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2005

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FISHERIES  
RESOURCE MONITORING PLAN



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FEDERAL SUBSISTENCE MANAGEMENT

## **C O N T E N T S**

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## INTRODUCTION

### Background

On October 1, 1999 and under the authority of Title VIII of ANILCA, the Federal government assumed management responsibility for subsistence fisheries on Federal public lands in Alaska. This imposed substantive 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. The challenge posed by dual management of fisheries, coupled with the need to collect more and better information, prompted creation of the Fisheries Resource Monitoring Program (Monitoring Program) within the Office of Subsistence Management (OSM).

***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 program, five Federal agencies (U.S. 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 and other organizations to identify research priorities and select projects to meet information needs.

### Monitoring Plan Development

Based on identified research priorities, an annual request for proposals is made. An inter-agency Technical Review Committee (TRC) evaluates all proposals and selects the ones that should be developed into investigation plans. The TRC is composed of representatives from each of the five Federal agencies and three representatives from Alaska Department of Fish and Game. It is chaired by the Chief of FIS and supported by FIS staff. The TRC reviews the investigation plans that are submitted and recommends which ones should be included in the annual monitoring plan. Public review of the draft monitoring plan occurs at the Regional Advisory Council meetings during which the Council's recommendations on the plan are made. An inter-agency Staff Committee reviews all recommendations, and attempts to reconcile any differences between the recommendations of the TRC and Councils. The Federal Subsistence Board (Board) then considers these recommendations before approving the final monitoring plan.

### Project Evaluation

Four factors are applied to the evaluation and selection of studies:

#### ***1. Strategic Priorities***

To be considered for funding under the Monitoring Program, there must be, at a minimum, a Federal *nexus*, or interest. Proposed studies must have a direct association to a subsistence

fishery, and either the subsistence fishery or fish stocks in question must occur in waters within or adjacent to Federal public lands. Studies that can establish a Federal *nexus* are then further evaluated for strategic importance within the region in question by assessing:

- ➤ Conservation Mandate – Risk to the conservation of species and populations that support subsistence fisheries and risk to conservation unit purposes.
- ➤ 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. A higher priority is given where a lack of information exists.
- ➤ Role of Resource – Importance of a species to a subsistence harvest (e.g. number of subsistence users affected, quantity of subsistence harvest), and qualitative significance (e.g. cultural value, unique seasonal role).
- ➤ Local Concern – Level of user concern over subsistence harvests (e.g. allocation, competing uses, changes in fish size).

## ***2. Technical-Scientific Merit***

Technical quality of the study design must meet accepted standards for information collection, compilation, analysis, and reporting. Studies must have clear objectives, appropriate sampling design, correct analytical procedures, and specified reporting.

## ***3. Past Performance-Administrative Expertise***

Investigators and their organizations must have demonstrated technical and administrative expertise to complete prior studies, or have co-investigators or appropriate partnerships with other organizations to meet all requirements of the study. Studies must not duplicate existing projects.

## ***4. Partnership-Capacity Building***

Studies must include appropriate partners and contribute to the capacities of rural organizations, local communities, and residents to participate in fisheries resource management. Investigators must have completed appropriate consultations about their study with local villages and communities in the area where the study is to be conducted. Investigators and their organizations should be able to demonstrate the ability to maintain effective local relationships and a commitment to capacity building.

## **Policy and Funding Guidelines**

Several policies have been developed to aid in implementing funding.

- A minimum of 60% of the 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; and c) contaminant assessment, evaluation, and monitoring. 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 USDA Forest Service, annually provides \$2 million. On an annual basis, this budget funds both continuation of existing studies (year-2 or 3 of multi-year projects), and new study starts. Budget guidelines were established by geographic region and data type (**Table 1**).

**Table 1.** Current Board guidelines for funding by region for the 2005 Monitoring Program.

| Region           | Values in 1,000's    |                |                     |              |               |                |
|------------------|----------------------|----------------|---------------------|--------------|---------------|----------------|
|                  | Dept of the Interior |                | Dept of Agriculture |              | Total         |                |
|                  | %                    | \$             | %                   | \$           | %             | \$             |
| Northern         | 17.0%                | \$244          |                     |              | 11.6%         | \$244          |
| Yukon River      | 29.0%                | \$416          |                     |              | 19.8%         | \$416          |
| Kuskokwim River  | 29.0%                | \$416          |                     |              | 19.8%         | \$416          |
| Southwest        | 15.0%                | \$215          |                     |              | 10.3%         | \$215          |
| Southcentral     | 5.0%                 | \$ 72          | 32.5%               | \$215        | 13.7%         | \$286          |
| Southeast Alaska | 0.0%                 | \$ 0           | 62.5%               | \$413        | 19.7%         | \$413          |
| Inter-regional   | 5.0%                 | \$ 72          | 5.0%                | \$ 33        | 5.0%          | \$105          |
| <b>TOTALS</b>    | <b>100.0%</b>        | <b>\$1,433</b> | <b>100.0%</b>       | <b>\$661</b> | <b>100.0%</b> | <b>\$2,094</b> |

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.

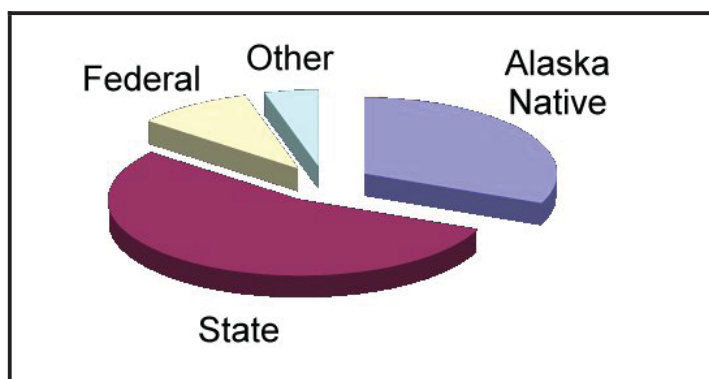
### 2. Harvest Monitoring and Traditional Ecological Knowledge (HM-TEK).

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.

## 2005 Fisheries Resource Monitoring Plan

In November of 2003, a request for proposals was issued. Fifty-nine proposals were received in February of 2004. Of these proposals, the TRC recommended 37 for development into investigation plans. Thirty-one investigation plans were received in June of 2004; twenty-one were in the SST category and 10 in the HM-TEK category. The TRC recommended funding 24 of the 31 projects at a cost of \$1.9 million. The Regional Advisory Councils supported the TRC's recommendations for 29 of the 31 investigation plans. The two projects the Councils disagreed with the TRC's recommendation were: 05-306 Kuskokwim Inseason Subsistence Salmon Harvest Data Collection and 05-403 Lake Clark Whitefish Assessment.

The FSB reviewed the draft 2005 Fisheries Resource Monitoring Plan in January 2005. The Board selected 24 projects for inclusion in the monitoring plan. Based on this plan, the Monitoring Program funding allocations would be: State agencies (55%), Federal agencies (10%), Alaska Native Organizations (31%), and other non-government organizations (4%) (**Figure 1**).



**Figure 1.** Percent 2005 funding distributed to Alaska Native, Federal, State and other organizations.

Tables summarizing the 2005 Fisheries Resource Monitoring Plan are provided on pages 5-8. More detail descriptions of the projects included in the plan can be found on pages 9-58.

**SUMMARY TABLES**

Number of projects funded for the 2005 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          | 1   | 0      | 1     |
| Yukon River       | 4   | 1      | 5     |
| Kuskokwim River   | 5   | 2      | 7     |
| Southwest         | 3   | 1      | 4     |
| Southcentral      | 2   | 1      | 3     |
| Southeast         | 3   | 0      | 3     |
| Inter-regional    | 1   | 0      | 1     |
| Total             | 19  | 5      | 24    |

Cost of projects funded for the 2005 Fisheries Resource Monitoring Plan. Project type includes stock status and trends (SST) and harvest monitoring and traditional ecological knowledge (HM-TEK).

| Geographic Region | Cost (\$000) |        |         |
|-------------------|--------------|--------|---------|
|                   | SST          | HM-TEK | Total   |
| Northern          | \$104        | \$0    | \$104   |
| Yukon River       | \$335        | \$34   | \$369   |
| Kuskokwim River   | \$381        | \$135  | \$516   |
| Southwest         | \$130        | \$77   | \$207   |
| Southcentral      | \$262        | \$85   | \$347   |
| Southeast         | \$371        | \$0    | \$371   |
| Inter-regional    | \$30         | \$0    | \$30    |
| Total             | \$1,613      | \$331  | \$1,944 |

## Summary Tables

Northern Alaska stock status and trends projects funded in 2005.

| Project # | Title                                                      | Cost (\$000) |      |      |
|-----------|------------------------------------------------------------|--------------|------|------|
|           |                                                            | 2005         | 2006 | 2007 |
| 05-101    | Coho Salmon Distribution and Abundance in Unalakleet River | \$104        | \$68 | \$0  |
| Total     |                                                            | \$104        | \$68 | \$0  |

Yukon River region stock status and trends projects funded in 2005.

| Project # | Title                                   | Cost (\$000) |       |       |
|-----------|-----------------------------------------|--------------|-------|-------|
|           |                                         | 2005         | 2006  | 2007  |
| 05-203    | Coho Salmon Genetics, Yukon River       | \$22         | \$28  | \$0   |
| 05-208    | Anvik River Sonar                       | \$59         | \$59  | \$59  |
| 05-210    | Tanana River Fall Chum Salmon Abundance | \$172        | \$167 | \$162 |
| 05-211    | Henshaw Creek Weir                      | \$82         | \$79  | \$81  |
| Total     |                                         | \$335        | \$332 | \$302 |

Yukon River region harvest monitoring and traditional ecological knowledge projects funded in 2005.

| Project # | Title                                          | Cost (\$000) |      |      |
|-----------|------------------------------------------------|--------------|------|------|
|           |                                                | 2005         | 2006 | 2007 |
| 05-254    | Yukon River Inseason Salmon Harvest Assessment | \$34         | \$30 | \$30 |
| Total     |                                                | \$34         | \$30 | \$30 |

Kuskokwim River region stock status and trends projects funded in 2005.

| Project # | Title                                                         | Cost (\$000) |       |       |
|-----------|---------------------------------------------------------------|--------------|-------|-------|
|           |                                                               | 2005         | 2006  | 2007  |
| 05-301    | Whitefish PIT Tags                                            | \$40         | \$0   | \$0   |
| 05-302    | Inriver Abundance of Chinook Salmon                           | \$118        | \$346 | \$0   |
| 05-304    | George and Takotna River Weirs                                | \$72         | \$79  | \$89  |
| 05-305    | Genetic Stock ID of Chinook Salmon on Kuskokwim River         | \$106        | \$73  | \$19  |
| 05-306    | Kuskokwim Inseason Subsistence Salmon Harvest Data Collection | \$45         | \$45  | \$45  |
| Total     |                                                               | \$381        | \$543 | \$153 |

Kuskokwim River region harvest monitoring and traditional ecological knowledge projects funded in 2005.

