
Strategic Plan for the Subsistence Fisheries Resource Monitoring Program, Southwest Region, Bristol Bay and Chignik Areas

Developed by

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PREFACE

A strategic planning process was initiated for the Bristol Bay and Chignik areas of the Southwest region in 2004 to ensure that the Fisheries Resource Monitoring Program (Monitoring Program) focuses on the highest priority information needs for management of Federal subsistence fisheries over the next 3 -5 years. The process involved regional managers, scientists, Bristol Bay Subsistence Regional Advisory Council (Council) members, and stakeholder groups, and included participation at workshops held in Anchorage during May 11-13, 2004 and February 9-11, 2005.

There were three distinct phases in the process:

1. Development of a prioritized framework of goals, objectives, and information needs for each identified subsistence fisheries unit (May 2004 workshop);
2. Review of frameworks by agencies, the Council, stakeholders and the general public, and incorporation of relevant comments; and
3. Development of prioritized fisheries unit information needs lists for which Monitoring Program study proposals should be considered, based on results of a study inventory and knowledge gap analysis (February 2005 workshop).

Elements of the framework were considered in the context of enabling legislation, Section 812 of Alaska National Interest Lands Conservation Act¹ (ANILCA), and Federal Subsistence Board (Board) guidelines. Consistent with ANILCA, the workgroup only included information needs that had relevance to management of subsistence fisheries on or associated with Federal public lands. Consistent with Board guidelines, the workgroup acknowledged that hatchery propagation, restoration, enhancement, and supplementation; habitat protection, restoration, and enhancement; and contaminant assessment, evaluation, and monitoring activities were more appropriately funded through other programs, but felt information needs addressing effects of these activities on subsistence resources and fisheries were suitable Monitoring Program study topics. Three other issues were also addressed by the workgroup. First, they felt alternative subsistence fisheries management paradigms should be explored, but decided this should occur on a statewide rather than regional level. Second, they initially identified development of more cost efficient technology, methods and approaches as a specific framework objective with associated information needs, but then decided to treat this matter as an underlying principle for conducting any study rather than a specific study topic. Third, they agreed it was necessary to continue cataloging relevant regional studies each year to update the gap analysis.

INTRODUCTION

BACKGROUND

On October 1, 1999, under the authority of Title VIII of ANILCA¹, the Federal government assumed management responsibility for subsistence fisheries on Federal public lands in Alaska (Buklis 2002). Expanded subsistence fisheries management has imposed substantive new informational needs for the Federal system (Krueger *et. al* 1999).

Section 812 of ANILCA directs the Departments of Interior and Agriculture, cooperating with the State of Alaska and other Federal agencies, to research fish, wildlife and subsistence uses on Federal public lands. The challenge posed by dual management of fisheries, coupled with the informational and communication demands of real-time fisheries management, prompted creation of the Monitoring Program within the Office of Subsistence Management (OSM). The Monitoring Program was envisioned as a collaborative inter-agency, inter-disciplinary approach to enhance existing fisheries research, and effectively communicate information needed for subsistence fisheries management on Federal public lands.

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.

RATIONALE FOR STRATEGIC PLANNING

Since its start in 2000, over 200 monitoring and research studies have been funded through the Monitoring Program in support of Federal subsistence fisheries management. To date, strategic priorities for the Monitoring Program have been identified through the Councils as issues and information needs (OSM 2004). These issues and information needs have been used to guide solicitation and evaluation of study proposals. While this process has provided a valuable public forum for a wide range of staff and public recommendations regarding informational needs for the Monitoring Program, it has often been difficult to determine the highest priority information needs for Federal subsistence management program.

To ensure strategic use of limited Monitoring Program funds, beginning in spring 2004 OSM initiated a more rigorous strategic planning process to identify and prioritize program goals, research objectives, and information needs (Appendix A). To identify key information needed to better manage Federal subsistence fisheries, the Fisheries Information Services Division (FIS) staff will eventually undertake a planning process for each region. Participants in the process will include managers, natural and social scientists, Council members, and other stakeholders. Beginning in 2004, the strategic planning process was applied to the Copper River-Prince William Sound areas of the Southcentral Region, and Bristol Bay and Chignik areas of the Southwest Region. Workshop participants were solicited from organizations appropriate to each region including Federal agencies, the Alaska Department of Fish and Game (ADF&G),

¹ See www.r7.fws.gov/asm/anilca/title08.html

academia, and Alaska Native, rural and other organizations. Council representation was also invited to effectively transition from issues and information needs already developed through the Councils, as well as to provide valuable local perspective.

Prioritized program goals, research objectives and information needs developed through these workshops underwent public review through the appropriate Council. Following this review, workshop participants re-convened a second time to address review comments, inventory all past and current studies that address each identified information need, and assess which information needs are of importance to address in subsequent Annual Monitoring Plans.

The purpose of this report is to describe and present the strategic plan developed through the Bristol Bay-Chignik workshop process.

APPLICATION OF STRATEGIC PLANNING

The strategic plan will be used to: (1) clarify requests for proposals; and (2) define the evaluation criteria for strategic priorities. Clarification of strategic priorities for the Monitoring Program should improve the quality and focus of proposals. Some clarity has already been provided to the mission of the Monitoring Program through establishment of policy approved by the Board (see below). For instance, identified information needs should not be in conflict with activities ineligible for funding. The 3-year limitation for funding commitments provides a realistic planning horizon.

Strategic plans should also improve focus for the evaluation process and address existing policy sideboards. The current evaluation process (described below) will remain in place. However, the role of funding guidelines by data type will likely diminish as the Monitoring Program evolves to address high priority information needs.

A summary of the existing proposal evaluation process, policy guidance, and funding guidelines established for the Monitoring Program follows.

Study Evaluation Process

The Monitoring Program is implemented through a collaborative approach involving five Federal agencies (Fish and Wildlife Service, Bureau of Land Management, National Park Service, Bureau of Indian Affairs, and U.S. Forest Service), ADF&G, Councils, Alaska Native organizations, and other organizations. An inter-agency Technical Review Committee (TRC) provides evaluation and technical oversight of proposals. Public review and recommendations for funding are provided through the Councils. An inter-agency Staff Committee reviews all recommendations, and attempts to reconcile any differences between staff and public recommendations. The Board approves Annual Monitoring Plans with the benefit of both a technical recommendation by the TRC and public review by the Councils.

The TRC screens study proposals, forwards a subset of these proposals for development of detailed study investigation plans, and subsequently evaluates these investigation plans to make recommendations for funding. The TRC is composed of representatives from each of the five

Federal agencies, three representatives from ADF&G, and is chaired by the Chief of FIS. Staff from FIS provides support for the TRC.

Evaluation and recommendations for funding are based upon four evaluation criteria:

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 being assessed:
 - a. Conservation Mandate - Risk to the conservation of species and populations that support subsistence fisheries and risk to conservation unit purposes.
 - b. Allocation Priority - Risk of failure to provide a priority to subsistence uses and risk that subsistence harvest needs will not be met.
 - c. Data Gaps - Amount of information available to support subsistence management. A higher priority is given where a lack of information exists.
 - d. 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).
 - e. Local Concern - Level of user concern over subsistence harvests (e.g. allocation, competing uses, and 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 progress and final reports.
3. Investigator Ability and Resources - Investigators must have the ability (training, education, and experience) and resources (technical and administrative) to successfully complete the proposed study. This will be evaluated using the following information for each investigator:

Ability, including

 - a. Education and training
 - b. Related work experience
 - c. Publications, reports, and presentations (no more than five totals)
 - d. Performance history for funded FRMP studies

Resources including

 - a. Office and laboratory facilities
 - b. Technical and logistic support
 - c. Personnel and budget administration
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

consultation 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

In addition to the above evaluation criteria used by the TRC, several other policies also affect consideration of studies:

- A minimum of 60% of Monitoring Program annual funding is dedicated to non-Federal sources.
- Activities not eligible for funding under the Monitoring Program include: a) hatchery propagation, restoration, enhancement, and supplementation; b) habitat protection, restoration, and enhancement; and c) contaminant assessment, evaluation, and monitoring. The rationale behind this policy guideline is to ensure that existing responsibilities and efforts by government agencies were not duplicated under the Monitoring program. Land management agencies already have direct responsibility, as well as applied programs, to address these activities. Examples of activities not eligible for funding include: enforcement of habitat protection regulations; restoration or mitigation of altered habitat; fish stocking; enhancement of spawning or rearing habitats; and heavy metal contaminant sampling. However, the Monitoring Program can fund research to determine factors that affect subsistence fisheries or fishery resources. For example, the Monitoring Program can legitimately fund studies that assess the effects of hatchery fish on subsistence fisheries and resources, or measure freshwater rearing capacity; however, it would be inappropriate to fund studies to solely assess or make recommendations on stocking levels. Similarly, the Monitoring Program can legitimately fund studies that assess whether migratory barriers, such as falls and beaver dams, affect spawning success or distribution; however, it would be inappropriate to fund studies to build fish passes or otherwise alter or enhance spawning habitat.
- Studies may be funded for up to three years duration.

