2007

FISHERIES RESOURCE MONITORING PLAN

FEDERAL SUBSISTENCE MANAGEMENT

CONTENTS

INTRODUCTION

BACKGROUND

Since 1999, under the authority of Title VIII of ANILCA, the Federal government has assumed 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 Interior and Agriculture, cooperating with the State of Alaska and other Federal agencies, to research fish and wildlife and subsistence uses on Federal public lands. To increase the quantity and quality of information available for management of subsistence fisheries, the Fisheries Resource Monitoring Program (Monitoring Program) was created within the Office of Subsistence Management. The Monitoring Program was envisioned as a collaborative inter-agency, inter-disciplinary approach to enhance existing fisheries research, and effectively communicate information needed for subsistence fisheries management on Federal public lands.

Original guidance for the Monitoring Program was provided by the Federal Subsistence Board and outlined in the *Operational Strategy for Information Management*[1]. The Regional Advisory Councils (Councils) have identified important issues and information needs for their regions, with review and update on an annual basis. To ensure that the Monitoring Program addresses the highest priority information needs for Federal subsistence fisheries management, the Office of Subsistence Management began a strategic planning process in 2004 to build on the work done by the Councils. Facilitated workshops for the Southwest, Southcentral, and Southeast regions have been held over the last three years with representatives of Federal and State agencies, academia, Alaska Native and rural organizations, and Councils. Participants at each workshop identified fisheries units for their region; developed goals, objectives, and information needs for each fishery unit; and then prioritized fishery units, goals, objectives and information needs. Final workshop reports for the Southcentral region and Bristol Bay-Chignik area have been completed, and results were used to guide the 2007 Request for Proposals. The Kodiak-Aleutians report should be completed by November 2006, the first workshop for the Northern Alaska Region is tentatively scheduled for spring 2007, and plans for the remaining regions should be completed within three years.

> *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 where five Federal agencies (Fish and Wildlife Service, Bureau of Land Management, National Park Service, Bureau of Indian Affairs, and USDA Forest Service) work with the Alaska Department of Fish and Game, Regional Advisory Councils, Alaska Native organizations, and other organizations. An inter-agency Technical Review Committee provides scientific evaluation of proposals and investigation plans. Public review and recommendations for funding are provided through the Councils. An inter-agency Staff Committee reviews all recommendations, and reconciles differences between staff and public recommendations. The Federal Subsistence Board approves annual monitoring plans with the benefit of both a technical recommendation by the Technical Review Committee and public review by the Regional Advisory Councils.

[1] Krueger, C., Brelsford, T., Casipit, C., Harper, K., Hildebrand, I., Rost, P., Thompson, K., and Jones, L. 1999. *Federal Subsistence Fisheries Management: Operational Strategy for Information Management. Report to the Federal Subsistence Staff Committee by the Sub-Committee for the Development of a Blueprint for Interagency Functions, Roles, and Responsibilities. 122 p.*

The purpose of this section is to present the Technical Review Committee's funding recommendations for the 2007 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 Chief of the Office of Subsistence Management Fisheries Information Services Division, and is composed of representatives from each of the five Federal agencies and three representatives from the Alaska Department of Fish and Game. An additional anthropologist from the Minerals Management Service provides additional social science expertise on the Technical Review Committee and provides a balance of disciplines. Staff from Fisheries Information Services provides 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, and risk that subsistence harvest needs will not be met.

   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 using the following information for each investigator:

Ability

- Education and training
- Related work experience
- Publications, reports, and presentations
- Past or ongoing work on Monitoring Program studies

Resources

- Office and laboratory facilities
- Technical and logistic support
- 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.

- 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.
- Proposals may be funded for up to three years duration.

Finances and Guideline Model for Funding

The Monitoring Program was first implemented in 2000, with an initial investment of $5 million. Since 2001, a total of $6.25 million is annually allocated for the Monitoring Program. The Department of Interior, through the U.S. Fish and Wildlife Service, annually provides $4.25 million. The Department of Agriculture, through the U.S. Forest Service, annually provides $2 million. On an annual basis, this budget funds both continuations of existing studies (year-2 or 3 of multi-year projects), and new study starts. Budget guidelines are established by geographic region and data type, and for 2007, $3.97 million is available for new starts. Proposals are solicited according to the following two data types.

1. **Stock Status and Trends Studies (SST)**.
   These projects address abundance, composition, timing, behavior, or status of fish populations that sustain subsistence fisheries with nexus to Federal public lands. The budget guideline for this category is two-thirds of available funding.

2. **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.

2007 FISHERIES RESOURCE MONITORING PLAN DEVELOPMENT

A Request for Proposals was issued in November 2005 that identified the following information needs:

- Escapement assessment of sockeye salmon stocks in southeast Alaska that support subsistence fisheries, particularly in the Chatham Straits area.
- Local knowledge of sockeye salmon stream locations, abundance and changes over time in southeast Alaska.
- Research to improve/ verify estimates of inriver return for Copper River Chinook and sockeye salmon.
- Escapement assessment of sockeye salmon stocks that support subsistence fisheries in the Kodiak and Alaska Peninsula area, particularly Afognak Lake, Buskin River, and McLees Lake.
- Document subsistence harvest patterns in southwest Alaska.
- Assessment of Lake Clark sockeye salmon (Kvichak River drainage).
- Evaluate patterns and trends in subsistence fish harvests in the Kuskokwim and Yukon rivers.
- Develop and maintain reliable estimates of mainstem abundance and tributary escapements for Chinook and chum salmon in the Kuskokwim and Yukon rivers.
- Develop basic biological monitoring information (distribution, abundance and stock structure) to detect and track changes in the status of fish stocks utilized for subsistence in the northern region
- Evaluate patterns and trends in subsistence fish harvests in Norton and Kotzebue Sounds

Sixty-eight proposals ($7.1 million) were received in February 2006. These proposals were reviewed by Fisheries Information Services Division staff and then the Technical Review Committee. In March 2006, the Technical Review Committee recommended 44 proposals ($4.8 million) for investigation plan development. In May 2006, 38 investigation plans ($4.1 million) were submitted for funding consideration. The Technical Review Committee recommended funding 35 projects ($3.8 million). The Regional Advisory Councils supported the committee's recommendations for all but one investigation plan, *07-455 Adak Island Subsistence Fishing*.

The Federal Subsistence Board reviewed the draft 2007 Fisheries Resource Monitoring Plan in January 2007 and selected 34 projects for inclusion in the plan. The plan provides 35% of the funding to Alaska Native organizations, 28% to Federal agencies, and 33% to State agencies (Figure 1).

Tables summarizing the 2007 Fisheries Resource Monitoring Plan are provided on pages 8–11. Descriptions of the projects included in the plan can be found on pages 12–87.

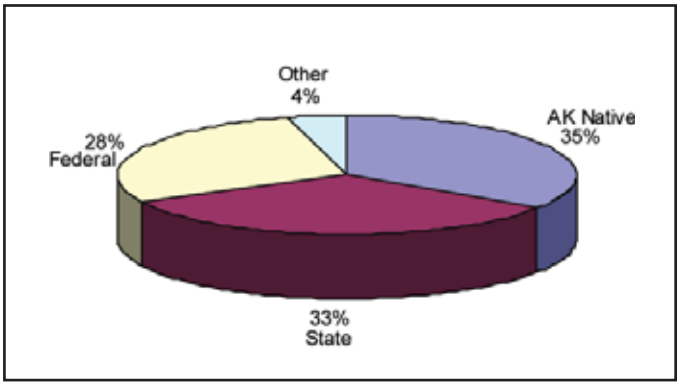

Figure 1. Distribution of 2007 funding to Alaska Native, Federal, State, and other organizations.

Table 1. Number of projects funded for the 2007 Fisheries Resource Monitoring Plan. Project type includes stock status and trends (SST) and harvest monitoring and traditional ecological knowledge (HM-TEK).

Geographic Region	SST	HM-TEK	Total
Northern Alaska	2	1	3
Yukon	5	2	7
Kuskokwim	6	0	6
Southwest Alaska	5	1	6
Southcentral Alaska	4	0	4
Southeast Alaska	7	1	8
Total	29	5	34

Table 2. Cost of projects funded for the 2007 Fisheries Resource Monitoring Plan. Project type includes stock status and trends (SST) and harvest monitoring and traditional ecological knowledge (HM-TEK).

	Cost ($000)		
Geographic Region	SST	HM-TEK	Total
Northern Alaska	$152	$136	$288
Yukon	$522	$164	$686
Kuskokwim	$724	$0	$724
Southwest Alaska	$334	$146	$480
Southcentral Alaska	$514	$0	$514
Southeast Alaska	$749	$95	$844
Total	$2,995	$542	$3,537

Table 3. Northern Alaska region stock status and trends projects funded in 2007.

Study #	Title	Approved Budget ($000) 2007	2008	2009
07-105	North Slope Dolly Varden Genetic Baseline Completion	$33.0	$28.3	$15.1
07-107	Hulahula River Enumeration of Dolly Varden	$119.0	$0.0	$0.0
	Total	$152.0	$28.3	$15.1

Table 4. Northern Alaska region harvest monitoring and traditional ecological knowledge projects funded in 2007.

Study #	Title	Approved Budget ($000) 2007	2008	2009
07-151	NW Alaska Subsistence Fish Harvest Patterns and Trends	$136.4	$129.3	$79.6
	Total	$136.4	$129.3	$79.6

Table 5. Yukon region stock status and trends funded in 2007.

Study #	Title	Approved Budget ($000) 2007	2008	2009
07-202	East Fork Andreafsky River Salmon Weir	$148.6	$148.3	$139.2
07-204	Lower Yukon River Salmon Drift Test Fishing	$58.7	$50.9	$50.9
07-206	Innoko River Inconnu Radio Telemetry	$80.6	$73.2	$30.2
07-207	Gisasa River Salmon Weir	$123.0	$127.4	$135.1
07-208	Tozitna River Salmon Weir	$111.3	$111.3	$111.3
	Total	$522.2	$511.1	$466.7

Table 6. Yukon region harvest monitoring and traditional ecological knowledge projects funded in 2007.

Study #	Title	Approved Budget ($000) 2007	2008	2009
07-252	Yukon Flats Fishing Practices	$89.7	$76.4	$86.0
07-253	Yukon River Salmon Harvest Patterns	$74.4	$204.4	$46.1
	Total	$164.1	$280.8	$132.1

Table 7. Kuskokwim region stock status projects funded in 2007.

Study #	Title	Approved Budget ($000) 2007	2008	2009
07-302	Kuskokwim River Chum Salmon Run Reconstruction	$49.0	$56.4	$0.0
07-303	Kuskokwim River Salmon Age-Sex-Length Assessment	$81.4	$96.0	$99.5
07-304	Tatlawiksuk River Salmon Weir	$154.7	$161.8	$176.1
07-305	Kanektok-Goodnews River Salmon & Dolly Varden Weirs	$108.9	$101.0	$104.6
07-306	Kwethluk River Salmon Weir	$176.2	$187.9	$190.4
07-307	Tuluksak River Salmon Weir	$154.1	$159.6	$173.6
	Total	$724.3	$762.7	$744.2

Table 8. Southwest Alaska region stock status and trends projects funded in 2007.

Study #	Title	Approved Budget ($000) 2007	2008	2009
07-401	Afognak Lake Sockeye Salmon Smolt Assessment	$76.7	$76.7	$81.0
07-402	Buskin River Sockeye Salmon Weir	$99.2	$78.1	$79.2
07-404	Perryville-Clark River Coho-Sockeye Aerial Counts	$0.0	$31.0	$31.0
07-405	McLees Lake Sockeye Salmon Weir	$80.0	$75.9	$78.0
07-408	Togiak River Rainbow Smelt Assessment	$78.1	$78.4	$31.8
	Total	$334.0	$340.1	$301.0

Table 9. Southwest Alaska region harvest monitoring and traditional ecological knowledge projects funded in 2007.

Study #	Title	Approved Budget ($000) 2007	2008	2009
07-452	Kvichak Watershed Subsistence Fishing Ethnography	$146.1	$111.8	$42.3
	Total	$146.1	$111.8	$42.3

Table 10. Southcentral Alaska region stock status and trends projects funded in 2007.

Study #	Title	Approved Budget ($000) 2007	2008	2009
07-501	Tanada and Copper Lakes Burbot Abundance	$41.0	$37.0	$37.0
07-502	Tanada Creek Salmon Weir	$81.0	$81.9	$83.9
07-503	Copper River Chinook & Sockeye Salmon Abundance	$372.5	$366.7	$373.1
07-505	Long Lake Salmon Weir	$19.3	$19.7	$20.1
	Total	$513.8	$505.3	$514.1

Table 11. Southeast Alaska region stock status and trends projects funded in 2007.

Study #	Title	Approved Budget ($000) 2007	2008	2009
07-601	Hatchery Creek Sockeye Salmon Assessment	$117.8	$123.2	$122.9
07-604	Klag Lake Sockeye Salmon Assessment	$108.4	$109.1	$109.8
07-606	Hetta Lake Sockeye Salmon Assessment	$161.0	$161.8	$154.0
07-607	Kanalku Lake Sockeye Salmon Assessment	$172.8	$161.7	$165.4
07-608	Klawock Lake Sockeye Salmon Assessment	$73.2	$75.1	$76.3
07-609	Falls Lake Sockeye Salmon Assessment	$87.7	$90.3	$92.6
07-610	Behm Canal Eulachon Genetics	$27.9	$28.1	$0.0
	Total	$748.8	$749.3	$721.0

Table 12. Southeast Alaska region harvest monitoring and traditional ecological knowledge projects funded in 2007.

Study #	Title	Approved Budget ($000) 2007	2008	2009
07-651	Hydaburg Sockeye Salmon Customary & Traditional Systems	$94.9	$38.7	$0.0
	Total	$94.9	$38.7	$0.0

Project Number: 07-105

Project Title: Completion of a Genetic Baseline for Mixed-stock Analysis of Dolly Varden in the North Slope

Geographic Region: Northern

Data Type: Stock Status and Trends

Principal Investigator: Penny Crane, USFWS Conservation Genetics Laboratory

Co-Investigator(s): John Wenburg, USFWS Conservation Genetics Laboratory
Jim Reist, Canada Department of Fisheries and Oceans

Cost: 2007: $32,988 **2008:** $28,349 **2009:** $15,096

ISSUE

The North Slope Council has identified char fisheries as among the most important subsistence fisheries for this region. This proposal addresses the following priority information need for char, "Basic biological monitoring information (distribution, abundance and stock structure) to detect and track changes in the status of fish stocks utilized for subsistence."

Dolly Varden are harvested in coastal fisheries in the summer, and in inland fisheries in the winter. The largest harvests occur near Kaktovik, located in the Arctic National Wildlife Refuge (ANWR) near the U.S./Canada border. Marine fisheries harvest anadromous fish on their summer feeding migrations; harvests comprise fish from numerous spawning stocks, including fish from Canada. Inland fisheries harvest fish overwintering in rivers. The origin of fish in overwintering areas and the extent of mixing is largely unknown. We propose completing a genetic baseline initiated in FIS 01-113, "Eastern North Slope Dolly Varden genetic stock identification and stock assessment." Baseline data were collected from the Anaktuvuk River, Sagavanirktok River (Echooka, Ribdon, Saviukviayak, and Ivishak rivers), Canning River (Marsh and Main forks), Kavik River, Hulahula River, and Kongakut River. Simulation studies indicated that the stock contribution of individual rivers could be estimated reliably. However, adequate samples from rivers in ANWR and Canada are lacking. Inclusion of samples from rivers supporting the largest spawning aggregates in ANWR and anadromous populations in Canada would finalize an extensive baseline suitable for a multitude of mixed-stock analysis projects in coastal fisheries and in overwintering areas in Arctic Alaska and Canada. This baseline would facilitate subsistence fishery management: mixed-stock analysis using the baseline could be used to estimate the stock contributions to subsistence catches in Kaktovik to monitor trends in stock abundance which may be affected by changes in subsistence or sport fish harvests, increased industrialization in the North Slope, and climate change affecting species composition and hydrology in North Slope streams. Studies estimating the stock composition of fish in overwintering areas will aid the interpretation of aerial survey and sonar counts and evaluate the impacts of winter harvests.

OBJECTIVES

1. Collect tissue samples from Dolly Varden from two rivers in ANWR and one stream in Canada. Obtain tissue samples from DFO-Canada for archive Dolly Varden collections made in the five rivers in Canada that support anadromous Dolly Varden populations.

2. Assay samples (N=approximately 800 fish) for genetic variation at seven microsatellite loci to complete a genetic/tissue database for North Slope Dolly Varden for future mixed-stock analysis studies.

METHODS

Fin clips will be collected from approximately 200 Dolly Varden adults in spawning condition or juveniles from two rivers in the ANWR (likely the Aichilik and Egaksrak rivers) and one in Canada. Sampling of juveniles will be conducted to minimize the possibility of sampling error (see Waples 1998) by sampling a variety of size classes at multiple locations in a drainage. Sampling in Alaska will be coordinated through FIS 06-108 to minimize costs and impact in the ANWR. DFO-Canada will provide tissue from archived collections from five rivers in Canada known to support spawning aggregates of anadromous Dolly Varden: Firth, Babbage, Big Fish, Rat, and Vittrekwa rivers. Samples will be genotyped for at least seven microsatellite loci. Conformation of genotypic frequencies to Hardy-Weinberg expectation will be conducted on each putative population sample to verify that samples do not comprise more than one population; data will be evaluated for temporal stability of allele frequencies; and juvenile collections will be evaluated to determine at which size class family groups disperse. Data will be tested using analysis of artificial mixtures to define stock groups of Dolly Varden that can be estimated in mixtures.

PARTNERSHIPS/CAPACITY BUILDING

A poster summarizing results will be prepared for the ANWR, the village of Kaktovik, and appropriate communities in Canada. This project will foster partnerships between USFWS and DFO-Canada and will provide the basis to foster new partnerships between these agencies and North Slope villages for future mixed-stock fishery projects.

JUSTIFICATION

Funding this work will allow these investigators to complete and evaluate a comprehensive genetic baseline for Dolly Varden within the North Slope area. If genetic differences are great enough, the model developed can be used to obtain information on stock composition of harvests and wintering aggregations. This type of information will help managers ensure that this important resource and the fisheries that depend upon it are sustained.

Project Number: 07-107

Project Title: Enumeration of Dolly Varden Using Dual Frequency Identification Sonar in the Hulahula River, Alaska

Geographic Region: Northern

Data Type: Stock Status and Trends

Principal Investigator: Bruce Osborne, USFWS Fairbanks Fish and Wildlife Field Office

Co-Investigator(s): Jeff Melegari, USFWS Fairbanks Fish and Wildlife Field Office

Cost: 2007: $119,023 **2008:** $0 **2009:** $0

ISSUE

Dolly Varden from the nearshore coastal waters of the Beaufort Sea are one of the most extensively used and favored fish species in the subsistence harvest of coastal villages (Jacobson and Wentworth 1982; Craig 1989). They are primarily harvested in the nearshore narrow band of brackish water during the summer open-water season and during the late winter and early spring at overwintering locations in various rivers. Seven North Slope rivers, the Kongakut, Egaksak, Aichilik, Hulahula, Canning, Sagavanirktok, and Anaktuvuk, provide known spawning and overwintering habitat for separate stocks of Dolly Varden (Craig 1973; Krueger et al. 1999). Very little is known about the population sizes of these stocks or their contribution to subsistence fisheries. However, it is known that these stocks are an important subsistence resource for the communities of Kaktovik, Nuiqsut, and Anaktuvuk Pass (Jacobson and Wentworth 1982; Craig 1989; Pedersen 1990; Pedersen and Linn 2005).