| Project # | Title                                                | Cost (\$000) |       |      |
|-----------|------------------------------------------------------|--------------|-------|------|
|           |                                                      | 2005         | 2006  | 2007 |
| 05-353    | Nunivak Island Subsistence Fisheries                 | \$61         | \$45  | \$0  |
| 05-356    | Kuskokwim Area Postseason Subsistence Harvest Survey | \$74         | \$74  | \$74 |
| Total     |                                                      | \$135        | \$119 | \$74 |

Southwest Alaska stock status and trends projects funded in 2005.

| Project # | Title                                                                     | Cost (\$000) |       |       |
|-----------|---------------------------------------------------------------------------|--------------|-------|-------|
|           |                                                                           | 2005         | 2006  | 2007  |
| 05-402    | Lake Clark Sockeye Salmon Escapement                                      | \$44         | \$44  | \$45  |
| 05-403    | Lake Clark Whitefish Assessment                                           | \$71         | \$101 | \$62  |
| 05-405    | Perryville-Chignik Coho Salmon and Late-Run Sockeye Salmon Aerial Surveys | \$15         | \$29  | \$29  |
| Total     |                                                                           | \$130        | \$174 | \$137 |

Southwest Alaska harvest monitoring and traditional ecological knowledge projects funded in 2005.

| Project # | Title                                                            | Cost (\$000) |      |      |
|-----------|------------------------------------------------------------------|--------------|------|------|
|           |                                                                  | 2005         | 2006 | 2007 |
| 05-452    | Non-salmon Harvests and TEK in Togiak, Manokotak, and Twin Hills | \$77         | \$29 | \$0  |
| Total     |                                                                  | \$77         | \$29 | \$0  |

Southcentral Alaska stock status and trends projects funded in 2005.

| Project # | Title                                                               | Cost (\$000) |       |       |
|-----------|---------------------------------------------------------------------|--------------|-------|-------|
|           |                                                                     | 2005         | 2006  | 2007  |
| 05-501    | Spawning Distribution and Run Timing of Copper River Sockeye Salmon | \$225        | \$225 | \$225 |
| 05-502    | Abundance, Timing and Distribution of Copper River Steelhead        | \$37         | \$37  |       |
| Total     |                                                                     | \$262        | \$262 | \$225 |

Southcentral Alaska harvest monitoring and traditional ecological knowledge projects funded in 2005.

| Project # | Title                                                  | Cost (\$000) |      |      |
|-----------|--------------------------------------------------------|--------------|------|------|
|           |                                                        | 2005         | 2006 | 2007 |
| 05-553    | Changes in Subsistence Salmon Harvests on Copper River | \$85         | \$0  | \$0  |
| Total     |                                                        | \$85         | \$0  | \$0  |

Southeast Alaska stock status and trends projects funded in 2005.

| Project # | Title                                        | Cost (\$000) |       |       |
|-----------|----------------------------------------------|--------------|-------|-------|
|           |                                              | 2004         | 2005  | 2006  |
| 05-601    | Kook Lake Sockeye Salmon Assessment          | \$79         | \$80  | \$82  |
| 05-603    | Klawock Lake Sockeye Salmon Stock Assessment | \$164        | \$168 | \$0   |
| 05-604    | Prince of Wales Steelhead                    | \$128        | \$137 | \$157 |
| Total     |                                              | \$371        | \$384 | \$239 |

Alaska Inter-regional stock status and trends projects funded in 2005.

| Project # | Title                                | Cost (\$000) |      |      |
|-----------|--------------------------------------|--------------|------|------|
|           |                                      | 2005         | 2006 | 2007 |
| 05-702    | Genetic Species Markers in Whitefish | \$30         | \$30 | \$0  |
| Total     |                                      | \$30         | \$30 | \$0  |

**05-101****Estimation of Coho Salmon Abundance and Spawning Distribution in the Unalakleet River****Geographic Area:** Northern Alaska**Information Type:** Stock Status and Trends

**Principal Investigator:** Phil Joy and Audra Brase  
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 Fairbanks, AK  
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**Co-Investigator:** Mike Scott, Bureau of Land Management  
 Meryl Towarak, Native Village of Unalakleet

|              |             |             |             |
|--------------|-------------|-------------|-------------|
| <b>Cost:</b> | <b>2005</b> | <b>2006</b> | <b>2007</b> |
|              | \$103,665   | \$68,055    | \$ 0        |

**Issue**

The Unalakleet River supports the largest population of coho salmon *Oncorhynchus kisutch* in Norton Sound. This population is harvested by subsistence, commercial and recreational users. Little is known about coho salmon distribution in the Unalakleet River drainage. A counting tower is operated on North River, but coho salmon estimates from North River may not be an accurate index of total Unalakleet River escapement. Aerial surveys to count coho salmon in Unalakleet River are often ineffective due to poor weather conditions.

**Objectives**

1. Estimate the proportions of the total coho salmon escapement migrating up the mainstem Unalakleet, North, Chirokey, Old Woman, North Fork Unalakleet rivers, and into all waters designated Federal Wild and Scenic River;
2. Estimate the abundance of coho salmon escaping into the Unalakleet River drainage by proportional expansion of the North River tower count estimate;
3. Estimate the abundance of coho salmon migrating through the Federal Wild and Scenic River portion of the Unalakleet River;
4. Estimate the age, sex, and length composition of the coho salmon escapement into the Unalakleet and North rivers; and
5. Document the locations of coho salmon spawning areas throughout the Unalakleet River drainage, including the Federal Wild and Scenic River portion of the river.

## **Methods**

Two-hundred radio tags would be fitted to individual coho salmon captured using set and drift gillnets at a site approximately 5 km upstream from the mouth of the Unalakleet River. Tags would be deployed in proportion to coho salmon abundance throughout the run, from mid-July through September. Coho salmon fitted with radio tags would also be marked with an external “spaghetti” tag so they can be easily identified if recaptured. Migrating coho salmon fitted with radio tags would be tracked using four remote tracking stations: one located below the tagging site, one between the North and Chirosky rivers on the mainstem of the Unalakleet River, one at the North River counting tower site, and one above the mouth of the Chirosky River (the boundary of the Federal Wild and Scenic River portion of the Unalakleet River). Aerial tracking would be used to determine spawning locations of all radio-tagged coho salmon.

## **Partnerships/Collaboration**

This project would be performed in cooperation with Bureau of Land and Management, Alaska Department of Fish and Game’s Commercial Fisheries Division, and the Village of Unalakleet. The Bureau of Land Management would provide \$35,000 each year to purchase radio tags. This project would promote interactions and develop working relationships between stakeholders and a primary management agency. Rural residents would be introduced to potential fisheries careers by working as technicians and hosting them as high school and college interns on the project.

## 05-203

# Yukon River Coho Salmon Genetics

**Geographic Area:** Yukon River

**Information Type:** Stock Status and Trends (SST)

**Principal Investigators:** Blair Flannery, Penny Crane, Jeffery Olsen, and John Wenburg  
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Email: blair\_flannery@fws.gov

|              |             |             |
|--------------|-------------|-------------|
| <b>Cost:</b> | <b>2005</b> | <b>2006</b> |
|              | \$ 22,106   | \$ 27,814   |

### Issue

Coho salmon are an important Yukon River subsistence fishery, comprising 10% of the salmon subsistence harvest. However, little is known about the biology of the Yukon River coho salmon. With the recent decline in Yukon River chum and Chinook salmon, demand for coho will continue to rise, emphasizing the need for a better understanding of this resource. Further, the Regional Advisory Councils for the Yukon River identified the need to identify the contribution of individual or geographically similar populations of Yukon River salmon to mixed-stock fisheries. In this project, we will provide estimates of population structure and genetic diversity of coho salmon within the Yukon River to assist in conservation and management of this species; this work is a necessary precursor for future mixed-stock analysis and harvest allocation.

### Objectives

- 1) Evaluate patterns of genetic diversity within and among nine putative coho salmon populations distributed throughout the Yukon River drainage;
- 2) Provide preliminary estimates of the power of genetic data for use in various mixed-stock analyses (MSA) of Yukon River coho salmon.

### Methods

The population structure and genetic diversity for Yukon River coho salmon will be evaluated using samples collected from the following locations: Archuelinguk, Andreafsky, Anvik, Kaltag, Kantishna, Nenana-Otter Creek, Nenana-17 mile slough, Delta Clearwater, and Fishing Branch. These samples will be assayed for genetic variation at 9 microsatellite loci currently in use for coho salmon research. The data will be tested to determine if sufficient variation exists for mixed-stock analysis applications.

### **Partnerships/Collaboration**

In this project, we will work closely with YRDFA, BSFA, ADF&G, and USGS. In addition, we intend to hire Howard Beans from Mountain Village to sample coho salmon from the Archuelinguk.

## 05-208

# Anvik River Sonar Project

**Geographic Area:** Yukon River

**Information Type:** Stock Status and Trends (SST)

**Principal Investigators:** Carl T. Pfisterer  
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 Email: carl\_pfisterer@fishgame.state.ak.us

**Co-Investigators:** Roger Dunbar  
 ADFG

|              |             |             |             |
|--------------|-------------|-------------|-------------|
| <b>Cost:</b> | <b>2004</b> | <b>2005</b> | <b>2006</b> |
|              | \$ 58,589   | \$ 58,589   | \$ 58,744   |

### Issue

This project addresses Stock Status and Trends concerns by continuing to monitor summer chum escapement to one of the most important and longest running (began in 1979) summer chum salmon project in the Yukon River. Because of its longevity, this project has been important in setting escapement goals for managing summer chum salmon stocks in the Yukon River drainage. In a larger context, continuation of the Anvik River sonar project will enhance comprehensive research efforts examining this mixed stock fishery and the relative contributions from various tributaries of the Yukon River.

### Objectives

The purpose of this project is to monitor escapement of summer chum salmon to the Anvik River and to assess age and sex composition of the escapement. The two primary objectives of this project are to:

1. Estimate daily summer chum salmon escapement passing the Anvik River sonar site during the target operation dates of June 20 through about July 25.
2. Estimate age and sex composition of the summer chum salmon spawning escapements by collecting samples from 152 summer chum during each of 4 stratum throughout the summer.

## **Methods**

Split-beam sonar data will be collected 24-hours per day, 7 days a week for the duration of the study. Data will be collected for thirty minutes, alternating between each bank providing a total of 12 hours of data per day per bank. Counts will be expanded for the fraction of the day sampled to estimate daily passage.

The number of scales required for age-sex-length sampling this season are based on obtaining 152 summer chum salmon for each of the following time strata: June 17-30; July 1-7; July 8-14; and July 15-30. A sample size of 450 fish per stratum is needed for Chinook salmon assuming three major age classes with minor ages pooled and a 14% unageable rate when 3 scales per fish are collected, though attaining this number of samples is not a goal of the beach seining activities associated with the sonar project. Chinook salmon samples are collected during carcass sampling activities immediately after the sonar program terminates.