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, provides \$4.25 million each year, while the Department of Agriculture, through the U.S. Forest Service, provides \$2 million. This annual budget funds both continuation of existing studies (year-2 or 3 of multi-year studies) and initiation of new studies. Budget guidelines were established by geographic region (Table 1), and two data types. Stock status and trend studies, the first data type, are initially allocated two-thirds of available funding. These studies address abundance, composition, timing, behavior, or status of fish populations that sustain subsistence fisheries with nexus to Federal public lands. Harvest monitoring and traditional ecological knowledge studies, the second data type, are initially allocated one-third of available funding. These studies address assessment of subsistence fisheries with nexus to federal public lands, including quantification of harvest and effort, and description and assessment of fishing and use patterns.

Table 1. Federal Subsistence Board regional funding guidelines for the Monitoring Program. In this example, guidelines are applied to the \$6.25 million annual allocation for studies.

Region	Values in \$000's					
	Dept. of the Interior		Dept. of Agriculture		Total	
	%	\$	%	\$	%	\$
Northern	17.0	722			11.6	722
Yukon	29.0	1,233			19.7	1,233
Kuskokwim	29.0	1,233			19.7	1,233
Southwest	15.0	638			10.3	638
Southcentral	5.0	212	32.5	650	13.8	862
Southeast	0.0	0	62.5	1,250	20.0	1,250
Inter-regional	5.0	212	5.0	100	5.0	312
Totals	100.0	4,250	100.0	2,000	100.0	6,250

BRISTOL BAY AND CHIGNIK AREAS

Geographic Scope

The Monitoring Program is administered by geographic region, and the Bristol Bay and Chignik areas are part of the Southwest region. While current planning efforts address only the Bristol Bay and Chignik areas, future efforts will address the remainder of this region, the Kodiak, Alaska Peninsula, and Aleutian Islands areas.

Federal public lands in the Bristol Bay and Chignik areas are extensive (Figures 1 and 2). The major features that define the Federal nexus for these areas include: the Alagnak River component of the Wild and Scenic River System, Alaska Maritime National Wildlife Refuge, Alaska Peninsula National Wildlife Refuge, Aniakchak National Monument and Preserve, Becharof National Wildlife Refuge, Katmai National Preserve, Lake Clark National Park and Preserve, and Togiak National Wildlife Refuge.

Subsistence Fisheries Units

Subsistence fisheries units describe the major functional units for management and regulation of subsistence fisheries with nexus to Federal public lands, and are defined by geography, species, and subsistence fishery users. For each unit, species are identified that are to be addressed for strategic planning at this time. Three subsistence fisheries units, in order of importance, were identified for the Bristol Bay and Chignik areas:

1. Bristol Bay salmon fisheries unit – Chinook, sockeye, and coho salmon
2. Chignik salmon fisheries unit – sockeye and coho salmon
3. Bristol Bay-Chignik non-salmon fisheries unit - Arctic grayling, whitefish species, Dolly Varden, rainbow trout, smelt species, and northern pike.

Although Bristol Bay salmon and Chignik salmon subsistence fishery units have identical planning frameworks and priorities, they were treated as separate units because the workgroup wanted to provide for differences between these two areas, and because they felt Bristol Bay salmon are of slightly greater importance to Federal management than Chignik salmon.

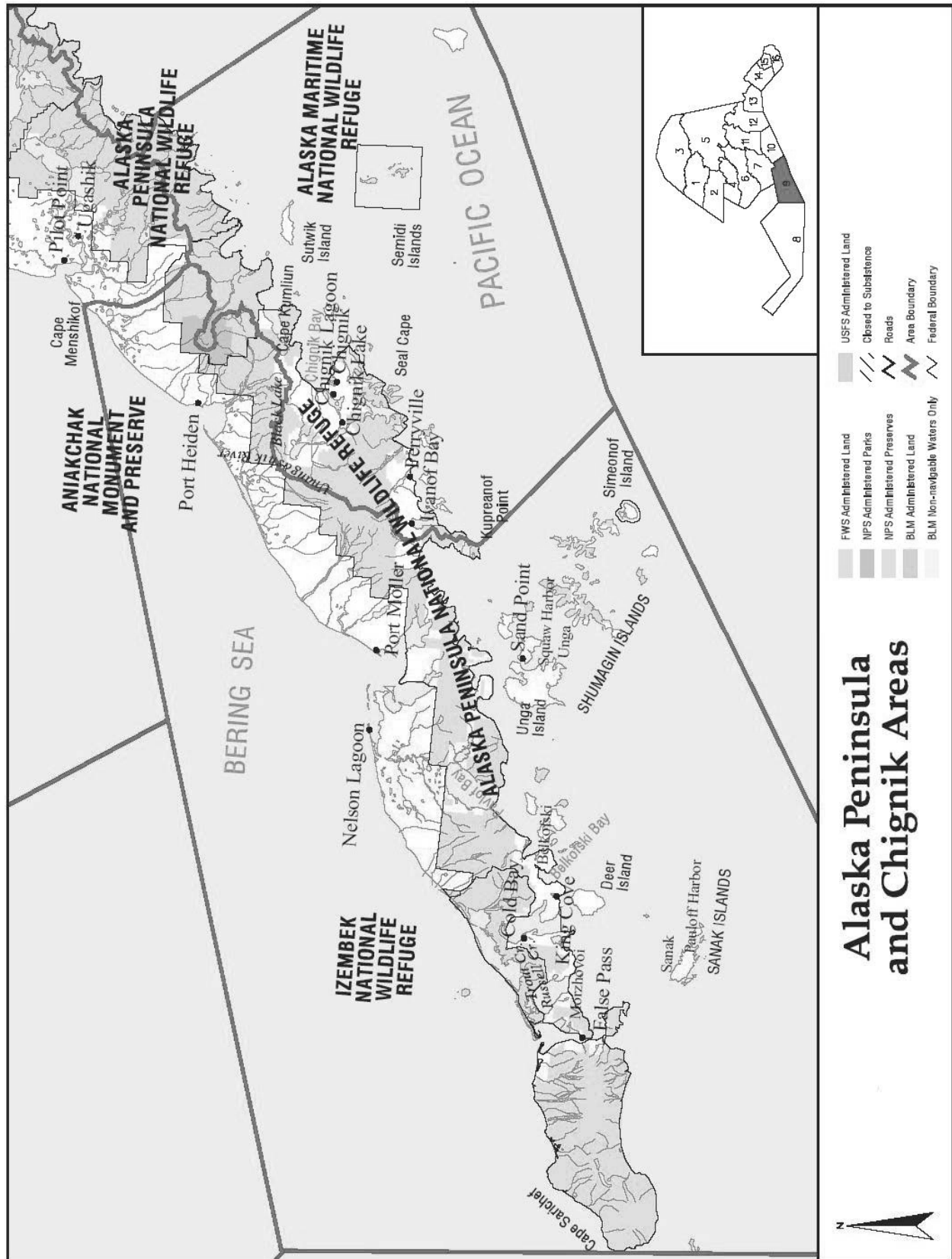


Figure 2. Federal public lands within the Chignik area.

THE STRATEGIC PLAN AND PROCESS OVERVIEW

The strategic plan consists of three products:

1. Frameworks of prioritized goals, objectives and information needs for Federal subsistence fisheries management units within the region, including a Glossary of Terms (Appendix B);
2. Inventories of completed and ongoing studies that provide relevant information for identified information needs; and,
3. Knowledge gap analysis results (referred to hereafter as the gap analysis) that provide decisions on whether or not to consider Monitoring Program proposals for each identified information need.

These products are used to define strategic priorities for the Monitoring Program. Strategic priorities are: high priority information needs (identified in 1 above); that are insufficiently or not addressed (see 2 above); and for which specific recommendations have been identified (see 3 above).

Strategic planning occurred in three phases (Figure 3). The first phase included a May 11-13, 2004 workshop in Anchorage at which participants structured the problem and prioritized information needs. Results of this workshop were drafted as an interim report that was distributed among participants for review and comment. The second phase was Council and public review of the interim report. Review comments were primarily solicited by having workshop participants and all Council members make the interim report available within their agencies, organizations, and communities. In September 2004, FIS staff presented the interim report at the Council's fall meeting and actively solicited review comments. The third phase included a February 9-11, 2005 workshop in Anchorage at which participants addressed review comments, finalized plan frameworks, completed the prioritization of information needs, and conducted the study inventory and gap analysis. The draft final plan report was made available to all Council members, who were encouraged to share it with their constituents, and comments were sought prior to and during the Council's fall 2005 meeting in October.