Kaktovik is the center of federal subsistence fishing activity in the eastern North Slope. During April 2003, fishers indicated that throughout the winter 2002–2003 season, at Fish Hole Two on the Hulahula River, greater effort was being expended for harvesting fewer fish than in previous years (David Wiswar, U.S. Fish and Wildlife Service, personal communication). Some village residents have also described the last three years' harvests as having smaller sized fish. Continued concerns raised by residents of Kaktovik over reduced harvest of Dolly Varden in the Hulahula River make it logical to continue the DIDSON enumeration study for an additional year.

OBJECTIVES

The objectives of this study are to use DIDSON technology to:

1. Estimate annual abundance and describe variability in run size and timing of Dolly Varden in the Hulahula River;
2. Evaluate the presence of non-target species.

METHODS

The operational phase of the study will begin the third week of July and run through the third week of September 2007. Target validation of DIDSON images using underwater video, hook and line sampling and netting will continue during this third year. We will test the hypothesis that Dolly Varden are the only

fish present at the site during counting operations. To evaluate the presence of non-target species on the Hulahula River, an underwater camera synchronized with the sonar to view passing fish will be operated. The video monitoring in the Hulahula River will be used to identify what species are present, and verify DIDSON data. Video and DIDSON images will be compared and evaluated to identify swimming or other behavioral aspects that could influence counts or that may suggest potential methods of separating other species from Dolly Varden in the DIDSON images.

Additional sampling with a beach seine will be conducted to confirm timing and relative abundance of Dolly Varden and other species. The netting will be used to document species presence when water clarity prevents use of video monitoring and when the DIDSON data shows lots of fish. Species identification using DIDSON is difficult or impossible with fish of similar size and body shape. Arctic grayling are the only known species of a similar size and shape as Dolly Varden present in the Hulahula River when we are counting with the DIDSON. However, sampling efforts in previous years on the Hulahula River lead us to believe that they do not make up a large component of the fish population at any given time, and so do not compromise the Dolly Varden abundance estimate.

PARTNERSHIP/CAPACITY BUILDING

During fall 2006–winter 2007, the investigators will travel to the village of Kaktovik to discuss the nature and status of this project. Funding is requested for a local hire from the village of Kaktovik to utilize his/her knowledge of Dolly Varden and the area. Also, the possibility of placing a sonar intern on the project will be researched. Consultation with the Arctic National Wildlife Refuge will also continue.

JUSTIFICATION

Continuation of funding for an additional year will allow collection of one more year of sonar counts on the Hulahula River, and, more importantly, more rigorous examination of species apportionment assumptions. The investigators also need to determine whether a substantial proportion of the run enters this river after cessation of sonar operations, including the possibility of under-the-ice migration, by first obtaining information from Kaktovik residents to assess the need to extend the sonar operation season and sample under the ice. The investigators would need to modify the investigation plan, if additional information on this issue needs to be collected. If successful, this project would provide annual abundance estimates and describe annual variability in run size and timing of Dolly Varden in an important system within the Arctic National Wildlife Refuge. These techniques could then be adopted for other systems within the refuge to validate and supplement aerial survey counts that are now used to assess Dolly Varden.

Project Number: 07-151

Project Title: Patterns and Trends in Subsistence Fish Harvests, Northwest Alaska 1994–2003

Geographic Region: Northern

Data Type: Harvest Monitoring/Traditional Ecological Knowledge

Principal Investigator: James Magdanz, ADFG Division of Subsistence

Co-Investigator(s): Hazel Apok, Maniilaq Association

Cost: **2007:** $136,425 **2008:** $129,314 **2009:** $79,627

ISSUE

This project will explore subsistence fishery harvest patterns and trends in six Northwest Alaska communities: Ambler, Kiana, Kobuk, Noatak, Noorvik, and Shungnak. In every one of the six study communities, estimated salmon harvests have declined since 1994. In some communities, declines in salmon harvests have been mitigated by increases in other fish harvests. But in other communities, this has not occurred. In each of the six communities, this project will explore community harvest trends and community patterns of use for salmon, Dolly Varden (trout), whitefish, and inconnu (sheefish). In an unusual feature of the study, researchers will invite a respondent in selected fishing households in two communities to participate in the analysis by reviewing their own households' ten-year harvest history and providing commentary and explanations for their own harvest patterns. In two communities, researchers also will work with high school science teachers and students to review existing data and collect new data in their communities. The main focus of the study is to identify variables that could improve the reliability of predictive harvest models so managers can better understand the factors associated with changing fish harvests. A specific focus will be on characterizing changes related to social, economic, and environmental factors—which cannot be influenced—from changes related to managerial factors—which can be influenced.

OBJECTIVES

1. Compare community and household harvest databases; identify and correct data errors.
2. Analyze community database to identify harvest trends for four fish species in six communities.
3. In two communities, work with high school students to review community harvest patterns, and with respondents in selected households to review household harvest patterns.
4. In six communities, collect household attributes (age of household head, changes in health status, deaths, marriages, etc.) from key respondents and through household interviews.
5. Summarize data from interviews and add household interview data to the harvest database.
6. Analyze the household-level database to identify associations between harvests and social, economic, and demographic variables.

METHODS

This project will rely extensively on two subsistence fishery harvest databases developed during previous projects. One is a community-level database, in which each record contains the fish harvests for one community in one year. The other is a household-level database, in which each record contains the fish harvests for one household in one year. The general study design calls for a coordinated analysis of the two datasets. The household harvest dataset will be enhanced with additional data on household attributes and from household interviews. To verify the household level database, researchers will calculate the sums of the annual reported harvests for each species in each community, and compare the results with the previously published annual summaries in the community-level database. If discrepancies are found, researchers will locate and correct the discrepancies. Researchers will visit each study community to verify household identifiers and gather additional data about household characteristics to supplement each household's harvest data. Data from these forms will be entered in a series of Microsoft Access databases, one for each study community. Researchers will use SPSS to merge the aggregated harvest database with the household characteristics data. Household identifiers will be corrected as necessary and duplicate records, if any, will be merged. The final expanded household-level database will be stored in SPSS. Researchers will use the SPSS to categorize households based on their harvesting histories, then test for correlations between reported harvests and household attributes. Researchers also will prepare a narrative summary discussing the explanations households offered for their own harvesting patterns. Researchers expect respondents will discuss changes in processing methods, changes in employment levels, increases in fuel and equipment costs, and changing environmental conditions as factors in their households' harvest levels.

PARTNERSHIPS/CAPACITY BUILDING

The project will work through the local IRA governments in each community, and contract with local research assistants in each study community to gather the data. When possible the project will employ the same local residents who gathered the fisheries data during the original salmon harvest survey projects. The project also will work with high school students and teachers in two communities. The ADFG Division of Subsistence and Maniilaq Association have cooperated on a number of research projects in Northwest Alaska dating back to the 1980s.

JUSTIFICATION

A majority of the Technical Review Committee (7 of 10 members) recommends funding this project. The goal of this project is to improve the reliability of a predictive harvest model for understanding changing subsistence harvest patterns, which is a high priority for the Monitoring Program. The investigation plan is scientifically and technically sound; the principal investigator is highly qualified to conduct the proposed work, and has an excellent record of performance with the Monitoring Program. Of concern, however, is the significantly increased cost and expanded timeframe compared with previous submissions for the same project. At the request of the Technical Review Committee, the principal investigator provided a budget justification for the $96,000 budget increase over the proposal, however, a minority of the committee (3 of 10 members) recommended that the project not be funded due to the high cost and lack of agency match. The minority of the Technical Review Committee recognized that while this project benefits the State and Federal subsistence programs, the State is seeking to have the Monitoring Program fund the entire effort. The minority of the Technical Review Committee felt that this project should only be done on a partnership basis with the State sharing costs.

Project Number: 07-202
Project Title: Abundance and Run Timing of Adult Salmon, East Fork Andreafsky River
Geographic Region: Yukon
Data Type: Stock Status and Trends
Principal Investigator: Raymond Hander, USFWS Fairbanks Fish and Wildlife Field Office
Co-Investigator(s): Francis Thompson, Algaaciq Tribal Council
David Waltemeyer, Association of Village Council Presidents
Ursula Hunt, Yupiit of Andreafski Tribal Council

Cost: **2007:** $148,623 **2008:** $148,293 **2009:** $139,221

ISSUE

The abundance and run timing of spawning populations of salmon within the Yukon River drainage have been identified as priority information needs by the Regional Advisory Councils, the Yukon River Comprehensive Management Plan for Alaska, and the Yukon River Joint Technical Committee Plan. The Andreafsky River system supports relatively large populations of Chinook, summer chum and coho salmon. The project's location in the lower river allows its escapement estimates to be used in-season by fishery managers. Data from the project are useful for post-season evaluation of management practices and provide insights for future run projections. The East Fork Andreafsky River weir has operated for the past twelve years and provides one of the longer term databases on escapement in the entire Yukon River, meeting the priority information need of the Office of Subsistence Management to "maintain reliable estimates of Chinook and chum salmon escapement over time." Andreafsky River salmon stocks comprise an important component of the diet of villagers along the Andreafsky River and the Yukon River below and including Pitka's Point. In addition, these stocks are harvested in commercial and subsistence fisheries below the confluence of the Andreafsky River from May through October. This investigation plan addresses enumeration of only Chinook and chum salmon.

OBJECTIVES

1. Determine daily escapement numbers and run timing of two species of adult salmon into the East Fork Andreafsky River.
2. Estimate the age, sex, and length composition of adult Chinook and chum salmon in the East Fork Andreafsky River.
3. Determine the numbers of resident fish species passing the weir.

METHODS

The location of the weir site is approximately 43 rkm upriver from the confluence of the Andreafsky and Yukon Rivers. A resistance board weir will be installed and operated on the Andreafsky River each year from 2007 to 2009. The abundance of salmon and resident fish species will be recorded to determine run timing and escapement size. A stratified random sampling design will be used to collect age, length, and sex ratio information for Chinook and summer chum salmon.

PARTNERSHIPS/CAPACITY BUILDING

The Fairbanks Fish and Wildlife Field Office will work with the Office of Subsistence Management Fisheries Information Services staff to strengthen the capacity building component of this project. Consultation will occur with Ursula Hunt, Andreafsky Tribal Council Leader, and Francis Thompson, Algaaciq Tribal Government, for hiring people from the local area, and David Wages, St. Mary's School Principal, for coordination with the Science Camp. David Waltemeyer, Association of Village Council Presidents will be working with weir personnel to become more familiar with weir operations. The Fairbanks Fish and Wildlife Field Office will continue the long running precedence of hiring local persons to staff and operate the Andreafsky River weir and provide outreach and educational opportunities for the benefit of the local communities. Discussions will continue regarding the Association of Village Council Presidents becoming a co-investigator on the project during this funding cycle.

JUSTIFICATION

This project addresses an issue specifically identified as a high priority need in the 2007 Request for Proposals, namely maintenance of reliable estimates of Chinook and chum salmon escapement over time. The Andreafsky River weir supports one of the most comprehensive data sets (12 consecutive years) for salmon escapement in the lower Yukon River. It currently operates from late June through July, providing escapement counts for Chinook and chum salmon. The U.S. section of the Joint Technical Committee ranked the East Fork Andreafsky River weir as third in importance for Chinook salmon, fourth for summer chum salmon, and second for coho salmon among existing escapement projects. Managers use the information provided by this weir as an indicator of run timing and strength in the lower Yukon River Geographic Unit for Chinook and summer chum salmon.

Project Number: 07-204
Project Title: Lower Yukon River Salmon Drift Test Fishing
Geographic Region: Yukon
Data Type: Stock Status and Trends
Principal Investigator: Fred Bue and Eric Newland, ADFG Division of Commercial Fisheries

Cost: 2007: $58,708 **2008:** $50,876 **2009:** $50,876

ISSUE

Fluctuations in production of Yukon River fall chum salmon make optimal harvest management of the mixed stocks especially difficult. Most commercial salmon harvest occurs near the mouth of the Yukon River in Districts 1 and 2, whereas the majority of the subsistence harvest occurs in the upper portion of the drainage. The subsistence fishery has priority use of these resources, but the fish pass through the major commercial harvesting area in the lower river before they arrive into the upper regions where most of the subsistence harvest occurs. Fishery managers are challenged to quickly and accurately assess run timing and abundance inseason to ensure that sufficient numbers of salmon pass through the downstream commercial fishing districts in order to provide for subsistence needs and adequate escapements to Alaskan and Canadian streams.

This proposal is an extension of the FIS 04-229 cooperative project. The U.S. section of the Joint Technical Committee ranked the lower Yukon River cooperative fall salmon drift test fishing project as one of the highest assessment projects for fall chum salmon based on it's performance and utility for providing information relevant for management decisions. Both State and Federal managers are in direct contact with this project inseason which enables a good understanding of the data and it's relevance to the fisheries as the salmon return.

OBJECTIVES

The objectives for the lower Yukon River fall salmon drift gillnet test fishery are to:

1. Estimate relative abundance of fall chum and coho salmon on a daily basis as they enter the mouth of the Yukon River.
2. Estimate run timing of fall chum and coho salmon as they enter the mouth of the Yukon River.
3. Estimate the age, sex, and length composition of the return of fall chum and coho salmon for use in brood year assessment and run forecasting.
4. Build partnerships and capacity by involving local technicians and communities in the project operation and information sharing.

METHODS

Project operation and data collection will be conducted in a manner similar to the project's operations over the past five fall seasons. Two test fish crews will be assigned one each to the Big Eddy and Middle Mouth locations. Drift test fishing will be conducted twice daily at each location using standardized methods and gear for consistency to allow time-series comparisons with previous years. Fishing times

and catch by species are recorded and catch per unit effort data is calculated for each drift. Age-sex-length sample data will be collected from a portion of the catch lost due to netting mortality with all mortalities distributed locally.

Test fishing results will be recorded twice daily on Excel spreadsheets at the ADFG Emmonak field office, consolidated and distributed daily to ADFG and USFWS offices. Daily results are made available to the public via an ADFG recorded telephone message. ADFG also provides test fish information to the public in weekly update packets which include other current Yukon River fisheries information that are distributed by fax, email, and web-posting. The updates track the project in season and makes relative comparisons to previous years and subjective observations. Post season, test fish data will be incorporated in annual project reports and merged into a larger data base for access by other studies.

PARTNERSHIPS/CAPACITY BUILDING

Staff from the Division of Commercial Fisheries would work cooperatively with local staff from the Yukon Delta Fisheries Development Association to recruit and appoint local technicians into crew-member positions. Participants would collect data utilizing drift gill nets and use standardized techniques for taking biological samples. In addition, staff from ADFG would mentor local-hire staff to develop skills for advancement within the program. The project will be reviewed inseason by the Regional Advisory Council and communities throughout the Yukon River drainage during teleconferences sponsored by the Yukon River Drainage Fisheries Association. The project has been used in the past as a platform to collect biological samples for other studies which will be considered an important function in the future as time permits and opportunities are presented. The annual start up of the fall drift project would be an extension of the summer chum salmon drift test fish project that has cooperative funding from ADFG and the Community Development Quota Program. The Yukon River Drainage Fisheries Association plans to continue their capacity building commitments by providing additional local technicians to assist in this project as well as overlap with other harvest monitoring projects operating in the same location.

JUSTIFICATION

Although the production of Yukon River fall chum salmon has improved since 2003, the Alaska Board of Fisheries has designated Yukon River fall chum salmon as stocks of yield concern. In 2001, the amounts necessary for subsistence (ANS) for Yukon River salmon species was revised. For fall chum salmon the range, based on historical harvests, was set to 89,500 to 167,100 fish annually. The subsistence harvest of fall chum salmon has fallen below the ANS range in five of the last six years. Based on the 1998–2002 averages, approximately 17% of the subsistence harvest and 97% of the commercial harvest of Yukon River fall chum salmon occurs in the lower Yukon River. This project provides one of the first reliable indications of run timing and strength for fall chum and coho salmon returning to the Yukon River. The U.S. Section of the Joint Technical Committee ranked the lower Yukon River cooperative salmon drift test fishing project as one of the highest priority assessment projects for fall chum salmon.

Project Number: 07-206

Project Title: A Radio Telemetry Investigation of the Spawning Origins of Innoko River Sheefish

Geographic Region: Yukon

Data Type: Stock Status and Trends

Principal Investigator: Randy Brown, USFWS Fairbanks Fish and Wildlife Field Office

Co-Investigator(s): John Burr, ADFG Division of Sport Fisheries
Caroline Brown, ADFG Division of Subsistence

Cost: **2007:** $80,593 **2008:** $73,159 **2009:** $30,240 **2010:** $30,976 **2011:** $43,187

ISSUE

Although not identified as a formal priority in the 2007 Monitoring Program, life history and stock distribution information regarding sheefish and other whitefish species utilized in the subsistence fisheries of the Yukon River drainage will be critical for future management of these stocks. Previous sheefish studies carried out in the Innoko River and elsewhere in the Yukon River drainage suggest that they use the Innoko River for feeding only and migrate elsewhere to spawn. Five spawning areas have been identified in the Yukon River drainage; two in the upper Koyukuk River, one in the upper reaches of the Yukon Flats, one in the upper Nowitna River, and one in the Chatanika River. At this point it appears that most or all sheefish in the drainage originate in one of these spawning areas. During their annual migrations between overwintering, feeding, and spawning areas, Innoko River sheefish would undoubtedly be subject to a wide variety of commercial, subsistence, and sport fisheries within the Innoko River and elsewhere in the Yukon River drainage. If Innoko River sheefish are members of Yukon River populations that spawn elsewhere, as suggested by previous studies, then effective management will be possible only by identifying the contributing stocks, the user groups throughout the range of each contributing stock, and the magnitude of the fishery harvests. In this study we propose to use radio telemetry techniques to test the hypothesis that Innoko River sheefish are members of Yukon River populations that spawn in locations other than the Innoko River drainage, and identify the spawning locations of those contributing stocks. Other biological data will be gathered as well, including spawning frequency, feeding habitat fidelity, and annual survival rates.

OBJECTIVES

1. Identify the spawning origins of sheefish radio-tagged in the Innoko River during summer by surveying known and suspected spawning areas in the drainage during spawning season.
2. Determine spawning frequency of radio-tagged sheefish by locating fish on spawning grounds over the course of four spawning seasons.
3. Investigate feeding habitat fidelity of radio-tagged sheefish by surveying major feeding habitats in the drainage during four summer feeding seasons.
4. Estimate annual survival of radio-tagged sheefish directly by assessing the status of each tagged fish over time.
5. Estimate the proportional contributions of identified spawning stocks to the aggregation of feeding sheefish in the Innoko River during 2007 and 2008.

6. Involve students and other Shageluk community members in the project directly during the tagging component of the project, and provide location data so the community can map the migrations of tagged fish through time.