## **Partnerships/Collaboration**

Daily passage estimates will be shared at with other agencies and organizations at weekly Yukon River Drainage Fisherman's Association meetings and used in making management decisions.

**05-210**

## Estimation of Tanana River Fall Chum Salmon Abundance Using Mark-Recapture Techniques

**Geographic Area:** Yukon River

**Information Type:** Stock Status and Trends (SST)

**Principal Investigators:** Bonnie Borba and Pete Cleary  
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**Co-Investigators:** Hollis Twitchell, Gates of the Arctic National Park and Preserve  
 Karen Gillis, Bering Sea Fishers's Association  
 Jill Klein, Yukon River Drainage Fisheries Association

|              |             |             |             |
|--------------|-------------|-------------|-------------|
| <b>Cost:</b> | <b>2005</b> | <b>2006</b> | <b>2007</b> |
|              | \$172,073   | \$167,062   | \$162,311   |

### Issue

There is a need to document the abundance and run timing of fall chum salmon within the Tanana River in the upper Yukon River area. This data gap was identified and the initial tagging project began in 1995 for the Tanana River. The addition of the Tanana River abundance project represents a significant improvement in data that was used for in-season assessment, total run reconstructions, and establishment of Biological Escapement Goals for larger drainages. Severe declines in Yukon River drainage fall chum salmon runs have resulted in restrictions and closures in attempts to provide for escapement and the first priority use of subsistence harvest. The Tanana River stocks represent greater than 30 percent of the Yukon River fall chum salmon. However, fall chum salmon bound for the Tanana River pass through mixed stock fisheries along the migration route. The estimates of fall chum salmon in the Tanana River in combination with upper main stem Yukon River project provide a check to the estimates provided by Pilot Station sonar and the information is used for in-season fishery management as well as reconstruction the run post season.

### Objectives

1. Estimate abundance *in-season* of fall chum salmon in Upper Tanana and Kantishna River drainages with relative precision (coefficient of variation) of 30%.
2. Estimate stock timing of fall chum salmon in Upper Tanana and Kantishna Rivers and migration rates between capture and recapture sites.

3. Estimate the total abundance of fall chum salmon in Upper Tanana and Kantishna River drainages with relative precision (coefficient of variation) of 20%.
4. Provide managers an assessment of total run based on in-season abundance estimates.

## **Methods**

Alaska Department of Fish and Game (ADF&G), Bering Sea Fishers's Association (BSFA), Yukon River Drainage Fisheries Association (YRDFA) and National Park Service (NPS) propose to provide abundance estimates of fall chum salmon utilizing mark-recapture techniques. Chum salmon will be captured in fish wheels equipped with live boxes, tagged with spaghetti (Floy) tags and released from one site in each of the Tanana and Kantishna Rivers. The tagged chum salmon are subsequently recaptured in tag recovery fish wheels located 76 km upstream on the Tanana River, 113 km upstream on the Toklat River and 139 km upstream on the Upper Kantishna River. Data is relayed to Fairbanks ADF&G office daily during operations from August 15 to September 30. The in-season abundance estimates are typically based on the Bailey model with associated 95% confidence bound.

## **Partnerships/Collaboration**

Operations and maintenance of fish wheels used in the mark-recapture are contracted to four local fishers. The state contracts the Tanana tagging and the Nenana recovery fish wheels since 1995. BSFA funds the Kantishna tagging fish wheel (1999 to present), NPS funds the Upper Kantishna recovery fish wheels (2000 to present), and YRDFA will provide a technician to assist in tagging salmon (2005 to 2007). Freight is barged to the ADF&G camp with the assistance of a local resident in Nenana annually. United States Fish and Wildlife Service assists with technical support for video monitoring at one site.

**05-211**

## **Abundance and Run Timing of Adult Salmon in Henshaw Creek, Kanuti National Wildlife Refuge, Alaska**

**Geographic Area:** Yukon River

**Information Type:** Stock Status and Trends (SST)

**Principal Investigators:** Jeff Adams

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**Co-Investigators:** Kimberly Elkin, Tanana Chiefs Conference, Inc.

|              |             |             |             |
|--------------|-------------|-------------|-------------|
| <b>Cost:</b> | <b>2005</b> | <b>2006</b> | <b>2007</b> |
|              | \$ 82,107   | \$ 78,500   | \$ 80,597   |

### **Issue**

Declines in run sizes of Yukon River salmon, especially Chinook *Oncorhynchus tshawytscha* and chum *O. keta* salmon have resulted in subsistence fishing restrictions and, in some cases, users not meeting their subsistence needs. To manage these stocks in-season, managers need information from throughout the drainage. This project provides in-season information to federal and state managers as an indicator for Koyukuk River salmon stocks.

### **Objectives**

- (1) Determine daily escapement and run timing of adult salmon;
- (2) Estimate the age, sex and length composition of adult salmon;
- (3) Determine the number of resident fish passing the weir;
- 4) Serve as a training platform for Tanana Chiefs Conference, Inc. (TCC) Natural Resource Program and its FIS Partners program fisheries biologist.

### **Methods**

Investigators will install a resistance board weir across Henshaw Creek 1.5 km upstream from its mouth. The weir, live trap, and passing chute will allow investigators to count fish (by species) as they pass through the live trap. Fish sampling will include measuring length (MEL), determining

sex, collecting scales, and examining fish for floy and radio tags and secondary marks. TCC and FFWFO will partner to incorporate TCC into weir operation including pre- and post-season coordination and planning. TCC will be fully engaged through this funding cycle so that it will be fully capable of administering and conducting all aspects of weir operation after 2007.

### **Partnership/Collaboration**

The FFWFO has worked with TCC to strengthen the capacity building component of this project. Consultation has occurred with Mr. Mike Smith, TCC, Wildlife and Parks, to develop the proposed approach and the integration of TCC in the project and the future of assumption of operations by TCC. The FFWFO staff has established a positive rapport with villages, hired local residents, participated in YRDFA meetings and seminars, and utilized the Kanuti National Wildlife Refuge for local logistical support.

## 05-254

# Yukon River In-season Salmon Harvest Assessment

**Geographic Area:** Yukon River

**Information Type:** Harvest Monitoring and Traditional Ecological Knowledge (HM/TEK)

**Principal Investigators:** Russ Holder and Jonathon Gerken  
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**Co-Investigators:** Geoff Beyersdorf, Koyukuk/Nowitna NWR Complex  
 Jill Klein, Yukon River Drainage Fisheries Association

|              |             |             |             |
|--------------|-------------|-------------|-------------|
| <b>Cost:</b> | <b>2005</b> | <b>2006</b> | <b>2007</b> |
|              | \$ 34,000   | \$ 30,000   | \$ 30,000   |

### Issue

Timely subsistence salmon harvest information is needed for in-season fishery management by state and federal fishery managers on the Yukon River. Two key partners, Alaska Department of Fish and Game (ADF&G) and YRDLFA, plus the Federal Regional Advisory Councils, have requested assistance from the U.S. Fish and Wildlife Service (USFWS) in obtaining timely qualitative in-season salmon harvest information from rural villages. By conducting in-season salmon harvest surveys there is direct link from subsistence user to managers allowing managers to assess whether subsistence harvests in villages along the Yukon River are consistent with managers perception of the salmon run. These surveys are weekly face to face meetings with local fishers conducted by local technicians that have been hired by nongovernment, tribal, or agency personnel. When fisheries managers know how people are progressing toward meeting their subsistence needs they have more information with which to adjust subsistence schedules, provide for commercial openings, and adjust for liberalization of the fishing schedule.

### Objectives

(Local surveyors *at this time* are primarily RITs with some tribal organization representation. Long term objective is to potentially turn in-season salmon surveys over to tribal organizations).

1. Increase involvement and participation of tribal organizations in initiating in-season harvest assessment surveys.
2. Involve local people in fisheries management by having them collect and share information used for in-season fishery management decisions.

3. Train local villagers on in-season salmon harvest survey techniques.
4. Local surveyors weekly will collect qualitative in-season subsistence salmon harvest data in a standardized format from active fishing households.
5. Summarize weekly survey data and provide it to state and federal managers *prior* to the weekly YRDFA teleconferences so it can be used when making management decisions.
6. Local surveyors will present survey summaries and receive information on the YRDFA teleconferences.
7. Broadcast weekly YRDFA teleconference summaries via the local Galena public radio station to keep resource users in the Middle Yukon informed of management decisions.
8. Opportunistically collect age, sex, and length samples from Chinook and chum salmon in coordination with and support of ADF&G.

## **Methods**

The USFWS and YRDFA propose to collect weekly qualitative in-season subsistence salmon harvest data from active fishing households in Emmonak, Holy Cross, Nulato, Huslia, Galena, and Beaver specific to Chinook, summer chum, fall chum, and coho salmon. USFWS RITs and Emmonak/Louden Tribal council local hire surveyors will conduct interviews on participating fishing households between June and September. Sampling for age, sex, and length information will occur opportunistically with subsistence surveys.

## **Partnerships/Collaboration**

This proposal is a collaborative effort between YRDFA, the Emmonak and Loudon Tribal Council, Fairbanks Fish and Wildlife Field Office, and several National Wildlife Refuges. The local hire emphasis will promote involvement of local resource users as active participants of the federal and state in-season fisheries management decision process. Local hiring may also help identify individuals interested in the natural resources and help them decide if they have an interest for further study and career selection. A long-term vision for this pilot project is that it could be managed by the USFWS Partner participants (CATG, AVCP, TCC, and/or local tribal organizations) and allow local administration of harvest assessment. Conducting these surveys and using them in management decisions establishes communication and promotes interaction between subsistence users, tribes, organizations, communities, and agencies.

**05-301****Using PIT Tags to Monitor Movements of Kuskokwim River Whitefish.****Geographic Area:** Kuskokwim River**Information Type:** Stock Status and Trends

**Principal Investigator:** Ken Harper  
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**Co-Investigator:** David Cannon, Kuskokwim Native Association

|              |             |             |             |
|--------------|-------------|-------------|-------------|
| <b>Cost:</b> | <b>2005</b> | <b>2006</b> | <b>2007</b> |
|              | \$ 95,000   | \$ 0        | \$ 0        |

**Issue**

This proposed project evaluates using PIT (Passive Interrogator Transponder) tag technology to gather information on the distribution, movement, abundance and life history of whitefish in the Kuskokwim River drainage. Whitefish are an important subsistence resource in the Kuskokwim River drainage, yet little is known about the status and life history of the stocks. Information on movement patterns from brackish water rearing areas to upstream subsistence harvest areas such as Whitefish Lake and other large tundra lakes is unknown. This proposed project will develop techniques to use this technology to gather information needed to fill the existing data gap. PIT tag interrogation technology has been found to be more appropriate than radio telemetry as a monitoring tool for some fish populations and life history stages. PIT tags are less invasive to implant, less expensive and last longer (indefinitely) than radio tags allowing long term monitoring of individual fish. The use of this technology will improve our knowledge of whitefish movements in the Kuskokwim River. These data will be used by fishery managers and subsistence users to formulate actions required to maintain or rebuild these populations.