Stakeholder input on issues of concern and their support of the planning process is important to the long-term success of a strategic approach to sustainable fisheries because group consensus provides greater validity to conclusions (Saaty 1999). It is generally agreed that participation of stakeholders in planning can lead to improved fisheries management (Lane 1989, Stephenson and Lane 1995). In the development of previous strategic plans for sustainable fisheries, stakeholders have provided key insights to issues comprising problems as well as possible solutions (Merritt and Criddle 1993; Merritt 1995; Merritt and Skilbred 2002).

To balance logistic considerations concerning group size with the need to obtain a representative cross section of stakeholder perspectives, 19 people were invited to participate in the planning process (Appendix C). Participants included professional natural and social scientists from federal and state natural resource agencies, academia, and organizations representing area residents. The Council was also asked to provide one to three participants for this planning as

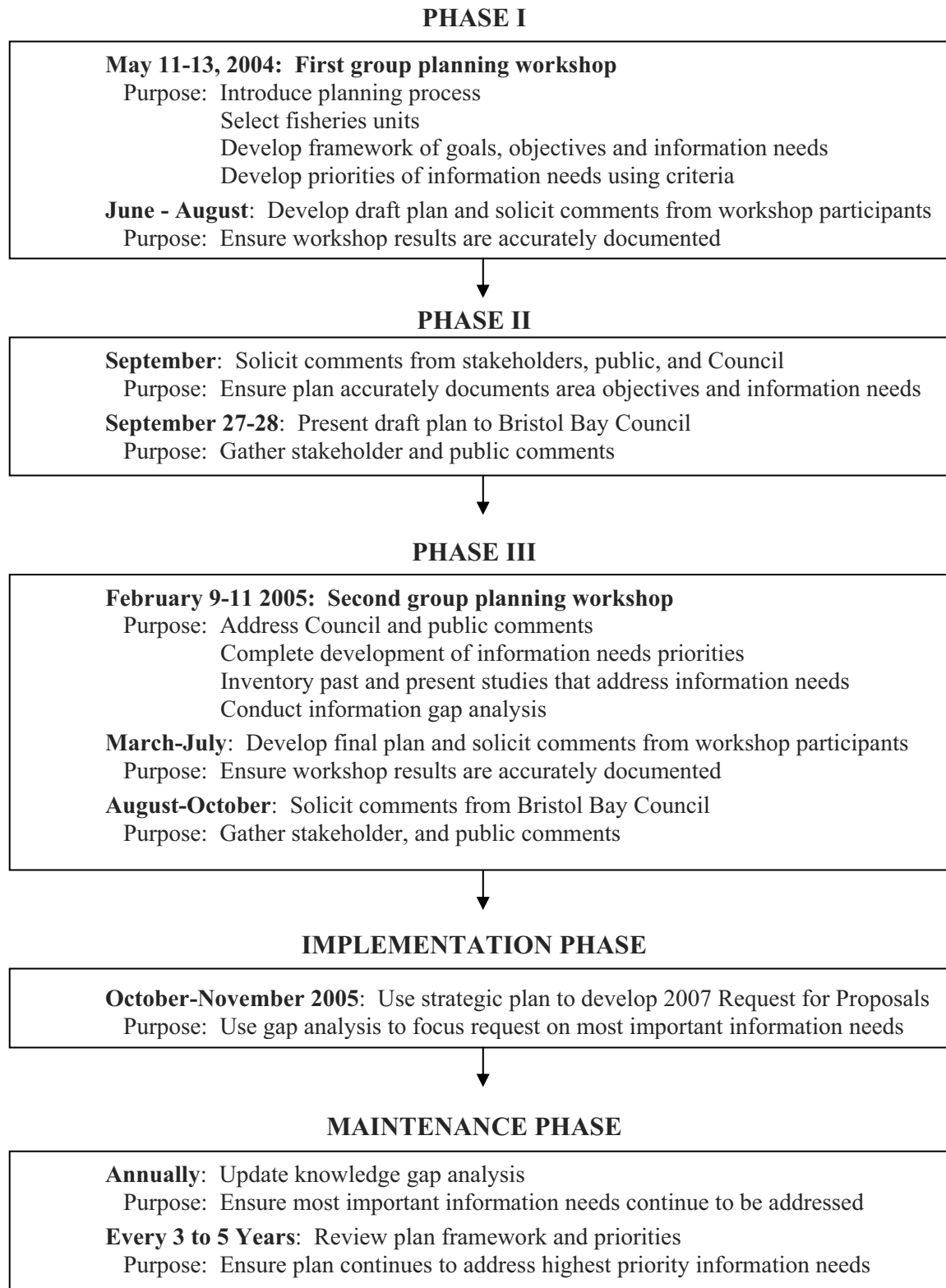


Figure 3. Major phases in the development of a strategic plan for the Monitoring Program in the Bristol Bay and Chignik areas.

effort to allow for effective transition from the Council's issues and information needs list effort to allow for effective transition from the Council's issues and information needs list as well as to provide local input. It proved challenging to find workshop dates to accommodate the schedules of all participants, and unanticipated issues, such as illness and emergencies, still made it impossible to obtain perfect attendance at both workshops. However, all participants had the opportunity to contribute information and critique workshop products throughout the planning process. Both workshops were co-chaired by a fishery biologist and an anthropologist from FIS. Additionally, a professional facilitator and decision analyst was hired to provide training in decision-making methodology, guide workshop discussions, assist with analyses, and draft the interim and final reports. Support staff from OSM included one person trained to operate the computer software used for recording and analyzing participant decisions, at least one person to take meeting notes, and one person to manage the computers, printers, and projectors.

PLAN FRAMEWORK AND PRIORITIZATION

METHODS

Participants

All but one of 16 participants scheduled to attend were present during the three-day May 2004 workshop (Appendix C). The participant representing the Council had to unexpectedly return home, due to a community emergency, just prior to the start of the workshop.

Planning Approach

The Analytic Hierarchy Process (AHP) was used to structure and prioritize the strategic plan (Saaty 1999). This method was chosen because it: 1) clearly and concisely communicates the problem, 2) has been successfully applied in similar planning efforts, 3) encourages explicit statements of preference, 4) allows for consideration of conflicting viewpoints, and 5) provides a record of how decisions made. The AHP facilitates decision-making by breaking complex problem into levels. This improves the ability of decision makes accurate judgments by allowing them to think through a problem in a systematic and thorough manner and focus on smaller sets of decisions. The AHP has been used extensively for decades to address planning, conflict resolution, and prioritization in such areas as policy development, economics, engineering, medical and military science, and has more recently been applied to fisheries research and management (NEFC 1990; Merritt and Criddle 1993, Merritt 2000, 2001, Merritt and Skilbred 2002). The AHP encourages people to explicitly state their expert judgments of preference or importance as well as to explore alternative viewpoints. Expert judgment is defined as "previous relevant experience, supported by rational thought and knowledge" (Saaty and Kearns 1985). While subsequent discussion and debate may bring conflicting viewpoints closer together, the AHP provides a method to integrate all viewpoints. Decision support software, Expert Choice,² was used interactively to structure the problem, depict the influence of weights, derive the priority of elements, and provide a record of how decisions were made.

² Forman, E., T. Saaty, M. Selly, and R. Waldron. Expert Choice, Decision Support Software, McLean VA. 1983.

Structuring and Establishing Priorities

A top-down structuring approach was used in the planning process, whereby the mission is the top of the hierarchy and goals are the second level. OSM staff developed the mission and goals of the Monitoring Program prior to the workshop. The workgroup identified objectives for each goal and information needs for each objective. Objectives are measurable statements of purpose, and as intermediary steps, form the third level of the hierarchy. Information needs are the data required to meet each objective, and are the bottom level of the hierarchy. To facilitate development of information needs, participants formed small workgroups for each objective, and then presented their recommendations to the entire group for further comment and refinement.

Structuring of goals, objectives and information needs was first completed for the Bristol Bay salmon fisheries unit, and this planning framework was subsequently used as a template from which to develop objectives and information needs for the Chignik salmon and Bristol Bay-Chignik non-salmon fisheries units. Again, participants formed small workgroups to discuss information needs for each objective, and then presented their recommendations to the entire group for further comment and refinement.

The planning framework for each subsistence fishery unit was completed during the second day of the workshop. Participants then turned their attention towards developing criteria for judging importance. Two sets of criteria were needed: one to judge importance of information gathering among subsistence fisheries units, and another to judge importance among goals, objectives and information needs of planning frameworks. There was considerable discussion about what each criterion represented, which helped refine understanding among the group.