METHODS

Radio telemetry techniques will be used in this study to identify the spawning origins of mature sheefish (≥72.5 cm fl) tagged in the Innoko River drainage during the summer feeding season. The transmitters will be surgically implanted in candidate fish. They will be programmed to operate for eight weeks during each of three seasons; spawning during September and October, overwintering during January and February, and feeding during May and June. They are expected to last for well over 4 years with this operating schedule. Aerial surveys will be conducted to locate tagged fish in known or possible spawning areas, feeding habitats, and overwintering locations. Spawning destinations will be identified based on the presence of radio-tagged fish in previously identified spawning areas, or in new areas of riverine habitats with gravel substrate during late September and early October. Spawning frequency will be evaluated based on the time intervals between spawning events, as determined by their presence in spawning areas during the fall. Feeding habitat fidelity will be investigated based on their presence in the same or different geographic areas during the summer feeding season from one year to the next. Annual survival will be estimated directly based on the fraction of tagged fish that are known to survive from one year to the next. Survival will be judged based on seasonal migrations. Stock contributions to the Innoko River feeding aggregation will be estimated based on the fraction of all sheefish located in spawning habitats that migrate to particular spawning areas. Some of the tagging will be conducted in the vicinity of Shageluk, and regular contact with the Shageluk School and sharing of location data will ensure community awareness and involvement in the project and its findings.

PARTNERSHIPS AND CAPACITY BUILDING

Caroline Brown has initiated an arrangement with Joy Hamilton, a teacher in the Shageluk School, to involve middle school students in an educational unit focused on this project. They will read about the project, join us in tagging fish in the Shageluk area, map migrations based on tag locations during the course of the year, share migration data with elders in the community, interview elders about their knowledge and how it relates to the telemetry findings, and write about the project. In this way, the students will take some ownership of the project and communicate the findings to the community.

JUSTIFICATION

Sheefish are an important subsistence resource throughout the Yukon River drainage. Currently, there is little information available on the life history of sheefish in the Yukon River. Sheefish are targeted in subsistence, commercial and sport fisheries, and caught incidentally in salmon fisheries. This project would build on the work initiated in 2005 on the lower Nowitna River. In 2007–2008, investigators propose to radio tag 50 sheefish annually from the Innoko River drainage and track them seasonally through 2011. This project will provide the opportunity to relocate each fish four times during spawning and feeding periods and three times during the overwintering period. The investigators have a strong capacity building component incorporating multiple disciplines and emphasizing outreach to local communities. The Technical Review Committee recommends funding this project for 3 years, with years 4–5 funding contingent upon committee review.

Project Number: 07-207

Project Title: Abundance and Run Timing of Chinook and Summer Chum Salmon in the Gisasa River, Koyukuk National Wildlife Refuge, Alaska

Geographic Region: Yukon

Data Type: Stock Status and Trends

Principal Investigator: Mark Voight, USFWS Fairbanks Fish and Wildlife Field Office

Cost: **2007:** $123,016 **2008:** $127,440 **2009:** $135,138

ISSUE

Assessment of management actions for Yukon River salmon fisheries is difficult due to the limited number of escapement studies in the drainage. Within the Koyukuk River drainage, a major tributary in the middle-lower Yukon River, the Gisasa River weir is one of two projects (Henshaw Creek weir) that provides inseason information to assess management actions as well as a postseason indexes of escapements of other tributaries within the Koyukuk River. Federal and State managers have consistently identified this project as an important source of information for fishery management. Also, the Yukon River Comprehensive Management Plan describes the need for escapement monitoring projects in the Koyukuk River region. Further, in November 2005 the Joint Technical Committee of the Yukon River Panel identified the Gisasa River weir as the second highest priority among lower river projects for Chinook salmon. The project was also identified as the third highest priority for summer chum salmon. The Gisasa River weir has operated for the past twelve years and provides one of the longer term databases on escapement in the entire Yukon River.

OBJECTIVES

This project is proposed as a three-year (2007–2009) study. The objectives are:

1. Enumerate the daily passage of Chinook and summer chum salmon.
2. Describe the age, sex, and length of Chinook and summer chum salmon.
3. Enumerate the daily passage of resident fish species.

METHODS

Investigators will install a resistance board weir across the Gisasa River, 4 km upstream from the mouth of the Gisasa River. The weir and passing chute will funnel fish into a live trap, which holds the fish so they can be counted (by species). Fish sampling will include measuring length, determining sex, and collecting scales.

PARTNERSHIP/CAPACITY BUILDING

Fairbanks Fish and Wildlife Field Office and the Refuge have strived for local involvement and capacity building with the project, and initial interest had been expressed by residents in the Galena area. However, the remoteness of the weir site reduces the attraction of the project, and subsequent interest has not

developed. Nevertheless, the Fairbanks Fish and Wildlife Field Office and the Refuge are committed to continually promoting capacity building by describing project opportunities at Regional Advisory Council, Yukon River Drainage Fisheries Association, and Refuge coordination meetings. In 2007, renewed efforts will focus on promoting the project and the potential for local involvement to tribal and village groups in the lower Koyukuk River area.

JUSTIFICATION

This project addresses an issue specifically identified as a high priority need in the 2007 Request for Proposals, namely maintenance of reliable estimates of Chinook and chum salmon escapement over time. The project is technically sound and the Gisasa River weir supports one of the most comprehensive data sets (12 consecutive years) for salmon escapement in the lower Yukon River Geographic Unit for Chinook and summer chum salmon. It currently operates from late June through the middle of August, and provides escapement counts for Chinook and chum salmon. The U. S. Section of the Joint Technical Committee ranked the Gisasa River weir as second importance for Chinook salmon and third for summer chum salmon among existing escapement projects. Managers use the information provided by this weir project as an indicator of run timing and strength.

Project Number: 07-208
Project Title: Abundance and Run Timing of Adult Salmon in the Tozitna River
Geographic Region: Yukon
Data Type: Stock Status and Trends
Principal Investigator: Bob Karlen, Carl Kretsinger, and Jason Post, Bureau of Land Management

Cost: **2007:** $111,349 **2008:** $111,349 **2009:** $111,349

ISSUE

There is a need to document the abundance and run timing of salmon spawning in the middle and upper portions of the Yukon River. This data gap has been identified by fishery managers and as part of the Yukon River Comprehensive Salmon Plan for Alaska. The current lack of information makes it difficult for Federal and State managers to adjust fishing schedules to assure that the many objectives of salmon management are met. Recent severe declines in Yukon River drainage salmon runs have resulted in additional concerns about conserving stocks and providing for subsistence uses. The region's Regional Advisory Councils have called for a range of studies to address the salmon declines, including new projects that assess the production of salmon from tributary streams and quantify their contribution to the overall productivity of the Yukon River drainage. The Tozitna River escapement project addresses these concerns.

OBJECTIVES

1. Count adult Chinook and summer chum salmon passing through the weir.
2. Describe run-timing characteristics of Chinook and summer chum salmon.
3. Estimate the proportion of Chinook and summer chum salmon spawning in the Tozitna River downstream of the weir and document the location of spawning habitat throughout the drainage using aerial survey techniques.
4. Estimate the age and sex composition of Chinook and summer chum salmon weekly.
5. Estimate the mean length of Chinook and summer chum salmon by sex and age.

METHODS

The Bureau of Land Management (BLM) proposes to count adult Chinook and summer chum salmon as they pass through a floating resistance-board weir located at river kilometer 79 on the Tozitna River. Counting and sampling for age, sex, and length information would begin with the arrival of the first salmon and continue until the daily salmon passage drops to <1% of the cumulative count for three consecutive days for both species.

PARTNERSHIPS/CAPACITY BUILDING

In 2005 (and again in 2006), the Yukon River Drainage Fisheries Association provided BLM with a research assistant who provided the project with over 30 years of local knowledge. In an ongoing effort to involve nearby communities in the project, BLM would like to continue hiring rural residents while using the Yukon River Drainage Fisheries Association as a source of technicians for the project. If the project is funded, BLM will put a portion of the money into an agreement with the Yukon River Drainage Fisheries Association to cover the annual cost of one technician for the project.

To further capacity development, BLM also presents the Tozitna River escapement data annually to the Resource Advisory Councils as a means of information sharing with subsistence users of the Yukon River. BLM has also promoted interaction with subsistence users through the Partners for Fisheries Monitoring Program. Kim Elkin (Tanana Chiefs Conference) and Dave Waltemyer (Association of Village Council Presidents) and their technicians from the Partners Program visited the Tozitna project in 2003 in an effort to gain exposure to project operations and data gathering methodologies. BLM encourages continued information sharing like this in the future.

JUSTIFICATION

This project addresses an issue specifically identified as a high priority need in the 2007 Request for Proposals. The project is technically sound and supports 5 consecutive years of salmon escapement in the middle Yukon River. The U.S. Section of the Joint Technical Committee ranked the project as sixth importance for both Chinook and summer chum salmon, making the Tozitna River weir the lowest ranked Chinook salmon monitoring project in the lower Yukon River Geographic Unit. Managers use the information provided by this weir as an indicator of run timing and strength for the lower Yukon River Geographic Unit for Chinook and summer chum salmon.

Project Number: 07-252

Project Title: Non-Salmon Fishing Practices and Traditional Knowledge in the Northern Yukon Flats Region of Alaska

Geographic Region: Yukon

Data Type: Harvest Monitoring/Traditional Ecological Knowledge

Principal Investigator: Mike Koskey, ADFG Division of Subsistence

Co-Investigator(s): Hishinlai' "Kathy " Sikorski, UAF Alaska Native Language Center
Ingrid McSweeny, Bureau of Land Management
Wennona Brown, USFWS Yukon Flats National Wildlife Refuge
Davey James, Gwichyaa Zhee Gwich'in Tribal Government

Cost: 2007: $89,691 **2008:** $76,433 **2009:** $85,957

ISSUE

Non-salmon fish are an important subsistence resource. There may be an inverse relationship between salmon and non-salmon harvests, but there is little in-depth information on the changes that have influenced non-salmon fishing practices in the Northern Yukon Flats region. The ADFG Community Subsistence Information System reports wide variation in the contribution of non-salmon fish to the regional subsistence harvest by both year and location. The greatest take of non-salmon fish reported for a single year (1987) was in Fort Yukon at 75,965 pounds (29,083 fish). The proposed project will provide information on the contemporary harvest and use of non-salmon fish by residents of four Yukon Flats communities: Chalkyitsik, Venetie, Arctic Village and Fort Yukon—and to place these data within a historical framework of changing fishing practices within the region

OBJECTIVES

This project is designed on a three-year time-frame with the following goals:

1. Document the traditional ecological knowledge of non-salmon fish species in the Yukon Flats communities of Fort Yukon, Chalkyitsik, Venetie, and Arctic Village.
2. Estimate the harvest levels and use patterns of non-salmon fish species by village residents through systematic household surveys.
3. Identify and document historic and contemporary non-salmon harvest areas through resource use and Gwich'in placename mapping.

METHODS

The project relies on semi-structured ethnographic interviews with elders and other knowledgeable fishers, mapping, placename analysis, archival research, and participant-observation in order to address the first objective. The second objective is addressed through the implementation of a household harvest survey in each community conducted by a local research assistant. The final objective is addressed through a review of previously collected Gwich'in placenames as well as resource use mapping to be conducted during ethnographic interviews and reviewed during community meetings

PARTNERSHIPS/CAPACITY BUILDING

One of the primary strengths of this project is the cooperation of five organizations representing two Federal agencies (BLM and USFWS), one State agency (ADFG), one academic institution (Alaska Native Language Center), and one Alaska Native government (Gwichyaa Zhee).

JUSTIFICATION

The Technical Review Committee recommends funding this project. This is a potentially important project that ties in with several other Monitoring Program funded projects to provide a comprehensive understanding of non salmon harvest and use along the Yukon River. The project addresses an issue specifically identified as a high priority in the 2007 Request for Proposals, namely evaluating patterns and trends in subsistence fish harvests for important non-salmon fish species, and will likely provide valuable information for Federal subsistence fisheries management. The project is technically sound, contains a solid capacity building project, and investigators are qualified to conduct the proposed work. Investigators responded to Technical Review Committee comments in full. The budget increased 33% over the proposal submitted in January 2006.

Project Number: 07-253
Project Title: Continuity and Change in Salmon Harvest Patterns, Yukon River Drainage, Alaska
Geographic Region: Yukon
Data Type: Harvest Monitoring/Traditional Ecological Knowledge
Principal Investigator: Robert J. Wolfe, Robert Wolfe and Associates
Co-Investigator(s): Cheryl Scott, Alaskan Connections

Cost: 2007: $74,431 **2008:** $204,370 **2009:** $46,116

ISSUES

The primary issues addressed are the factors contributing to changes in subsistence harvest patterns for salmon along the Yukon River since the 1990s, the period of recent collapse of summer chum, fall chum, and coho salmon runs and restrictions of local subsistence and commercial salmon fisheries. The study will describe and analyze continuity, change, and trends in harvest patterns of federally-qualified subsistence users during this time period. The analysis will clarify how local families have responded to the salmon downturn in terms of household participation rates, fishing areas, mobility, use of seasonal fishing camps, types of equipment (such as boats, motors, fishwheels, net mesh size, and net length), effort, labor force composition, commercial-subsistence fishing interactions, species selection, harvests of fish, furbearers, and other wildlife, customary management practices, and other factors. The research will explore relationships of subsistence salmon harvests with other sectors of the local socioeconomic system, including commercial salmon harvests, furbearer harvests, and other fish and wildlife harvests. This type of information fits with Priority Information Needs for the Yukon Region: "Evaluate patterns and trends in subsistence fish harvests; factors to include, but are not limited to, demographic, economic, regulatory, and cultural issues."

OBJECTIVES

The objective of this study is to document continuity, change, and trends in the subsistence salmon fisheries of the Yukon River drainage as families have responded to salmon declines during the 1990s. The research will describe and examine continuity and changes in factors such as the following: local participation in salmon fishing, fishing efficiency, equipment, areas, mobility, fishing camps, species composition, workers, dogs, dog food, trapping/hunting furbearers, customary management of furbearer areas, commercial-subsistence fishing relationships, and out-migration of family members. The objective of the analysis is to produce a report that assesses continuity and change in these factors.

METHODS

The primary methods are face-to-face interviews with knowledgeable, local subsistence experts, and systematic surveys of households in three villages in the lower, middle, and upper Yukon River drainage. Additional methods are the compilation and analysis of existing databases on fish harvests by area, and consultation with other experts familiar with the fisheries.

PARTNERSHIPS/CAPACITY BUILDING

This project will develop partnerships and build capacity in rural villages. Before collecting new information, the first year provides a period of consultation with rural villages, fishing organizations, and local experts. The principal investigator will train three local researchers at each village location in social science methodology, including training in survey construction, sample selection, survey administration, note taking, key respondent interviews, and data management techniques. The local researchers will be responsible for conducting household interviews, comprising a central part of the study. To the extent the local researchers are members of existing rural organizations, this training will build capacity in local entities as well as in individuals. The project will pay honorarium to persons interviewed as part of the project. This recognizes the significant contributions of their knowledge in documenting trends and patterns in subsistence fisheries.

JUSTIFICATION

The Technical Review Committee recommends funding this project. The project addresses an issue specifically identified as a high priority issue in the 2007 Request for Proposals, namely to evaluate patterns and trends in subsistence fish harvests, including demographic, economic, regulatory and cultural issues. Project investigators are uniquely qualified to conduct the proposed work, and have a proven track record in conducting complex analyses such as the one described in this investigation plan. Investigators were highly responsive to all the Technical Review Committee comments, and have provided a very thorough, well written, and technically sound project. While somewhat high, the budget is clearly justified in the investigation plan, and based on the extensive involvement of the principal investigators in all phases of the project, appears justified. Understanding changing harvest patterns is a critical element of Federal subsistence fisheries management, and this research will make a significant contribution towards this goal. Investigators are encouraged to include an assessment of the effects of windowed fishing schedules on subsistence fishing in their analysis.

Project Number: 07-302
Project Title: Kuskokwim River Chum Salmon Run Reconstruction
Geographic Region: Kuskokwim
Data Type: Stock Status and Trends
Principal Investigator: Brian Bue, Bue Consulting LLC
Co-Investigator(s): Douglas Molyneaux, ADFG Division of Commercial Fisheries
Cost: 2007: $49,015 **2008:** $56,398 **2009:** $0

ISSUE

The status of chum salmon populations within the Kuskokwim River drainage has been of concern in recent years due to apparently low run abundance. The Alaska Board of Fisheries identified Kuskokwim River chum salmon as a stock of concern in November 2000, and enacted regulations to reduce fishing opportunity in all fisheries so more chum salmon could escape to spawn. Reliable information on the numbers of salmon returning by year is essential if researchers are going to understand the mechanisms that drive variation of salmon abundance. This information is a prerequisite to investigating the effects of subsistence management actions, historical exploitation rates, long-term consequences of harvest practices, and the likelihood that projected abundance levels can sustain future harvests.

University of Alaska researchers began to approach the problem of reconstructing past returns by developing a statistical model which incorporated historical information (1976–1999) to estimate the magnitude of past chum salmon returns. The project showed promise but suffered because of insufficient information on salmon escapement. Numerous new projects to enumerate salmon escapement have been in place since the late 1990s and there is a strong chance that this new data will provide the needed resolution to allow the model to work properly. This project will build upon previous work by drawing in information from escapement and mark-recapture projects collected since 1999. Objectives of this project have been identified as high priority information needs by the Kuskokwim Fisheries Resource Coalition in the recent draft Gap Analysis for the Kuskokwim Area Salmon Research Plan.

OBJECTIVES

1. Estimate spawning and total abundance of chum salmon in the Kuskokwim River from 1976 through 2007 using a statistical model for combining multiple data sources.
2. Develop brood year tables for Kuskokwim chum salmon for the years 1976 through 2007 by combining the abundance estimates with estimates of age composition obtained from the subsistence and commercial fisheries as well as escapement enumeration projects.
3. Estimate the stock-recruitment relationship for the Kuskokwim River chum salmon population using the brood table developed in Objective 2 and the Ricker and Beverton-Holt stock-recruitment models.

METHODS

Total chum salmon abundance and escapement into the Kuskokwim River for return years 1976 through 2007 will be estimated using statistical models similar to those developed by University of Alaska

researchers for estimating historical chum salmon abundance in the Yukon and Kuskokwim Rivers. Our strategy will use all historic data related to abundance; including: subsistence catch numbers, catch numbers and rates from the inriver commercial fisheries, test fishery catch rates, weir counts, aerial surveys, sonar counts, and mark-recapture estimates. While no one of these abundance indices is likely to provide a reliable estimate of historical drainage wide abundance or escapement, when used in aggregate, they should provide a reasonably accurate estimate. We will combine these indices of abundance using multivariate statistical tools and a maximum likelihood estimation framework. The abundance and escapement estimates will be combined with all available data on salmon age composition to estimate brood tables for the Kuskokwim River chum salmon stock. Brood table information will then be used to estimate the stock-recruitment relationship for the drainage.

PARTNERSHIPS/CAPACITY BUILDING

Organizations that provide data processed by this project include Kuskokwim Native Association, Organized Village of Kwethluk, Orutsararmiut Native Council, Takotna Tribal Council, Tuluksak Traditional Council, ADFG Commercial Fisheries Division, and U.S. Fish and Wildlife Service (Kenai Fish and Wildlife Field Office; Yukon Delta and Togiak National Wildlife Refuges). In December 2005, this project was reviewed and supported by the Kuskokwim Fisheries Resources Coalition, a group that includes representatives from the ADFG Subsistence Division, ADFG Commercial Fisheries Division, the Association of Village Council Presidents, Kuskokwim Native Association, Orutsararmiut Native Council, Yukon Delta National Wildlife Refuge, USFWS Fisheries Information Services, and others.