**Objectives**

- 1) Evaluate capture techniques including mobile Merwin nets, tangle nets, and gill nets to capture live whitefish in multiple habitats.
- 2) Evaluate PIT tag use in whitefish.

- 3) Develop and evaluate pit tag interrogator systems for use at the outlet of Whitefish Lake and on the Middle Kuskokwim River salmon mark and recapture fish wheels near Kalskag.

## **Methods**

The Kenai FWFO and Kuskokwim Native Association propose to evaluate the use of PIT tags to monitor movements of Whitefish in the Kuskokwim River drainage. The first year of the project will consist of evaluating capture methods for obtaining large samples of whitefish from multiple habitats including Whitefish Lake, other lakes and riverine systems. Efficient methods and means to implant PIT tags in whitefish will be evaluated, coupled with tag retention and fish survival. PIT tag reader antennas will be constructed and tested in Kenai and shipped to Whitefish Lake. Antennas and antenna placements will be tested for detection efficiency at the outlet of Whitefish Lake. In addition we will use an existing sampling platform, the Middle Kuskokwim River fish wheels operated by ADF&G located near Kalskag to test detection efficiencies.

## **Partnerships/Collaboration**

The U.S. Fish and Wildlife Service and the Kuskokwim Native Association (KNA) have been cooperatively conducting the Whitefish Lake study for the past three years. KNA has shown a keen interest in learning more about whitefish since local fishers have been concerned about the loss of broad whitefish from their traditional Whitefish Lake harvest area. Consultations have been ongoing with ADF&G about installing the PIT tag readers on the Kalskag and Birch Tree fish wheels.

**05-302****Inriver Abundance of Chinook Salmon in the Kuskokwim River, 2005-2006****Geographic Area:** Kuskokwim River**Information Type:** Stock Status and Trends

**Principal Investigator:** Lisa Stuby  
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**Co-Investigator:** Audra Brase  
 ADFG, Division of Sport Fish

|              |                          |                        |
|--------------|--------------------------|------------------------|
| <b>Cost:</b> | <b>2005</b>              | <b>2006</b>            |
|              | \$349,000 <sup>a,b</sup> | \$346,211 <sup>b</sup> |

**Issue**

The amount of information provided from current Kuskokwim River escapement monitoring and run assessment projects provide limited information to manage the Chinook salmon runs for sustained yield. An estimate of total inriver Chinook salmon abundance is needed to evaluate harvest strategies and effectively manage the Kuskokwim River fisheries to ensure subsistence needs are met.

**Objectives**

1. Estimate the abundance of Chinook salmon in the Kuskokwim River for all waters upstream of Kalskag; and,
2. Estimate age, sex, and length compositions of Chinook salmon in the Kuskokwim River upstream of Kalskag.
3. Estimate the abundance of Chinook salmon escaping into the Holitna River drainage by proportional expansion of the Kogruklu River weir count.

<sup>a</sup> Budget for 2005 does not include \$231.4 from the Holitna River study (FIS 04-306) that could be redirected to this project (see cover letter). If included, costs for 2005 would be reduced to \$117.6 K.

<sup>b</sup> Costs for 2005 and 2006 include funds for personnel from this project to independently operate fish wheels near Kalskag. These costs may be reduced if the current mark-recapture study performed by Commercial Fisheries Division continues through 2006 (see cover letter).

4. Document Chinook salmon spawning locations within the Kuskokwim River drainage.

## **Methods**

This study will estimate the inriver abundance of Chinook salmon on the Kuskokwim River upstream of Kalskag using mark-recapture techniques. In this type of mark-recapture experiment there are two events: 1) the marking event, when fish are captured and tagged; and 2) the recapture event, when fish are sampled again to identify the ratio of tagged to untagged fish. During the marking event of this study, Chinook salmon will be captured using large-mesh drift gillnets and fish wheels at sites near Kalskag. Approximately 500 Chinook salmon will be radio-tagged (marked) with electronic transmitters. Radio-tagged fish will be secondarily marked with an external plastic “spaghetti” tag to facilitate identification of the radio-tagged fish. The tagged Chinook salmon will be tracked by a series of stationary radio-tracking stations positioned on various tributaries and along the mainstem river. Radio-tagged fish will also be located through aerial-tracking surveys of the drainage. The recapture portion of this study will be made up of Chinook salmon passing through the weirs on the George, Kogrukluuk, Tatlawiksuk, and Takotna rivers. All migrating Chinook salmon (marked and unmarked) will be counted through the weirs by ADF&G and Kuskokwim Native Association (KNA) staff. Radio-tagged fish migrating through the weirs will be identified from tracking stations positioned at each weir. A sample of the Chinook salmon passing through each weir will be sampled for age, sex, and length data to aid in performing statistical analyses. After all data is collected, it will be edited for accuracy and statistical tests will be performed to accomplish project objectives.

## **Partnerships/Collaboration**

The proposed study will be performed in cooperation with the KNA and ADF&G Commercial Fisheries Division. This project directly promotes interaction between KNA and ADF&G and supports a positive working relationship between a major user group and the primary management agency on the Kuskokwim River. To expose more rural residents to the career field of fisheries biology; a local resident will be hired as a fisheries technician and the project will host local high school and college interns throughout the season.

**05-304****George and Takotna River Weirs****Geographic Area:** Kuskokwim River**Information Type:** Stock Status and Trends

**Principal Investigator:** Douglas B. Molyneaux  
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**Co-Investigators:** Sara Gilk and Rob Stewart  
 ADFG, Division of Commercial Fisheries

|              |             |             |             |
|--------------|-------------|-------------|-------------|
| <b>Cost:</b> | <b>2005</b> | <b>2006</b> | <b>2007</b> |
|              | \$ 71,979   | \$ 78,973   | \$ 89,257   |

**Issue**

Salmon populations of the George and Takotna Rivers contribute to subsistence fisheries within the Yukon Delta National Wildlife Refuge. Weak runs in recent years have resulted in the classification of Kuskokwim River Chinook and chum salmon as Stocks of Concern by the Alaska Board of Fisheries. George and Takotna River weirs are part of an array of projects developed in recent years to monitor the distribution, abundance, and quality of salmon escapements in the Kuskokwim River drainage. Information collected at these weirs is used for in-season management of Kuskokwim River subsistence, commercial, and sport fisheries. Development of Donlin Creek mine is expected to intensify subsistence and recreational use of George River salmon populations. Takotna River weir is the only weir project in the upper Kuskokwim River area used for assessing escapement of these genetically distinct salmon stocks.

**Objectives**

1. Determine daily and total annual escapements of Chinook, chum, and coho salmon to the Takotna River upstream of the community of Takotna during the target operational period of 24 June to 20 September.
2. Determine daily and total annual escapements of Chinook, chum, and coho salmon to the George River during the target operational period of 15 June to 20 September.
3. Estimate age-sex-length (ASL) composition of total Chinook and chum salmon escapements to Takotna and George Rivers from a minimum of three pulse samples collected from each third of the run, such that simultaneous 95% confidence intervals of age composition in each pulse are no wider than 0.20 ( $\alpha = 0.05$  and  $d = 0.10$ );

4. Estimate age-sex-length (ASL) composition of total coho salmon escapements to Takotna and George Rivers from a minimum of three pulse samples collected from each third of the run, such that simultaneous 95% confidence intervals of age composition in the total annual escapements are no wider than 0.20 ( $\alpha = 0.05$  and  $d = 0.10$ );
5. Serve as platform to collect data for related fisheries projects

## **Methods**

Resistance-board fish weirs will be operated on the George and Takotna Rivers to monitor salmon escapement into spawning grounds upstream. A live trap, incorporated into each weir will allow crews to collect age, sex, and length samples from migrating salmon, and recover tag data in support of *Kuskokwim River Salmon Mark/Recapture Project*. Provisions will also be made to allow for boat passage over the weir and for safe downstream passage of fish. Local technicians hired by Kuskokwim Native Association (KNA) and Takotna Tribal Council (TTC) will operate the weirs along with ADF&G/CF biologists and technicians funded under this proposal.

## **Partnership/Collaboration**

Both the George and the Takotna River weirs are established cooperative projects involving ADF&G/CF, KNA and TTC.

**05-305**

## Genetic Stock Identification of Kuskokwim River Chinook Salmon

**Geographic Area:** Kuskokwim River

**Information Type:** Stock Status and Trends

**Principal Investigators:** William Templin, Christian Smith, Doug Molyneaux and Lisa Seeb  
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|              |             |             |             |
|--------------|-------------|-------------|-------------|
| <b>Cost:</b> | <b>2005</b> | <b>2006</b> | <b>2007</b> |
|              | \$105,952   | \$ 73,151   | \$ 18,663   |

### Issue

Kuskokwim River Chinook salmon have been identified as a “stock of concern” due to the chronic inability to maintain expected harvest above escapement needs despite the use of specific management and conservation measures. However the efficacy of these measures is uncertain without knowing the harvest of Kuskokwim River stocks in subsistence and commercial fisheries in the entire Kuskokwim Management Area (KMA). Previous investigation of the genetic population structure of Chinook salmon within the KMA, using three different types of genetic markers found patterns of population divergence and identified at least four groups: 1) Goodnews/Kanektok, 2) Lower Kuskokwim (from the Eek River upstream to the Hoholtna River), 3) Middle Kuskokwim (the Stony, Cheeneetnuk and Tatlawiksuk rivers), and 4) Upper Kuskokwim (the Takotna River and Pitka Fork). Genetic stock identification methods can provide information concerning the origins of fish harvested in the KMA; critically important information for an effective, sustainable management program. The existing baseline of genetic markers provides adequate coverage of the spawning aggregates within the Kuskokwim River, but only moderate coverage of the populations outside of the river. We propose to refine our analyses by increasing sample sizes and geographic coverage of the genetic baseline and to begin mixed stock identification applications in KMA fisheries.

### Objectives

1. To increase sample sizes and expand collections of Chinook salmon in the KMA.
2. To expand the set of genetic loci to include additional microsatellite and SNP (single nucleotide polymorphism) markers.
3. To analyze the genetic population structure and refine mixed stock analysis.

4. To conduct a pilot study of salmon harvested in mixed stock fisheries, specifically the Bethel test fishery, the subsistence fishery in the Bethel area and the W-4 commercial fishery.

## **Methods**

Baseline tissue sampling will partner with existing projects in the KMA to collect samples. Chinook salmon will be sampled at weirs on the Takotna, Tatlawiksuk, Kogruklu, George, Tuluksak, Kwethluk, Kanektok and Goodnews rivers. Sampling from radio-tagged Chinook salmon will provide additional baseline samples from locations that do not have weirs. In addition, samples will be taken by subsistence fishers on the Little Tonzona, Eek, and Kisaralik rivers, and on Pitka's Fork, by volunteers on the Arolik River, and by sport fishers on the mainstem Goodnews River. Target sample sizes are set to provide baseline sample sizes of 200 individuals when combined with previously collected samples. Approximately 15 of the most information microsatellite loci developed for the Yukon River and the Pacific Salmon Commission coastwide baseline will be surveyed as well as additional SNP loci developed by ADF&G. Population structure will be investigated using standard population genetics techniques, and mixture analyses will be refined through simulation. Mixture samples will be collected from the Bethel Test Fishery, the Bethel subsistence fishery, and the District W-4 commercial fishery to estimate region of origin.