Importance of information gathering among subsistence fisheries units was judged according to three primary criteria:

1. Degree of resource allocation and corresponding management intensity;
2. Extent of Federal jurisdiction over the fishery and nexus (direct versus indirect);
3. Vulnerability of stocks to over harvest and other conservation concerns; and

four secondary criteria:

1. Importance of resource to subsistence users;
2. Magnitude of harvest;
3. Number of fishery participants;
4. Role of resource in the subsistence way of life.

Importance among goals, objectives and information needs was judged according to the strategic advantage to Federal subsistence management of the following five criteria:

1. Vulnerability of stocks to over harvest;
2. Degree of resource exploitation;
3. Importance of resource to users;
4. Degree of resource allocation and occurrence of allocation disputes;
5. Management consequences of uncertainty (risk).

Using these criteria as guidelines, the workgroup was asked to use their expert judgment to individually assign ratings of importance to each level (goals, objectives, and information needs) of the planning framework through a process of pairwise comparisons. First, the relative

importance of goals was evaluated, then that of objectives within each goal, and finally that of information needs within each objective. Participants were given time to think about and write down their importance ratings based on a numeric scale before entering them into the Group Version of Expert Choice software using individual wireless keypads. Group results were displayed as bar graphs. The keypads made it quick and easy to elicit and record judgments as well as display results. A positive ratio scale with associated verbal equivalents was used to rate importance:

Scale of Importance	Definition
9	Extreme importance
7	Very strong importance
5	Strong importance
3	Moderate importance
1	Slight importance

Elements judged to be of equal importance were given equal scores. Numbers between those listed, for example 2 or 2.5, were used to interpolate meanings as a compromise. Consensus within a range of two to three points on the rating of elements was usually achieved among participants. When disparity in judging importance occurred, it meant there was disagreement or misunderstanding, and discussion and debate was encouraged. Debates advanced the understanding of important concepts and often resulted in a clearer definition of the goal, objective or information need. Seeking consensus encouraged dialogue, learning, and formation of a group solution.

Expert Choice was used interactively to depict the influence of weights and derive the priority of information needs. Priorities were derived from the workgroup's score of each information need, weighted by the workgroup's score of the appropriate objective and goal. Mathematically, relative ratings of importance were entered into a vector and normalized. The values from the vector were multiplied by the weight in the next highest level, and the result is the weight of importance for information needs. The total score for each information need was calculated by adding the weighted propositions over all objectives within a goal:

$$T_m = \sum_{k=1}^d W_k p_{k,m}$$

where

- T_m = the total weighted score for information need m ,
- W_k = the weight for objective k ,
- $p_{k,m}$ = the weighted proportion of the total score for information need m addressing objective k
- d = the number of information needs.

Structural Adjust

Structural imbalance in the hierarchy can lead to dilution of the weight of information needs when there are unequal numbers of needs under each objective, so an adjustment feature in Expert Choice was used to restore priorities to their respective proportion of weight. In a

conceptual example, consider that if an objective (A) has four information needs, and another objective (B) has two information needs, then there are six information needs in all and structural adjusting multiplies A's priority by 4/6 and B's by 2/6. Thus, the overall priorities for A's information needs are not diluted simply because there are many of them. While approximate balance is sought in structuring, complex problems do not always lend themselves to balanced structures, and the structural adjust feature is often used.

RESULTS AND DISCUSSION

Structuring and Establishing Priorities

The workgroup struggled with reconciling existing policies, guidelines, and evaluation criteria with developing frameworks and establishing priorities. For example, traditional ecological knowledge (TEK) is a method potentially applicable to all three goals, but existing guidelines treat TEK as a data type and allocate 1/3 of available funding for harvest monitoring and traditional ecological knowledge studies. Participants were counseled that allocation was not relevant to identifying informational priorities, and told to focus on identifying and prioritizing information needed to attain the objectives of the strategic plan. Similarly, capacity building is a desired outcome of the conduct of studies and an important study evaluation criterion. However, participants agreed capacity building is not a valid goal, objective, or information need, and also not relevant to identifying informational priorities.

The workgroup recognized that while it is important for all studies to develop cost efficient technology and methods for assessment, this should not be a specific goal or objective within a framework. However, the workgroup strongly recommended that the following measures be adopted as part of the Monitoring Program's standard operating procedures:

- Identify sources of error and improve accuracy of existing methods
- Invest in knowledge to design better tools and methods
- Maintain an inventory and catalog of studies (such as in this plan)
- Determine the extent that information, infrastructure and equipment are transferable

Goals

FIS staff recognized four broad goals needed to achieve the mission of the Monitoring Program: 1) assessment of fish populations; 2) monitoring of subsistence fisheries; 3) evaluation of management actions; and 4) promotion of public support and involvement in fisheries monitoring. After thoughtful discussion, the workgroup carefully reworded the goals to ensure each represented a unique concept to reduce overlap in objectives and information needs (Table 2). The first three goals involve collection and synthesis of information, and form the basis for the Bristol Bay-Chignik strategic plan. The fourth goal concerns public support and involvement, and will undergo a separate statewide planning process.

Subsistence Fisheries Units

The workgroup judged salmon fisheries units to be of greater ecological importance and of more value to subsistence users than the non-salmon fisheries unit. Bristol Bay salmon were considered to be of slightly greater importance to Federal management than Chignik salmon.

Table 2. Goals of the Monitoring Program for the Bristol Bay and Chignik areas.

Goal	Examples of Activities
Sustain healthy fish populations that support subsistence uses	Estimate population abundance, composition, timing, and distribution; Identify critical factors affecting production.
Document subsistence uses	Estimate and describe use patterns, including harvest, effort, methods, timing, location, and demographics; Determine critical factors affecting use patterns.
Effective management to provide for subsistence uses	Examine alternative management strategies; Develop effective information sharing systems; Assess impacts of other fisheries.
Public support and involvement for fisheries monitoring.	Educate and involve people outside of government agencies by providing training materials, forums, educational and employment opportunities, and professional staff.

Within each subsistence fisheries unit, the workgroup identified subsistence resource locations and species, and then prioritized these as being of high, moderate, or low importance to Federal subsistence management. The workgroup decided not to consider locations and species of low importance (for example, chum and pink salmon, Alagnak River coho salmon, Egegik River Chinook salmon, eastside Bristol Bay whitefish, and Bristol Bay char) under the Monitoring Program strategic plan at this time in order to focus on locations and species of high or moderate importance to Federal subsistence management (Table 3). In addition to importance to subsistence users, various issues determined which species or species groups were ranked as high, moderate or low importance for specific locations. For example, declining abundance and resulting harvesting difficulties, in addition to subsistence user importance, led participants to classify Lake Clark sockeye salmon, Perryville coho salmon, and Lake Clark whitefish as subsistence resources of high importance to the Monitoring Program. Locations and species were judged to be of low importance if Federal nexus was slight or questionable, or if subsistence use was incidental and management intensity was negligible. For example, chum and pink salmon were deemed to be of low importance since these species are generally not heavily targeted by subsistence users in the Bristol Bay or Chignik areas. The designated importance of a species group in a specific location may be changed in future years due to emerging issues and concerns, or as other information becomes available.

Bristol Bay and Chignik Salmon Subsistence Fisheries Units

Because the workgroup rated Bristol Bay salmon as the most important subsistence fisheries unit for information needs, they focused effort on completing its framework and prioritization first, and then used this as a model for the Chignik salmon and Bristol Bay-Chignik non-salmon fisheries units. Although some minor differences were initially incorporated into the Chignik salmon framework during the first workshop, the workgroup resolved these during the second workshop and developed a single framework that was used for both salmon fisheries units (Figure 4). A total of 33 elements comprise the salmon planning framework: 3 goals, 7 objectives, and 23 information needs. The distribution of information needs was not balanced. Eight information needs were associated with Goal 1 (salmon populations), 10 with Goal 2 (subsistence uses), and 5 with Goal 3 (effective management). To correct for this imbalance,

Table 3. Perceived importance of subsistence fishery resources, grouped by fisheries unit, within Bristol Bay and Chignik areas. Fisheries units are arranged left to right, from most to least important. Resources are arranged alphabetically within groups of importance.

Bristol Bay Salmon	Chignik Salmon	Bristol Bay-Chignik Non-salmon Species
<i>Highly Important</i>		
Lake Clark sockeye	Clark River late-run sockeye	Bristol Bay rainbow trout
Togiak Chinook	Perryville coho	Lake Clark whitefish species
Togiak coho		Togiak Dolly Varden
Togiak sockeye		Togiak smelt species
<i>Moderately Important</i>		
Alagnak River sockeye	Clark River coho	Bristol Bay Arctic grayling
Eastside coho		Bristol Bay northern pike
Egegik sockeye		Chignik rainbow smelt
Igushik River sockeye		
Kulukak River Chinook, sockeye, coho		

ratings were adjusted using the structural adjust feature in Expert Choice to restore priorities to their intended proportion of weight.