JUSTIFICATION

The investigators propose analysis of existing data from 1976 through 2007 to estimate spawning and total abundance of chum salmon in the Kuskokwim River using a statistical model for combining multiple data sources; and to describe the spawner-recruit relationship of Kuskokwim River chum salmon assessing the influence of parental escapement abundance on variations in return. The proposed work would address an important research question and potentially could introduce innovative methodologies and management tools for Kuskokwim River chum salmon fisheries.

Project Number: 07-303
Project Title: Kuskokwim Salmon Age-Sex-Length Assessment
Geographic Region: Kuskokwim
Data Type: Stock Status and Trends
Principal Investigator: Douglas Molyneaux ADFG Division of Commercial Fisheries

Cost: 2007: $81,440 **2008:** $96,010 **2009:** $99,510

ISSUE

A number of projects have been funded through Fisheries Information Service to monitor salmon escapements and subsistence harvest, and most include collection of samples used to estimate salmon age, sex, and length (ASL) compositions. In 2005, ASL data were collected from 30,000 escapement samples, commercial and subsistence harvests, and the Bethel test fishery. This project provides the support required to process these ASL samples, compile the information, and provide consistent analysis of results to managers, project leaders and the public. The ASL information is used in a variety of ways including forecasting future run abundance, assessing effects of harvest methods, determining spawner-recruit relationships, studying causes of variation in freshwater and marine growth, and assessing many other short-term and long-term population trends.

OBJECTIVES

1. Estimate the age-sex-length (ASL) composition of Chinook, chum, and coho salmon samples collected from fisheries, escapements, and other Monitoring Program funded projects in the Kuskokwim Area.
2. Standardize ASL sampling throughout the Kuskokwim Area by providing sampling kits and instructions for measuring salmon length, sex determination, and collection of scales to all projects collecting ASL data in the Kuskokwim Area.
3. Standardize age determination of Kuskokwim Area salmon from scales by processing all collected scales at a central lab in Anchorage ADF&G with scale-ageing standardization across AYK.
4. Provide electronic and physical sample storage for project ASL data by loading ALS data into a central database and filing physical records (scales, acetates, data collection forms) in Anchorage (merging with data collected since 1961).
5. Provide access ASL data to researchers and public through responding to data requests for physical and electronic records of age and growth.

METHODS

Participants will deliver salmon ASL samples to the principal investigator. Samples will be from subsistence and commercial fisheries, as well as Kuskokwim River Region stock status and trends projects operated by various Federal, State and Tribal groups. Salmon scales will be manually processed and aged, and ASL data will be electronically processed with standard computer programs to provide summaries of harvest and escapements partitioned into age, sex, and length categories. A local hire fish

and wildlife technician will be employed through Work Place Alaska hiring procedures to assist with ASL processing during the summer months. Summary information will be provided to various contributing project leaders and to participating subsistence harvest samplers.

PARTNERSHIP/CAPACITY BUILDING

The *Kuskokwim Salmon Age-Sex-Length Assessment* project is integrated into several Monitoring Program funded projects. Some of the organizations that will directly benefit from the project include ADFG Commercial Fisheries Division, ADFG Sport Fish Division, ADFG Subsistence Division, Association of Village Council Presidents, Kuskokwim Native Association, Organized Village of Kwethluk, Orutsararmiut Native Council, Native Village of Kwinhagak, Takotna Tribal Council, Tuluksak Traditional Council, Kenai Fish and Wildlife Field Office, Togiak National Wildlife Refuge, and Yukon Delta National Wildlife Refuge. All of these groups have projects that include the collection of salmon ASL samples and depend on ADFG Commercial Fisheries Division for processing samples.

JUSTIFICATION

The proposed work addresses an important research and monitoring needed by supporting standardization and quality control for the collection, analysis and documentation of analysis techniques for use by the fishery managers. This information is used to monitor sex, age and size composition of commercial, subsistence fisheries and escapement projects; develop brood tables to assess management actions, develop run strength outlooks, and describe spawner recruit relationships.

Project Number: 07-304
Project Title: Tatlawiksuk River Salmon Weir
Geographic Region: Kuskokwim
Data Type: Stock Status and Trends
Principal Investigator: Douglas Molyneaux,, ADFG Division of Commercial Fisheries
Co-Investigator(s): David Orabutt, Kuskokwim Native Association
Dan Costello, ADFG

Cost: 2007: $154,665 **2008:** $161,777 **2009:** $176,134

ISSUE

Tatlawiksuk River salmon contribute to subsistence, commercial, and recreational fisheries within the Yukon Delta National Wildlife Refuge. The status of salmon populations within the drainage, including Tatlawiksuk River, has been of concern due to low run abundance. Tatlawiksuk 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 in the Kuskokwim Region, which is identified by Office of Subsistence Management as a priority information need. The project provides fundamental escapement information necessary to facilitate in-season 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 as is currently in consideration. This project also incorporates substantial capacity building and outreach components.

Salmon escapements to Tatlawiksuk River weir have been monitored successfully since 1999. Information from this project has become integrated into the annual management process, by providing insights into escapement and stock specific run timing through the fishery. The escapement age, sex, and length information collected at Tatlawiksuk 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*, FIS #04-354).

OBJECTIVES

1. Determine daily and total annual Chinook, chum, and coho salmon escapements to Tatlawiksuk River from 15 June to 20 September;
2. Estimate age, sex, and length composition of annual Chinook, chum, and coho salmon escapements;
3. Monitor habitat variables including daily water temperature, water level, and stream discharge;
4. Provide mentorship and administer education curriculum to Kuskokwim Native Association high school interns; and,
5. Serve as a platform to facilitate current and future fisheries research projects.

METHODS

Investigators will install a resistance board weir on the lower Tatlawiksuk River. A live trap will be used to sample salmon for scales, sex and length information, and for tag recovery. Investigators will also record daily water temperature, water level, and weather conditions. A local technician hired by the Kuskokwim Native Association will operate the project along with a lead crew member provided by ADFG. The project will also serve as a platform to host students from the Kuskokwim Native Association Student Internship Program.

PARTNERSHIP/CAPACITY BUILDING

Kuskokwim Native Association and ADFG have been cooperators on salmon escapement enumeration projects on the George and Tatlawiksuk Rivers since 1996 and 1998, respectively. Oversight of field operations is shared between the Kuskokwim Native Association and ADFG Division of Commercial Fisheries. ADFG takes the lead in data management, data analysis and reporting; however, more of this responsibility is expected to shift to the Kuskokwim Native Association. This budget also includes approximately $25,000 annual funding support for ADFG senior scientists, and $16,000 annual funding support for the Kuskokwim Native Association senior scientists.

JUSTIFICATION

The Tatlawiksuk River weir is an established and successful cooperative project operated by Kuskokwim Native Association and ADFG. The project provides valuable escapement and biological sampling data for salmon stocks in an important sub basin of the Kuskokwim River, promotes local involvement, and develops the capacity of Kuskokwim Native Association to monitor fish populations.

Project Number: 07-305
Project Title: Kanektok — Goodnews River Salmon Run Assessment Projects
Geographic Region: Kuskokwim
Data Type: Stock Status and Trends
Principal Investigator: John Linderman, ADFG Division of Commercial Fisheries
Co-Investigator(s): Edward Mark, Native Village of Kwinhagak
Mark Lisac, USFWS Togiak National Wildlife Refuge

Cost: **2007:** $108,900 **2008:** $101,000 **2009:** $104,600

ISSUE

This proposal will fund the operations of two resistance-board weirs currently utilized on the Kanektok and Goodnews Rivers (funding here is requested to extend the operational period for the Goodnews River weir to better enumerate coho salmon stocks). Both of these projects enumerate all five species of salmon found in Alaska, as well as, Dolly Varden. Escapement information and biological data collected at these projects are valuable for setting escapement objectives, determining run timing, assessing the age structure of the returns, and enumerating adult salmon spawners.

OBJECTIVES

1. Enumerate daily and annual total passage of Chinook, chum, sockeye, and coho salmon, and Dolly Varden through the Kanektok and Middle Fork Goodnews River weirs.
2. Describe the run-timing or proportional daily passage of Kanektok River Chinook, chum, sockeye, and coho salmon and Middle Fork Goodnews River coho salmon.
3. Estimate the sex, age, and length composition of Kanektok River Chinook, chum, sockeye, and coho salmon escapements and Middle Fork Goodnews River coho salmon escapement such that simultaneous 90% confidence intervals have maximum width of 0.20.
4. Monitor environmental variables at the project sites such as relative water level, discharge rate, and water temperature.

METHODS

A resistance-board weir will be installed in the Kanektok and Goodnews Rivers to enumerate passage of the five species of salmon found in Alaska and Dolly Varden. The projects will also act as a platform for the collection of biological samples (age-sex-length, genetics, scales, etc.). This information will be used to assess the returns to these systems.

PARTNERSHIPS/CAPACITY BUILDING

Goodnews weir will be staffed by two ADFG Fish and Wildlife Technicians and one local hire USFWS Fisheries Technician.

The Kanektok River weir is operated cooperatively by ADFG, Native Village of Kwinhagak, and USFWS Togiak National Wildlife Refuge.

Regular consultations between ADFG, the Native Village of Kwinhagak, USFWS, CVRF and local stake holders will occur throughout the year to coordinate logistics, discuss results, and exchange ideas.

JUSTIFICATION

The Goodnews and Kanektok River weirs are established and successful monitoring projects that provide the primary escapement and run strength data used to ensure sustainability of Kuskokwim Bay subsistence fisheries and conserve fisheries stocks in the Goodnews and Kanektok Rivers. This proposal would support continued operations of both the Kanektok and Goodnews River weirs for a complete field season enumerating escapements of Chinook, sockeye, chum and coho salmon. These projects also serve as important platforms for ongoing Dolly Varden char research being conducted by the Togiak NWR.

Project Number: 07-306
Project Title: Kwethluk River Salmon Weir
Geographic Region: Kuskokwim
Data Type: Stock Status and Trends
Principal Investigator: Ken Harper, USFWS Kenai Fish and Wildlife Field Office
Co-Investigator(s): Native Village of Kwethluk

Cost: **2007:** $176,157 **2008:** $187,863 **2009:** $190,403

ISSUE

Management of Kuskokwim Area salmon fisheries is complex because of annual variability in run size and timing, harvesting of mixed stocks, overlapping runs of multiple species, allocation issues, and the immense size of the Kuskokwim River drainage. Fishery managers need salmon escapement data from representative rivers that contribute to this complex mixed stock subsistence fishery. Investigators will collect data on chum, Chinook, sockeye, and coho salmon.

OBJECTIVES

1. Enumerate the daily passage of Chinook, chum, sockeye, and coho salmon and resident fish species through the weir.
2. Describe the run-timing or proportional daily passage of Chinook, chum, pink, sockeye, and coho salmon through the weir.
3. Estimate the weekly sex and age composition of Chinook, chum, and coho salmon such that simultaneous 90% confidence intervals have a maximum width of 0.20.
4. Estimate the mean length of Chinook, chum and coho salmon by sex and age.
5. Enumerate the number of Chinook, chum, pink, sockeye, and coho salmon carcasses that wash down onto the weir each day.
6. Monitor passage of any salmon (Chinook, chum, sockeye and coho salmon) that may be tagged in middle Kuskokwim River mark recapture studies.

METHODS

Investigators will install a resistance board weir across the Kwethluk River, 78 river kilometers upstream from the Kuskokwim River. Salmon will be counted as they pass through a counting chute located on a live trap. Weekly samples of length, sex, and scales will be collected from fish passing up stream, and gill net marks will be noted before releasing sampled fish up-stream from the weir. Local technicians hired by the Organized Village of Kwethluk will be trained by the Kenai Fish and Wildlife Field Office in weir operations and biological sample collection methodology.

PARTNERSHIP/CAPACITY BUILDING

Capacity building will continue, as the USFWS mentors and trains 3–5 village technicians in project operations. This project reaches the cooperation level of capacity building (level 5) and potentially could fully become a partnership of equals between the USFWS and the Organized Village of Kwethluk. We have developed a formal agreement that has been signed by both parties committing the Service to making it a priority to train village personnel for crew and possible leaders. Under this signed agreement, the village has agreed to recruiting technicians with the understanding that they will be expected to follow a set work schedule to ensure proper function of the project. The village will also have technicians available to assist with and learn the process of installation and removal of the weir. They will participate in the operation and collection of escapement data. This will provide an educational basis for employees and the village government to further their understanding of the management of lower Kuskokwim River commercial and subsistence fisheries.

In partnership with the Association of Village Council Presidents and their Partners Biologist the Kenai Kenai Fish and Wildlife Field Office office is currently working with Association of Village Council Presidents and the Yukon Delta National Wildlife Refuge and planning for hosting science camp students at the weir in 2006 and beyond. The Kenai Fish and Wildlife Field Office will provide biologists to mentor students when they spend time at the fish weir. It is expected that the Partners Biologist will be available to work at the weir when needed to expand their understanding of the weir. This educational mentoring will be crucial in developing future village weir technicians, crew leaders, and biologists at these projects.

JUSTIFICATION

The Kwethluk River weir is an established and successful monitoring project that provides escapement and run strength data used to ensure sustainability of subsistence fisheries and conserve fisheries stocks in the Kwethluk River. There is a strong Federal Nexus with the Yukon Delta National Wildlife Refuge; and the Kwethluk River salmon stocks are harvested by a large lower river subsistence fishery, and pass through a commercial fishing district between the Kuskokwim and the Kwethluk River mouths.

Project Number: 07-307
Project Title: Salmon Run Timing and Abundance in the Tuluksak River
Geographic Region: Kuskokwim
Data Type: Stock Status and Trends
Principal Investigator: Ken Harper, USFWS Kenai Fish and Wildlife Field Office
Co-Investigator(s): Tuluksak Native Community

Cost: **2007:** $154,061 **2008:** $159,574 **2009:** $173,610

ISSUE

Management of Kuskokwim Area salmon fisheries is complex because of annual variability in run size and timing, harvesting of mixed stocks, overlapping runs of multiple species, allocation issues, and the immense size of the Kuskokwim River drainage. Fishery managers need salmon escapement data from representative rivers that contribute to this complex mixed stock subsistence fishery. Investigators will collect data on chum, Chinook, sockeye, and coho salmon.

OBJECTIVES

1. Enumerate the daily passage of Chinook, chum, sockeye, and coho salmon and resident fish species through the weir.
2. Describe the run-timing or proportional daily passage of Chinook, chum, pink, sockeye, and coho salmon through the weir.
3. Estimate the weekly sex and age composition of Chinook, chum, and coho salmon such that simultaneous 90% confidence intervals have a maximum width of 0.20.
4. Estimate the mean length of Chinook, chum and coho salmon by sex and age.
5. Enumerate the number of Chinook, chum, pink, sockeye, and coho salmon carcasses that wash down onto the weir each day.
6. Monitor passage of any salmon (Chinook, chum, sockeye and coho salmon) that may be tagged in middle Kuskokwim River mark recapture studies.

METHODS

Investigators will install a resistance board weir across the Tuluksak River 49 river kilometers (rkm) upstream from the confluence with the Kuskokwim River. Salmon will be counted as they pass through a counting chute located on a live trap. Weekly samples of length, sex, and scales will be collected from fish passing up stream, and gill net marks will be noted before releasing sampled fish up-stream from the weir. Local technicians hired by the Tuluksak Native Community will be trained by the Kenai Fish and Wildlife Field Office in weir operations and biological sample collection methodology.

PARTNERSHIP/CAPACITY BUILDING

Capacity building will continue, as the USFWS mentors and trains 3–5 village technicians in project operations. This project reaches the cooperation level of capacity building (level 5) and potentially could fully become a partnership of equals between the USFWS and the Tuluksak Native Community. We have developed a formal agreement that has been signed by both parties committing the Service to making it a priority to train village personnel for crew and possible leaders. Under this signed agreement, the village has agreed to recruiting technicians with the understanding that they will be expected to follow a set work schedule to ensure proper function of the project. The village will also have technicians available to assist with and learn the process of installation and removal of the weir. They will participate in the operation and collection of escapement data. This will provide an educational basis for employees and the village government to further their understanding of the management of lower Kuskokwim River commercial and subsistence fisheries.

In partnership with the Association of Village Council Presidents and their Partners Biologist the Kenai Fish and Wildlife Field Office is currently working with the Association of Village Council Presidents and the Yukon Delta National Wildlife Refuge and planning for hosting science camp students at the weir in 2006 and beyond. The Kenai Fish and Wildlife Field Office will provide biologists to mentor students when they spend time at the fish weir. It is expected that the Partners Biologist will be available to work at the weir when needed to expand their understanding of the weir. This educational mentoring will be crucial in developing future village weir technicians, crew leaders, and biologists at these projects.

JUSTIFICATION

The Tuluksak River weir is an established and successful monitoring project that provides the escapement and run strength data used to ensure sustainability and conservation of fisheries stocks in the Kuskokwim River. There is a strong federal nexus with the Yukon Delta National Wildlife Refuge; and the Tuluksak River salmon stocks are harvested by a large lower river subsistence fishery, and pass through a commercial fishing district between the Kuskokwim and the Kwethluk river mouths.

Project Number: 07-401

Project Title: Stock Assessment and Restoration of the Afognak Lake Sockeye Salmon Run

Geographic Region: Southwest

Data Type: Stock Status and Trends

Principal Investigator: Steven Honnold, ADFG Division of Commercial Fisheries

Co-Investigator(s): Stephen Schrof and Robert Baer, ADFG Division of Commercial Fisheries

Cost: 2007: $76,726 **2008:** $76,726 **2009:** $81,039

ISSUE

The investigators will continue to assess sockeye salmon production at Afognak Lake in response to the declining adult runs that began in 2001 and have continued through 2005. In response to the declining runs from 2001 to 2004, State and Federal managers closed subsistence fishing in early June during the 2002 season, and in-season closures have occurred each year through 2005 in an attempt to achieve the escapement goals for sockeye salmon into Afognak Lake. This project will continue investigations started in 2003 that were intended to develop possible strategies for increasing future sockeye salmon production for the subsistence fishery in Afognak Bay. Moreover, the Kodiak/Aleutians Subsistence Regional Advisory Council has determined the Afognak Lake sockeye assessment and monitoring project to be one of their highest priority issue and information needs.

OBJECTIVES

1. Estimate the number, age, and average size at age of sockeye salmon smolt emigrating from Afognak Lake from 2007–2009.
2. Evaluate the water chemistry, nutrient status, and plankton production of Afognak Lake from 2007–2009.
3. Assess the rearing conditions for juvenile sockeye salmon in Afognak Lake based upon completion of objectives 1 and 2.

Methods

A smolt trap will be installed in the Afognak River to capture a portion of the sockeye salmon smolt outmigration from Afognak Lake. Trap efficiency will be determined using mark-recapture techniques in order to estimate the total sockeye salmon smolt outmigration from Afognak Lake. Associated trapping, handling, and marking mortality will be determined.