## **Partnerships/Collaborations**

Samples will be taken at weirs in the KMA in cooperation with the following government and local organizations: ADF&G, Kuskokwim Native Association, Native Village of Kwinhagak, Organized Village of Kwethluk, Orutsaramuit Native Council, Takotna Tribal Council, Tuluksak Tribal Council, and USFWS. Chinook salmon will be sampled from subsistence harvest on the Little Tonzona, Eek, and Kisaralik rivers and the Pitka Fork of the Salmon River. The Arolik River will be sampled by Willard Church (Native Village of Kwinhagak) and the mainstem of the Goodnews River will be sampled by area sportfish guides. Chinook salmon will be sampled as part of the radio telemetry tagging projects and fisheries technicians from ADF&G and ONC will sample the Bethel test fishery. The college intern/technician position in the ADF&G Gene Conservation Laboratory will continue in coordination with KNA.

**05-306**

## Kuskokwim River In-season Subsistence Salmon Harvest Data Collection Continuation

**Geographic Area:** Kuskokwim River

**Information Type:** Stock Status and Trends

**Principal Investigator:** Douglas B. Molyneaux,  
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**Co-Investigators:** Greg Roczicka  
Orutsararmuit Native Council  
Tracie Krauthoefer  
ADFG, Subsistence Division  
David L. Folletti  
ADFG, Division of Commercial Fisheries

|              |             |             |             |
|--------------|-------------|-------------|-------------|
| <b>Cost:</b> | <b>2005</b> | <b>2006</b> | <b>2007</b> |
|              | \$ 73,079   | \$ 79,177   | \$ 88,017   |

### Issue

The *Kuskokwim River In-season Subsistence Salmon Harvest Data Collection* project has two components:

1. In-season interviews with subsistence salmon fishers to assess their progress towards achieving harvest needs; and
2. Collection of biological information from subsistence caught Chinook salmon to characterize the unique age, sex and length (ASL) composition of the subsistence harvest, which is a specific subset of the total Chinook salmon run to the Kuskokwim River.

Fishery managers will use the in-season subsistence salmon harvest data when assessing stock status and making in-season management decisions concerning the commercial and subsistence fisheries. The age sex and length (ASL) composition of the subsistence Chinook harvest is a

unique subset of the ASL composition of the Chinook salmon run, which differs from the ASL compositions of the escapement due to the selectivity of the harvest methods.

## **Objectives**

1. Conduct weekly interviews with Bethel Area subsistence salmon fishers in June, July and early August to determine the adequacy and quality of the harvest.
2. Characterize the annual ASL composition of Chinook salmon in the Kuskokwim River subsistence harvest.
3. Characterize and compare the annual ASL composition of Chinook salmon in the Kuskokwim River subsistence harvest by geographic area (lower, middle and upper Kuskokwim River).
4. Characterize the annual ASL composition of Chinook salmon in the Kuskokwim River subsistence harvest by gear type (e.g., gillnets with mesh of 6 inches or smaller, gillnets with mesh between 6 and 8 inches, gillnets with mesh of 8 inches or larger, rod and reel, fishwheel).
5. Characterize and compare the annual ASL composition of Chinook salmon in the lower Kuskokwim River subsistence harvest by temporal strata (i.e., fish harvested for the early, middle and late portions of the run).

## **Methods**

Orutsararmuit Native Council (ONC) will hire two fisheries technicians in consultation with Alaska Department of Fish and Game (ADF&G) staff to conduct weekly in-season interviews with subsistence fishers in the Bethel Area. The information will be used along with other information to guide in-season management decisions.

In addition, the ONC technicians and ADF&G staff will recruit subsistence fishers from throughout the Kuskokwim River drainage to collect ASL data from their subsistence harvest of Chinook salmon. The data will be used to estimate the ASL composition of the Chinook salmon harvest of the Kuskokwim River subsistence fishery.

## **Partnerships/Collaboration**

This project is a collaborative effort between ONC, ADF&G/CF, ADF&G/SD.

**05-353**

## Nunivak Island Subsistence Cod, Red Salmon and Grayling Fisheries – Past and Present

**Geographic Area:** Kuskokwim River

**Information Type:** Harvest Monitoring and Traditional Ecological Knowledge

**Principal Investigator:** Robert M. Drozda  
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**Co-Investigator:** Howard T. Amos  
Nuniwarmiut Piciryarata Tamaryalkuti, Inc.

|              |             |             |             |
|--------------|-------------|-------------|-------------|
| <b>Cost:</b> | <b>2005</b> | <b>2006</b> | <b>2007</b> |
|              | \$ 61,000   | \$ 45,000   | \$ 0        |

### Issue

Information on the traditional and customary use of Pacific cod, red salmon and Arctic grayling by Nunivak Islanders as well as availability and locations of these subsistence resources is poorly documented. The Yukon-Kuskokwim Regional Advisory Council has identified long term trends and sources of variation of important subsistence species as an information need. This project addresses these concerns and will provide baseline data for comparative future studies.

### Objectives

1. Accurately record and map 11 traditional cod fishing areas.
2. Survey fish campers regarding codfish catch at various locations.
3. Survey commercial halibut fishers who use the Mekoryuk fish plant regarding cod by-catch.
4. Conduct literature/internet search relevant to Nunivak Pacific cod, red salmon and grayling.
5. Review Nunivak oral history records, develop context for cod, grayling and red salmon.
6. Identify archives and museums with holdings relevant to Nunivak Island.

7. Conduct interviews and/or surveys with key informants on the historic and contemporary use of the Pacific cod, red salmon and grayling subsistence economy of Nunivak Island.
8. Write a narrative report including a comprehensive bibliography.
9. Publish results and report project design and progress on NPT, Inc website ([www.nunivak.org](http://www.nunivak.org)).
10. Prepare draft text for local school natural/cultural resource curriculum.

## **Methods**

Conduct background research using standard library, archival and internet search procedures. Develop survey questionnaire in consultation with subsistence specialists and fisheries biologists. Survey fishers at fish camps and Mekoryuk processing plant. Travel by boat to fishing locations and document sites with GPS and depthfinder. We will partner with the UAF Kuskokwim Campus, NIMA Corporation and USFWS Yukon Delta Refuge at the Ellikarmiut (Nash Harbor) Science camp in developing research that is useful to students and scientists in successive years.

## **Partnerships/Collaboration**

This project will proceed with the endorsement of the Native Village Mekoryuk IRA Council. Interviews and/or surveys will be conducted by local residents and shared with community members. Results of the study will be distributed to the University of Alaska Rasmuson Library for public access and via the world wide web. Work will be conducted in conjunction with ongoing village based cultural, natural history and Native language preservation projects and will partner with University of Alaska Kuskokwim Campus, Lower Kuskokwim School District, NIMA Village Corporation, and commercial fishery corporations operating in the Bering Sea.

**05-356**

## **Kuskokwim Area Post-Season Subsistence Salmon Harvest Surveys, 2005-2007**

**Geographic Area:** Kuskokwim River

**Information Type:** Harvest Monitoring and Traditional Ecological Knowledge

**Principal Investigator:** Tracie Krauthoefer  
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**Co-Investigators:** Greg Roczicka  
 Orutsararmuit Native Council  
 Dwayne Hoffman  
 Kuskokwim Native Association, Aniak

|              |             |             |             |
|--------------|-------------|-------------|-------------|
| <b>Cost:</b> | <b>2005</b> | <b>2006</b> | <b>2007</b> |
|              | \$ 74,206   | \$ 74,206   | \$ 74,316   |

### **Issue**

This project will continue the annual subsistence salmon harvest surveys in the Kuskokwim Fisheries Management Area for the year 2005, 2006, and 2007.

### **Objectives**

1. Determine the total number of households in the Kuskokwim Fisheries Management Area and identify the number of households that harvested salmon as well as the number of households that did not harvest salmon for subsistence use. Update the community household lists and mail households salmon harvest calendars the following season.
2. Estimate the total number of Chinook, sockeye, chum, and sockeye salmon harvested for subsistence use by residents in communities throughout the Kuskokwim Area and also non-salmon species harvested by residents of Aniak and Bethel
3. Identify the types of fishing gear used by residents and collect qualitative information that will be helpful in identifying how fishers characterize subsistence fishing success for the 2004 season.

## **Methods**

Methods used for carrying out this work will follow procedures established by the ADFG/SD to conduct subsistence fish harvest surveys in the Kuskokwim Area during 2002 and 2003. Currently ADF&G is working to revise methods, to move from a census to a stratified sample design. A new operational plan will be written and submitted to FIS when the revision is complete.

## **Partnerships/Collaboration**

The ADFG/SD, KNA and ONC have cooperated to successfully complete this project during 2002 and 2003 and are accustomed to working together to collect subsistence fisheries information using the methods described in this investigation plan. This project continues the joint efforts to collaborate to collect critical subsistence fisheries information and encourages ongoing involvement by local tribal entities.

**05-402**

## Lake Clark Sockeye Salmon Escapement and Population Monitoring

**Geographic Area:** Southwest – Bristol Bay area

**Information Type:** Stock Status and Trends (SST)

**Principal Investigator:** Dan Young  
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**Co-Investigators:** Mary McBurney, National Park Service  
 Dr. Carol Ann Woody, U.S. Geological Survey

|              |             |             |             |
|--------------|-------------|-------------|-------------|
| <b>Cost:</b> | <b>2005</b> | <b>2006</b> | <b>2007</b> |
|              | \$ 44,042   | \$ 44,502   | \$ 44,968   |

### Issue

Continued decline in the number of sockeye salmon returning to the Kvichak River is a priority concern to subsistence fishers, the National Park Service and the Alaska Department of Fish and Game. Sockeye salmon bound for Lake Clark comprise 7 to 30% of the total Kvichak River escapement and provide the communities of Newhalen, Iliamna, Nondalton, and Port Alsworth with up to 75% of their total subsistence needs. This project will provide information on daily and annual Lake Clark escapements, return time, age structure, and size composition, all of which will aid in construction of brood tables and trend analysis. This information is needed to define the relationship between Kvichak and Lake Clark sockeye salmon stocks as well as for in- and post-season management decisions.

### Objectives

1. Estimate sockeye salmon escapement to Lake Clark.
2. Determine age and size structure of the Lake Clark escapement.

### Methods

Sockeye salmon will be counted and sampled as they ascend the Newhalen River. Standard Alaska Department of Fish and Game counting tower protocols will be used to enumerate fish. Age and size data will be collected from sockeye salmon in collaboration with the communities of Newhalen-Iliamna and Nondalton. Locally hired technicians, trained through the National

Park Service-University of Alaska Fairbanks Biotechnician Training Program, will lead or assist salmon escapement and sampling efforts.