Goals In assessing the three goals, several members felt that Goal 1 was of greatest importance because without the resource there would be no opportunity for use. However, others felt that Goal 2 was of equal or greater importance than understanding the resource because part of the mission of the Monitoring Program is to sustain subsistence fisheries. Most participants agreed that Goal 3 was of least importance because Federal subsistence fisheries in this area generally harvested very small portions of runs, particularly in comparison to commercial salmon fisheries. Overall, the group ranked Goal 1 as most important (56.5% of total weight), Goal 2 as second most important (33.7%), and Goal 3 as least important goal (9.9%; Figure 4).

Objectives Two basic research objectives were defined under Goal 1 (Figure 4). There was little discussion on prioritizing the two objectives. Participants agreed the most important one should be to “Determine spawning escapement needed to sustain subsistence fisheries” (37.4% of total weight), while the second most important was to “Characterize and define abundance, composition, and timing of salmon populations” (19.1%). An objective originally proposed for Goal 1, “Develop cost efficient technology, methods, and approaches for assessment”, was removed from the planning framework and raised to a regional principle for application to all studies (see page 13).

Three objectives were defined under Goal 2 (Figure 4). There was much debate on the importance of these objectives, particularly between the need for current fishery information versus that for describing trends in use patterns. Some participants felt it was most important to try to project future use trends to avoid overreacting to current problems and issues. However, others argued that predicting the future was too uncertain, so it was more important to ensure

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<u>GOAL</u>	<u>OBJECTIVE</u>	<u>INFORMATION NEED</u>
0.503 Sustain healthy salmon populations that support subsistence uses	0.344 Determine spawning escapement needed to sustain subsistence fisheries	0.165 Obtain reliable estimates of spawning escapement over time
		0.063 Describe relationship between escapement and production including smolt production
		0.058 Identify critical factors that affect population dynamics including effects of restoration and enhancement on wild stocks
		0.037 Determine quantity of salmon by river/lake system needed to sustain ecosystem functions
		0.021 Relate historic salmon harvest to current productivity levels of river/lake systems
	0.159 Characterize and define abundance, composition, and timing of salmon populations	0.077 Estimate abundance of total run by species and river/lake system
0.299 Document subsistence uses	0.120 Document the current fishery	0.055 Determine adult timing and migration patterns by stock, size, and age
		0.027 Define and catalog management units that sustain subsistence fisheries
		0.081 Annually estimate subsistence harvest effort by location, type, species, and date
		0.039 Independently verify permit data
	0.115 Identify and describe trends in past and present use patterns	0.036 Estimate historic harvest levels and effort, and evaluate trends and data quality
		0.031 Identify and evaluate factors affecting subsistence uses
		0.018 Document changes in harvest timing and factors influencing it
		0.016 Describe current and historic fish processing and distribution practices including sharing, barter, and trade
0.198 Effective management to provide for subsistence uses	0.064 Project future use patterns	0.014 Describe historic and current harvest methods and means by species and area
		0.024 Gather local perspectives on future use patterns
		0.030 Evaluate key factors influencing future use patterns
		0.010 Build process based models to predict future use patterns
	0.113 Develop and evaluate management strategies to provide for subsistence fisheries	0.047 Evaluate usefulness and effectiveness of current regulations
		0.039 Develop information sharing between stakeholders and agencies
		0.027 Examine alternative management strategies
	0.085 Assess impacts of other fisheries on subsistence fisheries	0.051 Describe socioeconomic and cultural impacts of other fisheries
		0.034 Describe total harvest rates by fishery for specific stocks of interest

Figure 4. Framework of goals, objectives and information needs, including adjusted weights of importance, Bristol Bay and Chignik salmon subsistence fisheries units, 2005.

that past and present information on use is available. Overall, the group rated “Document the current fishery” as the most important objective (13.4% of total weight), “Identify and describe trends in past and present use patterns” as a close second (12.9%), and “Project future use patterns” as least important (7.3%).

Two objectives were defined under Goal 3 (Figure 4). Opinions differed on whether it was more important to assess impacts of other fisheries on subsistence uses or to develop strategies for managing subsistence fisheries. Overall, the group decided that to “Develop and evaluate management strategies for subsistence fisheries” was of somewhat greater importance (5.6% of total weight) than to “Assess impacts of other fisheries on subsistence fisheries” (4.3%; Figure 4). The concept of alternative management paradigms for sustaining salmon systems was also discussed at length. Some participants were concerned the current focus of management was based on short time frames that would not ensure sustainability of salmon populations over long time periods. Salmon have been commercially harvested within Bristol Bay for over a century, with some river/lake systems having well over 50% of the returning population harvested some years. While this level of exploitation does not appear to impact sustainability of these salmon fisheries, some participants are concerned that these fisheries, by preventing large quantities of marine-derived nutrients from reaching freshwater systems, could have long-term detrimental consequences for freshwater and terrestrial ecosystems. Such impacts may be difficult to detect due to natural variability, and may not be readily apparent. To develop alternative management paradigms, a synthesis of the current state of knowledge regarding salmon management is needed along with information on levels of salmon harvest by river/lake system needed to sustain ecological functions, factors influencing salmon productivity, and transfer of nutrients between coastal watersheds and the marine environment. The group concluded that alternative management paradigms are policy-level decisions that would be best addressed at a statewide level, although studies providing information that could contribute to development of new management systems are appropriately funded within the Bristol Bay and Chignik areas. The workgroup also recognized that such efforts would be difficult to fund if they had to compete with proposals to conduct basic assessment and monitoring work. Therefore, they suggested that either a portion of existing Monitoring Program funds be set aside to specifically fund alternative management paradigm work, or that additional funds be sought for these efforts.

Information Needs Synthesis of information need priorities was conducted at two levels: within individual goals, and across the entire framework. At the individual goal level, information need priorities can be examined within three specific areas of study: assessment of fish populations, monitoring of subsistence fisheries, and evaluation of management actions. These results could be helpful in coordinating efforts with other programs or allocating resources among these three areas of study. At the framework level, information needs can be examined for the entire Monitoring Program. These results will be used to direct and focus future calls for Monitoring Program study proposals.

In discussing the information needs under Goal 1, discussion occurred on potential effects on wild stock production of rehabilitation efforts for Kametolook River coho salmon. The workgroup agreed such effects could be studied as part of the information need to, “Identify critical physical, biological and human factors that affect wild salmon population dynamics”.

For Goal 1, the top three information needs (Figure 5) are:

- Obtain reliable estimates of spawning escapement over time
- Estimate abundance of total run by species and river/lake system
- Describe relationship between escapement and production including smolt production

