessment of fishing and use patterns. The budget guideline for this category is one-third of available funding.

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For 2012, 25 of the 32 investigation plans under consideration were recommended for funding by the Technical Review Committee. Total funding available for new projects in 2012 was \$2.70 million, while the proposed cost of funding all 32 projects submitted would have been \$2.74 million. Of the 32 investigation plans recommended, the Technical Review Committee recommended funding 29 projects at a cost of \$2.18 million. Subsequently, the Regional Advisory Councils and the Interagency Staff Committee agreed with the Technical Review Committee recommendations. The Federal Subsistence Board adopted a 2012 Monitoring Plan that included funding for 25 of the 29 recommended projects, which have a total cost of \$1.62 million. This decision was made because the U.S. Forest Service only anticipated having sufficient funds for ongoing projects in 2012 but not for any of the four recommended new 2012 project investigation plans for the Southeast Alaska Region. As has been done in past years, any unallocated Monitoring Program funds from the current year will be used to fund subsequent years of new and ongoing projects so that more of the funds available in 2014 can be used to fund new projects.

The 2012 Monitoring Plan adopted by the Federal Subsistence Board will provide 28% of the funding to Alaska Native organizations, 47% to State agencies, 14% to Federal agencies, and 11% to other non-government organizations.

Table 1. Number of projects funded for the 2012 Fisheries Resource Monitoring Plan. Projects include stock status and trends (SST) and harvest monitoring and traditional ecological knowledge (HMTEK).

Geographic Region	SST	HMTEK	Total
Northern Alaska	3	3	6
Yukon	5	1	6
Kuskokwim	6	1	7
Southwest Alaska	0	3	3
Southcentral Alaska	1	1	2
Multiregional	1	0	1
Total	16	9	25

Table 2. First year cost of projects funded for the 2012 Fisheries Resource Monitoring Plan.. Projects include stock status and trends (SST) and harvest monitoring and traditional ecological knowledge (HMTEK).

Geographic Region	SST	Cost (\$000)	
		HMTEK	Total
Northern Alaska	\$95	\$290	\$384
Yukon	\$338	\$25	\$363
Kuskokwim	\$599	\$70	\$669
Southwest Alaska	\$0	\$182	\$182
Multiregional	\$17	\$0	\$0
Total	\$1,048	\$567	\$1,616

Table 3. Northern Alaska region projects funded in 2012.

Project No.	Title	Approved Budget (\$000)			
		2012	2013	2014	2015
<u>Stock Status and Trends</u>					
12-100	Selawik River Inconnu Spawning Population Abundance	\$78.7	\$124.3	\$104.8	\$68.7
12-103	Kobuk River Sheefish Spawning Frequency, Location, and Run Timing	\$13.8	\$13.8	\$13.8	\$0.0
12-104	Noatak River Dolly Varden Evaluation of Overwintering Populations	\$2.3	\$142.4	\$76.2	\$2.5
<u>Harvest Monitoring and Traditional Ecological Knowledge</u>					
12-153	NW AK Key Subsistence Fisheries Harvest Monitoring Program	\$106.4	\$117.4	\$119.8	\$98.5
12-154	NS Salmon Fishery Harvest Monitoring Traditional Ecological Knowledge	\$48.5	\$42.3	\$44.8	\$30.6
12-155	NS Climate Change Traditional Ecological Knowledge Whitefish and Cisco	\$134.7	\$52.5	\$0.0	\$0.0
Total		\$384.4	\$492.7	\$359.4	\$200.3

Table 4. Yukon region projects funded in 2012.

Project No.	Title	Approved Budget (\$000)			
		2012	2013	2014	2015
<u>Stock Status and Trends</u>					
12-200	Alatna River Inconnu Population Structure	\$32.5	\$0.0	\$0.0	\$0.0
12-202	Henshaw Creek Salmon Weir	\$137.0	\$131.4	\$0.0	\$0.0
12-204	Anvik River Sonar	\$93.4	\$97.0	\$0.0	\$0.0
12-205	Kaltag Chinook Salmon Sampling	\$4.0	\$4.0	\$4.0	\$4.0
12-207	Yukon River Bering Cisco Spawning Origins Telemetry Investigation	\$71.1	\$77.6	\$10.0	\$0.0
<u>Harvest Monitoring and Traditional Ecological Knowledge</u>					
12-251	Inseason Salmon Harvest Teleconferences	\$24.9	\$72.5	\$72.9	\$54.7
Total		\$362.9	\$382.5	\$86.9	\$58.7

Table 5. Kuskokwim region projects funded in 2012.

Project No.	Title	Approved Budget (\$000)			
		2012	2013	2014	2015
<u>Stock Status and Trends</u>					
12-302	Lower Kuskokwim River Chinook Salmon Harvest ASL	\$100.3	\$93.8	\$96.9	\$82.4
12-303	George River Salmon Weir (Option B)	\$171.1	\$175.3	\$0.0	\$0.0
12-304	Takotna River Salmon Escapement Monitoring	\$116.1	\$115.3	\$0.0	\$0.0
12-309	Kwethluk River Weir Salmon Escapement Enumeration	\$36.2	\$0.0	\$0.0	\$0.0
12-312	Highpower Creek Sheefish Status and Upper Kuskokwim River	\$100.8	\$45.8	\$24.4	\$0.0
12-313	Kuskokwim River Bering Cisco Spawning Origins	\$74.1	\$56.9	\$17.1	\$0.0
<u>Harvest Monitoring and Traditional Ecological Knowledge</u>					
12-352	Upper Kuskokwim River Whitefish Climate Change Trends	\$70.4	\$63.0	\$42.1	\$0.0
Total		\$669.0	\$550.1	\$180.5	\$82.4

Table 6. Southwest Alaska region projects funded in 2012.

Project No.	Title	Approved Budget (\$000)			
		2012	2013	2014	2015
<u>Harvest Monitoring and Traditional Ecological Knowledge</u>					
12-450	Aleutian Islands Salmon and Other Subsistence Harvests	\$44.2	\$160.1	\$100.0	\$0.0
12-452	Lake Clark Whitefish Climate Change Trends	\$138.2	\$93.3	\$53.4	\$0.0
12-453	Kodiak Salmon Fishery Changing Patterns	\$0.0	\$86.3	\$86.3	\$0.0
Total		\$182.4	\$339.7	\$239.7	\$0.0

Table 7. Southcentral Alaska region projects funded in 2012.

Project No.	Title	Approved Budget (\$000)			
		2012	2013	2014	2015
<u>Stock Status and Trends</u>					
12-500	Copper River Feasibility of Remote Streambed Readers	\$76.4	\$74.5	\$0.0	\$0.0
<u>Harvest Monitoring and Traditional Ecological Knowledge</u>					
12-550	Copper River Changing Environments and Contemporary Sub Fisher	\$82.0	\$86.6	\$0.0	\$0.0
Total		\$158.4	\$161.1	\$0.0	\$0.0

Table 8. Multi-regional Alaska region projects funded in 2012.

Project No.	Title	Approved Budget (\$000)			
		2012	2013	2014	2015
<u>Stock Status and Trends</u>					
12-700	Yukon and Kuskokwim Rivers Inconnu Genetic Baseline	\$16.8	\$49.9	\$23.3	\$0.0
Total		\$16.8	\$49.9	\$23.3	\$0.0

Project Number: 12-100
Project Title: Selawik River Inconnu Spawning Population Abundance and Age Structure Evaluation
Geographic Region: Northwest Alaska
Information Type: Stock Status and Trends
Principal Investigator: Raymond Hander, U.S. Fish and Wildlife Service
Co-Investigators: Mary Beth Loewen, U.S. Fish and Wildlife Service
 Randy J. Brown, U.S. Fish and Wildlife Service

Project Cost: **2012:** \$78,680 **2013:** \$124,299 **2014:** \$104,818 **2015:** \$68,749

Recommendation: Fund

Issue

The Selawik National Wildlife Refuge (Refuge) has a congressional mandate through ANILCA to conserve inconnu (sheefish) *Stenodus leucichthys* populations. This project addresses two priority issues identified for the Northern Region in the 2012 Fisheries Resource Monitoring Program: “spawning distribution, timing, and stock structure of Selawik River whitefish species”; and “identify and characterize critical factors affecting population dynamics of Selawik River inconnu”. This project benefits from information provided by FIS projects 02-020, 02-040, 03-016, and 04-101.

There are two known populations of inconnu in Northwest Alaska, one that spawns in the upper Kobuk River and the other that spawns in the upper Selawik River. Both populations are subject to intensive fisheries throughout the region. A large permafrost thaw slump (thaw slump) located about 40 km upstream from the inconnu spawning area on the Selawik River began emitting large amounts of sediment into the river in 2004. Since then the normally clear Selawik River has flowed extraordinarily turbid during the summer months transporting huge quantities of sediment downstream, potentially destroying the habitat for stream-spawning fish. Similar slumps in the upper Yukon River drainage have been emitting sediment into the Stewart River for over 40 years so we must assume that the Selawik River slump will continue for the foreseeable future. Habitat qualities of the inconnu spawning area in the Selawik River have undoubtedly changed because of the dramatically increased sediment exposure. These changes will probably 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, or possibly to become established in another suitable location. The increased sediment in the upper Selawik River is an environmental factor that will have a profound effect on the inconnu population that spawns there.

Objectives

1. Collect inconnu age structure data from male inconnu from the Selawik and Kobuk River spawning populations in 2012, 2013, and 2014;
2. Identify possible recruitment failures and missing age classes based on Chi-square test of six age class bins;
3. Determine the spawning population abundance of Selawik River inconnu in 2012, 2013, and 2014; and

4. Determine whether age structure and spawning population abundance data support the null hypothesis that sediment deposition from the slump does not affect recruitment over time caused by reduced egg survival.

Methods

This project will involve three distinct components that together will reveal whether the Selawik River thaw slump is impacting egg development and subsequent recruitment of the inconnu population in the drainage. The first component will be a series of annual age distribution profiles of spawning male inconnu collected from the Selawik River spawning area. We have chosen to focus on males because they will provide the recruitment data we are seeking without reducing the number of fertilized eggs on the spawning grounds each year. The earliest age distribution profiles will be dominated by cohorts that were spawned prior to the thaw slump and will be unaffected by the sediment released into the river. These early age distribution profiles will serve as baselines for comparison with later profiles. The second component will be a series of annual age distribution profiles of spawning male inconnu from the Kobuk River population. If recruitment failure is observed in both sample collections, it would indicate an effect in their shared rearing environment and not necessarily in the Selawik River spawning area. If recruitment failure is observed only in the Selawik River sample collection it would indicate an effect from the Selawik River spawning area. The Alaska Department of Fish and Game operates an annual chum salmon *Oncorhynchus keta* test fishery on the Kobuk River near the community of Kiana during July and August. Incidental catches of inconnu from 2003 to 2008 have ranged from 375 to 880. During 2010, otoliths and gonosomatic index data were collected from Kobuk River inconnu and preliminary analysis suggest that inconnu caught in the test fishery are preparing to spawn and would provide commensurate age distribution data. The third component of the project will be a complimentary series of annual spawning population estimates for the Selawik River inconnu population. Age distribution data is proportional to the sample so one could see identical profiles from a population at radically different population levels. Brown found that individuals in the first seven age classes of a Yukon River inconnu spawning population made up 80% to 90% of his sample. If the Selawik River inconnu population is similarly skewed to the younger age classes, which is common for coregonid populations in general, then the spawning population should decline dramatically with even modest declines in recruitment. Modeling exercises suggest that our ability to identify large declines in recruitment (80% or greater) with age distribution data will be substantial, but modest declines in recruitment (50% or less) will be difficult to detect with statistical certainty. Annual spawning population estimates will allow us to identify modest declines in recruitment. These three components will permit detection of modest to high recruitment failure resulting from reduced egg survival caused by sediment from the Selawik River thaw slump.

Partnerships and Capacity Building

Project logistics and partnership would be a collaborative effort between the U.S. Fish and Wildlife Service and the Native Village of Selawik. Residents of Selawik will be sought after to assist with collecting otoliths. Specific training to address project specific sampling procedures and protocols will be conducted for individuals prior to initiating sampling. Selawik residents will also be sought for logistical support for camp gear transportation logistics. Discussions with the Selawik IRA Council regarding the project are planned during one of their monthly meetings.

Justification

The proposed work is technically sound and addresses an important subsistence sheefish fishery associated with Selawik National Wildlife Refuge. This project builds upon several Fisheries Resource Monitoring Program projects (02-020, 02040, 03-016 and 04-101). The investigators responded to the

Technical Review Committee's comments by providing details concerning trend detection and DIDSON sonar application. If the Fisheries Resource Monitoring Program were to provide support for the proposed work, it would need to be understood that no commitment is made beyond the four year funding cycle. Investigators would need to consider alternative funding sources for additional future study years as a contingency.

Northern Region

Project Number: 12-103
Project Title: Spawning location, run timing, and spawning frequency of Kobuk River sheefish.
Geographic Region: Northern Alaska
Information Type: Stock Status and Trends
Principle Investigator: James Savereide, Alaska Department of Fish and Game
Co-Investigator(s): Randy J. Brown, U.S. Fish and Wildlife Service

Project Cost: 2012: \$13,800 2013: \$13,800 2014: \$13,800

Recommendation: Fund

Issue

The Kobuk River sheefish *Stenodus leucichthys* population supports substantial inriver subsistence fisheries and winter subsistence fisheries that occur in Hotham Inlet and Selawik Lake. Inriver fisheries utilize gillnets, beach seines, and hook and line techniques to capture migrating sheefish during their upstream (mid-June through August) and downstream (late September through mid-October) spawning migrations, whereas the winter fishery mainly utilizes under-ice gillnets and hand-held jig lines. Sheefish harvested in Hotham Inlet and Selawik Lake are from a mixed population comprised of the only two known spawning stocks in the region, the Selawik and Kobuk River stocks. Stock assessments are only feasible within the individual rivers, when the stocks are separated into spawning aggregations; however, estimates of spawning frequency are needed to determine the total stock size because mature sheefish can spawn more than once and in sequential and/or non-sequential years. Even though sheefish in the Northern Region are not identified as a priority need, an understanding of total exploitable stock size would allow researchers to determine sustainable harvest levels for an important subsistence fishery. In 2008, a four-year radiotelemetry project (08-103) was funded by the Fisheries Monitoring Program to estimate the spawning frequency, spawning locations, and migratory timing of sheefish in the Kobuk River.

The spawning locations, estimates of migratory timing (up and downstream), and spawning frequency have been determined annually since 2008, and will continue through the fall of 2011 as part of project 08-103. At that time, 3 years of information will be available to estimate the spawning frequencies of sheefish tagged in 2008, and two years will be available for sheefish tagged in 2009. However, the potential for a more complete and descriptive database is available because the minimum life expectancy of the radio transmitters deployed is five years. To obtain more detailed and precise estimates of spawning frequency, spawning locations, and migratory timing and to maximize the potential of the radio transmitters already purchased, three more years of data from aerial tracking surveys and the stationary tracking stations should be collected. This would provide five years of spawning information for each year transmitters were deployed.

Objectives

1. Document spawning locations within the Kobuk River upstream of the village of Kobuk;
2. Describe the timing of spawning migrations (upstream and downstream past the village of Kobuk) for mature sheefish within the Kobuk River drainage;

3. Estimate the proportion of the sheefish spawning population in 2008 and 2009 that returned annually to spawning areas upstream of the village of Kobuk from 2012 to 2014 such that each annual proportion is within 10% percentage points 90% of the time; and,
4. Identify and characterize different spawning frequency strategies used by adult sheefish in the Kobuk River, estimate the proportion of adults using each strategy, and estimate the potential variation in the proportion of adult sheefish spawning in any given year.

Methods

Spawning frequency, spawning locations, and migratory timing of mature sheefish in the Kobuk River stock will be determined by assessing spawning status of individually radiotagged sheefish over 3 consecutive years (2012–2014). The radio transmitters will be operable each year from July through October. Combined with the results from project 08-103, this will provide a total of 5 annual assignments of spawning status to categorize and estimate spawning frequency. This approach will serve to provide precise estimates of spawning frequency (sequential, non-sequential, or combination thereof) expressed by the stock.

Spawning migrations, frequency, and locations of radiotagged sheefish will be deciphered using a combination of aerial tracking surveys and stationary tracking stations. Two tracking stations located just upstream from the village of Kobuk will be used to record upstream and downstream migrations of radiotagged fish. Replicate aerial surveys conducted by U.S. Fish and Wildlife Service and Selawik National Wildlife Refuge will be conducted annually during July and August to document their locations throughout the river during their upstream migration, and during late September to mid-October to document their locations within the spawning area.

Partnerships and Capacity Building

One field technician was hired through the Kobuk IRA to assist with capture and sampling of fish, and this project extension will continue to utilize a local field technician and provide compensation for local logistical support (e.g., boat rentals, tracking station maintenance, and land leases). A rural outreach educational program on sheefish was carried out between the village of Kobuk, Kobuk Elementary School, and Alaska Department of Fish and Game; this program will continue through 2014. Additionally, progress reports will be presented to residents of the region at least once a year and written documents will be distributed to fisheries managers, researchers, local community groups and other interested parties.

Justification

This project will build upon Monitoring Program project 08-103 by allowing continue monitoring of radio-tagged sheefish in the Kobuk River. Combined with project 08-103, funding for this project will result in five years of sheefish migratory data. Results from this work will describe run timing and spawning frequency, giving fishery managers the context for understanding previously completed stock abundance work. This project is technically sound and addresses an important subsistence sheefish fishery associated with Gates of the Arctic National Preserve, Selawik National Wildlife Refuge, Kobuk Valley Wilderness and Kobuk Valley National Park. The investigators have the expertise needed to successfully conduct this ongoing project. Both investigators have worked on several successful Monitoring Program projects. Continuing this project would allow for a maximum amount of information to be gleaned from the deployed radio tags at a very modest cost. In addition, Alaska Department of Fish and Game is providing matching funds (\$18,500 per year) greater than the requested funds.

Project Number: 12-104
Project Title: Evaluation of the overwintering Dolly Varden population in the Noatak River.
Geographic Region: Northern Alaska
Information Type: Stock Status and Trends
Principal Investigator: Brendan Scanlon, Alaska Department of Fish and Game
Co-Investigator(s): Marci Johnson, National Park Service

Project Cost: **2012:** \$2,280 **2013:** \$142,381 **2014:** \$76,152 **2015:** \$2,508

Recommendation: Fund

Issue

Many northwestern Alaska residents maintain a traditional subsistence lifestyle and rely greatly on the harvest of overwintering Dolly Varden *Salvelinus malma* from the Noatak River. These fish are captured with gillnets or beach seines during open water periods and with hook and line during winter, and in some communities they outrank salmon and whitefish in importance to the subsistence economy. Currently, fisheries managers have little defensible information relative to habitat and abundance for the overwintering population of Dolly Varden in the Noatak River, which is needed to identify sustainable subsistence harvest levels, evaluate the potential effects of habitat perturbations, and address regulatory proposals or climatic change.