### **Partnerships/Collaboration**

This project has an established history of partnerships and capacity building. U.S. Geological Survey has successfully administered projects 01-095 (Population monitoring of sockeye salmon from Lake Clark and the Tazimina River) and 00-042 (Population Assessment of Lake Clark Sockeye Salmon) in collaboration with the Kijik Corporation, Nondalton Tribal Council and villagers, Iliamna-Newhalen villagers, and the Universities of Alaska, Montana, and Washington. Local youths have been trained as technicians and future project leaders through an intern program initiated in 2000.

**05-403**

## **Distribution, Seasonal Movement, and Life History of Humpback Whitefish in the Lake Clark Watershed**

**Geographic Area:** Southwest – Bristol Bay area

**Information Type:** Stock Status and Trends (SST)

**Principal Investigators:** Julie Meka, Carol Ann Woody  
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**Co-Investigators:** Dan Young, National Park Service  
 John Chythlook, Bristol Bay Native Association

|              |             |             |             |
|--------------|-------------|-------------|-------------|
| <b>Cost:</b> | <b>2005</b> | <b>2006</b> | <b>2007</b> |
|              | \$ 71,006   | \$100,969   | \$ 62,100   |

### **Issue**

Study of Lake Clark whitefish populations was listed as an important issue for the 2005 Fisheries Resource Monitoring Program. Both subsistence fishers and resource managers are concerned about whitefish population health. Local residents reported a decline in whitefish harvests during fall subsistence gill-net fisheries in the Lake Clark-Lake Iliamna region, and voiced concerns to the Bristol Bay Native Association and Regional Advisory Council. Humpback whitefish *Coregonus pidschian* are the primary harvest target and are typically captured using gill nets in spring and fall. Continued declines in sockeye salmon abundance in the region may have affected whitefish populations by reducing nutrient inputs from salmon carcasses, and increasing subsistence harvest pressure. Lack of basic biological information on whitefish populations in Lake Clark National Park prevents development of sustainable harvest guidelines.

### **Objectives**

1. Determine basic life history characteristics of Lake Clark National Park humpback whitefish populations including age and size, age at maturity, fecundity, and anadromy.
2. Determine seasonal migration patterns and habitat use of Lake Clark National Park humpback whitefish populations.

### **Methods**

Whitefish will be captured during the summers of 2005 and 2006 using seines, and during fall subsistence fisheries using gill-nets. Age, sex, size, and fecundity data will be collected from samples of whitefish captured at various locations. Otoliths will be collected from subsistence-caught whitefish for aging and microchemistry analysis to detect anadromy. About 80 whitefish

captured during the summer of 2006 will be fitted with a radio tag and tracked, using shore-based stationary as well as boat- and aerial-based mobile receivers, through late fall of 2007. Tracking data will be used to identify spawning, feeding, and overwintering habitats. Methods and findings should be transferable to whitefish populations in other Bristol Bay systems.

### **Partnerships/Collaboration**

This project addresses subsistence fisheries monitoring stock status and trends issues in the Bristol Bay region. It will provide local economic benefits through education and regional employment opportunities (2 jobs) as part of the research project.

**05-405**

## **Estimation of Coho Salmon Escapement in Streams Adjacent to Perryville and Sockeye Salmon Escapement in Chignik Lake Tributaries, Alaska Peninsula National Wildlife Refuge**

**Geographic Area:** Southwest Alaska – Chignik area

**Information Type:** Stock Status and Trends

**Principal Investigators:** Jim Larson

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King Salmon, AK  
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|              |             |             |             |
|--------------|-------------|-------------|-------------|
| <b>Cost:</b> | <b>2005</b> | <b>2006</b> | <b>2007</b> |
|              | \$ 14,700   | \$ 29,400   | \$ 29,400   |

### **Issue**

Coho salmon *Oncorhynchus kisutch* runs to the Kametolook, Three Star, and Long Beach rivers near Perryville have declined and residents can no longer meet their subsistence needs in those rivers. These residents now harvest coho salmon from streams outside the immediate vicinity of Perryville. With fishing effort spread out to other streams, we need to ensure escapements are maintained to meet Perryville residents' subsistence needs and to sustain these small stocks.

Subsistence fishers in the Chignik area have had difficulty harvesting sockeye salmon *Oncorhynchus nerka* in the Chignik watershed, and are concerned that runs have declined and may be over-exploited by the commercial fishery. We need to monitor late-run sockeye and coho salmon escapement in the Chignik watershed to ensure these runs are sustained and subsistence needs are met.

### **Objectives**

1. Obtain information on spawning distributions and minimum numbers of coho salmon in streams near the village of Perryville.
2. Obtain information on spawning distributions and minimum numbers of spawning late-run sockeye salmon in the Clark River.

### **Methods**

The investigator would use low-level aerial surveys, conducted from a helicopter, to estimate coho and sockeye salmon escapements into streams near Perryville and in the Clark River. Two

aerial surveys would be conducted annually, one in late September and one in mid October. Flights would be coordinated to minimize sampling error by avoiding periods of turbid flow and inclement weather. Survey reaches are considered to be index areas, and counts are considered minimum estimates of coho and sockeye salmon abundance. Periodic aerial counts would provide a minimum index of coho and sockeye salmon escapement. Due to the inclement weather and “flashy” nature of the streams in this region during late fall, getting more precise estimates of salmon escapement is neither logistically feasible nor cost effective.

### **Partnerships/Collaboration**

The project would develop partnerships between King Salmon Fish and Wildlife Field Office and the villages of Perryville, Chignik Lake, Chignik Lagoon, and Chignik Bay through annual meetings that would share project results and solicit additional input from village residents. Perryville residents have knowledge of where fishing pressure has shifted since closure of local rivers, and where monitoring is necessary to ensure escapement needs are met. In-season communication with local village residents would also be necessary to determine if coho and sockeye salmon escapements were sufficient for subsistence uses in each survey stream.

**05-452**

## **Non-salmon Fish Harvests and Traditional Knowledge in Togiak, Manokotak, and Twin Hills**

**Geographic Area:** Bristol Bay, Southwest Alaska, Togiak National Wildlife Refuge (TNWR)

**Information Type:** Harvest Monitoring and Traditional Ecological Knowledge

**Principal Investigators:** Ted Krieg and Molly Chythlook  
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**Co-Investigator:** Laura Jurgensen, Natural Resources Department  
 Bristol Bay Native Association

|              |             |             |             |
|--------------|-------------|-------------|-------------|
| <b>Cost:</b> | <b>2005</b> | <b>2006</b> | <b>2007</b> |
|              | \$ 77,225   | \$ 29,113   | \$ 0        |

### **Issue**

Subsistence harvests of non-salmon fish in the TNWR communities of Togiak, Twin Hills, and Manokotak are not monitored annually. Since the last studies in 1995 and 2000, several factors have likely influenced the subsistence fisheries in these communities, including the decline of the commercial salmon fishery and developing recreational fisheries. This study will update harvest and use information and will document any changes in harvest quantities, species used, gear types, and location of harvests. Interviews with key respondents will identify economic, cultural, and environmental factors influencing the characteristics of subsistence harvests and uses.

### **Objectives**

1. Approximately 10 to 15 key respondent interviews about subsistence harvests and uses of non-salmon fish, such as methods and means; changes in the fishery; environmental and other habitat changes; and potential impacts of the sport and commercial fisheries of the Togiak District on subsistence harvests and uses.
2. Estimates of harvests of nonsalmon fish for the calendar year 2005.
3. Maps of locations of harvests nonsalmon fish in 2005 by cultural/biological unit, as mapped in previous research in these study communities.
4. An update of the traditional knowledge database *From Neqa to Tepa*.

## **Methods**

This project involves key respondent interviews and subsistence harvest surveys for nonsalmon fish in three communities within the TNWR: Togiak, Twin Hills, and Manokotak. The first project phase will consist of approximately 10 to 15 key respondent interviews concerning non-salmon TEK. These interviews will be recorded on audiotape and will be conducted in English and Yup'ik depending upon the respondents' preferences and abilities. These interviews will focus on economic, cultural, and environmental factors that are influencing subsistence harvests of nonsalmon fish, and provide guidance for potential questions for the subsequent household survey. The second phase will consist of systematic household surveys in January 2006 documenting the non-salmon fish harvests of 2005. The survey will collect data to estimate subsistence harvests by species and area and gear type, the total number of households that subsistence fished in the study year, and local residents' observations and concerns. The third phase will consist of data analysis and preparation of a final report and an update to the TEK database "From Neqa to Tapa," using the AskSam software program

## **Partnerships/Collaboration**

This project will be a collaboration between the Division of Subsistence of ADF&G and BBNA. Letters of support will be solicited from the tribal council presidents of each of the proposed study communities by BBNA staff, and surveys will include the employment of individuals from each of the communities to assist with interviewing.

**05-501**

## Spawning Distribution and Run Timing of Copper River Sockeye Salmon

**Geographic Area:** Copper River

**Information Type:** Stock Status and Trends

**Principal Investigator:** Keith Van Den Broek, Native Village of Eyak  
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**Co-Investigator:** Jason Smith, LGL Alaska Research Associates, Inc.  
James Saveriede, Alaska Dept of Fish and Game, Div of Sport Fish

|              |             |             |             |
|--------------|-------------|-------------|-------------|
| <b>Cost:</b> | <b>2005</b> | <b>2006</b> | <b>2007</b> |
|              | \$225,126   | \$225,126   | \$225,166   |

### Issue

The purpose of this project is to estimate the run timing and spawning distribution of sockeye salmon stocks returning to the Copper River. Currently, there is limited information on the stock-specific migration rates of sockeye salmon traveling from the Copper River District (and Miles Lake sonar site) through the inriver fisheries, particularly as related to environmental factors such as stage height. Information 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 on healthy stocks. This project addresses subsistence fisheries-monitoring issues for Copper River sockeye salmon as outlined by the Federal Subsistence Regional Advisory Council.

### Objectives

1. Estimate the proportions of sockeye salmon returning to the major spawning tributaries of the Copper River (Chitina, Tonsina, Klutina, Tazlina, Gulkana and Upper Copper rivers).
2. Describe the stock-specific, migratory timing profile of sockeye salmon.

### Methods

This study will estimate the proportion of spawning sockeye salmon in each of six major spawning tributaries of the Copper River and describe the migratory timing profiles for each stock. To achieve this objective, 500 sockeye salmon will be radio tagged each year at

two fishwheels located in Baird Canyon (rkm 66) and tracked throughout the basin using a combination of fixed-station receivers and aerial surveys.

### **Partnerships/Collaborations**

This project will promote the interaction between a major subsistence group (NVE) and various management agencies (USDA Forest Service, U.S. Fish and Wildlife Service, Alaska Department of Fish and Game). The 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 their Tribal Council, staff, consultants and government agencies to identify key personnel to help carry on a long-term fisheries-monitoring program.