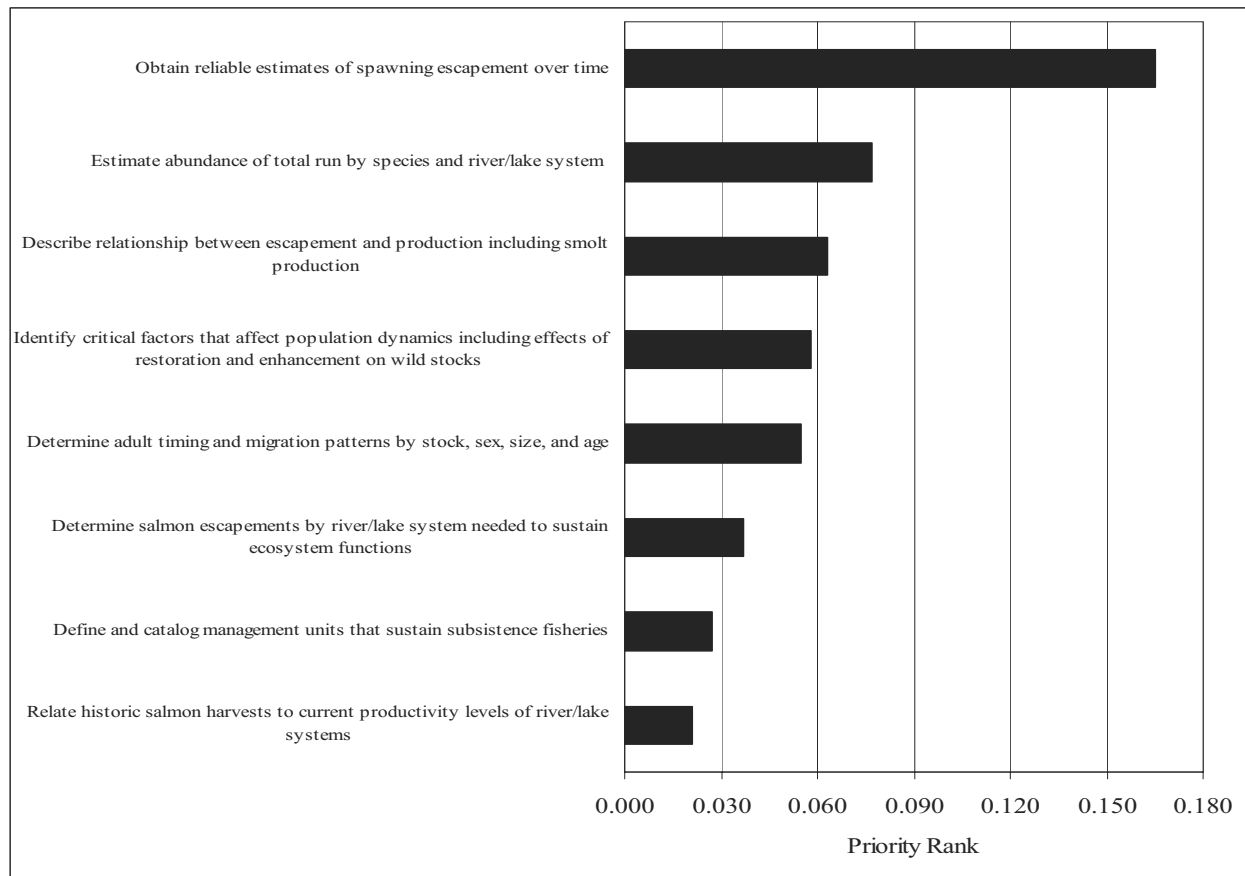


Figure 5. Structurally adjusted importance of the eight information needs for Goal 1 of the Bristol Bay and Chignik salmon fisheries units planning framework: Sustain healthy salmon populations that support subsistence uses.

For Goal 2, the top three information needs (Figure 6) are:

- Annually estimate subsistence harvest and effort by location, gear type, species, and date
- Independently verify permit data
- Estimate historic harvest levels and effort, and evaluate trends and data quality

For Goal 3, the top three information needs (Figure 7) are:

- Describe socioeconomic and cultural impacts of other fisheries
- Evaluate usefulness and effectiveness of current regulations
- Develop information sharing between stakeholders and agencies

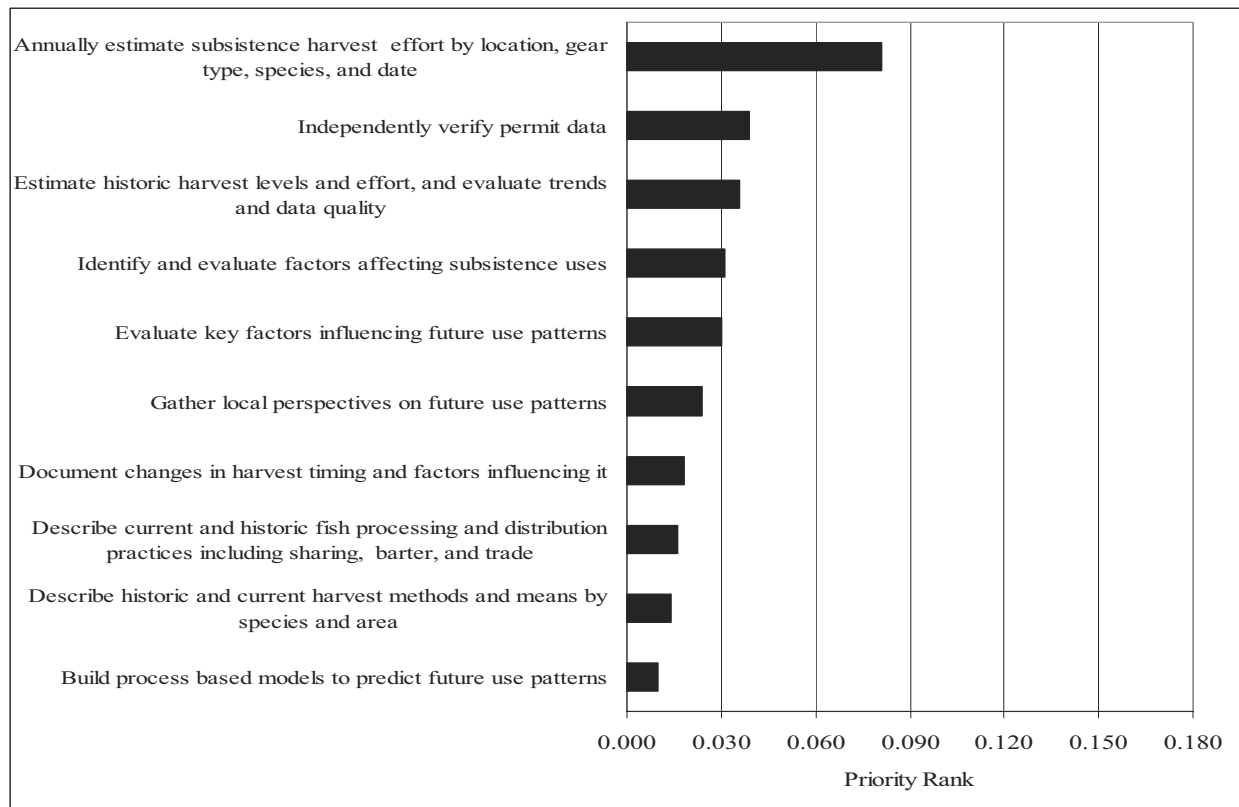


Figure 6. Structurally adjusted importance of the 10 information needs for Goal 2 of the Bristol Bay and Chignik salmon fisheries units planning framework: Document subsistence uses.

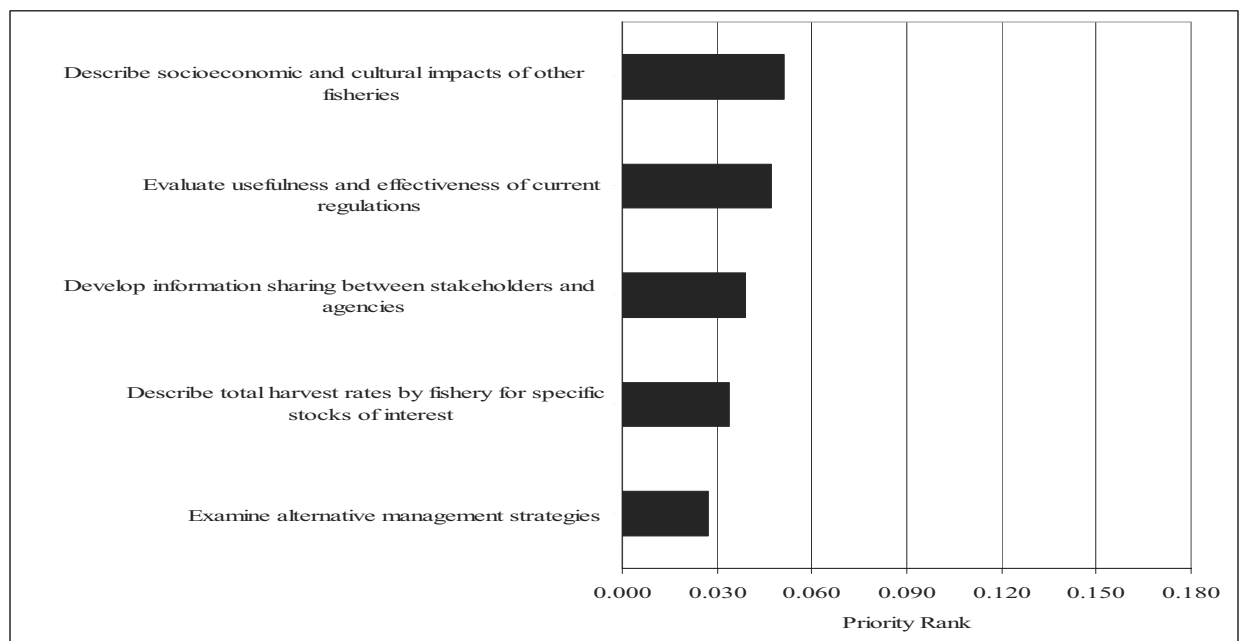


Figure 7. Structurally adjusted importance of the five information needs for Goal 3 of the Bristol Bay and Chignik salmon fisheries units planning framework: Effective management to provide for subsistence uses.