Objectives

1. Document overwintering locations of Dolly Varden in the Noatak River during the winters of 2012/2013 and 2013/2014.
2. Assess the feasibility of using side-scan sonar (i.e. DIDSON) to estimate the abundance of outmigrating overwintering Dolly Varden following breakup on the Noatak River. This will be accomplished using a set of secondary objectives.
 - a. Identify the location upstream of which 90% of the Dolly Varden overwinter (OW_{90}) during the winters of 2012/2013 and 2013/2014.
 - b. Describe the onset and duration of the Dolly Varden outmigration at OW_{90} during late spring of 2013 and 2014.
 - c. Evaluate physical characteristics of potential sonar sites near OW_{90} in June 2013 that could impact sonar detection of Dolly Varden such as channel profile (width, depth and substrate), debris load during break up, target range, target size, and aim/position of the sonar.
 - d. Evaluate biological characteristics of potential sonar sites near OW_{90} in June 2013 that could impact sonar detection of Dolly Varden such fish density, swimming behavior (e.g. direction of movement), and relative abundance of Dolly Varden and non-target species.
 - e. Based on conclusions from objectives 2a-d, enumerate all downstream targets at the selected OW_{90} site using a DIDSON sonar during the outmigration period of Dolly Varden during June of 2014.
 - f. Determine the relative abundance of non-target species in the immediate vicinity of the OW_{90} site using methods identified in Objectives 2c and 2d during June of 2014.

Methods

Radiotelemetry will be employed to evaluate overwintering areas, and identify OW_{90} and downstream run timing past OW_{90} of Dolly Varden in the Noatak River. During each of the first two years (2012 and 2013) of the study, 125 Dolly Varden will be surgically implanted with programmable radio transmitters. Deploying transmitter during mid-September will ensure that only overwintering Dolly Varden will be tagged. Data related to run timing and overwintering locations will be collected using a combination of aerial tracking surveys and ground-based tracking stations. A minimum of four tracking flights will be conducted each year: early March, mid-April, early June, and early July.

Objective 2 reflects a stepwise approach toward assessing the feasibility of the sonar and the conditions that need to be satisfied to enumerate the downstream migration of overwintering Dolly Varden. Because species apportionment can be problematic, our expectation of project success will be that downstream targets can be accurately counted and the relative abundance of non-target species will be negligible (i.e. <5%). We expect that the downstream outmigration period for a vast majority of the overwintering Dolly Varden will be very brief (<one week) and that their abundance (e.g. 30,000–150,000 fish) will simply overwhelm other species of similar size (e.g. ≥ 200 mm TL) that may confound the sonar counts. This ideal scenario will provide a relatively accurate census even without having to rigorously account for species apportionment.

In 2013, investigation of the potential sonar site will start immediately after ice-out. Based on work conducted in the neighboring Wulik River and prior telemetry work, it is assumed that there will be a delay of about seven days after ice-out before fish begin their outmigration to sea. Recommended procedures for site selection, installation, and operation of the DIDSON sonar will be followed over a four-week period. A radio receiver in camp or tracking station in camp will provide data on the progression of outmigrating radio tagged Dolly Varden. Test fishing will be developed and conducted to evaluate whether Dolly Varden make up $\geq 90\%$ of the total number of fish present in the ensonified field.

In 2014, the outmigration of Dolly Varden will be counted following breakup conditioned upon the results of the telemetry work and sonar investigations in 2013. All necessary equipment and personnel will be staged to ensure that the river can be ensonified immediately after ice-out and once the river can be safely navigated. Two DIDSON units will be operated, one on each bank of the river. Best practices for profiling the river channel, aiming, and testing of the sonar using targets will be repeated. The maximum attainable range window of an individual DIDSON unit on low frequency is 40 m and the window length of each sonar unit will be adjusted to maximize image resolution and avoid overlap. Sonar operations will be terminated after the outmigration period, which will be identified by telemetry and test fishing data. Test fishing results from 2013 will be used to develop a standardized protocol for determining the relative abundance of Dolly Varden and other species moving downstream through the ensonification field.

Partnership/Capacity Development

A letter of support will be solicited from the Northwest Arctic Regional Advisory Council at their August 2011 meeting in Kotzebue, and a portion of the requested funds will provide for a locally-hired technician from the village of Noatak to be recruited for approximately four weeks each year of this project to assist with operation of the DIDSON sonar. During the 2002-2003 Noatak River Dolly Varden telemetry experiment four individuals from Noatak were successfully hired each year to assist with weir and field camp operations in the upper Kugururok River. In addition, consultation with the Noatak/Kivalina Fish and Game Advisory Committee as well as the Noatak IRA will be conducted well before the start of the project to describe objectives and how the results will be used in management, and to inform fishers about

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the tag-return program. Finally, educational outreach regarding Dolly Varden life history and the field methods used in this experiment will be conducted at the public school in Noatak in May 2013.

Presentations will also be made at other regional villages and schools, such as Ambler, Kiana, and Kotzebue as interest and resources allow. Project results will be presented at Federal Regional Advisory Councils, and State Advisory Committees, and in regional newspapers and radio shows.

Justification

This project addresses an important subsistence Dolly Varden fishery in Northwest Alaska. The investigators plan to use radiotelemetry to document overwintering locations of Dolly Varden in the Noatak River and DIDSON sonar to estimate the outmigrating Dolly Varden. The investigators developed a logical stepwise approach to deploying the DIDSON sonar component of the project and detailed how they will address cold weather challenges. Information gained from this project will allow fishery managers to evaluate the importance of the Noatak River Dolly Varden population as compared to the Kivalina and Wulik rivers populations. It will also provide baseline information on Noatak River Dolly Varden overwintering habitat.

Project Number: 12-153
Project Title: Northwest Alaska Key Subsistence Fisheries Harvest Monitoring Program
Geographic Region: Northern Alaska
Information Type: Harvest Monitoring/Traditional Ecological Knowledge
Principal Investigator: Nicole M. Braem, Alaska Department of Fish and Game
Co-Investigator(s): James S. Magdanz, Alaska Department of Fish and Game
 Enoch Shiedt, Maniilaq, Inc.

Project Cost: **2012:** \$106,421 **2013:** \$117,408 **2014:** \$119,760 **2015:** \$98,540

Recommendation: Fund

Issue

Substantial subsistence fisheries sustain eight small communities (Kivalina, Noatak, Noorvik, Selawik, Kiana, Ambler, Shungnak and Kobuk) within the Kotzebue Management Area, yet little information on the subsistence harvest and use of salmon, char, whitefish, and other non-salmon species has been collected since 2004, when the annual salmon harvest monitoring program was terminated due to lack of funding. The Kotzebue Area has, by far, the largest subsistence salmon fishery in Alaska lacking an annual harvest assessment program.

Several development projects related to mineral extraction may occur in the area: oil exploration in the Chukchi Sea, a road to the Ambler mining district that would link a remote region to the road system and likely lead to further mining development, and the extension of the road from Red Dog mine, among others. While little commercial exploitation of fish stocks currently occurs in the region, it is expected that interest in developing such fisheries will grow in coming decades as activity in and access to the Arctic increases. While chum are the predominant salmon species in the region, it is believed that more commercially valuable species such as sockeye, Chinook and coho will expand their ranges as the Arctic warms. In 2009, U.S. Secretary of Commerce Gary Locke approved a plan prohibiting the expansion of commercial fishing into federal arctic waters; however, this limitation is in place until “researchers gather sufficient information on fish and the Arctic marine environment to prevent adverse impacts of commercial harvesting or activity on the ecosystem.” Among species identified in the plan as likely initial target species were Arctic cod, saffron cod and snow crab. Thus, state and federal fisheries regulatory bodies, including the Federal Subsistence Board, will require current and comprehensive data on the subsistence fisheries of this area in the near future.

The primary objective of this project is to gather *contextualized* harvest information in this region with an eye to future information needs. As time series data further accumulate, researchers may be able to detect an increasing trend in harvest of one species concurrent with a decline in another... but be unable to interpret the trends. It is hoped that traditional ecological and local knowledge can further inform and contextualize quantitative harvest data and information on factors affecting fishing during the study period.

Interested parties need updated harvest information both for established state and federal management processes and for planning and impact assessment efforts. Both the Seward Peninsula and Northwest Arctic Regional Advisory Councils have identified salmon and char fisheries as the most important fisheries in their areas and have expressed concerns about the effects of climate change on subsistence fisheries resources. Baseline harvest assessment and monitoring of subsistence fisheries and historic

trends and variability in harvest location, harvests and use of non-salmon fish have been identified as priority information needs for the Northern Region.

Objectives

1. Estimate annual harvest and use patterns of salmon, char, whitefish and other key non-salmon species of fish used by residents of the study communities in 2012, 2013, and 2014. Assess whether subsistence needs for these species are being met and impacts.
2. Systematically collect contextual information on what factors influence harvest and use of salmon, char, whitefish, and other key species in each study year.
3. Conduct network analysis of harvest, processing, and distribution networks of subsistence caught fish.
4. Document traditional and local knowledge about salmon, char, whitefish and other key subsistence species with particular attention to observed changes over time. Explore how various factors are affecting harvest methods, species targeted, the organization of fishing, fishing locations, preservation techniques, and harvest timing.
5. Compare data collected to historic and contemporary information; interpret changes and trends in the subsistence harvest and use of salmon, char, whitefish and other key species.

Methods

Three methods of data collection will be used in order to meet the objectives of this study: an adapted harvest survey, key respondent interviews, and participant-observation. Of an estimated 812 total households (based on 2010 federal census data), we estimate that about 650 (80%) will be surveyed each year (in January 2013, 2014, and 2015). Sixteen key respondent interviews will be conducted with knowledgeable subsistence fishers and processors identified in collaboration with Maniilaq and tribal councils. Investigators will make one trip to a community for the purpose of participant observation each year. Trips will be time to coincide with an important fish harvest period, i.e. seining for whitefish in the fall, jigging for Dolly Varden in the spring, or during salmon fishing in the summer.

Partnerships and Capacity Building

Consultation with Maniilaq, Inc. is ongoing. This will be a collaborative project between Alaska Department of Fish and Game, Maniilaq, Inc., and the tribal governments of the study communities. To continue capacity building at the community level, project partners will hire and train local residents to conduct surveys within their communities.

Justification

The goal of this project is to re-establish data collection for subsistence salmon and nonsalmon fisheries in the Northern region, namely in eight communities in the Kotzebue area (Kivalina, Noatak, Noorvik, Selawik, Kiana, Ambler, Shungnak, and Kobuk). Harvest surveys have not occurred for a number of years and increasing impacts to subsistence fisheries may be felt by subsistence users in coming years stemming from factors such as resource development or climate change. Regional Advisory Councils and the Monitoring Program have requested harvest data on salmon and nonsalmon fish. Additionally, the research will provide much needed socio-environmental and economic contexts for understanding changes including trends in harvests, uses, and distribution of subsistence resources. Given the importance of salmon and nonsalmon fisheries in this region, the lack of an annual harvest assessment

program, and the changing socio-environmental conditions, this study will be timely and valuable. The investigators demonstrate a clear understanding of the importance of collecting not just harvest numbers, but also broader data on subsistence harvests, uses, distributions, knowledge, and conditions. The investigators seek to broaden managers' understandings of change as well as the contexts within which and why they are occurring. This project would provide valuable information for managers and the Monitoring Program. The investigation plan addresses a priority information need in the 2012 Request for Proposals. The technical and scientific merit is high. The objectives are clearly stated. The investigators are qualified to conduct the proposed research and the partnership and capacity building component of the research is rated as high.

Project Number: 12-154
Project Title: Traditional Ecological Knowledge and Harvest Monitoring of an Emerging North Slope Salmon Fishery
Geographic Region: Northern Alaska
Information Type: Harvest Monitoring/Traditional Ecological Knowledge
Principal Investigator: Brittany Retherford, Alaska Department of Fish and Game

Project Cost: **2012:** \$48,493 **2013:** \$42,325 **2014:** \$44,835 **2015:** \$30,609

Recommendation: Fund

Issue

This project will document subsistence salmon and non-salmon fishery traditional ecological knowledge and harvest trends in two North Slope communities: Point Lay and Wainwright. Salmon in particular have been emerging as an increasingly used and harvested resource in these villages, yet baseline ethnographic information is lacking. Interviews conducted by Alaska Department of Fish and Game researchers in 2009 and 2010 in Wainwright and Point Lay found that local fishers have traditionally harvested and used salmon species, though largely opportunistically at hunting camps and fish camps established for targeting non-salmon species. This research responds to a unique opportunity to document what appears to be an emerging fishery for salmon (primarily pink and chum, but some Chinook as well), while simultaneously collecting baseline ethnographic and harvest data about select non-salmon fish. The communities of Point Lay and Wainwright both have linkage Federal subsistence management, in both the National Petroleum Reserve and the Alaska National Maritime Refuge. This research addresses priority needs identified by the Monitoring Program in its 2012 Request for Proposals and by the North Slope Regional Advisory Council.

Objectives

1. For each community, document and catalogue traditional ecological knowledge of subsistence salmon and non-salmon fishing, including historic abundance and trends, gear types used, seasonality, and harvest location information for each species.
2. Continue to synthesize existing data related to subsistence fisheries in Point Lay and Wainwright, including existing reports, Regional Advisory Council minutes, and other archival sources.
3. Develop an annotated bibliography that explores studies and themes related to change and resilience in culture, including topics such as emergence in nature, access issues as a result of environmental change, and human resilience and adaptation to changing surrounding environment.
4. Develop and implement an exploratory harvest monitoring program for salmon and non-salmon fisheries. Collect data on species harvest quantities, seasonality of harvest, and gear types for three study years: 2012, 2013, and 2014.
5. Map general areas where subsistence salmon and non-salmon fisheries take place for each community, including local place names and historic harvest locations to help establish patterns and trends.
6. Create a set of species identification educational materials to distribute to community members during organized outreach events and harvest calendar collection trips.

Methods

This research project will be conducted following basic procedures and policies characteristic of Alaska Department of Fish and Game Division of Subsistence research. Division staff will consult with regional and local governments and organizations with interests in fish and wildlife management and subsistence uses following the principles of informed consent, conducting research in the Arctic, and the Alaska Department of Fish and Game and Alaska Boards of Fisheries and Game's tribal consultation policy.

A three-year project is proposed. There are three components that are designed to address both research questions. The first component of the project will be primarily focused on a literature review and original archival research. A second component will be focused on building community participation and data collection as part of the proposed three-year exploratory harvest monitoring program. This component also includes the synthesis and analysis of collected data. The third component of the project is collecting and cataloging traditional ecological knowledge. The results of all three components will be summarized in a comprehensive final report.

Partnerships/Capacity Building

The principal investigator will build on earlier research efforts to contribute capacity building in study communities through research partnerships with local tribal or village councils in the identified study communities and will seek to hire local project assistants or community partners to help select key respondents, assist the investigators in all aspects of fieldwork, and administer the harvest monitoring program. Investigators will also regularly consult with the North Slope Wildlife Department and the Inupiat Community of the Arctic Slope to explore possibilities for collaborative efforts. Meetings will also be held annually to update study communities on project status, as well as, solicit ongoing feedback. This is particularly important due to the exploratory nature of this project.

Justification

This project aims to document baseline ethnographic data regarding salmon and nonsalmon fisheries in two North Slope communities, Point Lay and Wainwright. Given that the project is exploratory research of an emerging fishery, it has significant potential. Partnership and capacity building is ranked medium, and there is linkage to Federal subsistence management. The overall framework, questions, and objectives, the research methods and researcher ability, combined with the need for this investigation into an emerging fishery lead to a recommendation to fund this project.

Project Number: 12-155
Project Title: Climate Change and Traditional Ecological Knowledge of Subsistence Whitefish and Cisco on the North Slope of Alaska
Geographic Region: Northern Alaska
Information Type: Harvest Monitoring and Traditional Ecological Knowledge
Principal Investigator: George Weekley, SWCA Environmental Consultants
Co-Investigator(s): Liam Frink, University of Nevada-Las Vegas
Celeste Giordano, University of Nevada-Las Vegas
Mike Pederson, North Slope Borough
Leyla Arsan, SWCA Environmental Consultants
Brian Brettschneider, SWCA Environmental Consultants

Project Cost: **2012:** \$134,703 **2013:** \$52,453

Recommendation: Fund

Issue

This study will gather traditional ecological knowledge (TEK) on subsistence uses of broad whitefish (*Coregonus nasus*) [Aanaakjiq], Arctic cisco (*Coregonus autumnalis*) [Qaaqtaq], and least cisco (*Coregonus sardinella*) [Iqalusaaq]. This study will document the possible impacts to these three species as a result of the effects of climate change as measured by the changes in harvesting location and timing, as well as preservation and processing of these resources. The study will take place in the communities of Atqasuq and Kaktovik.

Objectives

Changes in Harvest Locations and Timing over the Past 20 Years

- 1) Identify traditional subsistence harvest locations of cisco and whitefish for each community.
- 2) Document place names for traditional cisco and whitefish harvest locations for each community.
- 3) Document duration of use at various subsistence harvest locations for cisco and whitefish for each community.
- 4) Document timing of subsistence harvest for cisco and whitefish for each community.
- 5) Identify perceived potential reasons for changes (if any) to subsistence harvest locations for cisco and whitefish, including perceived changes to climatic conditions.
- 6) Identify perceived potential reasons for changes (if any) to timing of subsistence harvest of cisco and whitefish, including perceived changes to climatic conditions.
- 7) Map changes to community subsistence harvest locations using subsistence mapping techniques.

Changes in Fish Preservation Methods over the Past 20 Years

- 1) Identify past methods used to prepare and preserve cisco and whitefish and investigate whether climate change is perceived to have affected those preparation and preservation methods.
- 2) Identify current fish preparation and preservation methods used in response to any perceived climate change.
- 3) Document any observed signs of fish pathogens (e.g., flesh texture changes due to *Ichthyophonus* and other parasites) in harvested whitefish that may have affected fish preservation methods and/or indicate changes in pathogen prevalence.

Methods

Data for this study will be collected by a combination of conversational interview, participant observation, and subsistence mapping. Conversational interviews will typically begin with an opening question and then free-flow into additional questions based on the participant's responses. The interviewer will use a digital voice recorder to accurately capture participant interviews. As a back-up, the interviewer will take notes to clarify information in digital recordings and to document information from participants who do not want to be recorded.

Areas identified by study participants as historic and/or contemporary subsistence harvesting locations will be documented on paper maps through subsistence mapping techniques. The interviewer will use GIS-generated 11x17 inch aerial photography maps showing known topographical identification points. Participants will be asked to circle locations where harvesting of the target subsistence resources occurs and to identify specific species harvested at those locations. Maps showing subsistence harvest locations will then be digitized into a shapefile for GIS use. At the end of the analysis, SWCA Environmental Consultants will produce a report that outlines data gathered from the study and an interpretation of these data in the results. All data gathered that correspond to the goals and objectives will be summarized in the report in textual and/or graphic form.