The ADFG field crew will collect age, weight, and length data from 40 sockeye salmon smolt per day for five consecutive days per week. These data will be used to estimate the age composition and average length, weight and condition factor by age of the Afognak Lake sockeye salmon smolt outmigration. ADFG staff will also collect limnology information from Afognak Lake, including water chemistry, nutrient, phytoplankton, zooplankton, temperature, dissolved oxygen, and light penetration data. Lake samples will be analyzed in Kodiak at the ADFG limnology laboratory. Investigators will use the smolt information along with limnology and other freshwater data to assess the carrying capacity for juvenile sockeye salmon in Afognak Lake.

PARTNERSHIPS/CAPACITY BUILDING

ADFG biologists are currently working with administrators in the Kodiak Island Borough School District's Rural Schools Office to educate students on the Afognak Lake sockeye salmon project and its importance to the subsistence users. ADFG biologists will travel to the Villages of Port Lions and Ouzinkie, and local Kodiak area schools for a visual presentation of the project. Contact with the Native Village of Afognak, Inc. is underway to foster a relationship for planning future trips to the project site for village members and discuss the work being done at the Afognak Lake system in an attempt to increase sockeye salmon production to Afognak Lake for subsistence purposes.

The ADFG will give preference to locals, including qualified residents of the Villages of Port Lions and Ouzinkie, when hiring sampling crews. If appropriate, internships will be developed through the University of Alaska to provide career-track positions. Local employees will be trained in various biological data collection techniques and will be educated in many research applications that assist with salmon management.

JUSTIFICATION

This project is of high strategic importance for the Kodiak Management Area, is technically sound, is a continuation of work successfully conducted since 2003, and has a reasonable schedule and budget for the proposed work. The investigators have a proven record of successfully conducting, administering, and completing other Fisheries Resource Monitoring Program projects. While capacity building would have been adequate as described in the original proposal, hiring local research assistants and developing the student internship for local residents represents a substantial improvement. The investigators have incorporated Technical Review Committee proposal recommendations concerning strengthening of capacity building and information sharing into the investigation plan.

Project Number: 07-402
Project Title: Buskin River Sockeye Salmon Stock Assessment and Monitoring, Kodiak, Alaska
Geographic Region: Southwest
Data Type: Stock Status and Trends
Principal Investigator: Donn Tracy, ADFG Division of Sport Fish

Cost: **2007:** $99,200 **2008:** $78,100 **2009:** $79,200

ISSUE

Investigators will annually enumerate escapement and sample age composition of sockeye salmon into the Buskin River drainage for inseason management of subsistence and other fisheries and development of a biological escapement goal. Investigators will also interview subsistence fishers to determine demographics of participants and use of harvested fish, and previous and potential future participation in subsistence fisheries in the area.

OBJECTIVES

1. Census the sockeye salmon escapement into Buskin and Louise Lakes from June 1 through August 15.
2. Estimate the age composition of the combined subsistence harvest in the Buskin River Section of Chiniak Bay and sockeye salmon escapement into Buskin Lake from June 1 to August 15 such that the estimates are within 5 percentage points of the true value 95% of the time.
3. Estimate the age composition of the sockeye salmon run to Louise Lake from June 1 to August 15 such that the estimates are within 7.5 percentage points of the true value 95% of the time.
4. Evaluate the sockeye salmon biological escapement goal.
5. Census the residence of subsistence fishery participants.
6. Estimate the distribution of use of subsistence-harvested fish, and the historic and potential future use of the Buskin River subsistence fishery such that all estimates are within 8 percentage points of the true values 95% of the time.

METHODS

Investigators will install a salmon counting weir on the Buskin River and Lake Louise tributary to annually census the spawning escapement of sockeye salmon. Additionally, sockeye salmon will be sampled at the weirs and from the subsistence harvest for age, sex and length, providing estimates of the combined escapement and subsistence harvest by age within 25% of the true values 95% of the time. Analyses of the return and age data will be incorporated into a brood table. Past estimates of total return, using sample sizes similar to those proposed here have been associated with a relative precision of about 12%. Collection of return and age data at this level of sampling will improve information in the brood table and, subsequently, evaluation of the biological escapement goal. Participants in the fishery will be surveyed to estimate the residency and fish stock(s) traditionally harvested by fishery participants.

PARTNERSHIPS/CAPACITY BUILDING

The investigators promote local hire of federally qualified subsistence users as project technicians. During each year of funding the investigators will continue a student intern program established in 2003 to provide education and career development opportunity for subsistence users. Through cooperation with the Kodiak National Wildlife Refuge (KNWR) the investigators have utilized the Buskin River weir as an educational tool for the KNWR Summer Science and Salmon Camp program.

JUSTIFICATION

This project addresses priority information needs for the Kodiak Management Area, is technically sound, is a continuation of work successfully conducted since 2000, and has both a reasonable schedule and budget for the proposed work. The investigators have a proven record of successfully conducting, administering, and completing other Fisheries Resource Monitoring Program projects. The investigators were responsive to recommendations made by the Technical Review Committee during their review of the initial proposal, and were generally successful in addressing these within the investigation plan. Further clarification is needed within the Methods section concerning the reasoning behind the investigators' decision to interview 150 subsistence fishers during the season and why this would result in estimates of "the distribution of use of subsistence-harvested fish, and the historic and potential future use of the Buskin River subsistence fishery…that…are within 8 percentage points of the true values 95% of the time." Finally, minor discrepancies in subsistence harvest numbers for 2002 and 2003 reported in the investigation plan should be resolved with harvest numbers for these years included in the 2004 annual report for project 04-414.

Project Number: 07-404

Project Title: Estimation of Coho Salmon Escapement in Streams Adjacent to Perryville and Sockeye Salmon Escapement in Clark River, Alaska Peninsula National Wildlife Refuge

Geographic Region: Southwest

Data Type: Stock Status and Trends

Principal Investigator: Jim Larson, USFWS, King Salmon Fish and Wildlife Field Office

Cost: 2007: $0 2008: $31,000 2009: $31,000

ISSUE

Conservation and subsistence concerns still exist for coho salmon stocks in the Kametolook drainage, and subsistence effort has expanded to adjacent drainages. During Regional Advisory Council meetings and at the Perryville Subsistence Working Group meetings, local residents stated that they were now taking coho salmon from other streams outside the immediate vicinity of Perryville. In many ways, these streams are similar to streams near Perryville in that they are short, high gradient streams with limited coho salmon abundance. In order to prevent over harvest of these small coho salmon stocks, escapement and harvest levels need to be monitored.

Sockeye salmon in the Chignik watershed are an important species for commercial and subsistence harvest. Subsistence fishers from the Chignik Villages target late run sockeye salmon. In recent years, subsistence fishers in the Chignik area have had difficulty harvesting enough late run fish and are concerned that this run has declined and may be over-exploited by the commercial fishery. We need to monitor sockeye salmon escapement in the Chignik watershed to ensure escapement is maintained to meet subsistence needs for residents of the Chignik villages.

The King Salmon Fish and Wildlife Field Office proposes to continue monitoring adult coho salmon returns in streams near Perryville, and to continue monitoring late run sockeye salmon returns to Clark River, a tributary to Chignik Lake. The run timing of these stocks is similar and lend themselves to concurrent monitoring. This project addresses Priority Need #1 for the Chignik Unit identified for the 2007 Fisheries Resource Monitoring Program by providing escapement information for late-run sockeye salmon in the Clark River, and addresses Priority Need #2 for the Chignik Salmon Unit by providing coho salmon escapement information for systems draining into Ivanof, Humpback, Anchor, and Ivan bays. Continuation of this project will increase baseline escapement data and provide a better understanding of run timing and adult production in these systems.

OBJECTIVES

1. Estimate minimum numbers of coho salmon returning to streams near the village of Perryville.
2. Estimate minimum numbers of late run sockeye salmon returning to the Clark River, a tributary to Chignik Lake.

METHODS

Two aerial surveys will be conducted annually (one in late September/early October, and one in mid to late October) using low-level helicopter flights. An observer will fly all of the chosen stream reaches in the study area (streams in Ivanof, Humpback, Anchor, and Ivan bays, and the Clark River) and count coho and sockeye salmon from a low-flying helicopter. We will coordinate our flights to avoid periods of turbid flow to minimize counting error. Our assumption is that aerial counts will provide a minimum estimate of escapement. We will not expand the counts.

PARTNERSHIPS/CAPACITY BUILDING

The project has developed partnerships between the villages of Perryville and Chignik and the King Salmon Fish and Wildlife Field Office through meetings that utilized the local knowledge to identify streams for monitoring. The local citizens have the knowledge of where fishing pressure has shifted with the closure of the local rivers, and thus where monitoring is necessary to ensure escapement needs are met. In-season communication with the local residents is also conducted to determine if salmon escapement is sufficient to satisfy subsistence needs in the survey area, and to coordinate survey timing.

JUSTIFICATION

This project is of high strategic importance for the Chignik Management Area, is a continuation of work successfully conducted since 2003, and has both a reasonable schedule and budget for the proposed work. The investigator has a proven record of successfully conducting, administering, and completing other Fisheries Resource Monitoring Program projects. While it would be preferable to have quantifiable objectives to monitor these runs, it would not be feasible or cost-effective to modify this project to accomplish this due to frequent storms, high water events, and the difficulty to access most of these streams.

Project Number: 07-405

Project Title: Estimation of Sockeye Salmon Escapement into McLees Lake, Unalaska Island

Geographic Region: Southwest

Data Type: Stock Status and Trends

Principal Investigator: Jim Larson, USFWS King Salmon Fish and Wildlife Field Office

Co-Investigator(s): Sharon Livingston, Qawalangin Tribe
Forest Bowers and Matt Foster, ADFG Division of Commercial Fisheries

Cost: **2007:** $79,964 **2008:** $75,929 **2009:** $77,961

ISSUE

The King Salmon Fish and Wildlife Field Office is seeking to continue monitoring the sockeye salmon escapement into McLees Lake for an additional three years. Sockeye salmon returns to McLees Lake have varied greatly over the past five years ranging from 12,097 in 2005 to 101,793 in 2002. Continuation of this project will increase the baseline escapement data and provide a better understanding of system productivity. A better understanding of productivity is necessary to manage the subsistence fishery and know the level of exploitation on this stock. If annual production results in run sizes around the 2005 escapement, there is the potential for this stock to be highly exploited. However, if the 2002 and 2003 escapements are typical, then concerns of high exploitation are not warranted at the current harvest level. At this time we do not have a clear pattern of escapement into McLees Lake. Without this information the management of the subsistence fishery will be conservative. Conservative management could limit subsistence fishing opportunities unnecessarily. If the need for an escapement goal arises in the future, the continued monitoring we propose will provide information necessary for the development of an escapement goal for this system. Managers need a better understanding of McLees Lake sockeye salmon production to maximize subsistence opportunities while protecting the health of the population. Additionally, continuation of this project will provide information needed to determine the effects the large escapements of 2002 (97,780) and 2003 (101,793) had on the dynamics of this stock. The sockeye salmon run is important to local subsistence users in Unalaska.

OBJECTIVES

1. Enumerate the daily passage of sockeye salmon through the weir;
2. Describe the run-timing, or proportional daily passage, of sockeye salmon through the weir;
3. Estimate the sex and age composition of sockeye salmon such that simultaneous 90% confidence intervals have a maximum width of 0.20; and
4. Estimate the mean length of sockeye salmon by sex and age.

METHODS

The U.S. Fish and Wildlife Service will install and operate a flexible picket weir at the outlet of McLees Lake. The weir will be operated from approximately May 30 to August 15 during each year of the project. A trap and holding area will be located on the upstream side of the weir to facilitate sampling

and passing adult salmon through the weir. Fish will be passed and counted intermittently between 0800 and 2300 hours each day. All fish passing upstream will be identified to species and enumerated. Data on sockeye salmon age, sex, and length will be collected weekly. Sampling will consist of measuring length, determining sex, collecting scales, and then releasing the fish upstream of the weir.

PARTNERSHIP/CAPACITY BUILDING

This project will assist in developing partnerships between the U.S. Fish and Wildlife Service, the Qawalangin Tribe of Unalaska, and the Alaska Department of Fish and Game. Capacity building will occur with the Qawalangin Tribe by their direct participation in the collection of escapement data that will be used to develop management strategies for the Reese Bay subsistence fishery. The King Salmon Fish and Wildlife Field Office crew leader will act as a mentor with the purpose of training the local technicians to become crew leaders for future weir operations. Local technicians will be trained in the installation and operation of a fish weir, biological sampling procedures, and data collection and verification methods. In conjunction with the University of Alaska Fairbanks Marine Advisory Program representative, annual project presentations will be given to the community of Unalaska.

JUSTIFICATION

This project is of high strategic importance for the Aleutian Islands Management Area, is technically sound, is a continuation of work successfully conducted since 2001, and has both a reasonable schedule and budget for the proposed work. The Principal Investigator has a proven record of successfully conducting, administering, and completing other Fisheries Resource Monitoring Program projects. The investigators addressed Technical Committee proposal review comments by including information on variance estimates for mean length in the Methods section for Objective 4 and omitting Objective 5 concerning escapement goal development. The investigators also need to include information in the Methods section on their intention to report standard errors and ranges of mean lengths, by age and sex, as they have done for projects 01-059 and 04-403.

Project Number: 07-408
Project Title: Stock Assessment of Rainbow Smelt in the Togiak River
Geographic Region: Southwest
Data Type: Stock Status and Trends
Principal Investigator: Jim Larson, USFWS King Salmon Fish and Wildlife Field Office
Co-Investigator(s): Robbin LaVine, Bristol Bay Native Association
Pat Walsh, USFWS Togiak National Wildlife Refuge

Cost: 2007: $78,141 **2008:** $78,352 **2009:** $31,827

ISSUE

Rainbow smelt are among the most harvested non-salmon fish by subsistence users in the villages of Togiak and Twin Hills. The only information on smelt in southwest Alaska is the documented subsistence harvest surveys conducted by ADFG and Bristol Bay Native Association. Conservation managers need basic life history data such as sex and age composition, in addition to harvest information, to maximize subsistence opportunities while continuing to protect the health of the population. This project would be the first steps in furthering our understanding of the life history of an important subsistence species. This project addresses two of the six priority information needs for the Bristol Bay-Chignik non-salmon group.

OBJECTIVES

1. Estimate age and sex composition of spring spawning populations of rainbow smelt in the Togiak River such that simultaneous 90% confidence intervals have a maximum width of 0.20.
2. Estimate age and sex composition of rainbow smelt harvested by the winter subsistence fishery in the Togiak River such that simultaneous 90% confidence intervals have a maximum width of 0.20.
3. Estimate mean length of rainbow smelt in the Togiak River by sex, age, and time of year.
4. Describe the maturation rate from November to June.
5. Identify spawning locations and timing of rainbow smelt in the Togiak River.
6. Conduct larval assessment as index of relative run strength.

METHODS

A two-year sampling regime will begin in 2007 with winter sampling during the subsistence harvest season followed by spring sampling from mid-May through June 2008. Rainbow smelt will be harvested during the winter subsistence fishery and analyzed for age, length, sex, food habits, and maturity. Locations for sampling will be determined by accessing local knowledge of customary fishing areas; time and dates to fish will be scheduled to match as closely as possible the schedule used by the subsistence fishers. Fish will be frozen and shipped to the King Salmon Fish and Wildlife Field Office for processing. Beginning in May, a three person crew will access the lower Togiak River by boat, sampling for spawning locations, egg and larvae collection, run timing, and population characteristics. Sampling will be conducted using a long-handled dip net, a variable-mesh monofilament gill net and a seine net. Sampling

locations include a gravel bar located about 200 m upstream from the mouth of the Togiak River as well as other spawning areas correlated with the gull activity and other surface disturbances associated with spawning activity. We will examine each location with a small under-water video camera and sample the substrate directly below. This sampling regime will allow for comparison between fish targeted by the subsistence fishery in the winter and fish found in the river during the spring spawning run.

Spawning productivity estimates based on in-river, egg and larval density measurements will be used to develop an index of larval smelt abundance that will be used to monitor the long-term population trends of the Togiak rainbow smelt. Variation in vulnerability and catchability of adults can be a problem with other assessment techniques that use seines, trawls, gill nets or traps. Ichthyoplankton catchability, however, is relatively constant, as most targets are small (< 15 mm), and unable to avoid the nets. Fishing skill usually is not a complicating factor in capturing larvae so catchability or sampling variation is minimal. For these reasons, larval samples may provide better unbiased estimates of the population than samples from other gear types. Ichthyoplankton surveys that utilized replicate sampling and bootstrapping techniques derived consistent estimates with relatively tight confidence intervals.

PARTNERSHIPS AND CAPACITY BUILDING

The Bristol Bay-Chignik Area Planning Work Group identified the lack of information on rainbow smelt in the Togiak River as a high priority need (OSM 2005). King Salmon Fish and Wildlife Field Office will provide a crew leader for this project and will conduct the data analysis; Togiak National Wildlife Refuge will conduct the sampling of the winter subsistence fishery; Bristol Bay Native Association will provide technicians to assist in data collection. This project will assist in developing partnerships between the U.S. Fish and Wildlife Service, the Native Village of Togiak, and the Bristol Bay Native Association. Capacity building will occur with the Native Village of Togiak by their direct participation in the collection of life history data that will be used to develop management strategies for the Togiak River subsistence fishery. The King Salmon Fish and Wildlife Field Office crew leader will act as a mentor with the purpose of training the local technicians to become crew leaders for future fishery data-collection operations. Local technicians will be trained in the use of collection gear, boating, biological sampling procedures, and data collection and verification methods. In this manner, local community members will develop a greater sense of ownership of conservation programs, with the intent that technicians will return as crew leaders, and these crew leaders will later attend post-secondary and graduate schools to develop the professional skills needed to take charge of conservation research. In conjunction with the Togiak National Wildlife Refuge representative, annual project presentations will be given to the community of Togiak.

JUSTIFICATION

This proposal would address information needs of strategic importance for non-salmon fisheries within the Bristol Bay Management Area. While the Non-Salmon Fisheries Unit was ranked as a lower priority than either of the salmon fisheries units within the strategic plan, rainbow smelt is an important component of the Togiak subsistence harvest and very little information is available on this resource. The investigators successfully addressed all needed modifications contained within the Technical Review Committee's proposal review. The proposal is technically sound, has a reasonable schedule and budget for the proposed work, and investigators have a proven record of successfully conducting, administering, and completing other Fisheries Resource Monitoring Program projects.