**05-502**

## **Relative Abundance, Migratory Timing, and Overwintering and Spawning Distribution of Steelhead in the Copper River Drainage**

**Geographic Area:** Southcentral

**Information Type:** Stock Status and Trends

**Principal Investigator:** Klaus Wuttig  
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**Co-Investigator:** Bruce Cain, Native Village of Eyak  
 Eric Veach, National Park Service Wrangell/St. Elias  
 Elijah Waters, Bureau of Land Management

|              |             |             |
|--------------|-------------|-------------|
| <b>Cost:</b> | <b>2005</b> | <b>2006</b> |
|              | \$ 36,500   | \$ 36,769   |

### **Issue**

This study will gather information to address stock status and trends issue #1 from the 2005 Issues and Information Needs of the Southcentral Copper River Region. The objectives are designed to estimate and describe the distribution (spawning and overwintering), relative abundance, and migratory timing of steelhead *Oncorhynchus mykiss* in the Copper River drainage using radiotelemetry. Attaining a measure of total run size is needed to assess the vulnerability of these stocks to overexploitation and the need for greater conservation measures such as more restrictive fishing seasons or methods (e.g. no subsistence fishing during the out-migration period of adult steelhead in late May, the inclusion of live boxes on fishwheels, or the closure of sport fisheries). Documentation of significant spawning and overwintering locations throughout the drainage is necessary to adequately manage and protect these critical habitats.

### **Objectives:**

1. Estimate the proportion of Copper River steelhead that migrate to both the Dickey Lake and Hanagita Lake spawning areas such that all estimates are within 10 percentage points of the true values 95% of the time.

2. Describe the migratory timing profile (upriver and downriver) of the steelhead return in the Copper River at the point of capture and investigate potential stock-specific differences in run timing.

A secondary task will be to document significant steelhead aggregations in the Copper River drainage during spawning and overwintering periods.

## **Methods**

This study will use radiotelemetry to determine the relative size of the total return of steelhead to the Copper River drainage. This will be accomplished by estimating the relative contribution of the Dickey and Hanagita lake stocks, for which abundance information has been attained, to the drainage-wide steelhead spawning escapement. Steelhead will be captured using a fish wheel and dip nets located on the east and west banks of the Copper River near Chitina from approximately 20 August to 10 October in 2005 and 2006. Each year, 130 radio tags will be distributed in proportion to fish passage. Run-timing information and documentation of significant spawning and overwintering locations will be attained using a network of 9 ground-based tracking stations positioned strategically throughout the drainage and aerial surveys conducted at biologically meaningful periods (e.g. spawning and overwintering).

## **Partnerships/Collaboration**

Financial consultations have been ongoing with Eric Veach of the NPS and Elijah Waters of the BLM, Glennallen office. Both organizations have agreed to provide financial and in-kind support to help in the project's success. The Native Village of Eyak (NVE) supports this study and their level of involvement depends on the proposed Copper River sockeye salmon study (FIS 05-502). If this proposal is funded and if the Copper River sockeye salmon proposal is funded, funding will be provided to NVE for extending their upriver fishwheel operations for 4-6 weeks to capture and radio-tag steelhead. NVE, NPS, and BLM will be involved in the data collection, analysis, and reporting of results.

**05-553**

## **Factors Contributing to Changes in Subsistence Salmon Harvests in the Copper River Basin**

**Geographic Area:** Southcentral

**Information Type:** Harvest Monitoring and Traditional Ecological Knowledge

**Principal Investigator:** Dr. William E. Simeone  
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Erica McCall, Partners for Fisheries Monitoring Program  
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**Co-Investigators:** Katherine Martin, Mentasta Tribal Council  
Julie Bator, Tazlina Tribal Council  
JoeNeal Hicks, Cheesh'na Tribal Council  
Bry Claw, Gulkana Tribal Council

|              |             |             |             |
|--------------|-------------|-------------|-------------|
| <b>Cost:</b> | <b>2004</b> | <b>2005</b> | <b>2006</b> |
|              | \$ 84,819   | \$0         | \$0         |

### **Issue**

In their final report, the Subsistence Fisheries Harvest Assessment Working Group recommended collecting “contextual information that would assist managers in evaluating and interpreting subsistence harvest data” (Fall and Shanks 2000). The justification for collecting this type of data was that there is “little contextual information available for managers and users to understand changes in harvests from year to year” (Fall and Shanks 2000). In addition, leaders from most of the Ahtna communities have expressed concern that quantitative harvest data does not represent the complete story of how local people’s lives have changed and what influences sometimes influence traditional subsistence harvest pursuits. The goal of this project is to provide a context for Copper River subsistence harvest data, and is therefore, a direct response to recommendations of the Harvest Assessment Working Group, as well as issues and information needs identified by OSM-FIS, and Copper River Basin Ahtna leaders. This project will provide information useful in evaluating current subsistence fishery regulations, regulatory proposals, and fisheries management actions, as well as, a tool for understanding trends in the subsistence salmon harvest.

## **Objectives**

1. To determine, using all available quantitative harvest data, if there has been a change, over the last 125 years, in the subsistence harvest of salmon by federally qualified users in the communities of Mentasta, Chistochina, Gulkana, and Tazlina.
2. To hypothesize possible factors that explain observed changes in the subsistence harvests and to test those explanations against quantitative measures, when possible, and against interview data collected from residents of the study communities.
3. To develop comprehensive explanations for changes in the subsistence salmon harvest and to predict likely outcomes of current and potential regulations (completed by October 30, 2006).

## **Methods:**

Methodology includes the collection and assessment of quantitative harvest data, demographic, and economic data, and interviews with local subsistence users about changes in their harvest.

## **Partnerships/Collaboration**

This project is a collaborative effort between the Division of Subsistence, the Tribal entities of the Copper River Basin, and the Partners for Fisheries Monitoring Program Southcentral Regional Social Scientist. The Tribal entities will share in the work by helping develop interview protocols, conducting key respondent interviews, and assisting in the review the final report. The partnerships and capacity development aspects of this project are numerous.

## 05-601

# Kook Lake Sockeye Stock Assessment

**Geographic Area:** Southeast

**Information Type:** Stock Status and Trends

**Principal Investigator:** Ben Van Alen,  
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**Co-Investigators:** Raynelle Jack, Angoon Community Association  
Meg Cartwright, ADFG, Division of Commercial Fisheries  
Jan Conitz, ADFG, Division of Commercial Fisheries

|              |             |             |             |
|--------------|-------------|-------------|-------------|
| <b>Cost:</b> | <b>2005</b> | <b>2006</b> | <b>2007</b> |
|              | \$ 78,620   | \$ 79,578   | \$ 81,644   |

### Issue

The current status of the Kook Lake (Basket Bay) sockeye run is poorly understood and of concern. We do not know if annual sockeye escapements are a few hundred fish or several thousand fish. Escapement survey counts and subsistence harvest estimates show declining trends; however, the usefulness of this information is questioned. Few sockeye salmon were marked and recaptured the past three seasons as part of Fishery Resource Monitoring Program project FIS01-126. Project personnel did not see many sockeye salmon in the system and deep water and logs made it difficult to seine fish in beach spawning areas. A weir project now appears to be the best method to measure escapements into this system.

### Objectives

1. Estimate the total escapement of sockeye salmon into Kook Lake with a weir/mark-recapture project such that the estimated coefficient of variation is less than 15%.
2. Estimate the age, length, and sex composition of the Kook Lake sockeye escapement so that the estimated coefficient of variation is less than 10%.
3. Clear debris from the cavern entrances on the outlet stream.

## **Methods**

An Angoon Community Association crew will install and operate an adult salmon weir on the outlet of Kook Lake from late-June through early-September of 2005, 2006, and 2007. Weir counts of sockeye salmon will be validated with a mark-recapture study. The age, sex, and length composition of sockeye salmon will be estimated.

## **Partnerships/Collaboration**

Crew members will be hired and employed by ACA. This cooperative ACA/USDA-FS/ ADF&G project will promote public support for our subsistence management program.

**05-603****Klawock Lake Subsistence Sockeye Salmon Project****Geographic Area:** Southeast**Information Type:** Stock Status and Trends

**Principal Investigators:** Meg Cartwright and Jan Conitz  
 ADFG, Division of Commercial Fisheries  
 Douglas, AK  
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 meg\_cartwright@fishgame.state.ak.us  
 jan\_conitz@fishgame.state.ak.us

**Co-Investigators:** Klawock Cooperative Association  
 Jeff Reeves, US Forest Service

|              |             |             |
|--------------|-------------|-------------|
| <b>Cost:</b> | <b>2005</b> | <b>2006</b> |
|              | \$164,238   | \$167,798   |

**Issue**

Investigators will collect data on returning sockeye salmon to Klawock Lake and interview the subsistence fishers in the bay to assist fishery managers in ensuring that escapement and subsistence opportunities are adequate.

**Objectives**

1. Count the number of sockeye salmon returning to Klawock Lake through the weir.
2. Estimate the annual adult and jack sockeye escapement into Klawock Lake with mark-recapture methods, using the weir as a marking platform and the major spawning grounds as the recapture sites, so that the estimated coefficient of variation is less than 10%.
3. Estimate the spawning population in Three-Mile, Half-mile and Inlet streams using mark-recapture methods so that the estimated coefficient of variation is less than 15%.
4. Describe the size, sex and age distribution of sockeye salmon adults and jacks returning to Klawock Lake.

**Methods**

The primary focus of this research will be to estimate the number of sockeye salmon adults returning to spawn in Klawock Lake. Standard multi-event mark-recapture statistical methods

will be used to estimate sockeye escapement. Sockeye adults will be marked at the weir. Seven or eight recapture events at the inlet streams will be conducted during the spawning season.

### Partnerships/Collaborations

Personnel from the three cooperating agencies, ADF&G, USDA-FS and Klawock Cooperative Association (KCA) have worked closely to ensure the success of the project through training, assistance in the field, and project and budget planning since 2000. Local residents and tribal governments are consulted on a regular basis. ADF&G staff will hold a community meeting in Klawock to describe the study, present the results of first year and get feedback from the community. The ADF&G project leaders and KCA staff communicate on a regular basis about personnel issues, project and budget planning, field expediting and natural resource issues.

Total Project Costs: (Dollars are shown in thousands)

|      | State | Federal | Non-Agency (KCA) | Total |
|------|-------|---------|------------------|-------|
| 2005 | 135.1 | —       | 29.1             | 164.2 |
| 2006 | 135.7 | —       | 32.1             | 167.8 |

Local Hire Costs (these costs are included in the Total Project Costs, above)

|      | State | Federal | Non-Agency (KCA) | Total |
|------|-------|---------|------------------|-------|
| 2005 | 16.8  | —       | 24.9             | 41.7  |
| 2006 | 16.8  | —       | 27.3             | 44.1  |

The Southeast Sustainable Salmon Fund (SSSF) will contribute \$32,000 in Federal FY05 and FY06 towards ADF&G permanent staff that oversee this project.