Partnerships/Capacity Building

SWCA Environmental Consultants is teaming with the North Slope Borough Department of Wildlife Management and will be working with them to help improve their capacity for conducting research projects involving qualitative research methods.

The project would contribute to the North Slope Borough Department of Wildlife Management's identified mission and responsibilities as listed below:

- Document the continued importance of subsistence hunting, fishing, and trapping through maintaining accurate, area-specific harvest records
- Determine those geographic areas critical to subsistence-use animals.
- Define critical aspects of the biology of major subsistence-use animals, to support efforts directed toward local management of such species.
- Cooperate with the Alaska Department of Fish and Game, the U.S. Fish and Wildlife Service, and the U.S. National Marine Fisheries Service regarding the conduct of studies and evaluation of data for strong local input into management of subsistence-use resources.
- Work closely with the Borough's fish and game management committee in developing and implementing programs for subsistence-use animals. Since this committee has a representative from each village, it is a valuable means for assisting in the local coordination

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of wildlife studies conducted by the borough and others and state and federal management programs.

The Borough's responsibilities for the project include the following:

- Securing local cooperation and support from the tribal governments,
- Identifying and setting up interview times with community residents,
- Assisting with language translations during qualitative interviews,
- Assisting in analyzing qualitative data from resident interviews,
- Collaboration between SWCA fisheries biologists and NSB fisheries biologists to determine possible physiological effects to whitefish and cisco that may result from climate change, and
- Assisting in report writing.

Justification

The project is focused solely on collecting qualitative ethnographic information about the harvests and associated uses, methods and means, and knowledge of subsistence fisheries in the Northern Region communities of Atqasuq and Kaktovik. This was a priority information need in the 2012 Request for Proposals that asked for "more comprehensive baseline and ethnographic data of salmon and nonsalmon fisheries in the region." The principal investigator has chosen to collaborate with researchers new to the Monitoring Program, who may provide interesting and valuable insight into the intersection of subsistence issues, health, and community well-being. Potentially significant data is being offered using a reasonable budget in a short time span. The ethnographic data collection will be tied to spatial data collection and mapping and may offer interesting insights into current and past whitefish and cisco subsistence fishing conditions in these four Northern Region communities.

Project Number: 12-200
Project Title: Alatna River Inconnu Population Structure
Geographic Region: Yukon
Information Type: Stock Status and Trends
Principal Investigator: Aaron Dupuis, Tanana Chiefs Conference
Co-Investigator(s): Randy Brown, U.S. Fish and Wildlife Service
 Jeffrey Olsen, U.S. Fish and Wildlife Service

Project Cost:* 2012: \$32,547

*Tanana Chiefs Conference has applied for continuation of the Office of Subsistence Management's Partner in Fisheries Program to fund a fishery biologist through 2015. Should Tanana Chiefs Conference receive this award, the salary of the fishery biologist (plus 33.2% indirect) requested in this proposal will be returned to the Office of Subsistence Management.

Recommendation: Fund

Issue

Five species of whitefish are present in the Koyukuk River drainage and are routinely harvested in local subsistence fisheries. Local residents rely heavily on whitefish which are taken in currently unmonitored fisheries. Inconnu *Stenodus leucichthys*, a large, long-lived, piscivorous whitefish, represent an important component of this subsistence harvest. The Alatna River is the only documented spawning tributary for inconnu in the Koyukuk River drainage and has been identified as the second largest spawning stock for inconnu in the Yukon River system. Despite the obvious importance of the Alatna River spawning population, there is currently no biological information available describing the age, sex, and length structure, and there have been no genetic collections for baseline development. Development of genetic baselines from known spawning stocks and the collection of stock and sex specific age and length data were cited as high priorities for inconnu throughout Alaska. Genetic baseline samples have been collected from the Yukon Flats and Sulukna River populations and samples from the Alatna River will be extremely useful in the future determination of stock compositions of inconnu taken in mixed-stock subsistence fisheries in the Yukon River drainage. Information describing the maturity of whitefishes is also important when describing the demography of a population. The gonadosomatic index can be used to assess the maturity of whitefishes. In addition, sex-specific age and length data can be used to monitor responses to changes in future management decisions and harvest activities. Given the importance of the Alatna River spawning stock to local subsistence fisheries and its contribution to the Yukon River system, it is appropriate to support this tissue and data collection activity.

Objectives

1. Collect 200 tissue samples from inconnu spawning in the Alatna River for population specific genetics baseline development.
2. Describe the demographic composition (age, sex, length, gonadosomatic index) of the Alatna River inconnu population.

Methods

Inconnu will be captured in cooperation with subsistence fishers from the local community of Alatna. Fish sampling will occur when subsistence fishers target fishing efforts near the putative spawning area in the

Yukon Region

Alatna River in the month of September. In order to sample fish over the entire run in the Alatna River, weekly sampling trips will be made during the month of September. Each week will be treated as separate strata for subsequent analyses. During each trip, 50 fish will be randomly sampled, for a total sample size of 200 inconnu. This sample size is consistent with similar studies describing the demographic composition of whitefishes in Alaska.

To address objective 1, a small piece of the pelvic fin will be removed from each fish, placed in a labeled genetic sample vial, and preserved in ethanol for genetic analyses. To address **objective 2**, all captured fish will be individually numbered, measured (fork length to the nearest 1 mm), weighed (wet weight to the nearest 1 g), sexed (by gross examination), and otoliths will be removed for aging. Removed otoliths will be placed in a labeled centrifuge tube. Female fish will have their ovaries removed and each ovary will be weighed separately. The gonadosomatic index (GSI) for female fish will be determined as: $GSI = (\text{total ovary weight}/\text{wet weight}) \times 100$.

The U.S. Fish and Wildlife Service, Genetics Laboratory will archive the genetic samples with those from the Yukon Flats and Sulukna River populations until they are ready to proceed with baseline development and analysis (J. Olson, U.S. Fish and Wildlife Service, personal communication). All otoliths will be returned to the U. S. Fish and Wildlife Service, Fairbanks Fish and Wildlife Field Office for age analysis (R. Brown, U.S. Fish and Wildlife Service, personal communication).

All genetic analyses will be the responsibility of the U. S. Fish and Wildlife Service, Genetics Laboratory. Age determination will be completed by U. S. Fish and Wildlife Service, Fairbanks Fish and Wildlife Field Office personnel. To describe the demographics of the Alatna River inconnu population ordinary least squares regression will be used to describe the relationships between age, length, weight, and GSI. Logarithmic transformations of data will be used if variances need to be stabilized. A paired t-test will be used to compare the length and weight for male and female inconnu. A Kruskal-Wallis one-way analysis of variance will be used to determine if significant differences in length and weight exist among the sampling strata (weeks). If differences are found, a Dunn's multiple comparisons test will be used to identify when differences occurred.

Partnerships and Capacity Building

This project represents collaboration among Tanana Chiefs Conference, U. S. Fish and Wildlife Service's Fairbanks Fish and Wildlife Field Office, U. S. Fish and Wildlife Service's Genetics Lab, and local subsistence fishers from Allakaket. The principal investigator will hire local fishers to coordinate sampling with subsistence fishing of inconnu on the Alatna River. This project will serve to build capacity among the residents of Allakaket by giving them a role in the future management and conservation of this resource. Additionally, this project will build the capacity of the Tanana Chiefs Conference fisheries program by involving the Office of Subsistence Management's Partners Program fishery biologist, and by strengthening professional relationships with the U. S. Fish and Wildlife Service, Fairbanks Fish and Wildlife Field Office and the subsistence fishers from Allakaket.

Justification

The proposed work addresses a priority information need supporting monitoring and management of Federal subsistence fisheries resources. The study outline is achievable and investigators are fully capable of successfully completing the work. The project would build capacity in a regional Tribal organization for conducting meaningful fisheries research supporting Federal subsistence management.

Project Number: 12-202
Project Title: Abundance and Run Timing of Adult Salmon in Henshaw Creek, Alaska
Geographic Region: Yukon
Information Type: Stock Status and Trends
Principal Investigator: Aaron Dupuis, Tanana Chiefs Conference
Co-Investigator(s): Aaron Martin, U.S. Fish and Wildlife Service

Project Cost:* **2012:** \$136,990 **2013:** \$131,369

*Tanana Chiefs Conference has applied for continuation of the Office of Subsistence Management's Partners in Fisheries Program to fund a fishery biologist and a fishery intern through 2015. Should Tanana Chiefs Conference receive this award, the salary of the fishery biologist and the fishery technician crew leader (plus 33.2% indirect) requested in this proposal will be returned to the Office of Subsistence Management. The savings to this project would be substantial, totaling \$115,450 over the two year period which would reduce the total cost of the project to \$152,909. Expected notice of the availability of these funds will be in fall 2011.

Recommendation: Fund

Issue

Management of the Koyukuk River salmon fishery is complex. This is due, in part, to a limited number of salmon escapement studies within the system and the mixed stock nature of the Yukon River salmon fishery. The Alaska Department of Fish and Game, Division of Commercial Fisheries has conducted aerial surveys within the Koyukuk River drainage since 1960, but the usefulness and reliability of that information is limited. Both Chinook salmon *Oncorhynchus tshawytscha* and chum salmon *O. keta* from Henshaw Creek contribute to the harvests occurring in the Koyukuk and Yukon rivers, and the information collected at Henshaw Creek is vital to the difficult task of managing the complex mixed-stock subsistence and commercial salmon fisheries in the Yukon River. In-season management and post-season evaluations of management actions are enhanced by the data from this project as well. Further, the Henshaw Creek weir is the only Upper Koyukuk River drainage salmon escapement monitoring project and its information can facilitate comparisons with lower drainage escapement projects. Furthermore, in recent years subsistence and commercial harvesters have identified a concern with the apparent decrease in the size of Chinook salmon in the Yukon River. The continuation of reliable escapement estimates and the collection of age, sex, and length (ASL) data at Henshaw Creek will assist in future analyses of trends in Chinook salmon and summer chum salmon run timing, escapements, gender composition, and size and age structure over time. In addition, this project aids the Kanuti National Wildlife Refuge in meeting objectives outlined in the 1993 Kanuti National Wildlife Refuge Fishery Management Plan, and addresses the priority information needs outlined for Yukon Region salmon by providing reliable estimates of Chinook and chum salmon escapements. With Tanana Chiefs Conference as the primary investigator and through the hire of local residents, this project will help to facilitate capacity building within Tanana Chiefs Conference and will give local communities a continued role in the management of this resource.

Objectives

1. Determine daily escapement and run timing of adult salmon
2. Determine age, sex and length (ASL) composition of adult salmon
3. Determine the number of resident fish passing the weir

4. Serve as an outreach platform for Kanuti National Wildlife Refuge staff and Tanana Chiefs Conference Partners Program fisheries biologist to conduct an onsite science camp

Methods

The Henshaw Creek weir project will provide involvement, education, and employment opportunities within local communities, as well as provide Federal and state managers with necessary information. The first component of this project will be to record abundance and run timing of Chinook and summer chum salmon returning to Henshaw Creek using a resistance board weir. The weir will be operational from approximately the last week of June until the middle of August. The second component will be to collect biological data from adult salmon migrating through the weir. A fish trap will be used to collect and sample salmon for ASL information, and also to document the movement and presence of resident fishes. Data will be collected using established sampling protocols. Daily escapement counts will be provided to Federal and state managers for in-season management needs. All data will be sent to the PI to collaborate with the co-investigator in organizing, editing, and ensuring data quality. The principal investigator will forward pertinent data to the proper laboratory for analysis. Biological samples will be prepared, processed, compiled, analyzed, and summarized by Alaska Department of Fish and Game laboratories. ASL data will be handled by the Stock Biology Laboratory (Anchorage). Any Chinook and chum genetic samples will be sent to Alaska Department of Fish and Game and U.S. Fish and Wildlife Service laboratories, respectively. The third component will be to serve as a platform for a one week science camp conducted in cooperation with Kanuti National Wildlife Refuge staff and local community members and funded by a Challenge Cost Share grant through the refuge.

Partnerships and Capacity Building

The Henshaw Creek weir project represents collaboration among the Tanana Chiefs Conference, the U.S. Fish and Wildlife Service, Fairbanks Fish and Wildlife Field Office, the Kanuti National Wildlife Refuge, and the local communities of the Koyukuk River drainage. This project has consulted with the U.S. Fish and Wildlife Service, Fairbanks Fish and Wildlife Field Office to provide logistical support for field operations, training of field technicians, and support with post-season data analyses and report writing. Consultations have been made with Kanuti National Wildlife Refuge in providing the project with overwintering storage facilities for gear and annually being a participant in a science camp hosted at Henshaw Creek weir through a Challenge Cost Share Grant. Additionally, Larry DuBois, Alaska Department of Fish and Game AYK Stock Biologist provided input and will continue to support this project through in-kind support by analyzing ASL data. Tanana Chiefs Conference will continue to work with Kanuti National Wildlife Refuge staff, the Western Regional Advisory Council, Allakaket, Alatna, Hughes, and Evansville traditional councils to recruit local residents.

Justification

The Henshaw Creek weir provides run timing and escapement information for Chinook and summer chum salmon in a stream located in the upper Koyukuk River. Data collected at the Henshaw Creek weir is used as an index for salmon populations in the upper Koyukuk River drainage; these stocks support subsistence fisheries in the Koyukuk River and lower Yukon River drainage. Project objectives are clear and have been achieved. The capacity building portion of this study is excellent, with Tanana Chiefs Conference assuming more responsibility for the Henshaw Creek weir. Support has been voiced by Tribal, State and Federal stakeholders. The continuation of reliable escapement estimates and the collection of age-sex-length data at Henshaw Creek will enable future analyses of trends in Chinook and summer chum salmon run timing, escapements, gender composition, and size and age structure over time. Funding beyond 2013 could be considered in response to the 2014 Request for Proposals; but given competing

priorities and budget limitations, investigators should begin seeking other funding sources. The overall long term priority of this project to address Federal subsistence management issues may not be sufficient to justify longer term support.

Yukon Region

Project Number: 12-204
Project Title: Anvik River Sonar Project
Geographic Region: Yukon
Information Type: Stock Status and Trends
Principal Investigator: Carl T. Pfisterer, Alaska Department of Fish and Game
Co-Investigator(s): Malcolm McEwen, Alaska Department of Fish and Game

Project Cost: **2012:** \$93,366 **2013:** \$97,043

Recommendation: Fund

Issue

The Anvik River contributes to the subsistence chum salmon fishery in the lower Yukon River, which is part of the Yukon Delta National Wildlife Refuge. The subsistence summer chum fishery occurs in the Yukon Delta National Wildlife Refuge from approximately June 10 through July 15. The Anvik River sonar project is a continuing project that directly addresses the identified Yukon Region priority need “reliable estimates of Chinook and chum salmon escapements (e.g., weir and sonar projects)”.

The Anvik River sonar project has provided reliable estimates of chum salmon escapement to the Anvik River since 1979 and is one of only two projects in the Yukon River drainage with an established Biological Escapement Goal for summer chum salmon. A Biological Escapement Goal is the escapement that provides the greatest potential for maximum sustained yield and is the primary management objective for escapement. The Anvik River sonar project's longevity and history of being one of the largest producers of summer chum salmon in the Yukon River drainage combine to make this one of the most important projects for escapement monitoring and management of chum salmon in the Yukon Region. Daily estimates of chum salmon passage are provided to Federal and State fishery managers daily for consideration in management actions that can directly affect subsistence harvest in the Yukon Delta National Wildlife Refuge and the rest of the Yukon River drainage.

Objectives

1. Estimate chum salmon fish abundance in the Anvik River using DIDSON sonar from approximately June 16 through July 26.
2. Collect between 162–210 chum salmon samples during each of 3 to 4 stratum throughout the season to estimate the age, sex, and length (ASL) composition of the Anvik River chum salmon passage, such that simultaneous 95% confidence intervals of age composition in each sample are no wider than 0.20 ($\alpha = 0.05$ and $d = 0.10$).
3. Monitor selected climatic and hydrological parameters daily at the project site for use as baseline data.

Methods

The Anvik River sonar project will be operated from its customary location approximately 76 km upstream of the confluence of the Anvik and Yukon Rivers, 5 km below Theodore Creek (Figure 2) in Sections 34 and 35, Township 31 North, Range 61 West, Seward Meridian, at latitude/longitude 62° 44.208” N 160° 40.724” W.

Dual Frequency Identification Sonar (DIDSON) will be used to count salmon migrating past the site. The DIDSON sonar is a state-of-the-art imaging sonar that produces video like images making it easy to identify fish, the direction of travel, and even limited ability to estimate size. Sonar will be deployed on each bank of the Anvik River and data will be collected 30 minutes of each hour, 24-hours per day, and seven days a week for the duration of the study. This will provide a total of 12 hours of data per day per bank. Counts will be expanded for the fraction of the day sampled to estimate daily passage. The only fish species present in large numbers during the chum salmon run is pink salmon. When pink salmon are present a tower will be used to estimate the relative proportion of chum and pink salmon. These proportions will be used to apportion the sonar counts to species.

Region wide standards have been set for the sample size needed to describe age composition of a salmon population. These would apply to the time period or stratum in which the sample is collected. Sample size goals are based on accuracy (d) and precision (a) objectives of $d = 0.10$ and $a = 0.05$ for a rejection rate of 10%. Sample sizes will be based on obtaining 162 summer chum salmon for each of the following time strata: June 17–30; July 1–7; July 8–14; and July 15–30.

Climatic and hydrologic data will be collected at approximately 1800 hours each day at the sonar site. River depth is monitored using a staff gauge marked in 1 cm increments. Change in water depth will be presented as negative or positive increments from the initial reading of 0.0 cm. Water and air temperature will be measured using a HOBO temperature logger, which will electronically record the temperature every hour. Subjective notes on wind speed and direction, cloud cover and precipitation will be recorded.

Partnerships/Capacity Building

Due to the technical nature of the work, limited opportunities exist to develop partnerships and build local capacity. During the fishing season information is presented during the weekly Yukon River Drainage Fisheries Association teleconference. Currently we have a technician working on the project from a village downriver of Anvik. When there is a vacancy with the crew we are trying to hire from the local villages.

Justification

The Anvik River is one of the top producers of summer chum salmon in the Yukon River currently accounting for approximately one third of total production. Approximately 70% of the total subsistence harvest of summer chum salmon occurs below the Anvik River. The Anvik River Sonar project is an important monitoring project for summer chum salmon to assess run strength and meet biological escapement goals. The project primarily supports the management of commercial fisheries directed at summer chum salmon. Consistent with policy for ongoing base projects, the proposal includes a 56% match with State funds. However, the overall long term priority of this project to address Federal subsistence management issues may not be sufficient to justify longer term support. Therefore, it is recommended that the project be funded for only an additional two years. Funding beyond 2013 could be considered in response to the 2014 Request for Proposals; but given competing priorities and budget limitations, investigators should begin seeking other funding sources.