For the entire framework, the top third of information needs (Figure 8) are:

- Obtain reliable estimates of spawning escapement over time (Goal 1)
- Estimate abundance of total run by species and river/lake system (Goal 1)
- Annually estimate subsistence harvest and effort by location, gear type, species, and date (Goal 2)
- Describe relationship between escapement and production including smolt production (Goal 1)
- Determine adult timing and migration patterns by stock, sex, size, and age (Goal 1)
- Identify critical factors that affect population dynamics including effects of restoration and enhancement on wild stocks (Goal 1)
- Independently verify permit data (Goal 2)
- Estimate historic harvest levels and effort, and evaluate trends and data quality (Goal 2)

Public and Council comments largely agreed with priorities identified by the workgroup. The top third of information needs reflect the highest priorities within each goal, particularly the need to obtain information to sustain salmon populations (Goal 1) and the need to document subsistence fisheries (Goal 2). The lowest priority information needs either largely come from Goal 3, or are information needs the workgroup did not rate as priorities during the 3-5 year planning horizon. The middle-ranked information needs are all close in scale.

Bristol Bay-Chignik Non-salmon Species Subsistence Fisheries Unit

Workgroup members thought this fisheries unit required less intensive management than the Bristol Bay and Chignik salmon subsistence fishery units since none of the non-salmon species are commercially harvested and only a few are the target of sport as well as subsistence fisheries. Therefore, participants felt this fisheries unit was of lesser importance than either of the salmon units and also did not think there was a pressing need for annual collection of most information. A total of 26 elements comprise the non-salmon planning framework: 3 goals, 6 objectives, and 17 information needs (Figure 9). The distribution of information needs was not balanced. Six information needs were associated with Goal 1 (fish populations), 8 with Goal 2 (subsistence uses), and 5 with Goal 3 (effective management). To correct for this imbalance, ratings were adjusted using the structural adjust feature in Expert Choice to restore priorities to their intended proportion of weight.

Goals In assessing the three goals, members felt that Goal 1 was of greatest importance because for most non-salmon species basic information on life history, population structure, abundance, and dynamics is lacking. Goal 2 was only rated somewhat less important than understanding the resource because historic subsistence harvest levels and trends for most non-salmon species have been well documented for Bristol Bay and Chignik communities. Participants agreed that Goal 3 was of lesser importance because Federal subsistence fisheries in this area generally seemed to harvest small portions of populations, non-salmon species were not commercially harvested, and only a few species were targeted by sport fisheries. Overall, the group ranked Goal 1 as most important (42.1% of total weight), Goal 2 as slightly less important (35.4%), and Goal 3 as least important (22.5%; Figure 9).

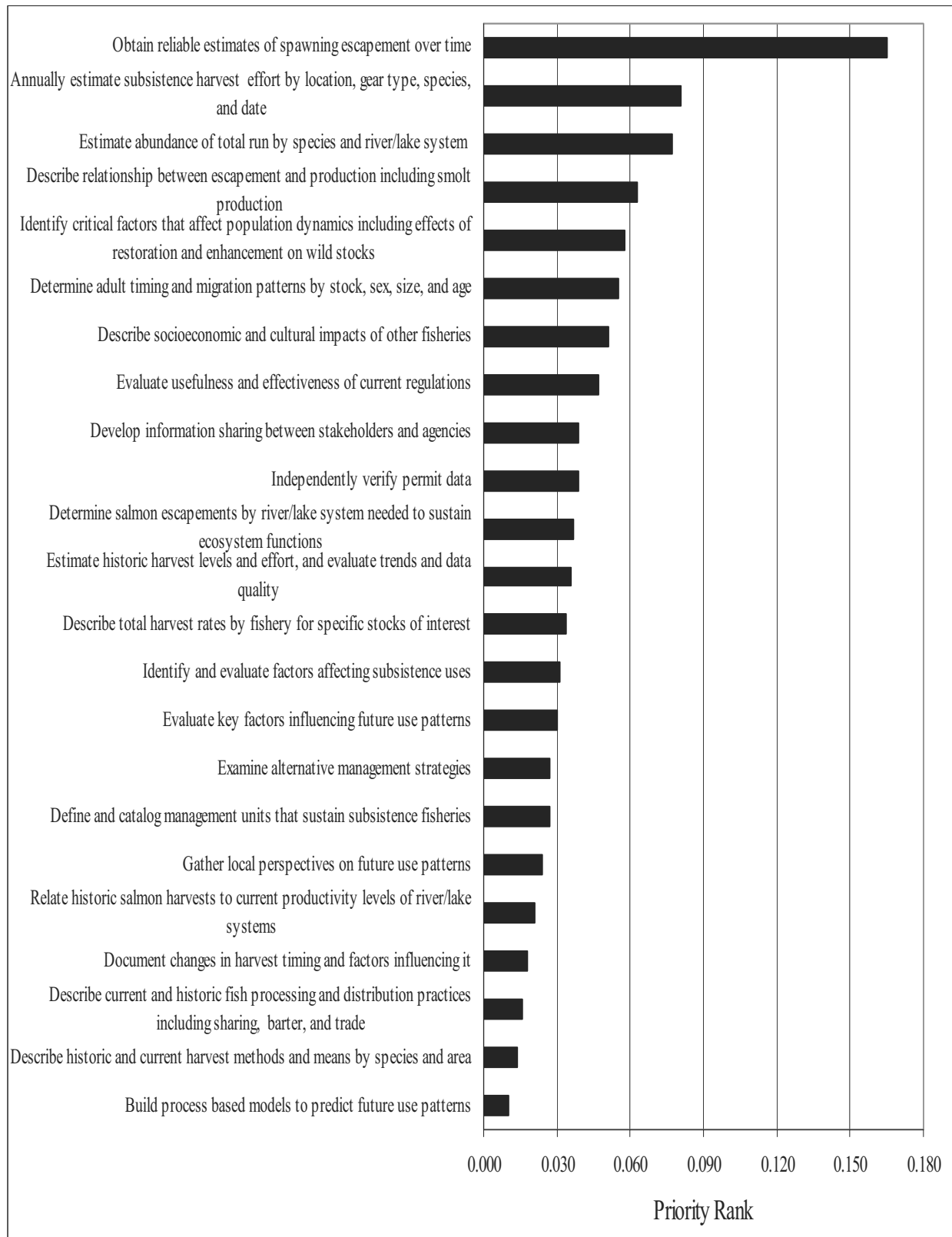


Figure 8. Structurally adjusted importance of all 23 information needs within the Bristol Bay and Chignik salmon fisheries units planning framework.

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<u>GOAL</u>	<u>OBJECTIVE</u>	<u>INFORMATION NEED</u>
0.267 Sustain healthy fish populations that support subsistence uses	0.267 Characterize life history, population structure and dynamics, and estimate abundance	0.078 Estimate abundance and composition by species and river/lake system
		0.071 Identify critical factors that influence population dynamics
		0.060 Describe trends in populations
		0.036 Determine timing and migration patterns
		0.022 Define and catalog management units that sustain subsistence fisheries
0.448 Document subsistence uses	0.330 Identify past and present use patterns	0.079 Periodically (about five year intervals) estimate harvest and effort by location, gear type, species, and season
		0.077 Estimate historic harvest levels and identify trends
		0.069 Identify factors affecting subsistence uses
		0.057 Describe historic and current harvest methods and means by species, area, and time
		0.048 Describe current and historic fish processing and distribution practices including sharing, barter, and trade
	0.118 Project future use patterns	0.050 Gather local perspectives on future use patterns
		0.046 Evaluate key factors influencing future use patterns
		0.022 Build process based models to predict future use patterns
0.285 Effective management to provide for subsistence uses	0.122 Develop and evaluate management strategies to provide for subsistence fisheries	0.038 Develop information sharing between stakeholders and agencies
		0.032 Determine whether current regulations are providing for adequate subsistence opportunities and harvests
		0.028 Examine alternative management strategies
		0.024 Determine compliance and support for current regulations
	0.163 Assess impacts of other fisheries on subsistence fisheries	0.086 Describe socioeconomic and cultural impacts of other fisheries
		0.077 Describe total harvest rates by fishery for specific stocks of interest

Figure 9. Framework of goals, objectives and information needs, including adjusted weights of importance, Bristol Bay-Chignik non-salmon species fisheries unit.

Objectives Only one research objective, “Characterize life history, population structure and dynamics, and estimate abundance”, was defined under Goal 1 (Figure 9). This information must be obtained to achieve the goal of sustaining healthy non-salmon fish populations that receive subsistence use.

Two objectives were defined under Goal 2 (Figure 9). The workgroup agreed that collection of information on present use patterns was very important, and most participants agreed that conducting these efforts on about a 5 year basis was sufficient for managing most non-salmon species. Participants agree that trying to predict future use was difficult and of lesser importance. Overall, the group rated “Identify past and present use patterns” as the most important objective (29.1% of total weight), and “Project future use patterns” as much less important (6.3%).