Project Number: 07-452
Project Title: The Kvichak Watershed Subsistence Fishery: An Ethnographic Study
Geographic Region: Southwest
Data Type: Harvest Monitoring/Traditional Ecological Knowledge
Principal Investigator: James Fall, ADFG, Division of Commercial Fisheries
Co-Investigator(s): Davin Holen, ADFG, Division of Subsistence
Robbin La Vine, Bristol Bay Native Association Natural Resource Department
Theodore Krieg, ADFG, Division of Subsistence
Michelle Ravenmoon and Karen Gaul, NPS Lake Clark National Park and Preserve

Cost: **2007:** $146,119 **2008:** $111,814 **2009:** $42,320

ISSUE

This ethnographic study will investigate how families in four communities of the Kvichak District of the Bristol Bay Management Area (Iliamna, Newhalen, Nondalton, and Port Alsworth) develop subsistence fishing strategies in response to changing sociocultural, economic, and environmental circumstances. Such ethnographic information about community patterns of subsistence use and adaptation is lacking, but is essential for the effective management of fisheries to provide for subsistence uses. Subsistence sockeye salmon harvests in the Kvichak District have declined since the early 1990s. Poor sockeye salmon returns are likely one factor responsible for declining harvests, but socioeconomic and sociocultural factors may be partly responsible as well. Further, the current household permit system may inadequately document participation, harvest levels, and harvest timing for at least some very active multi-household extended families, creating difficulties for tracking harvest trends. The three research questions are: (1) how do families make decisions about subsistence fishing in light of ever-changing sociocultural, economic, and environmental circumstances; (2) what factors shape annual variations in subsistence harvests of Kvichak fish, and (3) which of these factors shape long-term trends in the fishery. The study will use a combination of research methods organized in stages to build upon findings as the study progresses. The results will be directly useful for fisheries managers for interpreting changing subsistence harvest levels and participation rates for salmon and for nonsalmon fish and in providing more precise harvest data. Portions of this management area are within the Lake Clark National Park and Preserve; the proposed study communities are Resident Zone Communities of the park.

OBJECTIVES

1. Prepare an ethnographic description of the subsistence sockeye salmon fisheries of the communities of Nondalton, Newhalen, Iliamna, and Port Alsworth in 2007 regarding: the social organization of harvesting, processing, and distributing the catch; the location of harvests, including use of fish camps; gear types; and processing methods.
2. Estimate the subsistence sockeye salmon harvests, including harvests by location, date, and social group for Nondalton, Iliamna, Newhalen, and Port Alsworth in 2007.

3. Document the social context of subsistence fishing for salmon and other fish for four case study families over the course of one year as examples of community use patterns (2007/2008).
4. Describe the decision-making process of the four case study families in annual subsistence harvests of salmon and other fish, including adjustments made in response to resource abundance, the species selection process, and the selection of family members for harvesting.
5. Identify the social, cultural, economic and environmental factors that shaped subsistence salmon harvesting activities in Nondalton, Iliamna, Newhalen, and Port Alsworth in 2007.
6. Describe changing subsistence fishing strategies and patterns in the subsistence salmon fishery that have developed in the study communities over the last 20 to 25 years.

METHODS

(1) *A literature review* will identify trends in the Kvichak sockeye run and the subsistence fishery and help frame questions for key respondents and topics for the ethnographic fieldwork. (2) *Ethnographic fieldwork* during subsistence sockeye salmon fishing in the summer and fall of 2007 will address Objectives 2, 3, 5, and 6. The goal will be to describe the decision-making processes involved in subsistence fishing and organization of subsistence salmon harvesting. (3) *Family case studies* address Objectives 3, 4, 5, and 6. Documentation of subsistence activities and harvests of four families will take place over the course of a year (2007/2008) using logbooks, journals, photographs, and interviews. (4) *Key respondent interviews and oral histories* will contribute to meeting Objectives 1 and 2. About 20 interviews will record the history of fish camps, describe organizational principles of the subsistence fishery, and assess trends in the salmon run and subsistence fishing methods and harvests as informed by traditional knowledge. (5) *Systematic household harvest surveys* with about 20 to 30 households will address objective 2 and supplement 2007 harvest data from permits to help evaluate harvest data in light of observations about the social organization of fishing from the ethnographic fieldwork, family case studies, and key respondent interviews.

PARTNERSHIP/CAPACITY BUILDING

The project will be a collaboration between ADFG, NPS, and BBNA. NPS and BBNA local resident interns and other local resident research assistants will be trained to assist with literature review, ethnographic fieldwork, key respondent interviews, and harvest surveys. Case study families will be trained in data gathering methods and compensated for their involvement.

JUSTIFICATION

The Technical Review Committee recommends funding this proposal with modifications. The project addresses several high priority issues identified in the 2007 Request for Proposals, and is a strong collaborative effort. However, this is a highly ambitious and complex project, and while the data collection methods are technically sound, the various components are not well integrated into a cohesive project plan. Further, analysis and synthesis of the data are not well developed and investigator responsibilities and time commitments are not clearly delineated.

Project Number:	07-501
Project Title:	Tanada and Copper Lakes Burbot Abundance
Geographic Region:	Southcentral
Data Type:	Stock Status and Trends
Principal Investigator:	Molly McCormick, NPS
Co-Investigator(s):	Tom Taube, ADFG Sport Fish Division Shawn Sanford, Mentasta Village

Cost: 2007: $41,000 **2008:** $37,000 **2009:** $37,000

ISSUE

The Wrangell-St. Elias National Park/Preserve Superintendent is the local area manager for Federal subsistence fisheries in the Copper River drainage. Currently there are no Federal subsistence harvest limits established for freshwater fish species in the Copper River drainage including burbot. Therefore, when local rural residents request a subsistence permit to harvest burbot, we have no data to support limiting their harvest. This project will provide a population estimate for burbot in these lakes which we can use in cooperation with local users, Regional Advisory Councils and the Alaska Department of Fish and Game to establish appropriate burbot harvest limits using recognized fish and wildlife conservation principles.

OBJECTIVES

1. Estimate the length composition of fully recruited burbot (≥ 450 mm TL) at Copper and Tanada lakes for each sampling event (Spring 2007, 2008 and 2009) such that the estimated proportions are within ± 10 percentage points of the actual values 95% of the time.
2. Estimate mean catch-per-unit of effort (CPUE) of burbot (≥ 450 mm TL) in Copper and Tanada lakes for each sampling event (Spring 2007, 2008 and 2009) such that the estimated mean CPUE is within ± 50% of its asymptotic value 90% of the time.
3. Estimate the abundance of fully recruited burbot (≥ 450 mm TL) in Copper and Tanada lakes for spring 2008 such that the estimated abundance is within ± 25% of the true abundance 90% of the time.

METHODS

Burbot will be captured in hoop traps, immediately following the lakes becoming ice-free in 2007. Transects will be established and baited traps will be set following standard methods similar to those described by Taube and Bernard (2004). Captured burbot will be marked and released. Traps will be reset using the same techniques in 2008 and 2009. Abundance, survival rate and recruitment estimates will be generated for each burbot population with the Jolly-Seber model (Seber 1982) for 2008. This model requires a minimum of three sampling periods (years) to provide an abundance estimate for the second sampling period. CPUE estimates will provide an index of abundance for each lake during each sampling event.

PARTNERSHIPS/CAPACITY BUILDING

This project will utilize local hire employees including residents of the Village of Mentasta. Local knowledge was used in developing the proposal and will be used in implementing the project. Results will be shared with the village councils of Mentasta and Chistochina during our biannual government to government meetings. The community of Mentasta is and will be involved in policy and decision making about the project objectives. While joint decision making is not institutionalized, through the Park's government to government relationship with the Village of Mentasta, the village is considered an equal partner and is consulted regarding local area management decisions whenever possible. We consider our level of community involvement to be between "Collaboration" and "Partnerships" in the diagram of community involvement in Fisheries Resource Monitoring Program Projects.

JUSTIFICATION

This proposal directly addresses an information need identified as a high priority in the strategic plan, and requested in the Request for Proposals. Further, this proposal is technically sound, administratively competent, and furthers capacity building commensurate with the nature of the work and the tribal cooperator.

Project Number: 07-502
Project Title: Tanada Creek Salmon Weir
Geographic Region: Southcentral
Data Type: Stock Status and Trends
Principal Investigator: Molly McCormick, NPS

Cost: 2007: $81,015 **2008:** $81,928 **2009:** $83,885

ISSUE

Accurate assessment of yearly run strength and migratory timing in tributaries to the Copper River is essential to the development of a management strategy that provides for natural and healthy populations as mandated by the Alaska National Interest Lands Conservation Act (ANILCA). The upper Copper River sockeye salmon populations are of particular importance to both Federally qualified and state subsistence users. Tanada Creek sockeye are one of the uppermost runs of sockeye on the Copper River and support a subsistence salmon fishery both in the Copper River and Tanada Creek. In-season escapement estimates are a useful tool to manage subsistence fisheries, particularly the subsistence fishery in the Batzulnetas area. The Park Superintendent at Wrangell-St. Elias National Park/Preserve is the Federal local area or in-season manager for the Copper River. The Batzulnetas subsistence fishery targets two sockeye salmon stocks that utilize Tanada Lake for spawning and rearing habitat. The Batzulnetas fishery and the entire Tanada Creek watershed, including Tanada Lake, occur within Wrangell-St.Elias National Park. The Batzulnetas subsistence fishery is primarily a fishwheel fishery, although spears, dipnets and rod and reel are also legal gear. In January 2006, the Federal Subsistence Board adopted a proposal to allow the use of a fyke net to harvest salmon in Tanada Creek. As we begin to implement the use of this new gear type, the Tanada Creek weir will be a crucial in-season management tool. The fishery occurs annually June through September. The Batzulnetas Area subsistence fishery has supported harvests of up to 997 salmon since 1987, primarily by fish wheel.

OBJECTIVES

1. To use a weir and a video counting tower to estimate the abundance of adult sockeye and chinook salmon in Tanada Creek and document the timing of the passage of these fish past the weir site between early June and mid-September.
2. To estimate the abundance of adult sockeye salmon in Tanada Creek using additional mark and recapture censuses should high flows cause fish leakage around the weir, such that estimates are within 10% of the actual abundance 95% of the time.
3. To measure the entry pattern of sockeye and chinook salmon to Tanada Creek and compare the entry pattern to the historic entry pattern data set to test for changes in annual run timing.
4. To estimate the age, sex and length of the sockeye population by sampling 10% of the sockeye salmon proportionate to their abundance with a minimum of 100 fish per week and a maximum of 100 fish per night.
5. To determine if correlations exist between staff gauge height and migration timing.
6. To instruct local students and residents regarding sockeye and chinook salmon populations and to link this knowledge to providing for subsistence needs and compliance with the mandates of ANILCA.

METHODS

In 2007 the weir will move to a more suitable location upstream of the confluence of Caribou Creek and Tanada Creek. The project will use a floating resistance board weir in conjunction with an underwater video system to enumerate the number of salmon migrating up Tanada Creek and to sample age, sex and length of a portion of the salmon migrating through the weir. The weir will be monitored seven days a week from late May through early to mid September for at least 10 hours per day. The video camera will run 24 hours a day, will be monitored on site and tapes will be reviewed at a viewing station on a daily basis. The weir will be open continuously unless sampling is being done. A portion of the sockeye salmon will be sampled for age, sex and length and marked. Scales will be sent to ADFG for analysis. Sampled salmon will be marked with an opercle punch. Live salmon and carcasses will be recovered and a mark-recapture estimate of the total population will be derived in late September if necessary. The weir and video will be removed from the water in late September. Data entry and analysis will take place in October and November. The annual and final reports will be written during the winter months.

PARTNERSHIPS/CAPACITY BUILDING

Several local groups are interested in the Copper River watershed. This project provides an opportunity to collaborate with local students, tribes and culture camps, nonprofits, and agencies to partner in the data collecting process. Biotechnician positions are currently filled under local hire designation. The Batzulnetas culture camp occurs in mid-summer. Annually camp attendees participate in an interpretive visit to the weir site to learn about subsistence fisheries management. Annual data is regularly discussed with them during their annual meetings. ADFG is willing to provide scale analysis. Wrangell-St. Elias National Park/Preserve has and will continue to collaborate with ADFG to examine sockeye salmon genetics and recover radio tagged sockeye salmon.

JUSTIFICATION

This is a long standing project under the Monitoring Program that addresses an important strategic priority. This project provides an instrumental tool for Federal management of the Batzulnetas subsistence fishery. Continued escapement assessment into Tanada Creek will complement results from project (05-501) to estimate stock-specific timing and distribution of sockeye stocks. The investigator addressed Technical Review Committee review comments to explore alternative technology that is more robust to frequent flood conditions, and pilot work will be conducted in 2006, including exploration of a new weir site. The requested budget is increased over historic costs to the Monitoring Program, is largely due to funding for the crew leader position previously funded outside of the Monitoring Program, and appropriately reflects actual project costs.

Project Number: 07-503
Project Title: Copper River Chinook and Sockeye Salmon Abundance
Geographic Region: Southcentral
Data Type: Stock Status and Trends
Principal Investigator: Keith van den Broek, Native Village of Eyak
Co-Investigator(s): Jason Smith and Michael Link, LGL Alaska Research Associates, Inc.
ADFG, Division of Commercial Fisheries

Cost: 2007: $372,456 **2008:** $366,726 **2009:** $373,093

ISSUE

Copper River chinook and sockeye salmon sustain large and important subsistence fisheries under Federal jurisdiction; and subsistence, commercial and sport harvests are significant in comparison to abundance. Management of Copper River sockeye salmon is complex due to inter-annual variation in the size and timing of stocks, fisheries that target a mixture of stocks and difficulties in estimating abundance due to the physical characteristics of the drainage. Recently, returns of salmon to several tributaries of the upper Copper River basin (e.g., Gulkana Hatchery, Tanada Creek weir) have been lower than expected given the acoustic-based estimates of abundance obtained from the Miles Lake sonar site. To further confound certainty in the abundance estimates provided by the Miles Lake sonar, the Alaska Department of Fish and Game (ADFG) is currently upgrading their Bendix acoustic system with a newer and much different acoustic system (dual frequency identification sonar – DIDSON). The management system and management plans for Copper River sockeye salmon have been built around the old Bendix sonar counts. The degree of comparability of the old and new acoustic systems is uncertain and the efficacy of the original Bendix acoustic counter has never been independently validated with an alternative technique.

We propose to use an independent technique to validate estimates provided by the new acoustic system and to the extent it remains, the Bendix-based estimates at Miles Lake. The purpose of this project is to use mark-recapture methods to estimate the annual abundance of both chinook and sockeye salmon returning to the Copper River above Miles Lake and compare these estimates to those provided by the Miles Lake sonar gear. The information collected from this project can be used by fishery managers to better manage the subsistence fishery for individual stocks, which ultimately could lead to increased subsistence harvest opportunities. This project will also continue the efforts begun in 2001 by the Native Village of Eyak (NVE) to develop a long term monitoring program for Copper River chinook salmon. This component of the proposed project will remain important until acoustic technology advances to such a stage as to allow for accurate species apportionment of counts at Miles Lake. The need for continued study of annual sockeye salmon escapement will be reassessed after reviewing results from the 2007 season.

OBJECTIVES

1. To estimate the inriver abundance of sockeye salmon returning to the Copper River in 2007, such that the estimate is within 25% of the true value 95% of the time.
2. To continue a long-term monitoring program operated by the Native Village of Eyak, estimating the annual, system-wide escapement of chinook salmon to the Copper River using mark-recapture techniques such that the estimate is within 25% of the actual escapement 95% of the time.

METHODS

This project will use two-event mark-recapture methods to estimate the annual abundance of chinook and sockeye salmon at Baird Canyon in 2007, and chinook salmon in 2008–09. For the first event, salmon will be PIT-tagged daily at three fishwheels operated in Baird Canyon (rkm 66) from mid May to mid August. These fishwheels will be located upstream of the Miles Lake sonar site and downstream of any inriver fisheries and major spawning tributaries. The second event will consist of fish examined for tags using digital video and automated PIT tag readers at two fishwheels located near Canyon Creek (rkm 157), located 12 km downstream of Chitina, AK. The fishing sites at Baird Canyon and Canyon Creek have been used successfully by the project team for these purposes since 2001.

PARTNERSHIPS/CAPACITY BUILDING

This project gives the Native Village of Eyak an opportunity for meaningful inclusion in the research and long-term management of Copper River chinook and sockeye salmon. They will oversee all aspects of the project and provide critical logistical, technical and field assistance, thereby acquiring the array of skills needed to carry out major fisheries assessment projects. The Native Village of Eyak fishery technicians will acquire the necessary skills and experience required for this and other fisheries research jobs. This project will allow the Native Village of Eyak to further develop the skills of its members via local training, hiring for key positions in future fisheries assessment projects, and recruiting and encouraging young people to get an education in fisheries and natural resource management. This project will also promote interaction between a major subsistence group (Native Village of Eyak) and fisheries management agencies (ADFG Division of Commercial Fisheries). Finally, the overall study design will engage tribal organizations from different regions of the Copper River drainage in discussions on the project and promote interactions amongst subsistence users. The Native Village of Eyak will continue to work with the Tribal Council, staff, consultants and government agencies to identify key personnel to help carry on a long-term program.

JUSTIFICATION

This proposal ranks high in all evaluation criteria, and directly addresses the highest priority information need identified in the 2007 Request for Proposals and strategic planning for this region. Previously funded projects by these investigators that address this same strategic priority were technically sound and administratively competent. This study design contains appropriate modifications to address sampling of sockeye salmon on a production basis, and should also reduce costs for further assessment of Chinook salmon. The Native Village of Eyak has served as an effective and high profile Principal Investigator, providing arguably the best example of capacity building under the Monitoring Program. The need to continue abundance estimation of sockeye salmon will be evaluated, and proposed after 2007 if appropriate.

Project Number: 07-505
Project Title: Long Lake Salmon Weir
Geographic Region: Southcentral
Data Type: Stock Status and Trends
Principal Investigator: Molly McCormick, NPS
Co-Investigator(s): Kristen Smith, Copper River Watershed Project

Cost: **2007:** $19,252 **2008:** $19,698 **2009:** $20,121

ISSUE

Accurate assessment of yearly run strength and migratory timing in tributaries to the Copper River is essential to the development of a management strategy that provides for natural and healthy populations as mandated by the Alaska National Interest Lands Conservation Act (ANILCA). The Upper Copper River sockeye salmon populations are of particular importance to both federally qualified and state subsistence users. The sockeye salmon stock that spawns within Long Lake is the largest salmon stock within the Chitina River drainage. The Chitina River drainage, approximately 5 million acres in size, is the largest anadromous drainage contained in its entirety, within the Wrangell-St. Elias National Park/ Preserve. In addition, the Long Lake population has the longest known annual spawning duration of any sockeye salmon population in North America (Ken Roberson, personal communication). Therefore, this system is an excellent candidate for a long term monitoring site. Weir counts of salmon are a simple and basic dataset and therefore likely to provide valuable data far beyond the foreseeable future. Thirty-two years of weir show annual variations in abundance of Long Lake runs ranging from 4,400 to over 49,000 sockeye. This is the longest running data set of weir counts of salmon in the Copper River drainage.

The Alaska Department of Fish and Game (ADFG) initially operated the Long Lake weir, which stands on private property owned by the Collins family, in 1974 and 1975. In 1976 Cliff Collins voluntarily took over operation of the weir when ADFG was no longer able to fund the operation of the weir. He operated the weir continuously until 2003 when the Wrangell-St. Elias National Park/Preserve and the Copper River Watershed Project became partners with the Collins family trust in the operation of the weir.

Subsistence use of Copper River salmon occurs downstream of the Chitina River drainage in the Chitina Subdistrict of the Upper Copper River District. Federal subsistence users harvested approximately 20,000 salmon here in 2005 using dipnets. Harvest by as many as 10,000 households occurs in a state managed fishery that has been both a subsistence and personal use fishery harvesting as many as 125,000 salmon annually some years. These fisheries undoubtedly harvest some salmon returning to Long Lake.