Project Number: 12-205
Project Title: Kaltag Chinook Salmon Sampling Project
Geographic Region: Yukon
Information Type: Stock Status and Trends
Principal Investigator: Richard Burnham, City of Kaltag

Project Cost: **2012:** \$4,000 **2013:** \$4,000 **2014:** 4,000 **2015:** \$4,000

Recommendation: Fund

Issue

Knowledge of Chinook salmon mixed stock harvests are a prerequisite to understanding and evaluating changes to stock-specific production. Current sampling programs are designed to fulfill the U.S.-Canada Treaty Agreement by assessing the number of Yukon River Chinook salmon harvested and estimating this harvest by age, sex, length (ASL), and stock composition. A lack of data from the District 4 harvest, which includes Kaltag, has contributed to uncertainty in previous stock specific harvest estimates. In 2005, subsistence harvest samples from Kaltag and Nulato will be used to estimate the ASL and stock composition of the Yukon River Subdistrict 4-A subsistence harvest. In some years, with no or limited sampling, the nearest commercial harvest samples were used for estimating subsistence harvest composition. However, the subsistence harvest is greater than the commercial harvest in some districts, and the gear types may be different. Further, as subsistence harvests increase in relation to other harvests, these samples will become increasingly important to the composite database.

Federal and State managers rate this project as a high strategic priority. This project helps fulfill the US-Canada Treaty Agreement by estimating the age, sex, length (ASL), and stock composition for the fishery in Subdistrict 4-A. The Office of Subsistence Management supported this project in 2001 (01-050).

Objectives

Collect biological data from 250 Chinook salmon harvested by Kaltag subsistence fishers. These data include scales, sex, length, and an axillary process clip.

Record associated data such as date, harvest location, gear type, and mesh size.

Methods

Chinook salmon will be sampled in the round as soon after capture as practical. Sampling will occur throughout the duration of the run in proportion to abundance as much as possible. During sampling, all available fish will be sampled for an axillary process clip, scales, sex, and length. Capture method, mesh size, location, date, fish number, scale card number, and genetic vial number will be recorded.

Alaska Department of Fish and Game will send sampling supplies to Kaltag before the field season begins in late May. Sampling technicians will be hired before the field season. Sample collection will begin as soon as subsistence fishers start harvesting salmon, usually early to mid-June.

Three scales are collected from the preferred area on the left side of the fish and mounted on pre-printed gum cards. Length will be measured from mid-eye to fork of tail to the nearest five mm. Sex will be visually determined from external morphological characteristics or from internal examination of the

gonads. Approximately 3/4-inch of the axillary process is clipped, placed in individually numbered vials, and the vial filled with ethanol. Associated data are recorded in field logbooks and later transferred to Opscan forms. After the majority of the Chinook salmon subsistence harvest has occurred, samples and associated data will be sent to the Alaska Department of Fish and Game, Anchorage office.

From August through December, samples will be processed, analyzed and summarized by Alaska Department of Fish and Game. ASL data will be compiled by the Stock Biology Laboratory and the axillary process clips will be compiled by the Genetics Laboratory to estimate stock composition for Canadian- and U.S.-origin fish. Upon completion of sample processing and analysis, Alaska Department of Fish and Game will forward preliminary results to the principal investigator for inclusion in performance, annual, and final reports. Alaska Department of Fish and Game final reports, which include data collected by the principal investigator, will be forwarded to the principal investigator when available.

Partnership/Capacity Building

The project directly involves Kaltag residents collecting inseason fisheries data from the subsistence Chinook salmon harvest. Technical consultations were completed with Alaska Department of Fish and Game, Division of Commercial Fisheries, Larry Dubois, Summer Season Area Research Biologist.

Justification

The project supplements the commercial age, sex, and length database providing 250 samples from subsistence caught Chinook salmon in Subdistrict 4A. The project provides for direct involvement of a local community in the collection of fisheries data from the subsistence harvest. The project is reasonably budgeted and the information collected benefits the post-season evaluation of Chinook salmon harvest. Two local technicians would be hired to collect age, sex, and length and scale samples. The Office of Subsistence Management has supported this work since 2001.

Yukon Region

Project Number: 12-207
Project Title: Yukon River Bering Cisco Spawning Origins Telemetry Investigation
Geographic Region: Yukon
Information Type: Stock Status and Trends
Principal Investigator: David Daum, U.S. Fish and Wildlife Service
Co-Investigator(s): Randy Brown, U.S. Fish and Wildlife Service

Project Cost: **2012:** \$71,050 **2013:** \$77,550 **2014:** \$9,500

Recommendation: Fund

Issue

The Bering cisco *Coregonus laurettae* population in the Yukon River is thought to spawn in main-stem reaches of the upper Yukon Flats and rear in coastal lagoons of western and northern Alaska, though a comprehensive study defining spawning and rearing extent has not been attempted to date. Subsistence fishers harvest Bering cisco throughout their range and the species is particularly favored in most coastal communities of western Alaska. Annual subsistence harvest data specific to Bering cisco have not been collected (harvest surveys combine all Coregonid species under a “whitefish” category); however, harvest is assumed to be substantial. A commercial fishery for whitefish was initiated in the lower Yukon River in the fall of 2005 and the product is being marketed as a smoked fish product in New York City. Initially, all coregonid species were targeted in the fishery, but Bering cisco is now the preferred commercial species. The fishery has been limited to an annual cisco harvest of about 4,500 kg (10,000 lb) until 2010, when the allocation was increased to 6,800 kg (15,000 lb). This amount has been considered by fishery managers to be conservative, but there are no population abundance estimates to support this view. On numerous occasions, the commercial buyer has requested substantial increases in the annual allocation, but without additional population-specific data, managers have been reluctant to grant an additional allocation. Some coastal subsistence users are concerned about the developing commercial fishery and its potential impact on their harvest. There is also a biological concern for the potential over-harvest of Yukon River Bering cisco since the species is demographically distributed over a very large geographic region.

This proposed study will define the geographic spawning distribution of the Yukon River Bering cisco population. A spawning aggregate has been documented in the Yukon River main stem, upper Yukon Flats, though upper and lower limits of spawning have not been described. Also, additional spawning aggregates may exist that have not been identified. Defining the spawning locations of Yukon River Bering cisco is the next step in the sequential process leading to the ability to manage this important fishery. As outlined in the Preliminary Strategic Plan for Research of Whitefish Species in the Yukon and Kuskokwim River Drainages in Alaska, run timing and demography of the spawning run past Rampart Rapids (1,200 km upstream from the Yukon River mouth) have been described, genetic stock composition and demographic description of the commercial harvest are ongoing; spawning locations identified (this proposal); stock composition of the subsistence catch quantified; and a population monitoring program established. Data from this project will also be useful for ensuring protection of these important freshwater habitats from potential disruptive development, such as, streambed gravel extraction for rural village infrastructure upgrades. This proposal addresses the Yukon Region Priority Information Needs described in Office of Subsistence Management’s 2012 Request for Proposals, specifically, location of Bering cisco spawning habitat and timing of spawning in the Yukon River drainage. This proposal also addresses the Whitefish Strategic Plan general issues of concern #4, spawning origins of priority species

must be located to identify populations; and Bering cisco research priority #3, delineation of the spawning distributions of Bering cisco in the Yukon and Kuskokwim River drainages.

Objectives

1. Deploy 100 radio transmitters per year (2012 and 2013) at Rampart Rapids during the Bering cisco summer/fall spawning migration;
2. Locate spawning destinations for Bering cisco using remote station and aerial telemetry techniques;
3. Analyze telemetry data to determine geographic spawning distribution, timing of spawning, and post-spawning downstream migration; and
4. Nominate spawning areas for inclusion into the Alaska Anadromous Waters Catalog and other appropriate habitat protection vehicles.

Partnership/Capacity Building

A large part of this project (fish tagging) is directly dependent on the partnership with Rapids Research Center, the director Stan Zuray, and the local individuals (mostly students) who work at the Student Educational Camp during the summer months. The Rapids video fish wheel project (funded by Restoration and Enhancement Funds) will be the platform used for capturing, tagging, and releasing fish. This fish wheel has been designed to capture and release fish unharmed, which is not the case for most subsistence and commercial fish wheels operating in the Yukon River drainage. Local students, workers, fisherman, and camp instructors will all witness the Bering cisco tagging project first hand; becoming acquainted with all aspects of the project through discussions, hands on demonstrations, scientific interactions, and direct participation when work schedules allow. The Rapids Research Center will also provide housing and logistics for the project during the summer/fall tagging seasons in 2012 and 2013.

Justification

The proposal specifically addresses a priority information need established in the 2012 Request for Proposals and Strategic Whitefish Research Plan. Strategic priority, technical merit and investigator ability are rated high. The project design and sampling described in the investigation plan should ensure that the project objectives are achievable. The association and participation of the Rapids Research Center in this project provide enhanced opportunities for capacity building with local stake holders and communities. Given the importance of Bering cisco to Yukon River subsistence fisheries, detailed mapping and documentation of this species spawning areas will assist management agencies to protect their habitat as well as design future work to monitor the status of the Yukon River Bering cisco stock. This work should be viewed as an important and necessary step leading to development of effective management strategies to ensure long term conservation.

Yukon Region

Project Number: 12-251
Project Title: In-season Salmon Management Teleconferences and Harvest Interviews
Geographic Region: Yukon
Information Type: Harvest Monitoring and Traditional Ecological Knowledge
Principal Investigator: Jason Hale, Yukon River Drainage Fisheries Association
Co-Investigator(s): Catherine Moncrieff, Yukon River Drainage Fisheries Association

Project Cost: **2012:** \$24,886 **2013:** \$72,472 **2014:** \$72,940 **2015:** \$54,722

Recommendation: Fund

Issue

This project addresses the need for inclusive management in-season for Chinook, chum, and coho salmon fisheries on the Yukon River. Salmon are a critical resource for subsistence and commercial users in this region, which includes numerous Federal conservation units, and fisheries managers must have a means to gather input, assess harvests, and share information with these fishermen and fisheries stakeholders throughout the fishing season.

Yukon River Drainage Fisheries Association will host public in-season salmon management teleconferences throughout the salmon fishing season to foster communications between managers and fishermen in Yukon River. The Alaska Department of Fish and Game and the U.S. Fish and Wildlife Service fisheries managers monitor salmon fisheries and make in-season management decisions that need to be conveyed to approximately 55 communities in the Alaskan and Canadian portions of the Yukon River. The in-season management teleconferences give fishermen a reliable and consistent forum to access current information and also provide a direct link to communicate with fisheries managers. During the calls each week, fisheries reports are given up and down the river, including from 10 villages where Yukon River Drainage Fisheries Association will coordinate gathering qualitative in-season salmon harvest data. This enables fisheries managers to hear from fishermen, and community members from many locations along the Yukon River about fishing effort, harvest levels, and fishing conditions that impact their ability to harvest salmon. The calls aim to focus on in-season salmon management to ensure a maximum number of people can participate in the 90 minute time frame allotted to the calls. This project addresses the need for Alaskans and Canadians to participate first hand in fisheries management decision-making, especially during times of low salmon abundance and builds understanding regarding the management, use, and status of their shared salmon resource. The information shared helps fishing families prepare for the fishing season and builds relationships among diverse stakeholders that are needed for resource decision-making. Due to the need for consistent

The in-season harvest survey is an important assessment tool in that it qualitatively informs managers how fishers in key locations throughout the drainage are doing in-season, enabling managers to make timely decisions allowing the maximum of fishers to meet their subsistence needs. The in-season harvest survey will compliment the quantitative post-season survey by providing an explanation of fishing success such as high water, debris and other adverse effects that influence fishing success. In addition, a new question will be added to gather total harvest goals allowing for a secondary analysis of subsistence needs met as compared to harvest goal size.

Objectives

Provide an in-season forum for sharing information, facilitating discussion, building understanding among all stakeholder and user groups in the Yukon River drainage;

Collect qualitative harvest data information from 10 communities in the Alaskan portion of the Yukon River drainage during the Chinook salmon season.

Methods

Yukon River Drainage Fisheries Association will work with Alaska Department of Fish and Game and U.S. Fish and Wildlife Service annually to plan for the project by reviewing past performance and refining methods to meet project objectives. Yukon River Drainage Fisheries Association will implement pre-season promotions through direct mail, e-mail, social media, letters, posters, and newspaper advertisements to increase participation. Yukon River Drainage Fisheries Association will reserve a toll free phone line for every Tuesday at 1 p.m. AK time from the first week in June to the last week in August. During the first teleconference of the season Yukon River Drainage Fisheries Association will review the agenda and meeting protocols and Yukon River Drainage Fisheries Association staff will facilitate each teleconference that will include subsistence and management reports, as well as discussion. Yukon River Drainage Fisheries Association will summarize each call, which will be reviewed by agency managers and distributed through email and Yukon River Drainage Fisheries Association's website.

In-season harvest interviews will take place during the summer Chinook salmon season in 10 villages (Marshall, Russian Mission, Holy Cross, Kaltag, Nulato, Huslia, Galena, Nenana, Fort Yukon, and Eagle). The interview methodology will follow the *Principles for Conduct of Research in the Arctic*. The Yukon River Drainage Fisheries Association anthropologist will review the interview methodology and survey instrument will be reviewed and revised annually to ensure the recording and reporting formats are useful for managers and fishermen; she will identify any limitations from the previous year and will update data collection forms, interviewer training and protocols, and reporting.

Feedback from the state and federal managers in 2011 led to changes in the interview form and reports. Both the Yukon River post-season survey and the Kuskokwim River In-season survey have been reviewed and staff consulted on revisions. The in-season harvest survey methodology focuses on interviewing fishers weekly to collect qualitative information to provide managers with a real time assessment of the run. Quantitative information is not collected through this survey because of the nature of the design, surveyors do not always interview the same fishers every week but opportunistically interview all fishers they are able to contact, would make it difficult to collect extensive quantitative information, as in the post-season survey. But a secondary analysis that can link the post-season survey will include a question inquiring about each fisher's harvest goals at the beginning of the season and followed up weekly with a report on their progress towards their harvest goals.

In addition to collecting information from fishers, interviewers will disseminate relevant information to fishers as it becomes available. This will give fishers another link to management and keep them informed in-season regarding the fishery.

Partnerships/Capacity Building

This project will build the capability and expertise of Yukon River Drainage Fisheries Association, local interviewers, tribal councils and the fishing families participating in the interviews. Yukon River Drainage Fisheries Association will contract with tribal councils and train interviewers on information

gathering and reporting to include interview techniques, informed consent, protection of privacy, and how to report results in weekly teleconferences. The survey portion of the project will also build the capacity of the fishers being interviewed by informing them of current fisheries news and involving them in management. This project will promote interaction among rural residents through participation in the teleconferences and interaction within their villages on fisheries management. By engaging the resource users in the process of data gathering and including them in weekly discussions, they will be building their capacity in resource decision-making. Yukon River Drainage Fisheries Association will also build capacity in working with tribal councils on program implementation, oversight and delivery of services.

Justification

The project has a high strategic priority with high investigator ability and will continue to promote in-season information sharing, partnerships and capacity building, and management efforts on the Yukon River. In-season teleconferences have facilitated and improved communication and information sharing; the current proposal continues that effort. The budget is adequate for the proposed work.

Project Number: 12-302
Project Title: Lower Kuskokwim River Subsistence Chinook Salmon Harvest ASL Composition
Geographic Region: Kuskokwim
Information Type: Stock Status and Trends
Principal Investigator: Zachary W. Liller, Alaska Department of Fish and Game
Co-Investigator(s): Greg Roczicka, Orutsarmiut Native Council
 Christopher A. Shelden, Alaska Department of Fish and Game
 Kevin L. Schaberg, Alaska Department of Fish and Game

Project Cost: **2012:** \$100,279 **2013:** \$93,803 **2014:** \$96,923 **2015:** \$82,429

Recommendation: Fund

Issue

This project is designed to characterize the annual age, sex, and length (ASL) composition of the Lower Kuskokwim River Chinook salmon subsistence harvest for years 2012–2015. This project provides a quantitative assessment of Kuskokwim River Chinook salmon subsistence harvest patterns such as timing and methods (i.e., gear type) and the resulting harvest composition by age, sex, and size. The utility of this data is magnified when integrated with other existing Kuskokwim River monitoring projects that estimate total subsistence harvest of Chinook salmon, ASL composition of the annual escapement, ASL composition of the annual commercial harvest, and total Chinook salmon run abundance. Collectively, this information allows for broad-scale analyses that guide sustainable management of Kuskokwim River Chinook salmon.

The Kuskokwim Area subsistence salmon fishery is one of the largest and most important in the state. With a recent 10-year average (2000–2009) annual harvest of over 87,000 Chinook salmon, the Kuskokwim River subsistence fishery accounts for about half of the total statewide subsistence harvest of Chinook salmon. Within the Kuskokwim River, subsistence harvest accounts for over 96% of the average annual total harvest of Chinook salmon (2000–2009) with approximately 85% of the subsistence harvest occurring in the project study area, which is within the Yukon Delta National Wildlife Refuge. On average (2000–2009), the subsistence fishery harvests 33% of the total annual returns of Chinook salmon to the Kuskokwim River; although, exploitation by the subsistence fishery has been as high as 50–60% in years of low Chinook salmon abundance.

Given the relative size of the Kuskokwim River subsistence harvest of Chinook salmon compared to other fisheries, it is clear that the subsistence fishery has the single greatest inriver influence on the number and quality of returning adult Chinook salmon that escape each year. Moreover, considering that the timing of the Chinook salmon subsistence fishery tends to be focused during the early portion of the run and the primary gear type used (i.e., large mesh gill nets) is selective for larger fish (of which many are older-aged fish and females), there is considerable potential to adversely affect spawning escapement by harvesting disproportionately across stocks, age classes, sex, and sizes.

Continuing to accurately quantify the ASL composition of the Lower Kuskokwim River Chinook salmon subsistence harvest may prove especially valuable in upcoming years. Given the recent low returns of Chinook salmon to monitored tributaries in the Lower Kuskokwim River, conservation measures may be warranted that could have implications to subsistence fishermen. This project could provide insight into

the effects those management actions may have on subsistence harvests. Furthermore, knowledge of the ASL composition of the harvest is critical for generating reliable estimates of drainage wide Chinook salmon escapement and producing quantitative forecasts of future year returns, the importance of which are magnified during years of expected low abundance.