**05-604****Adult Steelhead Population Assessments on Prince of Wales Island****Geographic Area:** Southeast**Information Type:** Stock Status and Trends

**Principal Investigator:** Glenn Chen  
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**Co-Investigators:** Richard Peterson and Cathy Needham, Organized Village of Ka'saan  
 Roger Harding and Randy Mullen, ADFG, SE Sportfish Research Division  
 Steve Hoffman and Steve McCurdy, ADFG, SE Sportfish Research Division  
 Sheila Jacobsen and Jeff Reeves, USDA Forest Service, Craig Ranger District  
 Susan Howell, USDA Forest Service, Thorne Bay Ranger District

|              |             |             |             |
|--------------|-------------|-------------|-------------|
| <b>Cost:</b> | <b>2005</b> | <b>2006</b> | <b>2007</b> |
|              | \$127,708   | \$136,908   | \$156,921   |

**Issue**

Steelhead (*Oncorhynchus mykiss*) comprise an important subsistence fishery for rural residents of Prince of Wales Island (southeast Alaska region). Contemporary subsistence steelhead harvest by PWI residents estimated across all 12 PWI communities was 770 fish, with most of this harvest being taken by rod and reel, and occurring primarily among residents of Craig, Klawock, and Hydaburg. Analysis of this data suggests that a total annual harvest of about 600 fish occurs on Federal lands on Prince of Wales Island. Proposed regulations that established a limited Federal subsistence fishery for this species were approved by the Federal Subsistence Board in December 2002.

Little historical information is available to document population sizes, age/sex/length characteristics, run timing, and/or spatial distribution of steelhead on the majority of Prince of Wales Island (PWI) streams. There are 74 drainages known to contain steelhead on Prince of Wales Island. At present, each system is being managed according to categories of "small" (<150) or "large" (>150) numbers of adult spawners. Lack of more recent and accurate data has hampered efforts to assess the potential effects of subsistence fishing and/or catch-and-

release sport angling, and prevents the refinement of regulations that would ensure adequate conservation of steelhead, while allowing for expanded harvest opportunities.

In contrast to other Pacific anadromous salmonids, there are unique aspects of steelhead life history and ecology that make this species more difficult to study. Biologists continue to be concerned that low to moderate levels of harvest on PWI streams could potentially create conservation concerns, in a number of these systems. At present, a proposal has been submitted to the Federal program to expand subsistence harvest opportunities for steelhead across the entire Region. Given that quantitative population data for these fish are unavailable for the majority of stocks in southeast Alaska, there is an urgent need to develop and test alternative enumeration methodologies that are cost-effective, efficient, and that can yield data with the precision sufficient for management by State and Federal agencies.

This project will provide much needed quantitative data on adult spawning populations, run timing, and age/sex/length characteristics within a subset of PWI streams that support steelhead harvests by local subsistence users, and provide research/development on alternatives to full duration weir studies. It addresses an important southeast Alaska region Federal subsistence fishery monitoring issue, identified by the SERAC during the fall 2002 meetings, and listed in their current Issues and Information Needs.

## Objectives

1. Estimate the abundance of returning adult spring steelhead in a sub-set of seven to nine Prince of Wales Island streams, representing management categories of “large” ( $N > 150$ ) versus “small” ( $N < 150$ ) populations of fish.
2. Quantitatively estimate the sex and length compositions, and incidence of repeat spawning, of spring-run adult steelhead in the selected sub-set of PWI streams.

## Methods

This project is being proposed as a 3-year study (FY 2005 - 2007) to obtain quantitative information on the abundance of spring adult steelhead stocks in seven (7) freshwater stream systems on Prince of Wales Island (representing 10% of the Island’s steelhead systems). If funded, it will also expand upon a pilot effort that has been initiated in by ADF&G and USDA-FS on the Island in spring 2004, in 12-Mile Creek.

### *STEELHEAD ABUNDANCE*

STEELHEAD ABUNDANCE will focus on the collection of population data in an annual subset of PWI stream systems that support spring runs of adult steelhead. Selected streams will be stratified based on **management categories** based on population size and **accessibility**, with selection selected based on their importance to subsistence users. Weirs will be operated in each study stream for a limited, 8-week period corresponding to the main run timing for spring returning adult steelhead. These counts will serve as a “minimum” population estimate for each of the study streams, and are anticipated to provide information of sufficient resolution to address subsistence management issues on Prince of Wales Island. Channel-spanning, aluminum

and steel tripod/bipod weirs with fixed or floating center panel sections will be constructed and operated for 8 weeks (April 1st through May 31st), to enumerate upstream migrating steelhead spawners. These counts will serve as a “minimum” population estimate for each of the streams, and are anticipated to provide information of sufficient resolution to address subsistence management issues on Prince of Wales Island.

### Results from the Spring 2004 Pilot Study

USDA Forest Service and Alaska Department of Fish and Game biologists conducted a pilot study during March – May 2004, to evaluate the effectiveness of a mark-recapture study design for assessing steelhead populations on the streams of Prince of Wales Island. This work was conducted on 12 Mile Creek, a system that is typical of many small to moderate-sized streams on PWI. The 2004 pilot study on 12 Mile Creek indicated that mark-recapture using only seines and angling methods was largely unsuccessful, inefficient, and ineffective. When these techniques are combined with visual sightings as a re-capture method, the resulting population estimates had large variances and low precision.

While visual sightings via snorkeling were found to be successful for “re-captures”, a weir proved to be necessary for tagging a sufficient number of fish during the initial marking sessions to obtain a reliable population estimate. After the initial investment in supplies and materials is made, however, the costs of operating a weir are equivalent to, or less than, that required for a mark-recapture efforts (in fact, more personnel are needed to operate seines). For adult steelhead, tag loss was high and affected population estimates as well. In addition, the resulting stress associated with increased handling in a mark-re-capture study with angling or seining must also be considered, especially given that steelhead numbers in most PWI systems are small (the loss of a few individuals due to handling mortality may be significant for such populations). Based on these results, the principal investigators do not recommend that mark-re-capture techniques be utilized for addressing this study objective in the proposed research.

### *SEX, LENGTH, and INCIDENCE OF REPEAT SPAWNING*

SEX, LENGTH, and INCIDENCE OF REPEAT SPAWNING will be collected from a subset of adult steelhead captured in the study streams. Steelhead length will be determined by measurements from mid-eye to fork of caudal fin to the nearest 5 mm. Sex will be determined by observing external characteristics. The incidence of repeat spawning and saltwater age at initial spawning will be determined from scale pattern analysis. Scale samples will be cleaned and mounted on gum cards to facilitate making triacetate impressions of the scales. Samples will be stored and archived by ADF&G, and scale analysis will be conducted by Department in 2007.

### **Partnerships/Collaboration**

This project will promote and enhance working relationship among the State and Federal agencies, and the local communities on Prince of Wales Island. The Organized Village of Kasaan is a principal investigator and will receive funds and the responsibility for employing of up to 4 fisheries technicians, to assist the State and Federal biologists in conducting the field work associated with this study. Priority will be given to local hire of qualified. The proposed study will help to expand OVK’s capacity for fisheries resource monitoring.

PWI Native organizations, represented by the Hydaburg Cooperative Association, Craig Community Association, Klawock Community Association, and OV Kasaan were consulted. Each of these groups have expressed strong support for this project. ADF&G local managers, and line officers/natural resources staff members at the USDA Forest Service offices in Craig, Thorne Bay, and Ketchikan have indicated that they also fully support the proposed study and will be contributing in-kind contributions of salaries, travel, and helicopter transportation costs.

**05-702****Genetic Species Markers and Population Structure in Alaskan Whitefish****Geographic Area:** Inter-Regional**Information Type:** Stock Status and Trends

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 Office (KFWFO)

|              |             |             |
|--------------|-------------|-------------|
| <b>Cost:</b> | <b>2005</b> | <b>2006</b> |
|              | \$ 30,188   | \$30,188    |

**Issue**

There is a large and growing need for information on whitefish (for the purpose of this proposal, the term ‘whitefish’ includes all Alaskan *Coregonus*, *Presopium* and *Stenodus* species, except where specifically noted) as it relates to management of subsistence fisheries throughout Alaska. Furthermore, across Alaska, residents have expressed concern about the status of whitefish resources. A critical initial step in properly addressing whitefish biology and management in Alaska is to characterize their genetic population structure. Currently, there are little or no population genetic data available for whitefish in Alaska. It is believed that there are relatively few whitefish spawning areas, even in large systems like the Yukon River, and there is little or no information on how populations are structured genetically. In order to properly manage whitefish (e.g., assess abundance, stock structure, distribution, movement patterns, life history and reasons for potential declines) we must be able to determine the geographic scale at which their populations are structured.

Furthermore, current management for whitefish in Alaska is imprecise as it is based on a ‘whitefish group’ where species are not distinguished. Juvenile whitefish bear little resemblance to the adult forms, since many of their morphometric characteristics are not fully developed or easily recognizable, and hybridization appears to be widespread. Even “pure” adults can be difficult to reliably identify morphologically, depending on the local experience of the biologist. A genetic method to distinguish between species will allow us to 1) verify the species status of individual samples; 2) assess the extent and importance of hybridization between species; and 3) is the first step in developing a reliable field identification key for adults and juveniles.

## Objectives

1. Apply a set of 10 microsatellite loci (described below) to assess large scale population structure to 100 humpback whitefish from each of five geographic regions across Alaska.
2. Apply a set of 10 microsatellite loci (described below) to assess small scale population structure within the Yukon River to 38-100 humpback whitefish from each of eight previously determined spawning sites as given in Objective 1.
3. Develop diagnostic genetic markers to discriminate among Alaskan whitefish species: inconnu (*Stenodus leucichthys*), broad whitefish (*Coregonus nasus*), humpback whitefish complex (*C. pidschian*), Bering cisco (*C. laurettae*), least cisco (*C. sardinella*), round whitefish (*P. cylindraceum*), and pygmy whitefish (*P. coulteri*).

## Project Description

*Objectives 1 and 2*) Collections to be analyzed in the project were chosen to represent a mix of proximate and distant collections, in order to identify the geographic boundaries of populations and the connectivity between them. Tissues collected between 1998 and 2003 are archived in the CGL (N = 469; Figure 1). We will attempt to collect additional samples from the Coleville, Copper, Selawik and Kuskokwim Rivers during the summer of 2004 (target N = 200-400; Figure 1).

*Objective 3*) Tissue samples from 2-10 adults of seven whitefish species reliably identified by experienced field biologists were collected from 1998 to 2004 and archived at CGL. The geographic range of the samples extended from Alaska to Montana, and included some putative hybrids. In collaboration with the University of Montana, we will use PINE (paired interspersed nuclear elements) nuclear molecular markers (Spruell et al. 2001) in an attempt to describe diagnostic species markers.

## Partnerships/Collaboration

This project involves significant collaboration with faculty and graduate students at the University of Laval and the University of Montana. Furthermore, we have discussed this project with the Council Athabascan Tribal Governments Natural Resources Department (CATGNR) management team. The CATGNR represents a consortium of ten Gwich'in and Koyukon Athabascan tribes located throughout the Yukon Flats. The CATGNR agrees to the merit and need for this study and further development. This project will, to the extent possible, hire local residents of the Yukon Flats to assist with netting to capture whitefish at various locations.