OBJECTIVES

1. To enumerate the number of sockeye salmon entering Long Lake from July 1 to mid-September, thereby continuing a data set initiated in 1974.
2. To measure the entry pattern of sockeye salmon to Long Lake and compare the entry pattern to the historic entry pattern data set to test for change in the interannual run timing.
3. To estimate age-sex-length composition of the Long Lake sockeye salmon population such that estimates are within 10 percent of the actual composition 95 percent of the time.

4. To correlate run timing and numbers of sockeye entering Long Lake with similar data from the Miles Lake sonar.

METHODS

The project will use a weir to enumerate the number of salmon migrating into Long Lake and to sample age, sex and length of a portion of the salmon migrating through the weir. The pickets will be installed in the rigid picket weir and the sampling box will be erected around July 15. The weir will be monitored on a daily basis from July 15 to around October 15 and all adult salmon passing through it will be enumerated. The weir will be closed when it is not monitored. A portion of the sockeye salmon will be sampled for age, sex and length. Scale samples will be sent to ADFG for analysis. The pickets will be removed from the weir in mid-October. Data analysis will take place in October and November. The performance reports, annual reports and final report will be written during the winter months.

PARTNERSHIPS/CAPACITY BUILDING:

The Wrangell-St. Elias National Park/Preserve has partnered with the Copper River Watershed Project to perform this project since 2003 and will continue to do so in 2006. The project should result in increased capacity of the Copper River Watershed Project, a non-profit group that works with the support of the State of Alaska, Federal agencies and local organizations to monitor fish, fish habitat and water quality within the Copper River watershed. The Park sees this site as integral to monitoring Park resources and intends to utilize both the Principal Investigator and his staff to assist in the operation of this weir and analysis of data and will fund these individuals through Park base funds.

JUSTIFICATION

This is the longest standing escapement project in the Copper River drainage and addresses an important strategic priority. Continued escapement assessment into Long Lake complements project 05-501 to estimate stock-specific timing and distribution of sockeye salmon stocks. Unique logistics make this project extremely cost-effective in comparison to other weir projects.

Project Number: 07-601
Project Title: Hatchery Creek Sockeye Salmon Population Assessment
Geographic Region: Southeast
Data Type: Stock Status and Trends
Principal Investigator: Glenn Chen, Bureau of Indian Affairs
Co-Investigator(s): Jack Lorrigan, Organized Village of Kasaan
Steve McCurdy, ADFG Sport Fish Division
Sheila Jacobson, USDA Forest Service

Cost: **2007:** $117,837 **2008:** $123,199 **2009:** $122,866

ISSUE

The Hatchery Creek drainage on Prince of Wales Island has supported extensive subsistence and sport harvests by both Alaska resident and non-resident anglers. It is of particular importance to Prince of Wales Island rural residents, as it provides for a unique sockeye salmon harvest opportunity due to the early run timing of this stock, and because this location is entirely accessible from the Island's road system. In recent years, state biologists have taken action via emergency closures and changes in sportfishing regulations, to protect this stock from over-exploitation. However, in spite of the importance of this system to multiple user groups, the Hatchery Creek sockeye salmon population has not been formally studied.

The Hatchery Creek watershed is a 4th order stream system located in the north-central portion of Prince of Wales Island, on the U.S. Forest Service Thorne Bay Ranger District (Tongass National Forest). It is a major tributary to Sweetwater Lake. A 1.5-meter waterfall is located approximately 0.4 km upstream of the stream's confluence with the lake. The falls are a major obstacle to upstream migration at all flows, and can delay migrating fish for weeks before passage can be negotiated. It is thought that the majority of Hatchery Creek's early run adult sockeye spawn above the falls, and their offspring rear in lakes within the upper watershed. Hatchery Creek fisheries have been the subject of regulatory and management action by the State. USDA Forest Service has constructed a boardwalk trail to the falls, and subsistence fishing occurs under Federal jurisdiction.

OBJECTIVES

1. Census the total annual abundance of early run adult sockeye salmon returning to spawn in the upper reaches of Hatchery Creek, via a weir operated from June 1–August 31 above the waterfall partial migration barrier.
2. Quantitatively estimate the age, sex, and length compositions from a sub-sampled proportion of these early run adult fish.
3. Determine the primary spawning locations, and time of spawning, for sockeyes that utilize the stream area upstream of the waterfall partial barrier (via radio telemetry).
4. Estimate harvest levels of sockeyes by subsistence and sport users.

METHODS

This proposal provides funding to estimate sockeye salmon escapement into Hatchery Creek Prince of Wales Island through a weir. The weir from the Karta River will be used, which significantly reduces cost in 2007. Little is know about sockeye salmon returns to this drainage, and the location of spawning locations will be determined through a radio tagging experiment. The sample size for the radio tagging experiment is 40 fish. Tracking will be accomplished through aerial surveys. Additionally, harvest at the falls fishery will be estimated through a harvest survey. All assessment will focus on what is believed to be early run fish, which support inriver harvests.

PARTNERSHIPS/CAPACITY BUILDING

The Organized Village of Kasaan will be provided funds to hire the lead field biologist, crew leader, and field technicians needed for this study; local hiring priority will be given to qualified personnel from the Hatchery, Native organizations, and the island's rural communities to fill these positions. This proposal represents the results of extensive interagency cooperation between fisheries and subsistence program personnel from the Organized Village of Kasaan, the USFS Craig Ranger District, ADFG Sportfish Division, and the BIA. Sharing of data among all of the agencies involved in this subsistence fishery will provide better information to improve management of Hatchery Creek sockeye salmon for all users.

JUSTIFICATION

This proposal addresses an issue of the highest strategic importance. Subsistence fishing in this system is under Federal jurisdiction, which is unusual for sockeye salmon fisheries in southeast. Exploitation is believed to be high, although there are no credible estimates of escapement. The need for the harvest survey of just the falls is not well developed. Approval of the harvest survey is contingent upon further assessment of need; and completion of the study design. The investigators should base the harvest survey upon proven and documented methodology from ADFG Sportfish Division.

Project Number: 07-604
Project Title: Klag Lake Subsistence Sockeye Salmon Stock Assessment
Geographic Region: Southeast
Data Type: Stock Status and Trends
Principal Investigator: Brian Woody, Sitka Tribe of Alaska
Co-Investigator(s): Terry Suminski, USDA Forest Service

Cost: **2007:** $108,350 **2008:** $109,093 **2009:** $109,836

ISSUE

Because Klag Lake is one of the largest producers of subsistence sockeye salmon in Southeast Alaska and is so important to the people of Sitka, there is an obvious need for quantifiable escapement goals and the ability to regulate harvest opportunities to ensure that escapements are within goal ranges and adequately distributed through time. This Investigation Plan outlines three additional years of funding for the field project. Three additional years of stock assessment work at Klag Lake will enable fishery managers to begin setting scientifically-based escapement goals to manage the Klag Lake sockeye salmon run for sustainable subsistence harvests into the future.

OBJECTIVES

1. Estimate the escapement of sockeye salmon into the Klag Lake system, with the aid of a weir on the outlet stream of the lake and additional mark-recapture censuses, so that the estimated coefficient of variation is less than 10%.
2. Count the number and determine the timing of sockeye salmon returning to Klag Lake outlet stream through a weir.
3. Estimate the subsistence harvest of sockeye adults in the terminal area of Klag Bay so that the estimated coefficient of variation is less than 15%.
4. Describe the size, sex and age distribution of sockeye salmon adults returning to Klag Lake so that the estimated coefficient of variation is less than 5%.

METHODS

A weir will be installed in the outlet stream of Klag Lake and all salmonids entering the lake will be passed through a trap or holding pen and directly counted be the field crew. Counts of all fish passed through the weir will be recorded by species.

An on-site harvest survey will be conducted to estimate terminal harvest. A sampling design, stratified by gear type, will be used to estimate sockeye salmon harvest, and, if possible, fishing effort. The sport fishery will constitute one stratum, the subsistence fishers using gillnets and seines will comprise another. Given the low number of participants in the fishery, samplers will attempt to interview all participating boat groups.

Age, sex, and length data will be collected from adult sockeye salmon at the weir to describe the biological structure of the population. The crew will be instructed to sample at a rate of 20% in a systematic manner (e.g. sample every fifth fish) to avoid bias. The sampling rate may be adjusted upward or downward, depending on the size of the run, to achieve the sampling goal, but we will attempt to maintain consistent sampling rates through all parts of the run.

A stratified, two sample mark-recapture study is used to estimate sockeye salmon escapement into Klag Lake; a comparison between the estimate and the weir count tests the integrity of the weir and trap. Sockeye salmon passed through the trap are marked with fin clips, with marking stratified by time to allow separate estimation of different parts of the run should the weir fail or violations of mark recapture assumptions occur during some part of the run. The target daily marking rate at the weir is 15–20% of the run depending on the overall volume of the run.

PARTNERSHIP/CAPACITY DEVELOPMENT

It is the intention of all three partners that Sitka Tribe of Alaska and its members build on their capacity for management of their subsistence fishery resources. This project will give the Tribe an opportunity to increase its involvement as an organization in fisheries research and management, with active project leadership by the Tribe's biologist(s) and management of the project budget by the administrative staff. Through the joint involvement of the Sitka Tribe of Alaska, ADFG, and USFS in public and agency meetings on subsistence fishing issues, the project is already promoting interaction among Tribe staff and members, other subsistence users, and state and Federal fisheries managers and scientists. All three agencies will continue to be involved in information gathering, data analysis, reporting, and information sharing.

JUSTIFICATION

This is a solid proposal that ranks as *High* in all evaluation criteria. This proposal is technically sound and the investigators are administratively competent. As an outside stock, there is little competing harvest and exploitation is likely sustainable. However, Sitka has the largest concentration of Federally-qualified substance fishers in the region, the relative importance of Klag Lake increases in the event of reduced returns to Redoubt Lake, and there is compelling reason for the Monitoring Program to maintain assessment of important subsistence fisheries in Sitka Sound. The principal investigator is an Alaska Native organization and this project provides meaningful capacity building. The investigators addressed all Technical Review Committee comments regarding the harvest survey and costs.

Project Number: 07-606
Project Title: Hetta Lake Subsistence Sockeye Salmon Stock Assessment
Geographic Region: Southeast
Data Type: Stock Status and Trends
Principal Investigator: Jan Conitz, ADFG Division of Commercial Fisheries
Co-Investigator(s): Tony Christianson, Hydaburg Cooperative Association
Jeff Reeves, USDA Forest Service

Cost: 2007: $160,994 **2008:** $161,849 **2009:** $154,045

ISSUE

Investigators will collect information on sockeye salmon returning to Hetta Cove and Hetta Lake by interviewing subsistence fishers for the number of sockeye harvested in Hetta Cove and by counting salmon through a weir on the outlet stream of Hetta Lake. This information will be used to better establish subsistence needs, to monitor stock trends at Hetta Lake, and to assist fishery managers in ensuring that escapement and subsistence opportunities are adequate.

OBJECTIVES

1. Census the harvest of sockeye salmon by subsistence fishers in the terminal areas of Hetta, Eek, Kasook, and Hunter Bay, using completed-trip interviews of all fishers on the fishing grounds or immediately upon returning to Hydaburg from the fishing grounds.
2. Count the number of sockeye salmon and other salmonids returning to Hetta Lake through the weir.
3. Estimate the escapement of sockeye salmon into Hetta Lake using mark-recapture methods so that the estimated coefficient of variation is less than 10%.
4. Estimate the age composition of the sockeye escapement so that the coefficient of variation is 10% or less for the two major age classes and describe the size distribution of each age class by sex.

METHODS

The primary focus of this research will be to census the harvest of sockeye salmon in Hetta Cove by subsistence fishers, and to estimate the number of sockeye salmon escaping into Hetta Lake. The Hydaburg crew will interview all fishers at the completion of their subsistence fishing, and record the information daily. Investigators will operate a weir from the beginning of June to the end of September to count the number of salmon by species entering Hetta Lake. A mark-recapture study will also be conducted to test the integrity of the weir, marking fish at the weir and conducting mark-recovery sampling on the spawning grounds. The mark-recapture estimate of sockeye spawners will be used as the official sockeye escapement estimate if the weir fails. The ages of returning sockeye salmon will be described so as to be able to look at the lake's productivity on a year-specific basis.

PARTNERSHIPS/CAPACITY BUILDING

ADFG and Hydaburg Cooperative Association staff have worked closely for the last six years to ensure the success of the project and to increase the responsibility of the Hydaburg Cooperative Association each year. The goal is to have Hydaburg Cooperative Association take over the project by 2009. When they assumes total responsibility for the project, they will oversee the technical aspect of the project and ensure the completion of a final report for all three years of work.

JUSTIFICATION

This is a solid proposal that ranks as *High* in all evaluation criteria. This proposal is technically sound and the investigators are administratively competent. This system is in close proximity to significant commercial fisheries, the potential for significant competing harvest is high, subsistence exploitation is high, and there is evidence of very low escapements that could limit future returns. The investigators addressed all Technical Review Committee comments on this proposal to assess escapement and terminal subsistence harvest. Further, the investigators plan to transfer project supervision to Hydaburg Cooperative Association by 2009, which will meaningfully increase capacity building. At question for the future is how continued assessment data will be utilized by ADFG to assess the adequacy of escapements. As originally conceived by the investigators, justification for long-term assessment of this stock was in large part to provide data to make recommendations for an escapement goal. To achieve this goal, and to reduce costs to the Monitoring Program, the Technical Review Committee recommended that this proposal be further enhanced by assessment of this stock to mixed-stock and close proximity commercial fisheries. While there have been significant improvements in genetics technology, further research will be necessary before assessment of the harvest from this small stock is feasible. Also, there are significant issues with sampling these large commercial fisheries that must be addressed. As an alternative and to largely address the Technical Reveiw Committee's concerns with cost, the investigators have significantly reduced the proposed budgets for this and other projects (see 07-607, 608, and 609). The question of contribution of this stock to mixed-stock commercial fisheries is important to formulate recommendations for an escapement goal, and should be revisited upon advances in stock identification technology.

Project Number: 07-607

Project Title: Kanalku Lake Subsistence Sockeye Salmon Stock Assessment

Geographic Region: Southeast

Data Type: Stock Status and Trends

Principal Investigator: Jan Conitz, ADFG Division of Commercial Fisheries

Co-Investigator(s): Ed Gamble, Angoon Cooperative Association
Ben VanAlen, USDA Forest Service

Cost: **2007:** $172,791 **2008:** $161,694 **2009:** $165,396

ISSUE

A voluntary subsistence fishing closure for Kanalku Bay and Creek was in place from 2002 to 2005 in the community of Angoon, in response to estimated escapements of fewer than 300 sockeye salmon in two recent years (2001 and 2003). A majority of Angoon residents supported the closure and abstained from fishing. However, the voluntary closure was not universally observed, and ADFG management biologists have decided to recommend it not be continued in 2006, instead restricting the regular subsistence season and possession limit. Federal subsistence management biologists have not yet decided whether to implement similar limits on the Federal portion of the Kanalku subsistence fishery (B. Van Alen USFS biologist, personal communication 2006). Because of the extremely low estimated escapements, and loss of vital subsistence harvesting opportunities for Angoon residents, accurate and ongoing escapement estimates are needed. We propose to rigorously test our mark-recapture estimation methods, guided by results of a telemetry study in 2006 to search for previously unidentified sockeye spawning areas in Kanalku Lake. If no additional spawning areas are found, we will continue the mark-recapture program used in 2001–2006, add a weir and video recording system to count fish entering the freshwater, and also monitor subsistence and sport fisheries in Kanalku Bay. If additional spawning areas are found via telemetry, we will incorporate a conventional weir and trap into our mark-recapture study to ensure the estimate captures all sockeye spawners entering Kanalku Lake.

OBJECTIVES

Plan A (no new spawning areas are identified in 2006 telemetry study)

1. Count sockeye salmon using a weir and video recording system in the lower part of Kanalku Creek.
2. Estimate harvest of sockeye salmon in the Kanalku subsistence and sport fisheries with estimated coefficient of variation less than 15%.
3. Estimate the annual spawning population of sockeye salmon in Kanalku Lake, using mark-recapture methods on the spawning grounds with estimated coefficient of variation less than 15%.
4. Estimate the age, sex, and size distribution of sockeye salmon in the Kanalku Lake.
5. Maintain an ongoing record of physical lake habitat variables including water column temperature and light intensity.

Plan B (additional spawning areas are found with telemetry in 2006)

1. Count sockeye salmon through a weir at the outlet of Kanalku Lake.
2. Estimate the number of sockeye salmon entering Kanalku Lake, using mark-recapture methods at the weir and on the spawning grounds with estimated coefficient of variation less than 10%.

Objectives 3, 4 and 5 are the same as in Plan A.

METHODS

Under Plan A, an underwater video camera and digital video recorder will be used to monitor passage of fish through a weir near the mouth of Kanalku Creek. Trained technicians will play back the video recordings daily to count fish by species, and will periodically check these counts against direct visual counts at the weir. Daily and cumulative total counts of fish, by species, will be compiled for the season. The crew will conduct a harvest survey in Kanalku Bay and Creek, counting all sport and subsistence fishers that enter the area, and obtaining harvest information from the fishers as they leave the area. Total harvest for the season will be estimated using a one-stage roving-access survey design. The spawning population of sockeye salmon in Kanalku Lake will be estimated using mark-recapture methods on the spawning grounds and an open population estimator. The age, sex, and length distribution of the Kanalku Lake sockeye spawning population will be estimated using standard methods. Light intensity and temperature profiles in Kanalku Lake will be measured monthly, and if funding permits, zooplankton population species composition, density, and biomass will be estimated from monthly samples.

Under Plan B, a conventional weir and trap will be placed near the Kanalku Lake outlet, and a sample of fish passing through the weir will be marked with adipose clips and uniquely-numbered tags. Video recording equipment will be used to monitor fish passage between sampling periods. Fish will be sampled again on the spawning grounds for marks and tags, and total escapement will be estimated using a closed population estimator. The spawning population will also be estimated as in Plan A using mark-recapture methods on the spawning grounds and an open population estimator. The weir-based estimate will be compared with the open population estimate on the spawning grounds to determine whether the spawning grounds estimate is an accurate measure of total escapement. Fish will be sampled at the weir for age, sex, and length distribution estimates. Lake light intensity and temperature profiles will be measured and zooplankton population variables will be estimated, if funding permits, as under Plan A.

PARTNERSHIPS/CAPACITY BUILDING

Angoon Cooperative Association has successfully managed hiring, personnel issues, payroll, budgeting, and procurement of supplies and services over the past five years as a cooperator in fisheries research projects. The Angoon Cooperative Association fisheries technicians will refresh or learn scale, age, and length sampling techniques, methods and rationale for ageing sockeye salmon, mark-recapture sampling techniques and theory, salmon life history, lake ecology, and limnology sampling techniques. Crew members will also have an opportunity to learn or enhance computer skills and work with digital video technology. In addition, all Angoon Cooperative Association, ADFG, and USFS field staff will receive safety training including wilderness first aid and CPR, wilderness survival, safety around bears, water and boating safety, safe travel in aircraft, and remote radio and phone communications. All pre-season and on-the-job training serves to promote safety in the field, enhance the job skills of seasonal workers, and contribute to interest in and capacity for fisheries research in rural subsistence communities.