Objectives

- Describe the annual and temporally stratified ASL composition of Chinook salmon in the lower Kuskokwim River subsistence harvest.
- Characterize the annual ASL composition of Chinook salmon in the lower Kuskokwim River subsistence harvest by gear type.
- Compare the ASL composition of Chinook salmon harvested in the Kuskokwim River subsistence fishery to the ASL composition of the commercial harvest and spawning escapement.
- Assess the effectiveness of the current project study design. The goal of this analysis will be to:
- Identify an optimal number of participants to characterize the proportions of gear types used by lower Kuskokwim River Chinook salmon subsistence fishermen;
- Examine the cost vs. benefit of the spatial distribution of participants' fishing effort;
- Examine the effects of sub-sampling fishermen's annual harvest.

Methods

This study is a continuation of Monitoring Program project 08-302. The project study area is defined as ranging from the Eek Island at the mouth of the Kuskokwim River upstream to Tuluksak (rkm 192). Chinook salmon ASL information will be collected throughout the study area by non-agency participants, primarily subsistence fishermen and subsistence household members that will sample from their annual harvest. This study will implement a two-stage sampling design for collecting representative ASL data from the lower Kuskokwim River Chinook salmon subsistence harvest. The first stage involves recruiting a voluntary sample of lower river subsistence fishermen in order to characterize the harvest patterns of the subsistence fleet. The second stage involves collection of ASL samples from each Chinook salmon harvested by those participating fishermen. All data will be collected using standardized methods consistent with those used by Alaska Department of Fish and Game staff. All samples will be processed by Alaska Department of Fish and Game stock biologists and summarized in table and figure form. Data will be archived in the Arctic-Yukon-Kuskokwim Regional Database Management System and published in the Alaska Department of Fish and Game Fisheries Data Series.

Partnerships/Capacity Building

Alaska Department of Fish and Game, Commercial Fisheries Division and Orutsararmiut Native Council will conduct this project in partnership. Alaska Department of Fish and Game, Commercial Fisheries Division is responsible for data collection from communities outside the Bethel area, for data processing, and reporting. Orutsararmiut Native Council staff is responsible for data collection from Bethel and fish camps within nearly 20 miles of Bethel. Orutsararmiut Native Council staff provides critical review of data analysis and reporting.

Communication and consultation are cornerstones of the Kuskokwim Area fishery program with a proud history of building trust and broad public support through active sharing of information, which is perhaps best epitomized through the Kuskokwim River Salmon Management Working Group and the semi-annual Kuskokwim Interagency Fisheries meetings. Investigators not only heighten awareness of the subsistence ASL program, but guide participants through the process of interpreting and integrating a broad array of

fisheries projects to build a foundation on which to base informed fishery management decisions, and which facilitate effective public integration into the management process.

Justification

The project addresses a priority information need identified in the 2012 Request for Proposals. The principal investigator was responsive to the Technical Review Committee’s proposal review and thoroughly addressed all study design and budget issues. The investigation plan includes an additional objective to assess the effectiveness of the current project study design (sensitivity analysis) in the first year of the project and sets a sampling goal. Project objectives appear to be achievable with proposed budget. The funding request represents a 12% decrease over the previous four-year project budget. There is a strong partnership between the Alaska Department Fish and Game and the Orutsarmiut Native Council, project investigators.

Project Number: 12-303
Project Title: George River Salmon Weir
Geographic Region: Kuskokwim
Data Type: Stock Status and Trends
Principle Investigator: Christopher A. Shelden, Alaska Department of Fish and Game
Co-Investigator(s): Michael Thalhauser, Kuskokwim Native Association
Kevin Schaberg, Alaska Department of Fish and Game
Zachary Liller, Alaska Department of Fish and Game

Project Cost Option A: **2012:** \$154,903 **2013:** \$159,630

Project Cost Option B: **2012:** \$171,097 **2013:** \$175,289

Inclusive of Kuskokwim Native Association High School intern costs.

Recommendation: Fund Option B

Issue

George River salmon contribute to subsistence, commercial, and recreational fisheries within the Yukon Delta National Wildlife Refuge Federal nexus. Contributing to numerous initiatives that are inclusive of the entire Kuskokwim River drainage, the George River weir is one of several projects used to develop reliable estimates of abundance, run timing, stock structure, productivity, and carrying capacity of salmon stocks over a broad geographic scale in the Kuskokwim Region (Area), issues identified by the Office of Subsistence Management as a priority information need. The project provides fundamental escapement information necessary to facilitate inseason management decisions and to assess trends in salmon populations. This project is essential as a platform for several other projects and for developing escapement goals. This project also incorporates substantial capacity building and outreach components, including a Kuskokwim Native Association High School Internship program that has fostered understanding and cooperation between stakeholders and agencies across the region.

Salmon escapements from this project have been monitored successfully 13 out of 15 years since 1996. Information from this project has become integrated into the annual management process, both by providing insights into escapement and stock specific run timing through the fishery. The escapement age, sex, and length information collected at George River provides part of the context needed to assess the impacts of subsistence harvest practices (*Age, Sex, and Length Composition of Lower Kuskokwim River Subsistence Chinook Harvest*, proposed project 12-302). Total run abundance estimates that include data from George River weir contribute to determination of annual exploitation rates, comparison of exploitation among age/sex components, assessment of high seas interception, examination of the influence of environmental factors on variability in abundance, and investigations into the potential development of drainage-wide escapement goals. This information is foundational for assessing changes in salmon abundance and run dynamics that may result from management actions or environmental factors such as climate change. Total abundance estimates facilitate the identification of both harvestable surpluses and conservation concerns, contributing to regulatory and management decisions that directly affect subsistence use as the issue of “allocation priority” is defined in the 2012 Request for Proposals.

Objectives

1. Determine daily and total annual Chinook, chum, and coho salmon escapements from 15 June to 20 September;
2. Estimate age-sex-length (ASL) composition of annual Chinook, chum, and coho salmon escapements to the George River such that 95% confidence intervals of age composition will be no wider than $\pm 10\%$ ($\alpha=0.05$, $d=0.10$);
3. Provide mentorship and administer education curriculum to Kuskokwim Native Association high school interns; and
4. Serve as a platform to facilitate current and future fisheries research projects.

Methods

Investigators will install a resistance board weir on the lower George River. Passage gates in the weir will allow fish to be identified by species and counted as they pass upstream and a live trap will be used to sample salmon for scales, and sex and length information; and for tag recovery for AYK SSI funded projects *Kuskokwim River coho salmon investigations*, and *Kuskokwim River Sockeye Salmon Investigations*. ASL data is processed post-season under the *Kuskokwim Salmon ASL Assessment Project* (project 10-303). Investigators will also record daily water temperature, water level, and weather conditions, and maintain equipment in support of *Temperature Monitoring* (project 08-701). A local technician hired by Kuskokwim Native Association will operate the project along with a lead crew member provided by Alaska Department of Fish and Game. The project will serve as a platform for several research initiatives including those listed above and genetic and otolith collection for stock identification. Potential exists for this project to provide a platform for future studies as well.

Partnership/Capacity Building

Kuskokwim Native Association and Alaska Department of Fish and Game operate the George River weir jointly at the Partnership Level. Planning, operation, and data analysis associated with the weir is done through an interactive feedback between staff from both organizations, including the Kuskokwim Native Association fishery biologist who is employed through the Office of Subsistence Management Partners Program. Kuskokwim Native Association has a proven track record of effective involvement in weir operation. Past interactions between Kuskokwim Native Association, Alaska Department of Fish and Game, Commercial Fisheries Division, and local communities has created a high level of public awareness about salmon management and stock status, and has fostered career interests in fisheries through the student internship program.

The George and Takotna project hosts an established high school mentorship program, which facilitates broad community awareness and understanding, interest, and direct involvement fisheries management. The Kuskokwim Native Association High School intern program sponsors between 15 and 20 high school age students from throughout the Kuskokwim Area on week-long internships, which includes a curriculum of activities and assignments on salmon life history and management. This outreach program is a long-term investment that develops informed individuals who will serve as the future technicians, biologists, board members, public leaders, and the voting citizens who will influence the course of future events through their decisions. Several former High School and college interns from this program have already gone on to become fisheries technicians with both Kuskokwim Native Association and the Department of Fish and Game. Several others are now completing college degrees, having gotten a start through this program.

Justification

The project addresses a priority information need for salmon escapement monitoring identified in the 2012 Request for Proposals and provides information for inseason subsistence fishery managers. The investigators are experienced, competent and knowledgeable and there is strong partnership between the Alaska Department of Fish and Game and Kuskokwim Native Association. Option B is a request for \$16,000 of additional funds per year for approximately 15 high school interns. Under this option, the interns would spend 1-2 weeks at the George River weir and other fisheries projects, and would complete a curriculum of field work, a photo and writing journal, and worksheets; and engage in other relevant and related educational activities. The intern program is currently being funded under the Partners Program, PFM-103, which will conclude on 31 December 2011. Due to some confusion, the Kuskokwim Native Association Co-Investigator did not submit a proposal in early 2011 to the Office of Subsistence Management to continue this portion of the Partners Program. The public outreach and community involvement engendered by the intern program is one of the most important components of the various activities that the Alaska Department of Fish and Game and Kuskokwim Native Association do cooperatively, and therefore warrants inclusion in Project 12-303. There is a precedence for funding through a Stock Status and Trends project, as funding for the intern program was part of the Monitoring Program budget for the Tatlawiksuk River weir project (FIS 07-304), also cooperatively operated by the Alaska Department of Fish and Game and Kuskokwim Native Association. The investigation plan submitted would provide only two years of funding for this project. This was done at the request of the Technical Review Committee so that a programmatic and geographic review of all Kuskokwim area salmon enumeration (weir) projects could be done prior to the 2014 Call for Proposals.

Project Number: 12-304
Project Title: Takotna River Salmon Weir
Geographic Region: Kuskokwim
Information Type: Stock Status and Trends
Principle Investigator: Christopher A. Shelden, Alaska Department of Fish and Game
Co-Investigators: Dick Newton, Takotna Community Association
 Nell Huffman, Takotna Community Association
 Kevin Schaberg, Alaska Department of Fish and Game
 Zachary Liller, Alaska Department of Fish and Game
 Clinton Goods, Alaska Department of Fish and Game

Project Cost: **2012:** \$116,096 **2013:** \$115,345

Recommendation: Fund

Issue

Takotna River salmon contribute to subsistence, commercial, and recreational fisheries within the Yukon Delta National Wildlife Refuge Federal nexus. Contributing to numerous initiatives that are inclusive of the entire Kuskokwim River drainage, the Takotna River weir is one of several projects used to develop reliable estimates of abundance, run timing, stock structure, productivity, and carrying capacity of salmon stocks over a broad geographic scale in the Kuskokwim Region (Area), issues identified by the Office of Subsistence Management as a priority information need. The project provides fundamental escapement information necessary to facilitate inseason management decisions and to assess trends in salmon populations. This project is essential as a platform for several other projects and for developing escapement goals. This project also incorporates substantial capacity building and outreach components, including a Takotna Community Association High School Internship program that has fostered understanding and cooperation between stakeholders and agencies across the region.

Salmon escapements from this project have been monitored successfully 13 out of 15 years since 1996. Information from this project has become integrated into the annual management process, both by providing insights into escapement and stock specific run timing through the fishery. The escapement age, sex, and length information collected at Takotna River provides part of the context needed to assess the impacts of subsistence harvest practices (*Age, Sex, and Length Composition of Lower Kuskokwim River Subsistence Chinook Harvest*, proposed project 12-302). Total run abundance estimates that include data from Takotna River weir contribute to determination of annual exploitation rates, comparison of exploitation among age/sex components, assessment of high seas interception, examination of the influence of environmental factors on variability in abundance, and investigations into the potential development of drainage-wide escapement goals. This information is foundational for assessing changes in salmon abundance and run dynamics that may result from management actions or environmental factors such as climate change. Total abundance estimates facilitate the identification of both harvestable surpluses and conservation concerns, contributing to regulatory and management decisions that directly affect subsistence use as the issue of “allocation priority” is defined in the 2012 Request for Proposals.

Objectives

1. Determine daily and total annual Chinook, chum, and coho salmon escapements from 15 June to 20 September;
2. Estimate age-sex-length (ASL) composition of annual Chinook, chum, and coho salmon escapements to the Takotna River such that 95% confidence intervals of age composition will be no wider than $\pm 10\%$ ($\alpha=0.05$, $d=0.10$);
3. Provide mentorship and administer education curriculum to Takotna Community Association high school interns; and
4. Serve as a platform to facilitate current and future fisheries research projects.

Methods

Investigators will install a resistance board weir on the lower Takotna River. Passage gates in the weir will allow fish to be identified by species and counted as they pass upstream and a live trap will be used to sample salmon for scales, and sex and length information; and for tag recovery for Arctic-Yukon-Kuskokwim Sustainable Salmon Initiative funded projects *Kuskokwim River coho salmon investigations*, and *Kuskokwim River Sockeye Salmon Investigations*. ASL data is processed post-season under *Kuskokwim Salmon ASL Assessment Project* (project 10-303). Video equipment will be installed to improve counting coverage at times of low volume passage. Investigators will also record daily water temperature, water level, and weather conditions, and maintain equipment in support of *Temperature Monitoring* (project 08-701). A local technician hired by Takotna Community Association will operate the project along with a lead crew member provided by Alaska Department of Fish and Game. The project will serve as a platform for several research initiatives including those listed above and genetic and otolith collection for stock identification. Potential exists for this project to provide a platform for future studies as well.

Partnership/Capacity Building

Takotna Community Association and Alaska Department of Fish and Game operate the Takotna River weir jointly at the Partnership Level. Planning, operation, and data analysis associated with the weir is done through an interactive feedback between staff from both organizations. Formerly, this project was administered by Takotna Tribal Council with assistance from Takotna Community Association. However, because of financial and administrative difficulties, Takotna Tribal Council has requested that Takotna Community Association take responsibility for this project. Takotna Community Association is the recognized village government of the village of Takotna and has a proven track record of grant and project management. Takotna Community Association is committed to fostering the continued development of a high level of public awareness about salmon management and stock status, and to continue to foster career interests in fisheries through the student internship program.

The Takotna projects has an established high school mentorship program, which facilitates broad community awareness and understanding, interest, and direct involvement fisheries management. The Takotna program provides part-time employment throughout the season to high school students who work directly with the full-time adult crew members. This program also sponsors an annual meeting where community members for Takotna and McGrath spend a full day touring the weir and participating in a presentation that describes the annual status of Kuskokwim River salmon runs and an overview of projects. This outreach program is a long-term investment that has developed informed individuals who have served as technicians, and will one day be board members, public leaders, and voting citizens who will influence the course of future events through their decisions.

Justification

The investigation plan addresses a priority information need for salmon escapement monitoring identified in the 2012 Request for Proposals. The investigators are experienced, competent and knowledgeable and there is strong partnership between the Alaska Department of Fish and Game and the community of Takotna. This project has a history of successful operation, providing fisheries managers with reliable information on salmon escapement in the Takotna River. In addition, the Takotna River weir has been utilized as a platform for other projects, including Monitoring Program project 08-701 for water temperature and stream gauge monitoring. The proposed budget is adequate to achieve project objectives, with both years less than the budget amount for 2011 under project 08-304. The investigation plan submitted would provide only two years of funding for this project. This was done at the request of the Technical Review Committee so that a programmatic and geographic review of all Kuskokwim area salmon enumeration (weir) projects could be done prior to the 2014 Call for Proposals.

Project Number: 12-309
Project Title: Kwethluk River Weir Salmon Escapement Enumeration with Videography
Geographic Area: Kuskokwim
Information Type: Stock Status and Trends
Principal Investigator: Ken Harper, U.S. Fish and Wildlife Service
Co-Investigator(s): Steve J. Miller, U.S. Fish and Wildlife Service

Project Cost: 2012: \$36,240

Denotes cost associated with data analysis and report preparation between October 2013 and May 2014.

Recommendation: Fund

Issue

This project focuses on one of the priority information needs identified in the Federal Subsistence Fisheries Resource Program: Obtaining reliable estimates of Chinook, chum, and coho salmon escapements (e.g. weir projects). Management of Kuskokwim Area salmon fisheries is complex because of annual 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. Weirs that monitor salmon returning to Kuskokwim River tributaries provide accurate escapement numbers, sex and age information as well as run timing. These data are heavily relied upon by state and federal managers for management of the Kuskokwim River commercial fisheries and the largest subsistence fisheries in the state. Without adequate and accurate escapement monitoring of salmon returns to the Kwethluk River, there is a risk to the conservation and maintenance of Chinook *Onchorynchus tshawytscha*, chum *O. keta*, sockeye *O. nerka*, pink *O. gorbuscha*, and coho salmon *O. kisutch* populations. Monitoring of salmon returns to the Kwethluk River is essential to ensuring that Federal conservation mandates are fulfilled within the Yukon Delta National Wildlife Refuge (Alaska National Interest Lands Conservation Act (Section 303 (7) (8) a, b, c)). Escapement monitoring also helps reduce the risk of failure to provide a priority to subsistence uses, and the risk that subsistence harvest user needs will not be met. The addition of videography to the Kwethluk weir will enable accurate enumeration and identification of salmon passing the weir. It is anticipated that the video will allow for counts during turbid and high water events and allow fish passage to be recorded unattended during the night. The addition of the video will also help with fixed budgets and increasing operational costs that may result in reduced monitoring at the weirs in the future.

Objectives

1. Install and operate an underwater video system to improve enhance salmon escapement monitoring at the Kwethluk River weir.
2. Compare results of underwater video and above water counts to ensure video system functions correctly.

Methods

An underwater video system will be installed and operated in conjunction with the existing Kwethluk River weir project (project 10-306). The weir will direct upstream migrating adult salmon through a fish passage panel. A live trap will be attached to the upstream side of the fish passage panel and will be used

to capture and sample fish. A fish passage chute and video box will be installed at the head of the live trap to count fish. The entire weir and live trap will be visually inspected daily and maintained as needed to insure integrity.

Setup, design and operation of the video system will be similar to that used successfully in other rivers or tributaries in Bristol Bay, Kuskokwim River, and south-central Alaska. One underwater video camera will be located inside a sealed video box attached to the fish passage chute. The video box will be constructed of 3.2-mm aluminum sheeting and filled with filtered water. Safety glass will be installed on the front of the video box to allow for a scratch-free, clear surface through which images are captured. The passage chute will be constructed from aluminum angle and enclosed in plywood to isolate it from exterior light. The backdrop of the passage chute from which video images are captured will be adjustable laterally to minimize the number of fish passing through the chute at one time. The backdrop will be fabricated for ease of removal from the video chute when dirty and replaced with a new one. All video images will be recorded on a removable hard drive at 20 frames-per-second using a computer-based Digital Video Recorder. Fish passage will be recorded 24 hours per day seven days each week. Stored video files will be reviewed daily. The video box and fish passage chute will be artificially lit using a pair of 12-volt underwater pond lights. Pond lights will be equipped with 10-watt bulbs, which provided a quality image. The lights are to provide a consistent source of lighting during day and night hours. The Digital Video Recorder unit will be equipped with motion detection to minimize the amount of blank video footage and review time. A solar panel array will provide power to batteries. A gasoline generator will provide supplemental power to charge the batteries as needed. The video system will be installed and operated in conjunction with the weir, from late June through September 10. Age, sex, and length samples will continue to be collected as outlined in the weir investigation plan for the weir operations (project 10-306).

Proper function of the video system and motion detection software will be validated by comparisons of visual counts using established weir protocol and review of video footage for the same hourly blocks of time. Counts from on top of the fish trap will occur between the hours of 08:00 and 23:00 hours and adjustments to the video system will occur during this time when paired counts can be evaluated. Once counts match ($\pm 3\%$) between the two methods the fish passage chute will be opened and fish passage recorded 24 hours / day with video. The passage chute will be closed during periods when fish are sampled for ASL data. Video counts between 23:00 and 08:00 hours will be reviewed and tallied each day. Video operations will be evaluated and checked throughout the season. Four hours of randomly selected paired counts/week will be checked to validate the video system. During these paired counts, comparisons will be made between numbers counted, and identification of species. It is suspected that some deviation will occur between the two counting methods due to: water turbidity, multiple fish passing at one time, effects of water glare, and or rain/wind disturbances of the water surface. Species identification is also more accurate using the video because frames can be frozen, and reviewed numerous times by multiple observers. Results will be presented in the annual report for the weir operations (project 10-306).

Partnerships and Capacity Building

The Organized Village of Kwethluk has cooperatively worked with the U.S. Fish and Wildlife Service, Kenai Fish and Wildlife Field Office at the Kwethluk weir from 2001–present. The village employs local residents on the weir and keeps their constituents informed of information gathered at the weir. OVK is looking forward to continuing the partnership and working with the U.S. Fish and Wildlife Service, Kenai Fish and Wildlife Field Office. The addition of video to the weir will allow the FWS to train village technicians in the operation of this technology.

Justification

The Kwethluk River weir is an established and successful salmon monitoring project that provides the primary escapement and run strength data used to ensure sustainability of subsistence fisheries in the Yukon Delta National Wildlife Refuge and to conserve fisheries stocks in the Kwethluk River. Over the years of operation, weir counts have had to be suspended on several occasions due to high water or turbid water conditions. Adding video monitoring capability to the Kwethluk weir could provide more reliable estimates of salmon abundance, improve the long term data set necessary to monitor changes in adult salmon run strength on the Yukon Delta National Wildlife Refuge, and make enumeration work more cost effective.

The Office of Subsistence Management is planning to conduct a programmatic and geographic review of all Kuskokwim area weir projects prior to the 2014 Request for Proposals. If this video project (12-309) is funded in 2012, the video equipment may need to be transferred to another weir in 2014, if results of the programmatic and geographic review indicate this weir site to be of lower priority than others.

Project Number: 12-312
Project Title: Status of sheefish in Highpower Creek and Upper Kuskokwim River
Geographic Region: Kuskokwim
Information Type: Stock Status and Trends
Principle Investigator: Lisa Stuby, Alaska Department of Fish and Game

Project Cost: **2012:** \$100,776 **2013:** \$45,828 **2014:** \$24,396

Recommendation: Fund

Issue: Sheefish are a highly migratory, long-lived species that migrate throughout most of the Kuskokwim River drainage and are important to both subsistence and sport fishers. A five-year radiotelemetry study (06-305; 10-305) was initiated in 2007 to extend our understanding of sheefish in the Kuskokwim River drainage. Through this effort, two previously undocumented spawning areas (Middle and East Forks) have been identified and information refined on the most populous spawning area (Big River) in the upper Kuskokwim River. However, none of the radio-tagged sheefish were detected at the mouth of Highpower Creek, which had been described as a spawning area in an Alaska Department of Fish and Game 1972 study. In 2010, a survey of this area noted that the habitat characteristics were unlike the Big River and Middle Fork spawning areas. According to the 1972 study, an area approximately 24 km upstream of Highpower Creek on the Swift Fork had the right combination of gravel size, water depth, and current for sheefish spawning. However, few sheefish were observed and it was assumed that most spawning occurred downstream. Implanting radio transmitters into sheefish located in the vicinity of Highpower Creek would facilitate locating the actual spawning area(s), provide information on migratory behavior and life history characteristics of fish spawning in that area, and contribute additional samples toward genetic baseline stock identification efforts. Identifying the status of a sheefish spawning population in Highpower Creek and completing genetic baseline sampling of sheefish spawning populations have been identified as priority research needs by the Strategic Plan for Research of Whitefish Species and by the 2012 Fisheries Monitoring program.

Locating aggregations of radio-tagged sheefish during the spawning period does not necessarily provide conclusive evidence of spawning in a particular location. Verification of spawning requires site visits to those areas to sample sheefish and assess their spawning condition. By completion date of the current project (10-305), site visits and sampling activities will have been completed at 2 of the 5 known or suspected spawning areas in the Kuskokwim River (Big River and Middle Fork). This project proposes to conduct site visits and sample sheefish in the 3 remaining potential spawning areas (the Kongeruk River, East Fork, and Highpower Creek) to verify whether spawning is occurring at these locations and to collect tissue samples from documented spawning stocks for genetic baseline development.

Objectives

1. Determine the status of the sheefish in the vicinity of Highpower Creek by:
 - a. Documenting the locations of radiotagged sheefish during the spawning period;
 - b. Verifying spawning areas by conducting site visits and capturing fish to assess their spawning condition; and,
 - c. Determining the migratory timing and seasonal distribution of radiotagged sheefish through aerial tracking surveys and stationary tracking stations.

Kuskokwim Region

2. Conduct site visits and capture sheefish to assess spawning condition on suspected spawning areas on the East Fork Kuskokwim River and Kongeruk River to verify whether spawning is occurring there.
3. Collect tissue samples from each sheefish captured at spawning areas for future genetic stock identification analysis.
4. Describe habitat characteristics of the areas used for spawning such as channel characteristics, water temperature, spawning substrate, flow, turbidity, and pH.

Methods

Thirty sheefish will be captured using gillnets and hook and line gear and implanted with radio transmitters on the North Fork Kuskokwim River, principally at and near the mouth of Highpower Creek during September 2012. These fish will be followed through the fall of 2014 with a combination of stationary tracking stations and aerial tracking flights to ascertain whether or not they are actually spawning at the mouth of Highpower Creek or elsewhere on the Swift Fork Kuskokwim River. Because sheefish have been noted arriving at the Big River and Middle Fork 1–2 months prior to spawning, up to 15 transmitters will be deployed downriver to determine if sheefish migrate to additional upper Kuskokwim River locations to spawn. These transmitters will be deployed above the confluence with South Fork Kuskokwim River in order to not inadvertently tag sheefish bound for the East Fork Kuskokwim River spawning area.

Site visits to the Highpower Creek area (fall 2012) and the suspected spawning areas on the East Fork and Kongeruk River (fall 2013) will be made to capture sheefish and ascertain spawning readiness to verify whether spawning is occurring there. During these sampling efforts, a minimum of 10 sheefish will be examined at each location. Spawning readiness (i.e., determination of whether a fish will spawn in that season) will be evaluated based on a visual examination of gonads and Gonadosomatic indices (GSI) will be calculated for all fish sacrificed to begin establishing quantitative standards for maturity. Sheefish will be captured from each site using gillnet and/or hook and line gear. In addition, for every sheefish sampled, lengths will be taken and a fin clip will be collected and archived for future genetic analysis. Otoliths will be removed from all fish aged and archived for future strontium distribution microchemistry analysis to decipher the degree of anadromy for the different spawning stocks.

Few studies have been performed to classify and/or characterize sheefish spawning habitats, but it is generally recognized that sheefish require very specific habitats to spawn. Therefore, basic habitat characteristics in spawning areas such as water temperature, channel characteristics, spawning substrate, flow, pH, turbidity, and other pertinent habitat characteristic will be noted.

Partnerships/Capacity Development

The project biologist will continue to provide project updates to the Kuskokwim Native Association, McGrath, Telida, Nikolai, and Takotna, Limited), McGrath Native Village Council, and Tanana Chiefs Conference. She will continue to work closely with Kuskokwim Native Association and McGrath Native Village Council to garner college interns and/or local hires and will encourage local participation. The project biologist will offer to give public and school presentations. She will continue to present at the Kuskokwim Area staff meetings. The project biologist will work with the Eluska family of Telida and relatives in Nikolai for assistance in tagging sheefish at Highpower Creek and sampling sheefish on the East Fork Kuskokwim River. This project will be conducted cooperatively with other Kuskokwim River whitefish projects in sharing downloading duties of the stationary tracking stations and incorporating frequencies during aerial tracking flights. The fin clips collected during this study will be combined with

the fin clips collected during 2007 –2010 and added to a larger Yukon/Kuskokwim database currently at the U.S. Fish and Wildlife Service’s Alaska Conservation Genetics Laboratory in Anchorage. The project biologist is a co-investigator for “Yukon and Kuskokwim Rivers Inconnu Genetic Baseline (project 12-700)”.

Justification

This project addresses a priority information need identified in the 2012 Request for Proposals and the Whitefish Strategic Plan (project 08-206). The principal investigator has successfully designed, planned, and conducted similar sheefish work in the Kuskokwim River drainage (projects 06-305 and 10-305). The four objectives of the project are well thought out, clear, build on previous work by the principal investigator, and appear achievable with the proposed budget.

Project Number: 12-313
Project Title: Location, Migration Timing, and Description of Kuskokwim River Bering Cisco Spawning Origins
Geographic Area: Kuskokwim
Data Type: Stock Status and Trends
Principle Investigator: J. Michael Thalhauser, Kuskokwim Native Association
Co-Investigators: Randy J. Brown, U.S. Fish and Wildlife Service
Ken Harper, U.S. Fish and Wildlife Service

Project Cost: **2012:** \$74,116 **2013:** \$56,878 **2014:** \$17,138

Recommendation: Fund

Issue

This project addresses the Kuskokwim River priority information need for determining migration timing and destination of Bering cisco *Coregonus laurettae* spawning populations in the Kuskokwim River Drainage. Bering cisco are anadromous salmonids with known spawning populations only in the Yukon, Kuskokwim, and Susitna rivers in Alaska. At this time, there is little understanding of the life history of Bering cisco harvested in the coastal waters of western Alaska. It is believed that all Bering cisco in coastal environments are rearing individuals from the Yukon and Kuskokwim rivers because these are the only two rivers, among the many surveyed in western Alaska, in which spawning Bering cisco have been identified. Sampling activities in late September 2010 within the Kuskokwim River drainage suggest that Bering cisco restrict their spawning migration to the mainstem, and appear to go into the South Fork Kuskokwim River only, where pre-spawning fish were captured approximately 20 miles above the village of Nikolai.

Starting in 2005, fall commercial fisheries for coregonid (whitefish) species were permitted in the Yukon River delta. During the first two (more explorative) years of this fishery, 10,077 coregonids of various species were harvested (17,541 lbs). During 2006, Bering Cisco made up a bulk of that catch and since then, have been the targeted species of this fishery with buyers originally requesting an allocation of 40,000 lbs for an East Coast Kosher market. Managers set the limit at 10,000 lbs from the Yukon Delta region, which was considered to be a conservative allocation given that little biological information was available for Bering cisco. The commercial fishery continues to target Bering cisco and in 2008 and 2009 an average of 8,914 Bering cisco was harvested per year with an average weight of 8,642 lbs/year. Buyers have continued to pressure managers for higher harvest limits with the near limitless demand of the market, despite a lack of information on Bering ciscos life history and abundance. If the commercial fishery for Bering cisco continues, it will be important to identify all spawning origins and to determine a sustainable harvest level. Identification of their spawning destination and timing will allow: 1) description and protection of the habitat; and 2) the possibility of obtaining stock abundance (mark-recapture) estimates if management of the fishery is required.

Objectives

1. Deploy 50 radio transmitters per year (2012 and 2013); 25 at the Kalskag Fish Wheels on the main stem and 25 near Nikolai on the South Fork;

2. Identify spawning destinations for Bering cisco in the Kuskokwim River by use of fixed tracking stations along the main stem and aerial telemetry flights along the main stem and in suspected, tributary spawning areas;
3. Characterize habitat that make these spawning areas suitable for Bering cisco spawning in order to add this information to the life history record of Bering cisco; and
4. Nominate spawning areas for inclusion into the Alaska Anadromous Waters Catalog

Methods

We propose to deploy radio transmitters in Bering cisco that are migrating upstream in the Kuskokwim River and track them to their spawning destinations. Sampling data in the Yukon and Kuskokwim rivers suggests that all Bering cisco migrating upstream during summer and fall months are mature spawning individuals. Gonadosomatic index data for Bering cisco captured in late September (near Nikolai) further indicate that spawning in this area takes place in October. While some migration timing research has been conducted in the Yukon River, migration timing in the middle reaches of the Kuskokwim River is not as well understood, although it is presumed to be similar.

Radio tags will be deployed in migrating Bering cisco from a Kuskokwim River fish wheel operated by Alaska Department of Fish and Game at Lower Kalskag and by using beach seines and fish traps near the village of Nikolai in 2012 and 2013. Twenty-five transmitters will be deployed at each location between May and September. Receiving stations upstream from the Lower Kalskag deployment site will identify those fish that migrate upstream and the region of the upper drainage to which they migrate. Aerial surveys flown from Aniak to suspected spawning areas of the upper drainages will take place in late September and throughout October to further identify migration rates and to locate spawning destinations. In 2013, Mike Thalhauser, assisted by one local technician and Daniel Gillikin from U.S. Fish and Wildlife Service, Yukon-Delta National Wildlife Refuge will travel to identified spawning areas to conduct habitat studies in order to better characterize the flow and substrate qualities that Bering cisco utilize during spawning.

Partnerships/Capacity Building

We have spoken with numerous individuals and organizations about this project and have received only favorable responses. Kuskokwim Native Association has and will continue to involve its represented villages involved in this project through outreach and locally hired technicians. The Village of Nikolai will play a key role in this project.

Justification

This project directly addresses a priority information need in the 2012 Request for Proposals and would help determine whether or not Bering cisco from the Kuskokwim drainage are being harvested in the commercial Bering cisco fishery in the Yukon River, which could have implications for subsistence management. The study is well-thought out and designed, and utilizes proven methods from previous whitefish studies in the Kuskokwim River drainage. The objectives are clear and appear achievable with the proposed budget, and the investigators are well qualified to conduct the proposed work. The capacity building component of this project would be strong, particularly since the principal investigator would be a Partners Program biologist and the Kuskokwim Native Association.

Kuskokwim Region

Project Number: 12-352
Project Title: Whitefish trends on the Upper Kuskokwim, Alaska
Geographic Region: Kuskokwim Region
Information Type: Harvest Monitoring/Traditional Ecological Knowledge
Principal Investigator: Davin Holen, Alaska Department of Fish and Game
Co-Investigator(s): James Van Lanen, Alaska Department of Fish and Game
David Runfola, Alaska Department of Fish and Game

Project Cost: **2012:** \$70,411 **2013:** \$63,014 **2014:** \$42,055

Recommendation: Fund

Issue

The Yukon-Kuskokwim Delta and Western Interior Regional Advisory Councils have identified collection and analysis of traditional ecological knowledge and non-salmon fish population monitoring as issues and information needs. Whitefish are among the most important non-salmon fish in local subsistence harvests on the upper Kuskokwim River, but subsistence harvest levels have declined over the last several decades, for unknown reasons. Whitefish migration patterns are also little understood on the upper Kuskokwim River and genetic studies of whitefish species are incomplete. This project responds to two information needs identified by the 2012 Fisheries Resource Monitoring Program's "Priority Information Needs" document; "harvest, use, and associated contextual information for whitefish by species in upper Kuskokwim River drainage communities" and the multi-regional priority information need to document "changes in subsistence fishery resources and uses, in the context of climate change where relevant including but not limited to fishing seasons, species targeted, fishing locations, fish quality, harvest methods and means, and methods of preservation. Include management implications."

This project seeks to understand whitefish harvests within the broader non-salmon harvest efforts. These efforts mainly take place in the spring and fall and include jigging for fish through holes in the ice in the spring, or by using nets in the fall. In addition, whitefish near Nikolai are caught in nets during the salmon harvest and are often incorrectly identified as distinct whitefish species and harvests are underreported. In order to understand contemporary harvests and reasons for change over time researchers have focused on three research questions: 1) What are the contemporary harvest and use patterns of each whitefish species used by Lime Village and Nikolai?; 2) What factors have shaped the harvest efforts of each whitefish species over time and why are whitefish harvests declining?; 3) What factors are influencing the ability of residents to harvest the varied species of whitefish?

Objectives

- 1) Estimate the subsistence harvest of non-salmon fish by residents of Lime Village (pop. 27) and Nikolai (pop. 96) in 2012 and 2013.
- 2) Evaluate the harvest of subsistence non-salmon fish in terms of species, gear, location, and timing of harvests.
- 3) Document traditional ecological knowledge of each whitefish species, including life history, ecology, environmental and climate-related observations, seasonal movement, spawning areas, interactions with other fish and wildlife, local taxonomies, trends in abundance, and traditional management systems.

- 4) Describe the characteristics and trends of the whitefish fishery by species.
- 5) Identify what factors may be influencing the ability of residents to harvest various whitefish species through the ice in the spring by jigging and with nets, and with nets in the summer and fall.

Methods

1) Harvest survey. The harvest survey is intended to address Objective 1, to estimate the harvest of non-salmon by residents of Lime Village and Nikolai in 2012 and 2013, and Objective 2, to evaluate the harvest of non-salmon fish in terms of species, gear, location, and timing of harvests. A harvest survey for all non-salmon species will occur for study year 2012 between February and March of 2013 and for study year 2013 in February 2014. The survey will be a recall survey. The respondents will be asked to estimate their households' harvests for the past year. An attempt will be made to interview knowledgeable representatives of all households in each study community.

2) Key Respondent Interviews. Key respondent interviews will collect traditional ecological knowledge related to trends in whitefish stocks and subsistence uses of these stocks to add to the information already available from previous. A minimum of five key respondent interviews will be conducted in each of the study communities. Researchers will identify key respondents in each community during household harvest surveys and through consultation with community members during the community scoping meetings. Key respondents will represent a range of harvesting effort and experience in the fishery. Topics will focus on those addressed in Objective 3, to document local knowledge of each whitefish species, including life history, ecology, environmental and climate-related observations, seasonal movement, spawning areas, interactions with other fish and wildlife, local taxonomies, trends in abundance, and traditional management systems.

3) Participant observation. Participant observation will be utilized during this project to add an ethnographic context to whitefish harvest patterns and use. It is also important for researchers to have firsthand experience in participating in spring ice fishing to better understand the skills and knowledge involved in this important activity. Participant observation will be useful in meeting Objectives 3 and 4. This participation will mainly occur during spring whitefish harvest activities in Lime Village and during the summer in Nikolai. Researchers will document methods and gear for taking whitefish. In addition researchers will attempt to understand if whitefish are a target species, if certain species of whitefish targeted, or if whitefish are simply part of the overall harvest of non-salmon fish.