JUSTIFICATION

This is a solid proposal that ranks as *High* in most evaluation criteria. This proposal is technically sound and administratively competent. This system is in close proximity to significant commercial fisheries, the potential for significant competing harvest is high, subsistence exploitation is high, and there is evidence of very low escapements that could limit future returns. Subsistence fishing at Kanalku has been significantly reduced, either by voluntary or agency restrictions. During 2006, unspent funds are being utilized to construct a weir, and USDA FS is conducting a radio tagging experiment to estimate spawner distribution. The results of this study will provide the basis to site the weir either below the falls or the lake outlet, and the investigation plan addresses both of these contingencies. The investigators addressed all Technical Review Committee review comments with this proposal to assess escapement and terminal subsistence harvest. At question for the future is how continued assessment data will be utilized by ADFG to assess the adequacy of escapements. As originally conceived by the investigators, justification for long term assessment of this stock was in large part to provide data to make recommendations for an escapement goal. To achieve this goal, and to reduce costs to the Monitoring Program; the Technical Review Committee recommended that this proposal be further enhanced by assessment of this stock to mixed-stock and close proximity commercial fisheries. While there have been significant improvements in genetics technology, further research will be necessary before assessment of the harvest from this small stock is feasible. Also, there are significant issues with sampling these large commercial fisheries that must be addressed. As an alternative and to address the Technical Review Committee concerns with cost, the investigators have significantly reduced the proposed budgets for this and other projects (see 07-608 and 609). The question of contribution of this stock to mixed-stock commercial fisheries is important to formulate recommendations for an escapement goal, and should be revisited upon advances in stock identification technology.

Project Number: 07-608
Project Title: Klawock Lake Subsistence Sockeye Salmon Stock Assessment
Geographic Region: Southeast
Data Type: Stock Status and Trends
Principal Investigator: Jan Conitz, ADFG, Division of Commercial Fisheries
Co-Investigator(s): Cheryl Griffitt, Klawock Cooperative Association
Jeff Reeves, USDA Forest Service

Cost: **2007:** $73,246 **2008:** $75,101 **2009:** $76,303

ISSUE

Over the last two decades, residents of Klawock have expressed concerns about a perceived decline of sockeye salmon returning to the subsistence fishery in Klawock Inlet. A low sockeye escapement in 1983 prompted ADFG to initiate a sockeye fry stocking program in 1986. In 1999, local residence expressed continued concerns to tribal, state, and Federal governments about a perceived decline in subsistence sockeye resources. This motivated community leaders, the private non-profit hatchery, and ADF&G managers to hold a community workshop to devise a long-term plan to increase sockeye production in this lake. Not surprisingly, in 2000, Klawock community leaders also identified sockeye salmon in Klawock Lake as their top research priority to receive Fisheries Resource Monitoring Program funds. The Klawock Lake Sockeye Project began in 2001 and is currently funded through the 2006 season.

Our purpose in proposing three more years of escapement monitoring in Klawock Lake is to establish a reliable escapement benchmark for the proposes of tracking stock trends and allowing comparisons in the future. We expect these benchmarks to be used in the future to determine if the population size is declining, increasing, or fluctuating within normal limits. Additionally, this stream-specific benchmark should be used in the future as baseline information for stream restoration work.

Both Federal and State governments have regulations pertaining to the Klawock Lake area. Klawock Lake is recognized as a Federal subsistence area under "customary and traditional uses" for residents of the city of Klawock and portions of the watershed are in the Tongass National Forest, a Federal conservation system unit. The Klawock Lake Sockeye Salmon Project meets the Federal jurisdiction criteria for the Fisheries Resource Monitoring Program funding because part of the subsistence fishery occurs under Federal jurisdiction and sockeye salmon returning to this lake system spawn in the Tongass National Forest.

OBJECTIVES

1. Estimate the sockeye spawning population in Half-mile, Three-mile and Inlet streams using mark-recapture methods at the weir so that the estimated coefficient of variation is less than 25% for the sum of the three estimates.
2. In the Klawock Lake sockeye escapement, estimate proportions of fish in each age-sex category, with an estimated coefficient of variation of 10% or less for the two major age classes, and estimate the mean length of fish in each age-sex category with an estimated coefficient of variation less than 5%.

METHODS

The spawning population of sockeye salmon in Klawock Lake will be estimated using mark-recapture methods in three spawning streams using an open population estimator. In two previous studies, the estimated escapement into these three streams was very near the whole-lake escapement estimates based on weir counts. Fish sampled on the spawning grounds will be marked with opercular punches and uniquely-numbered tags. At the end of the season, an individual capture history will be constructed for each fish sampled, showing all sampling events in which that fish was caught. A Jolly-Seber model, with an appropriate modification for spawning salmon populations, will be used to estimate the total spawning population in Klawock Lake. Length, sex, and scale samples will be collected from 600 adult sockeye salmon sampled on the spawning grounds at Klawock Lake to estimate the size and age structure of the population, by sex. Ages will be determined by trained ADFG technicians and the proportion of fish in each age-sex category will be estimated. Crew members will record sex and length of each fish in the field, and pair these data with the scale samples. The average mid-eye-to-fork length of fish in each age-sex category will be estimated.

PARTNERSHIPS/CAPACITY BUILDING

Personnel from ADFG and Klawock Cooperative Association will work closely to ensure the success of the project through training, assistance in the field, and project and budget planning. CPR and First Aid training will continue to be offered annually in Craig. ADFG will offer a pre-season training on the protocols and basic concepts of estimating populations using mark-recapture methods, collecting fish scales, and fish biology. During the field season, the crew will receive additional on-the-job training, and review the concepts and procedures outlined in the pre-season training, acquire hands-on experience, and learn and practice general safety procedures for boat travel.

JUSTIFICATION

This is a solid proposal that ranks as *High* or *Medium* in all evaluation criteria. This proposal is technically sound and administratively competent. This system is in close proximity to significant commercial fisheries, the potential for significant competing harvest is high, subsistence exploitation is high, and there are significant development issues within the drainage that could limit future returns. The investigators addressed all Technical Review Committee review comments and worked with Fisheries Information Service staff to re-design this project to address the Federal interest of credibly estimating escapement in a more cost-effective manner. As currently designed, this project will provide postseason estimates of escapement. At question for the future is how continued assessment data will be utilized by ADFG to assess the adequacy of escapements. As originally conceived by the investigators, justification for long term assessment of this stock was in large part to provide data to make recommendations for an escapement goal. To achieve this goal, and to reduce costs to the Monitoring Program; the Technical Review Committee recommended that this proposal be further enhanced by assessment of this stock to mixed-stock and close proximity commercial fisheries. While there have been significant improvements in genetics technology, further research will be necessary before assessment of the harvest from this small stock is feasible. Also, there are significant issues with sampling these large commercial fisheries that must be addressed. As an alternative and to largely address the Technical Review Committee concerns with cost, the investigators have significantly reduced the proposed budgets for this and other projects (see 07-607 and 609). The question of contribution of this stock to mixed-stock commercial fisheries is important to formulate recommendations for an escapement goal, and should be revisited upon advances in stock identification technology.

Project Number: 07-609
Project Title: Falls Lake Subsistence Sockeye Salmon Stock Assessment
Geographic Region: Southeast
Data Type: Stock Status and Trends
Principal Investigator: Jan Conitz, ADFG Division of Commercial Fisheries
Co-Investigator(s): Mike Jackson, Organized Village of Kake
Cost: **2007:** $87,742 **2008:** $90,310 **2009:** $92,620

ISSUE

Sockeye salmon returning to the marine terminal area at Falls Lake are heavily utilized by Kake residents in an active subsistence fishery occurring in mid-July. In the years 2001–2003, approximately 3,700–8,400 sockeye salmon returned to the Falls Lake marine terminal area, and approximately 30%–70% of these fish were harvested in the subsistence fishery (Conitz and Cartwright 2005). In the same period, approximately 1,100–5,700 sockeye salmon spawned in Falls Lake. Because large proportions of returning sockeye salmon have been harvested in the subsistence fishery, ADFG management biologists closely monitor this fishery, and have made adjustments to the season to distribute the harvest so that not all the fish are taken from the beginning of the run, as was the case in 2001 (Conitz et al. 2002, Conitz and Cartwright 2005). Although subsistence fishing in the Falls Lake outlet stream or other freshwater parts of the system is Federally managed, very little occurs. However, management of the Falls Lake subsistence fishery affects Federally qualified subsistence users in Kake, who may shift their efforts to other Federally managed sockeye systems if sockeye returns or fishing opportunities are limited at Falls Lake. Because of the need for careful monitoring of this sockeye run and the need for active management of its subsistence fishery, we plan to continue the stock assessment program and provide annual estimates of escapement. We propose to estimate the sockeye spawning population in the late summer and fall using a mark-recapture sampling design on the spawning grounds with an open-population estimator. We are confident these methods will provide a sufficiently accurate estimate of annual sockeye escapement, because we have used these methods for the past five years and compared results with a conventional weir count and closed-population mark-recapture estimate. Each year, the spawning population estimate was somewhat less than the weir-based estimate, which could be due to the fact the two methods estimate the population at different times (at the time of spawning vs. as fish enter the lake). Furthermore, given the uncertainty associated with each estimate, they were not substantially different. Falls Lake is recognized as a Federal subsistence area under "customary and traditional uses" for residents of Kake and is located in the South Baranof Island Wilderness Area, a Federal conservation system unit.

OBJECTIVES

1. Estimate the size of the Falls Lake sockeye spawning population on spawning grounds, with estimated coefficient of variation less than 15%.
2. In the Falls Lake sockeye escapement, estimate proportions of fish in each age-sex category with estimated coefficient of variation 10% or less for the two major age classes, and estimate the mean length of fish in each age-sex category with estimated coefficient of variation less than 5%.

METHODS

The spawning population of sockeye salmon in Falls Lake will be estimated using mark-recapture methods on the spawning grounds and an open-population estimator. Fish sampled on the spawning grounds will be marked with opercular punches and uniquely-numbered tags. At the end of the season, an individual capture history will be constructed for each fish sampled, showing all sampling events in which that fish was caught. A Jolly-Seber model, with an appropriate modification for spawning salmon populations, will be used to estimate the total spawning population in Falls Lake. Length, sex, and scale samples will be collected from 600 adult sockeye salmon sampled on the spawning grounds at Falls Lake to estimate the size and age structure of the population, by sex. Ages will be determined by trained ADFG technicians and the proportion of fish in each age-sex category will be estimated. Crew members will record sex and length of each fish in the field, and pair these data with the scale samples. The average mid eye to fork length of fish in each age-sex category will be estimated.

PARTNERSHIPS/CAPACITY BUILDING

The Organized Village of Kake has successfully managed hiring, personnel issues, payroll, budgeting, and procurement of supplies and services over the past five years as a cooperator in fisheries research projects. Organized Village of Kake fisheries technicians will refresh or learn scale, age, and length sampling techniques, methods and rationale for ageing sockeye salmon, mark-recapture sampling techniques and theory, salmon life history, lake ecology, and limnology sampling techniques. Crew members may also have an opportunity to learn or enhance computer skills. In addition, all Organized Village of Kake, ADFG, and USFS field staff will receive safety training including wilderness first aid and CPR, wilderness survival, safety around bears, water and boating safety, safe travel in aircraft, and remote radio and phone communications. All pre-season and on-the-job training serves to promote safety in the field, enhance the job skills of seasonal workers, and contribute to interest in and capacity for fisheries research in rural subsistence communities.

JUSTIFICATION

This is a solid proposal that ranks as *High* or *Medium* in all evaluation criteria. This proposal is technically sound and administratively competent. This system is in close proximity to significant commercial fisheries, the potential for significant competing harvest is high, subsistence exploitation is high, and timing of the subsistence fishery in relation to migratory timing remains an issue. The investigators addressed all Technical Review Committee review comments and worked with Fisheries Information Service staff to re-design this project to address the Federal interest of credibly estimating escapement in a more cost-effective manner. As currently designed, this project will provide post-season estimates of escapement. At question for the future is how continued assessment data will be utilized by ADFG to assess the adequacy of escapements. As originally conceived by the investigators, justification for long term assessment of this stock was in large part to provide data to make recommendations for an escapement goal. To achieve this goal, and to reduce costs to the Monitoring Program; the Technical Reveiw Committee recommended that this proposal be further enhanced by assessment of this stock to mixed-stock and close proximity commercial fisheries. While there have been significant improvements in genetics technology, further research will be necessary before assessment of the harvest from this small stock is feasible. Also, there are significant issues with sampling these large commercial fisheries that must be addressed. As an alternative and to largely address Technical Review Committee concerns with cost, the investigators have significantly reduced the proposed budgets for this and other projects (see 07-607 and 609). The question of contribution of this stock to mixed-stock commercial fisheries is important

to formulate recommendations for an escapement goal, and should be revisited upon advances in stock identification technology.

Project Number:	07-610
Project Title:	Behm Canal Eulachon Genetics
Geographic Region:	Southeast
Data Type:	Stock Status and Trends
Principal Investigator:	Rob Spangler, USDA Forest Service
Co-Investigator(s):	Blair Flannery and John Wenburg, USFWS Conservation Genetics Laboratory Brenda Norcross, University of Alaska Fairbanks

Cost: 2007: $27,866 **2008:** $28,084 **2009:** $0

ISSUE

This project addresses the following Issues and Information Needs identified in the 2006 Request for Proposals under Stock Status and Trends:

- Assessment of Behm Canal eulachon
- Abundance and composition of Unuk River eulachon

In the past three years, the runs of eulachon in tributaries to Behm Canal (Unuk, Klahini and Eulachon rivers) have been extremely low, raising conservation concerns. In 2005 and 2006, nearly total run failures resulted in no subsistence or personal use harvest in these rivers.

In Alaska, eulachon are considered to be an important subsistence and personal use fishery. In Canada and the lower contiguous U.S., run strength of eulachon populations and spawning distributions between and within rivers can vary dramatically. This variability has been observed in Alaska as well, making management of these populations difficult.

Population discreteness for eulachon within and among river systems in Alaska and Behm Canal is unknown. In fact, very little information exists on eulachon in general. Initial, pilot genetic studies focused on eulachon from British Columbia and Washington observed little population structure, suggesting that eulachon exist as large metapopulations with low levels of genetic diversity. However, a more recent and thorough study of eulachon from this area found that eulachon exhibit much higher levels of genetic diversity than originally thought with significant differences occurring among eulachon from different inlets areas. These contradictory results further complicate management. It is clear that an understanding of eulachon genetic population structure is necessary to identify appropriate management units for maintenance of biodiversity and productivity. In this study, we propose to investigate the population discreteness of eulachon across Alaska, building off previous work.

OBJECTIVES

Evaluate patterns of genetic diversity within and among the three eulachon populations in Behm Canal and compare with the other fifteen eulachon populations distributed throughout Southeast Alaska and with seven populations from Southcentral Alaska.

METHODS

Archived tissues from 25 putative eulachon populations (*N*=1250) will be genotyped at 14 microsatellite loci. Each population will be analyzed for Hardy Weinburg and gametic phase equilibrium to test whether they represent randomly mating, Mendelian populations. Estimates of allelic richness, percentage polymorphic loci, and observed and expected heterozygosity will be calculated to assess the intrapopulation genetic diversity whereas spatial and hierarchical analyses will be conducted to assess the population structure or the interpopulation genetic diversity.

PARTNERSHIPS/CAPACITY BUILDING

This project is a partnership among the USFS, USFWS, and University of Alaska Fairbanks will provide the basis for future partnerships among these agencies.

JUSTIFICATION

This proposal addresses an important conservation issue for the Federal subsistence program in southeast. Of particular concern is estimation of spawning abundance; however, little is known about the population dynamics of this species including stock structure. This proposal is technically sound and administratively competent. Samples are already collected, archived, and prepared for analysis; which makes for a very cost-effective study. The requested funding is very low and entirely for lab costs. This proposal is of lower priority than those for sockeye salmon assessment; however, some investment on the part of the Monitoring Program to assess stock structure is appropriate.

Project Number: 07-651

Project Title: Customary and Traditional Sockeye Systems of the K'iis Xaadas (Hydaburg Haida)

Geographic Region: Southeast

Data Type: Harvest Monitoring/Traditional Ecological Knowledge

Principal Investigator: Anthony Christianson, Hydaburg Cooperative Association

Co-Investigator(s): Steve Langdon, University of Alaska Anchorage

Cost: **2007:** $94,903 **2008:** $38,672 **2009:** $0

ISSUE

Sockeye salmon are critical subsistence resource for the K`iis Xaadas (Hydaburg Haida). In recent years, sockeye returns to the streams customarily and traditionally utilized by K`iis Xaadas have declined significantly, and in some cases runs have disappeared, but reasons for the declines are not well understood by biologists. Through documenting the traditional knowledge of a local elder, longtime customary and traditional user, and observer of sockeye, this project will capture a wealth of information regarding sockeye salmon abundance, run timing, location, and biological characteristics/parameters of run. In addition, this project will also document customary and traditional practices with regard to harvesting and managing sockeye salmon. This information can then be used by biologists to gain an improved understanding of local sockeye salmon populations and factors that may influence sockeye salmon population viability.

OBJECTIVES

The objective of this project is to document the wealth of knowledge pertaining to sockeye salmon abundance, run timing, locations, and biological characteristics held by a key elder, customary and traditional user and long time observer of sockeye salmon. This information will then be corroborated and supplemented with additional key informant interviews with three other elders who hold critical traditional knowledge. The key informant interviews will focus specifically on various aspects of sockeye salmon ecology, biology, and customary and tradition use, including:

- Species utilized and their local names.
- Biological Information including habitat preference, spawning and rearing areas, and seasonal movements.
- Traditional and contemporary harvest methods, including timing of harvest, gear used, and mapping of harvest areas.
- Traditional and contemporary preparation and preservation methods.
- Fish related place names.

This information will then be assessed for coverage by geographic area and topic.

METHODS

Methods will include ethnographic and historical document review, ADFG data acquisition and summary, participant observation, formal interviewing of elders/experts (video and audio recordings), on-site

field investigations (digital video, image and audio recording, GPS recording) with elder/experts and community planning meetings. The information gathering will be achieved through the implementation of a number of tasks, which include, in order of their occurrence: 1) Documentation of K`iis Xaadas Sockeye Salmon TEK; 2) On-site field investigations of sockeye salmon systems; 3) Identification of sockeye salmon stream characteristics; 4) Develop GIS data base; 5) Sustainability Planning

PARTNERSHIP/CAPACITY BUILDING

The tribe and consultant will identify key local elders/experts to participate in the research. The consultant's experience in conducting TEK studies, both interviewing and on-site observational methods will be transferred to Hydaburg Cooperative Association personnel. Special efforts will be taken to hire young adults and students to assist in the research so that they can obtain information, research techniques and skills in problem identification and solution.

JUSTIFICATION

This investigation plan addresses several issues identified as being of high priority, in an area with considerable Federal jurisdiction. The Southeast Regional Advisory Council is very interested in attaining TEK to be used in management, and this project will likely be a model for such an approach. The study design, which primarily focuses on collecting and synthesizing TEK regarding sockeye salmon ecology, biology, and cultural use patterns, is clearly laid out and technically sound. Project investigators are experienced in successfully implementing Monitoring Program projects, and together they are a solid partnership with high potential for capacity building.