Partnerships/Capacity Building

The project will only be successful through participation of the residents of Lime Village and Nikolai. As noted community scoping meetings will occur prior to the start of research and residents will work with community members during fishing activities. Lime Village and Nikolai have been contacted about this project and both communities will submit resolutions supporting this project after the community scoping meeting takes place. Nikolai has submitted a letter of support already for this project. Local researchers will be trained to assist in conducting interviews and surveys and will work as co-researchers on this project. Alaska Department of Fish and Game will sign cooperative agreements with the tribal governments of Lime Village and Nikolai. This will allow the communities to choose and hire local personnel. The local research assistant hired by each community will be responsible for arranging and conducting interviews in their communities.

Justification

The proposed project addresses a priority information need in the 2012 Request for Proposals, notably data on whitefish (by species) in upper Kuskokwim River drainage communities. The objectives for collecting harvest and some demographic data are clear and achievable, and the time frame is reasonable. The methods to reach the objectives are clearly described and adequate, budget appears adequate to achieve project goals, and the study provides opportunity for the communities to actively participate in the project.

Project Number: 12-450
Project Title: Aleutian Islands Salmon and other Subsistence Harvests
Geographic Region: Southwest Alaska
Information Type: Harvest Monitoring and Traditional Ecological Knowledge
Principal Investigator: Dr. Katherine Reedy-Maschner, Idaho State University

Project Cost: **2012:** \$44,241 **2013:** \$160,113 **2014:** 99,984

Recommendation: Fund

Issue

This proposal addresses the priority information need for harvest data of salmon for subsistence use by Aleutian Islands Area residents, methods and means by species, and traditional use and distribution practices. Current detailed information on all subsistence harvests is needed for management of these species. This study will contextualize salmon in the broader subsistence and socioeconomic conditions of Adak, Atka, Nikolski, and Unalaska, and will include findings from a previous study involving the collection of similar data from Akutan, False Pass, Nelson Lagoon, and Port Heiden. The Office of Subsistence Management will receive comprehensive data on eight Bering Sea communities. Using household and community level data, the study will document subsistence harvests, distribution practices and levels, social dynamics that contribute to those practices, map harvest areas using GIS, and describe household and community economics in order to meet the priority need of the Office of Subsistence Management for information on salmon for subsistence use in the Aleutian Islands. This study will provide data on salmon availability and importance relative to other subsistence foods. The study will also investigate the role of salmon and other foods and products in household distribution networks, access to subsistence foods (regulatory, obtainability, socioeconomic and logistical), costs incurred, and resources (e.g., equipment, crews) needed in order to harvest. Surveys will also gather ecological observation data in conjunction with species observations to potentially evaluate climate change impacts on subsistence fish and other species.

Objectives

The overarching research questions are, what is the current role of subsistence fisheries to Aleutian Islands Area residents?; and what is the social map of food harvesting and distribution, and how is it shaped by other socioeconomic circumstances? The objectives are:

- 1) Estimate the harvest levels and methods of all subsistence species in the study communities for calendar year 2012, especially salmon. Determine proportion of salmon relative to other subsistence harvests.
- 2) Estimate sharing and distribution patterns of species and products between individuals, households, and communities.
- 3) Link and compare household harvests and uses by communities to four other Bering Sea study communities. Eight total villages will be included.
- 4) Determine, using all available qualitative and quantitative data, changes in subsistence species, access, and uses over time.
- 5) Contextualize subsistence fisheries in the broader regional economy.

- 6) Compare household survey data with harvests reported in the State's permit system and identify reporting issues.
- 7) Discover community subsistence concerns, observed changes in species abundances and locations, and observed environmental changes.

Methods

Methods, in order of implementation, are 1. Connect with Aleutian communities, give presentations on the goals and methods of the project, and set out opportunities for local involvement. 2. Conduct key informant interviews to determine harvest access, methods, frequency and use, village socioeconomics, local politics, demographics, and cultural factors. Perform a literature review. 3. Conduct household surveys for the four study communities (aiming for 100%) that capture genealogical relationships; harvest numbers of salmon, other marine fish, freshwater fish, land mammals, birds and eggs, and plant species for all household members; sharing and distribution of whole species and products between individuals; household economics; harvest locations; and species health/abundance observations. Participants shall be remunerated at a reasonable rate for their time and effort. 4. Integrate these data into a database from a recent ongoing study contract under the U.S. Bureau of Ocean Energy Management, Regulation and Enforcement in which similar data (in the context of anticipated oil and gas development) were collected for Port Heiden, Nelson Lagoon, False Pass and Akutan. Preliminary data from Akutan demonstrate limited salmon trading with people in the Pribilofs, thus data from those communities will be gathered indirectly. Contribute these data to the Community Subsistence Information System (CSIS) 5. Compare survey data with harvest numbers reported to the State to address data gaps. 6. Analyze survey field data, perform social network analysis, and use qualitative data to guide interpretation. 7. Prepare reports to the OSM and to the communities.

Partnerships and Capacity Building

This project actively solicits local research assistants who will be trained in administering the surveys. Assistants and survey respondents will be compensated for their time and efforts. The project also actively seeks analytical input from local communities in interpreting survey results. The project will conform to each community's requirements for participation and partnership.

Justification

This project offers to provide data as requested in the 2012 priority information needs for the Aleutian Islands Area, namely harvest data of salmon and other subsistence resources. The investigator will collect comprehensive data on subsistence harvests in four Aleutian communities, Unalaska, Nikolski, Atka, and Adak. The investigator presents this research plan clearly and comprehensively. The investigator offers a clear socio-cultural study which integrates valuable harvest information and knowledge about Aleutian fisheries with contemporary community, household, and management changes. The overall framework, questions, and objectives, the research methods, and researcher ability lead to a recommendation to fund this project.

Project Number: 12-452
Project Title: Whitefish trends in Lake Clark and Iliamna Lake, Alaska
Geographic Region: Southwest Alaska
Information Type: Harvest Monitoring/Traditional Ecological Knowledge
Principal Investigator: Davin Holen, Alaska Department of Fish and Game,
Co-Investigator(s): Courtenay Gomez, Bristol Bay Native Association,
 Robbin La Vine, Alaska Department of Fish and Game,
 Karen Evanoff, Lake Clark National Park and Preserve,
 Valerie Engebretsen, Nondalton Tribal Council

Project Cost: **2012:** \$138,169 **2013:** \$93,323 **2014:** \$53,359

Recommendation: Fund

Issue

This project responds to two information needs identified in the “Priority Information Needs” document by the Office of Subsistence Management and the Bristol Bay Regional Advisory Council. These are “patterns in whitefish harvest and use from Lake Clark communities,” and the multi-regional priority information need to document “changes in subsistence fishery resources and uses, in the context of climate change where relevant including but not limited to fishing season, species target, fishing locations, fish quality, harvest methods and means, and methods of preservation. Include management implications.” Whitefish species are among the most important non-salmon fish in local subsistence harvests, but harvest of whitefish by local residents of Lake Clark have declined over the last several decades, for unknown reasons. Whitefish migration patterns are also little understood in the Iliamna area and genetic studies of whitefish species are incomplete. A more complete understanding of whitefish migration patterns through local knowledge could inform fisheries managers and biologists in Lake Clark National Park and Preserve and Katmai National Park who could potentially be managing the same whitefish stock. This project seeks to understand whitefish harvests within broader non-salmon fish harvest efforts. These efforts mainly take place in the spring and fall and include jigging for fish through holes in the ice in the spring, or by using nets in the fall. In addition, whitefish in Sixmile Lake and Lark Clark are caught in nets during the salmon harvest and are often incorrectly identified and harvests are underreported. In order to understand contemporary harvests and reasons for change over time researchers have focused on three research questions: 1) What are the contemporary harvest and use patterns of each whitefish species used by residents of the Lake Clark communities of Igiugig, Iliamna, Newhalen, Nondalton, and Port Alsworth?; 2) What factors have shaped the harvest efforts of each whitefish species over time?; 3) What factors are influencing the ability of residents to harvest the varied species of whitefish?

Objectives

1. Estimate the harvest of nonsalmon by residents of Igiugig (pop. 50 in 2010), Iliamna (pop. 109), Newhalen (pop. 190), Nondalton (pop. 164), and Port Alsworth (pop. 159) in 2012 and 2013.
2. Describe the harvest of nonsalmon fish in terms of species, gear, location, and timing of harvests
3. Document local knowledge (TEK) of each whitefish species, including life history, ecology, environmental and climate-related observations, seasonal movement, spawning areas, interactions

with other fish and wildlife, local taxonomies, trends in abundance, and traditional management systems.

4. Describe the characteristics and trends of the whitefish fishery by species.
5. Identify what factors may be influencing the ability of residents to harvest various whitefish species through the ice in the spring.

Methods

1) Harvest survey. The harvest survey is useful to meet Objective 1; to estimate the harvest of nonsalmon by residents of Igiugig, Iliamna, Newhalen, Nondalton, and Port Alsworth in 2012 and 2013 and Objective 2; to evaluate the harvest of nonsalmon fish in terms of species, gear, location, and timing of harvests. A harvest survey for all non-salmon species will occur for study year 2012 between February and March of 2013 and for study year 2013 in February 2014. The survey itself will also document household demographics, harvest of non-salmon fish, and location of harvests. The study communities are experiencing demographic changes and this survey could lead to a greater understanding of the link between demographic changes and harvest patterns.

2) Key Respondent Interviews. Key respondent interviews will collect local traditional knowledge related to trends in whitefish stocks and subsistence uses of these stocks to add to the information already available from previous research. A minimum of four key respondent interviews will be conducted in each of the main study community of Igiugig, Nondalton, and Port Alsworth and an additional 4 key respondent interviews will be conducted in the other study communities for a total of 16 key respondent interviews. The topics will focus on those identified in Objective 3: to document local knowledge of each whitefish species, including life history, ecology, environmental and climate-related observations, seasonal movement, spawning areas, interactions with other fish and wildlife, local taxonomies, trends in abundance, and traditional management systems.

3) Participant observation. Participant observation will be utilized during this project to add an ethnographic context to whitefish harvest patterns and use. It is also important for researchers to have firsthand experience in participating in spring ice fishing to better understand the skills and knowledge involved in this important activity. Participant observation will be useful in meeting Objectives 3 and 4. This participation will mainly occur during spring whitefish harvest activities in Nondalton and Port Alsworth. In addition researchers will attempt to understand if whitefish are a target species, whether certain species of whitefish are targeted, or whether whitefish are simply part of the overall harvest of non-salmon fish. There will be an education element to the participant observation component. Spring fishing on the ice in Nondalton, for example, often occurs during culture week at the school.

Partnerships/Capacity Building

The project would be a collaborative effort among the Bristol Bay Native Association, the Division of Subsistence, Alaska Department of Fish and Game, the Nondalton Tribal Council, Lake Clark National Park and Preserve, and the tribal governments of Igiugig, Iliamna, and Newhalen. Local researchers will be trained to conduct interviews and surveys. The Nondalton Tribal Council is very interested in this study as it would complement their Integrated Resource Management Plan currently underway. The Nondalton Tribal Council will be a full partner on this project. The Nondalton Tribal Council researcher will coordinate the key respondent interviews and the participant observation. In addition they will be involved in Port Alsworth as well as this community has close ties to Nondalton. In all of the study communities the local research assistant will be responsible for arranging and conducting interviews in their communities.

Justification

The proposed project addresses a priority information need in the 2012 Request for Proposals that has been a high priority for a few years. The investigators followed the suggestions of the Technical Review Committee, rewriting their objectives and research questions so that they are clearer and potentially achievable. The project goals have the potential of being met within the suggested time frame. Ratings of high were given to the ability of the researchers, the partnership and capacity building, the need for this research, and the Federal linkage is clear. The investigators note that they are offering a broader exploration of factors affecting change; however, it is suggested that to be successful in meeting this goal the investigators need to address the framework for identifying these factors prior to collecting data so that it can be understood in the appropriate broader socio-environmental, political or economic context. While answering the research questions and objectives relating to change may be possible, without a clear discussion of how this study fits into existing data or without clearly defined and presented parameters surrounding 'factors' of influence, this study may only provide more data relating to description of the harvest and use patterns dealing with the first four objectives of the study. It would better serve the Monitoring Program to have the data collected by the project placed into a clearly defined context which will help the investigators to make a more reliable identification of the factors influencing the harvest levels by residents of these communities by species and through time. If the investigators address the concerns of the Technical Review Committee, it is recommended that this project be funded.

Project Number: 12-453
Project Title: Changing Patterns in the Kodiak Area Subsistence Salmon Fishery
Geographic Region: Southwest Alaska
Information Type: Harvest Monitoring/Traditional Ecological Knowledge
Principal Investigator: Davin Holen, Alaska Department of Fish and Game
Co-Investigator(s): Malla Kukkonen, Alaska Department of Fish and Game
Meredith Marchioni, Alaska Department of Fish and Game
Tonya Lee, U.S. Fish and Wildlife Service

Project Cost: **2012:** \$0 **2013:** \$86,334 **2014:** \$86,323

Recommendation: Fund

Issue

This project responds to an information need identified in the “Priority Information Needs” document prepared by the Office of Subsistence Management and the Kodiak Aleutians Regional Advisory Council by investigating the “environmental, demographic, regulatory, cultural and socioeconomic factors affecting harvest levels of salmon for subsistence use in the Kodiak Area.” This project was devised, and study communities chosen, after consultation with staff from the Kodiak National Wildlife Refuge, Alaska Department of fish and Game area fisheries managers, the Alutiiq Museum, the Kodiak Area Native Association, and the Sun’aq Tribe of Kodiak. In the Kodiak area, Alaska Department of fish and Game sends subsistence fishery permits to every permit holder who returned a permit in the previous year. Subsistence fishers are required to return their permits to Alaska Department of fish and Game after the salmon season. Every year, the U.S Postal Service returns many permits to Alaska Department of fish and Game marked “undeliverable.” Therefore, harvest reports are not expanded for this area to produce an estimated harvest. Surveying a sample of subsistence salmon permit holders on the Kodiak road system, a sample of the general population of the Kodiak road system, and the case study communities of Larsen Bay and Old Harbor could assist fishery managers and regulatory boards in evaluating subsistence salmon fishing opportunities in the Kodiak area. Information would also be collected for Kodiak road system resident important harvesting locations including the Buskin River, which the Federal Subsistence Board has identified as important for the customary and traditional use by residents of Kodiak. This project would update and expand on research previously conducted in Akhiok, Larsen Bay, Old Harbor, Ouzinkie, and Port Lions in 2005 which found data from returned permits underrepresented subsistence harvests. Conducting follow-up research in Larsen Bay and Old Harbor could inform managers on the outcome of educational efforts undertaken during the 2005 study to encourage residents to obtain permits and return them to Alaska Department of fish and Game. During deliberations at the 2010 Board of Fisheries meeting in Kodiak, Board Chairman Vince Webster encouraged the Subsistence Program Manager for the Division of Subsistence, Davin Holen, to conduct research to provide better harvest data for Kodiak Island communities. In addition to harvest data, this research project would also help managers understand the broader socioeconomic and regulatory factors influencing the harvest of salmon for subsistence by Kodiak Island residents. In addition to harvest data, this research project would also help managers understand the broader socioeconomic and regulatory factors influencing the harvest of salmon for subsistence by Kodiak Island residents.

Subsistence fisheries on Kodiak Island have been influenced by changes in demography, transportation technology, ecology, environmental disasters, and other cultural, social, and economic factors. This

project will seek to understand the effects of these changes on the cultural, social, and economic characteristics of salmon fishing. This research will be guided by three research questions based on an evaluation of existing data and the literature summarizing social-ecological studies about subsistence fishing economies and fisheries management. The three research questions are: 1) What are the historic use patterns of subsistence salmon fisheries that can be accessed by the Kodiak archipelago road system and by more isolated communities?; 2) What local knowledge do subsistence salmon harvesters hold regarding the social-ecological system of the Kodiak archipelago of which the subsistence salmon fishery is a part?; 3) How have cultural, social, and economic factors shaped the Kodiak subsistence salmon fishery over time?

Objectives

- 1) To compile and update data on the harvest of salmon in the Kodiak archipelago road system and the case study communities of Larsen Bay and Old Harbor and to compare and contrast the road system fishery and the fishery of the more isolated communities.
- 2) To describe current (2012 study year) subsistence harvest and use patterns of salmon on the Kodiak archipelago including harvest locations. Evaluate whether education efforts in Larsen Bay and Old Harbor increased the accuracy of permits over time.
- 3) To collect and discuss local knowledge about patterns and trends of salmon harvests and salmon stock diversity, including changes in location over time.
- 4) To identify factors of the social-ecological system of the Kodiak archipelago that shape contemporary subsistence harvesting patterns and uses of salmon by residents of Kodiak City and the nearby road system, and the study communities of Larsen Bay and Old Harbor.

Methods

1) Compile and update harvest data. This objective has two parts. The first task is to compile existing harvest data including spatial data. The second part of Objective 1 is to evaluate harvest and use patterns for salmon. The second data gathering method will be a systematic household survey administered in Kodiak City and the surrounding road system and the study communities of Larsen Bay and Old Harbor. Kodiak City will include Kodiak City, Kodiak Station, and Womens Bay; all of which are grouped together in findings prepared by Alaska Department of fish and Game.

2) Describe current subsistence harvest and use patterns. The data gathering methods for this objective will consist of key respondent interviews in the form of “map biographies” guided by an open interview protocol. Knowledgeable retired fishers will also be interviewed to understand historic harvest locations that could be compared to contemporary fishers.

3) Collect traditional ecological knowledge about salmon. Traditional ecological knowledge topics will be explored during the map biographies described under Objective 3. During the discussion, fishers will be asked to describe their observations regarding changes in salmon stocks at fishing locations they are familiar with and will be asked to provide information to help explain these trends. Topics will be focused on answering the research questions including what cultural, social, economic, and environmental factors have shaped salmon harvest efforts over time, as well as what environmental and climate related factors influence their ability to harvest salmon.

4) Identify factors influencing subsistence salmon fishing. A quantitative analysis of these factors will be performed based on the systematic household surveys in Objective 2, which will include an assessment question which will address how fishing activity has changed over time.

Partnerships/Capacity Building

This project will begin with a community scoping meeting in November 2012. Input will be sought from communities, staff of the divisions of Commercial Fisheries and Sport Fish of Alaska Department of Fish and Game, as well as the U.S. Fish and Wildlife Service, regarding survey instruments and interview protocols. The project will be a collaboration between the Division of Subsistence, Alaska Department of Fish and Game, and the Kodiak National Wildlife Refuge. The Sun'aq Tribe of Kodiak has been consulted. Local researchers will be trained to conduct interviews and surveys. The community of Larsen Bay and the Alutiiq Museum have provided letters of support for this project and a letter of support will be sought from the community of Old Harbor following the community scoping meeting. Ethnographic material will be archived at the Alutiiq Museum.

Justification

This project addresses a priority information need in the 2012 Request for Proposals on factors affecting salmon harvests in the Kodiak Area. The investigators are qualified to conduct research and the partnership and capacity building component of the research is rated high.

Project Number: 12-500
Project Title: Feasibility of remote streambed RFID readers for long-term salmon population monitoring on the Copper River
Geographic Region: Southcentral Alaska
Information Type: Stock Status and Trends
Principal Investigator: Keith van den Broek, Native Village of Eyak
Co-Investigator(s): Jason J. Smith, LGL Alaska Research Associates, Inc.

Project Cost: 2012: \$76,401 2013: \$74,503

Recommendation: Fund

Issue

Management of Copper River salmon is complex due to inter-annual variation in the size and timing of stocks, fisheries that target a mixture of species and intra-specific stocks, and difficulties in estimating abundance due to the physical characteristics of the drainage. The Native Village of Eyak, in partnership with Alaska Department of Fish and Game and LGL Alaska Research Associates, Inc., and funded through the Fisheries Resource Monitoring Program (Monitoring Program) and Alaska Sustainable Salmon Fund, have conducted multiple radio telemetry studies focused on the spawning distribution and stock-specific run timing of both Chinook and sockeye salmon (Monitoring Program projects 02-015, 05-502, and 05-501; Alaska Sustainable Salmon Fund project 45850). These studies have been hugely successful in providing a baseline of previously unknown information, but have also highlighted a substantial level of variability in these parameters between years. It is also unclear how much these populations will change over time, particularly in the context of climate change. Much longer-term or follow-up studies are warranted, but unfortunately the high cost of radio telemetry programs can be prohibitive. Even once the expensive receiver infrastructure is in place, the recurring high cost of tags, aerial surveys, maintenance, and personnel results in an incremental annual program cost at an average of \$250,000 to represent only a very small (<1%) proportion of the total run. Also, esophageal radio tags can be stressful to fish, and a fairly high percentage fail or result in unknown fates. Up to 5% of the total Chinook salmon run is already being marked through project 10-503 using passive radio frequency identification (RFID) transponders encapsulated on a T-bar style tag, referred to as a T-bar anchor-passive integrated transponder tag (tag). This may provide an opportunity to monitor Chinook salmon passage into tributaries for a small investment in infrastructure and a very low recurring incremental cost. However, emerging technologies need to be tested and refined, and feasibility of this approach assessed before large-scale application can be pursued. This project builds upon project 10-503, updates previous research supported by the Monitoring Program, and, in the long term, could support a 2012 Multi-Region Priority Information Need by providing data to document “Changes in subsistence fishery resources and uses, in the context of climate change...”.

Objective

To develop and assess the feasibility of using remote RFID readers and streambed antennas on select tributaries of the Copper River for long-term monitoring of spawning distribution and stock-specific run timing.

Methods

A remote RFID reader system would be installed in a single channel at Alaska Department of Fish and Game's Gulkana River counting tower site. The system would consist of a 134.2 kHz FDX RFID transceiver/logger, external pass-by antenna array and power supply. The transceiver and power supply would be housed in a weatherproof enclosure located on the island adjacent to the counting tower. Antennas would be anchored directly to the substrate, immediately downstream of the vinyl counting substrate. The system would be operated from 1 June to 15 August 2012-2013, and would continuously monitor for the presence of tags. Each tag passing the antenna array would be decoded and logged by the transceiver, and logged data would be downloaded on-site from the transceiver to a laptop computer once or more per day. Data would be cross-reference with tagging data from Baird Canyon, and each tagged Chinook salmon would be identified by tagging date and time.

Overall system efficacy and detection efficiency would be tested by comparison of logged transceiver detections with visual counts of marked fish from the counting tower by Alaska Department of Fish and Game and Native Village of Eyak technicians. Each tag visually observed but not recorded by the transceiver would be identified as a "failure to detect", while each tag both visually observed and logged would be identified as a "confirmed detection". The system would be tested and fine-tuned using tags attached to fishing lures and retrieved by rod and reel at varying depths and speeds across the full breadth of the antenna array, throughout the duration of the experiment, but only data from tagged salmon would be used to calculate overall detection efficiency of the system. Proportion of tagged Chinook salmon returning to the Gulkana River would be calculated by dividing the number of tags deployed at Baird by the number of tags detected at the Gulkana site. The number of tag detections would be an expanded count, calculated by dividing the number of actual detections by the detection efficiency of the system, and multiplying this number by the proportion of the total run migrating via the represented channel (using Alaska Department of Fish and Game expanded tower counts by channel). Migration rate from Baird Canyon to the Gulkana tower would be calculated for all detected tags. If multiple detections exist for a tag, only the first detection would be used. A run timing profile would be calculated for the Gulkana River based on detected tag dates at Baird Canyon and would be compared with historic data from radiotelemetry studies to assess major changes since the last study concluded in 2004.

Partnerships and Capacity Building

This project has been discussed with representatives from the U.S. Fish and Wildlife Service, U.S. Forest Service, Alaska Department of Fish and Game, Native Village of Eyak and LGL Alaska Research Associates, Inc. Mark Somerville at Alaska Department of Fish and Game's Glennallen office has offered support in allowing a system to be installed at the Gulkana counting tower site, and is excited about future partnership potential. All plans and resulting information would be shared with the Ahtna Tene Nene C&T Committee and Gulkana Village Council. Bureau of Land Management would be consulted as landowner and co-manager of the counting tower site.

LGL Alaska Research Associates, Inc. would provide technical review of data post-processing and statistical analyses. Hiring preference would be given to Alaska Natives and local residents, with particular effort made on this project to source a technician with extensive knowledge of RFID systems. This project would continue to build upon Native Village of Eyak's ability to conduct fisheries research and management activities on the Copper River. Native Village of Eyak's Copper River Chinook escapement monitoring program, Project 10-503, is currently funded through 2013. If detection of tags at the Gulkana site is successful, a tributary monitoring objective may be added to the proposal to continue the fish wheel mark-recapture project for the 2014 Request for Proposals. This would greatly enhance

the scope of the existing monitoring program to allow concurrent long-term monitoring of low resolution spawning distribution and stock-specific run timing for Chinook salmon, at a very low incremental cost to main stem mark-recapture efforts. It would also offer the potential to leverage spawning distribution studies for other anadromous species captured in mark-recovery fish wheels (sockeye, coho, steelhead, whitefish, and lamprey) for a very low cost of about \$4 per tag.

Justification

This project would evaluate the use of radio frequency identification readers to monitor escapement of Chinook salmon into Copper River tributaries. If successful, this could allow long term monitoring of tributary escapements and might contribute to an understanding of climate change effects on a subsistence fishery resource, which is a 2012 priority information need. The investigators have successfully conducted other Monitoring Program projects, and there would be a high level of partnership and capacity building in conducting this project. Although this would be a feasibility study, the investigators demonstrated that they were knowledgeable of the challenges they would face with known limitations in available passive integrated transponder tag and radio frequency identification equipment in attempting to obtain high detection rates of passive integrated transponder tagged Chinook salmon. Their proposed methods are basically sound, although there are a few areas that would need to be more fully developed if this project is funded. These include training their technician in tower counting techniques, designing a tower counting schedule for their technician that increases opportunities to observe marked Chinook salmon, and exploring ways to improve techniques for testing and adjusting the radio frequency identification reader and antenna. The investigators were responsive to comments and suggestions provided in the review of the original proposal. They have agreed to conduct all feasibility work at the Gulkana tower site and, while they did not reduce their requested budget from that in the proposal after examining ways to reduce costs, their requested budget is reasonable for the proposed work.

Project Number: 12-550
Project Title: Upper Copper River, Changing Environments and the Contemporary Subsistence Fisher
Geographic Region: Southcentral Alaska
Information Type: Harvest Monitoring/Traditional Ecological Knowledge
Principal Investigator: Erica McCall Valentine, Ecotrust
Co-Investigator(s): Robbin La Vine, Alaska Department of Fish and Game

Project Cost: 2012: \$81,967 2013: \$86,575

Recommendation: Fund

Issue

This project addresses the U.S. Fish and Wildlife Service, Office of Subsistence Management’s priority information need for federal subsistence fisheries in Southcentral Alaska: document the “harvest, use and associated contextual information for salmon and non-salmon by species in communities of the Copper River basin, updating previous research supported by the Fisheries Resource Monitoring Program (Monitoring Program). In addition, this project addresses two of the four goals of the Monitoring Program’s strategic plan for Southcentral Alaska: “Assess and monitor subsistence fisheries to document and provide for subsistence uses; and promote public support and involvement for fisheries monitoring.” Finally, this proposal addresses the Multi-Regional Priority Information Need on climate change and contemporary subsistence fishing patterns.

The research will also provide a social context for the harvest survey data that is currently being collected by the National Park Service on four communities within the Copper River watershed: Mentasta, Slana/ Nabesna Road, Chistochina, and Copper Center (including the Silver Springs census-designated place). These study communities harvest within both the state and federal subsistence fishery areas and are therefore under the management authority of the State of Alaska and the National Park Service (the designated federal subsistence fishing authority in this area). All four communities are resident zone communities of the Wrangell St. Elias National Park and Preserve.

Objective

The project’s overall research question, “What factors (social, cultural, demographic, economic, environmental) affect and/or influence contemporary subsistence salmon and non-salmon harvest and use patterns by residents of the Upper Copper River watershed over the course of a year?” is addressed by the following four project objectives:

1. Consolidate, synthesize and summarize the qualitative and quantitative data on all area resident subsistence fishing activities of the Upper Copper River basin, drawing upon existing traditional ecological knowledge (TEK) and harvest monitoring survey projects.
2. Describe the characteristics and trends of the contemporary salmon and non-salmon subsistence fisheries of the Upper Copper River basin.
3. Document the subsistence effort, harvest, processing and distribution of fish by four Copper River Basin families in the communities of Mentasta, Slana/Nabesna Road, Chistochina, and Copper Center (one family per community) over the course of one year, providing context to key respondent interviews and the NPS-led Copper Basin Community Harvest Assessment survey data.

4. Identify which factors most impact resident subsistence effort and harvest of salmon and non-salmon and discuss whether these factors can be addressed through management strategies.

Methods

Five methods (literature review, participant observation, key respondent interviews, case study families, and biographical mapping) will aid in describing the characteristics and trends of the contemporary salmon and non-salmon fisheries within the Upper Copper River basin.

A literature review will address Objectives 1 and 2 by identifying historical trends in the salmon and non-salmon fisheries, provide background to and further describe the contemporary subsistence fishery of the Upper Copper River watershed, and help frame questions for key respondent interviews and identify lines of inquiry for the ethnographic fieldwork.

Through participant observation, primary ethnographic data including subsistence harvest, use and distribution, study year environmental and climate-related observations, climate-related effects on harvests of salmon and other non-salmon species, seasonal movement, spawning areas, interactions with other fish and wildlife, trends in abundance and contemporary management systems will be collected. Eight families – two in each of the four study communities – will participate in this portion of the study. This method will contribute to addressing Objectives 2 and 3, while providing a foundation for addressing Objective 4.

As a means of verifying and augmenting data acquired through the literature review, participant observation and other recent harvest assessment projects (i.e. the National Park Service’s 2010-2011 Copper Basin Harvest Assessment project), project investigators will also conduct semi-structured key respondent interviews with sixteen families – four families in each of the study communities. The key respondent interviews will meet Objectives 2 and 3, and provide data for the completion of Objective 4.

Through case study families, four families – one in each study community – will systematically document their subsistence salmon and non-salmon fishing activities over the course of one year. Subsistence harvests and use will be documented through photography, maps, journals and quarterly review interviews with investigators. This research method will address Objectives 2 and 3, and will contribute to the fulfillment of Objective 4.

Biographical mapping will geo-spatially reference data derived from and incorporated within the analysis of the above described methodologies – participant observation, key respondent interviews, and family case studies. The biographical maps will visually display (and therefore analyze) subsistence harvest, use, and distribution of salmon and non-salmon species within the Copper River. The biographical mapping method will address Objectives 2-4.

Partnerships and Capacity Building

This project further facilitates partnerships between non-profits, state agencies, federal agencies and Tribal councils within the Copper River watershed. Project investigators will partner with the Ahtna Heritage Foundation to conduct key respondent interviews and participant observations and to translate (as needed), summarize, transcribe (as needed) and catalogue digital audio recordings. The families participating in the year-round documentation of subsistence use and effort will be identified with the assistance from local tribal councils, local Alaska Native and community organizations and/or local fishery managers. Project investigators have extensive relationships with project partners throughout the basin which inherently strengthens the consultations and capacity building components of this project.

Justification

The proposed research responds to a 2012 Request for Proposals priority information need to investigate the harvest, use, and associated contextual information for salmon and non-salmon by species in communities of the Copper River Basin. The project will improve previous studies of traditional ecological knowledge by interviewing diverse Alaska Native and non-Native residents from a range of age groups and fishing participation levels. The research objectives are clear and achievable. The investigators have the ability to complete the work. The results should illuminate aspects of local knowledge not often captured in traditional ecological knowledge studies, which tend to focus on past knowledge and techniques. Focusing on current social contexts will develop information about changing knowledge and use patterns, which should prove beneficial in management decisions dependent upon understanding contemporary alterations to harvest levels and participation rates.

Project Number: 12-700
Project Title: A Genetic Baseline for Inconnu from the Yukon and Kuskokwim Rivers
Geographic Region: Multi-Regional
Information Type: Stock Status and Trends
Principal Investigator: Jeffrey B. Olsen, U.S. Fish and Wildlife
Co-Investigator(s): Randy J. Brown, U.S. Fish and Wildlife Service
 John K. Wenburg, U.S. Fish and Wildlife Service
 Ray Hander, U.S. Fish and Wildlife Service
 Lisa Stuby, Alaska Department of Fish and Game,
 Aaron Dupuis, Tanana Chiefs Conference

Project Cost: **2012:** \$16,788 **2013:** \$49,896 **2014:** \$23,316

Recommendation: Fund

Issue

Inconnu (sheefish) *Stenodus leucichthys* contribute to subsistence fisheries in both the Yukon and Kuskokwim rivers. Despite the importance of inconnu as a subsistence resource in both rivers, relatively little information is available on the number and spatial distribution of discrete populations (population structure) and the impact of subsistence harvest on those populations. In this regard, genetic data is useful for not only describing population structure but also as a baseline for estimating population-specific harvest rates in a mixed-stock fishery. There are seven locations presently thought to be spawning sites for the majority of inconnu in both the Yukon and Kuskowim rivers. These sites include the upper Yukon Flats, the Sulukna, Alatna, and Tanana, upper Innoko rivers in the Yukon River drainage and Big River and High Power Creek in the Kuskokwim River drainage. It is not clear however if inconnu exhibit natal site fidelity to these spawning sites, although radio telemetry data suggests adults return multiple times to the same location to spawn. If distinct spawning populations exist the extent to which each population is available to, and impacted by, the fishery will likely vary depending the timing and location of the fishery. This study would assess genetic population structure of inconnu in the Yukon and Kuskokwim rivers and develop and evaluate a genetic baseline for monitoring the harvest of Yukon/Kuskokwim inconnu.

Objectives

1. Develop and test genetic markers for inconnu.
2. Describe and evaluate population structure of inconnu from the Yukon and Kuskokwim rivers. The data from this region will also be combined with data from the Kobuk and Selawik rivers (Monitoring Program project10-104) to describe population structure across western Alaska
3. Develop and test a genetic baseline for estimating the population composition in a mixed population sample of inconnu in the Yukon and Kuskokwim rivers.

Methods

Objective 1: Over 30 microsatellite markers have been identified from inconnu. Eight microsatellites have been tested and at least 10 more will be tested for Project 10-104. All microsatellites used for project 10-104 would be applied to populations in this study. In addition, the 12 microsatellites not tested in project 10-104 may be examined here if more loci are needed to provide adequate genetic variation.

Objective 2: Microsatellites would be used to describe and evaluate population structure among collections from putative spawning populations in the Yukon and Kuskokwim rivers. The goal is to examine population structure by sampling the seven locations thought to support the majority of inconnu spawners. These locations include the upper Yukon Flats, the Sulukna, Alatna, Tanana, and upper Innoko rivers in the Yukon River drainage and Big River and High Power Creek in the Kuskokwim River drainage. We presently have samples from the upper Yukon Flats (N=142), Sulukna River (N=177) and Big River (N=80). We anticipate receiving collections from at least some of the remaining four locations in the summer and fall of 2011 and 2012. Assuming a target sample size of 200 for the remaining collections, approximately 1,200 samples would be used to estimate and evaluate population structure. In addition, the data from Project 10-104 would be incorporated with data collected in this study to examine inconnu population structure across western Alaska.

In the event that we do not acquire samples from all seven locations, we would reduce the scope and cost of the project accordingly. We feel the most likely alternative is that we receive some samples from all but the Tanana River. However, at the very least this project would examine inconnu population structure using the collections currently on hand (Sulukna River, upper Yukon Flats, and Big River). These three collections would help reveal the extent of population structure in western Alaska when combined with the samples from Project 10-104, Genetic Mixed-Stock Analysis and Composition of Inconnu from the Hotham Inlet and Selawik Lake Winter Subsistence Gillnet Fishery.

Objective 3: The genetic data derived from objective 2 would be evaluated for mixed-stock fishery analysis in the Yukon and Kuskokwim rivers using computer simulation.

Partnerships and Capacity Building

We have discussed the project with John Burr (Alaska Department of Fish and Game, Yukon Area sport fish management biologist) who has expressed support for the conceptual proposal and currently plans to participate in collecting samples from the upper Innoko River in 2011. This project would build capacity within the Tanana Chiefs Conference by strengthening relationships between them and the U.S. Fish and Wildlife Service. Also, the proposed Alatna River inconnu Monitoring Program project (Project 12-200) includes the involvement of subsistence fishers from Alatna to sample fish and collect fin tissue for genetic analysis. The results of this study would contribute to a better understanding of the population structure of western Alaska inconnu and the genetic baseline would help subsistence fishery managers better assess the population-specific impacts of a mixed-stock subsistence fishery.

Justification

This project directly addresses a priority information need in the 2012 Request for Proposals. Data from this project would be used with data from Hotham Inlet and Selawik Lake, collected as part of Monitoring Program project 10-104, to examine inconnu population structure across western Alaska. All the investigators are well-qualified. The Conservation Genetics Laboratory investigators are currently conducting a similar Monitoring Program project on cisco (project 10-209, Genetic Stock Assessment of Yukon Delta Bering Cisco Commercial Harvest). Project objectives should be achievable with the proposed budget, and the methods used would be technically sound.