Two objectives were defined under Goal 3 (Figure 9). There was some discussion on whether it was more important to develop strategies for managing subsistence fisheries or to assess impacts of other fisheries on non-salmon species. However, it was recognized that while sport fishing has created cultural and socioeconomic issues with subsistence fishing, the major issue of catch-and-release mortality associated with sport fishing has been adequately addressed. Overall the group decided that to “Develop and evaluate management strategies to provide for subsistence fisheries” was somewhat greater importance (13.5% of total weight) than to “Assess impacts of other fisheries on subsistence fisheries” (9.0%).

Information Needs Synthesis of information needs priorities was again conducted at two levels: within individual goals, and across the entire framework. Prioritization at the framework level is of most importance to the Monitoring Program since these results will be used to direct and focus future study proposals.

For Goal 1, the top three information needs (Figure 10) are:

- Estimate abundance and composition by species and river/lake system
- Identify critical factors that influence population dynamics
- Describe trends in populations

For Goal 2, the top three information needs (Figure 11) are:

- Periodically (about 5 year intervals) estimate harvest and effort by location, gear type, species, and season
- Estimate historic harvest levels and identify trends
- Identify factors affecting subsistence uses

For Goal 3, the top three information needs (Figure 12) are:

- Describe socioeconomic and cultural impacts of other fisheries
- Describe total harvest rates by fishery for specific stocks of interest
- Develop information sharing between stakeholders and agencies

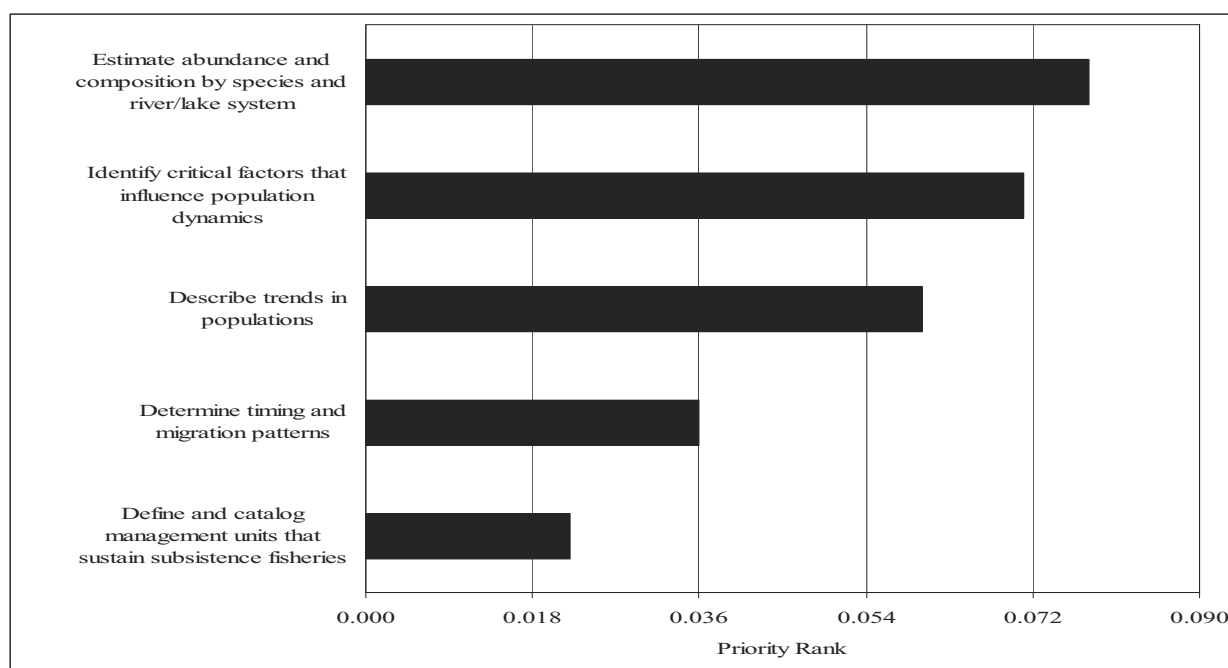


Figure 10. Structurally adjusted importance of the five information needs for Goal 1 of the Bristol Bay-Chignik non-salmon fisheries unit planning framework: Sustain healthy fish populations that support subsistence uses.

For the entire framework, the top third of information needs (Figure 13) are:

- Estimate abundance and composition by species and river/lake system (Goal 1)
- Identify critical factors that influence population dynamics (Goal 1)
- Describe trends in populations (Goal 1)
- Periodically (about 5 year intervals) estimate harvest and effort by location, gear type, species, and season (Goal 2)
- Estimate historic harvest levels and identify trends (Goal 2)
- Identify factors affecting subsistence uses (Goal 2)

Public and Council comments largely agreed with the priorities identified by the workgroup. The top third of information needs reflect the highest priorities within each goal, particularly the need to obtain information to sustain non-salmon populations (Goal 1) and the need to document subsistence fisheries (Goal 2). The lowest priority information needs either largely come from Goal 3, or are information needs the workgroup did not rate as priorities during the 3-5 year planning horizon. The middle-ranked information needs are all close in scale.

Comparison of Plan Framework to Existing Issue and Information Need Listings

The strategic plan developed by the workgroup overlaps many of the issues and information needs collected independently by Bristol Bay Native Association (BBNA; Appendix D) and developed by the Council (OSM 2004; Appendix E). Lists developed by BBNA and the Council also include some issues and information needs that are not associated with Federal subsistence management and that more appropriately deal with by land management agencies or other funding programs. For example, subsistence fisheries on the Nushagak, Naknek and Wood

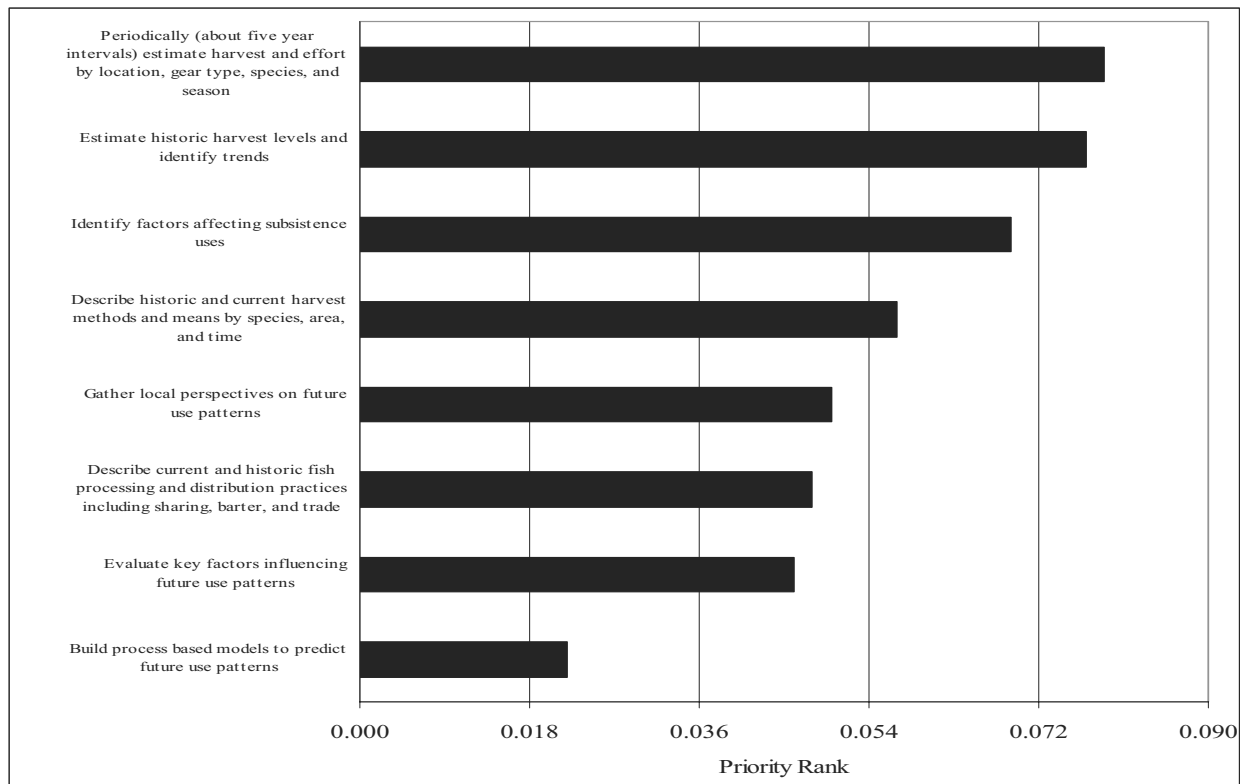


Figure 11. Structurally adjusted importance of the eight information needs for Goal 2 of the Bristol Bay-Chignik non-salmon fisheries unit planning framework: Document subsistence uses.

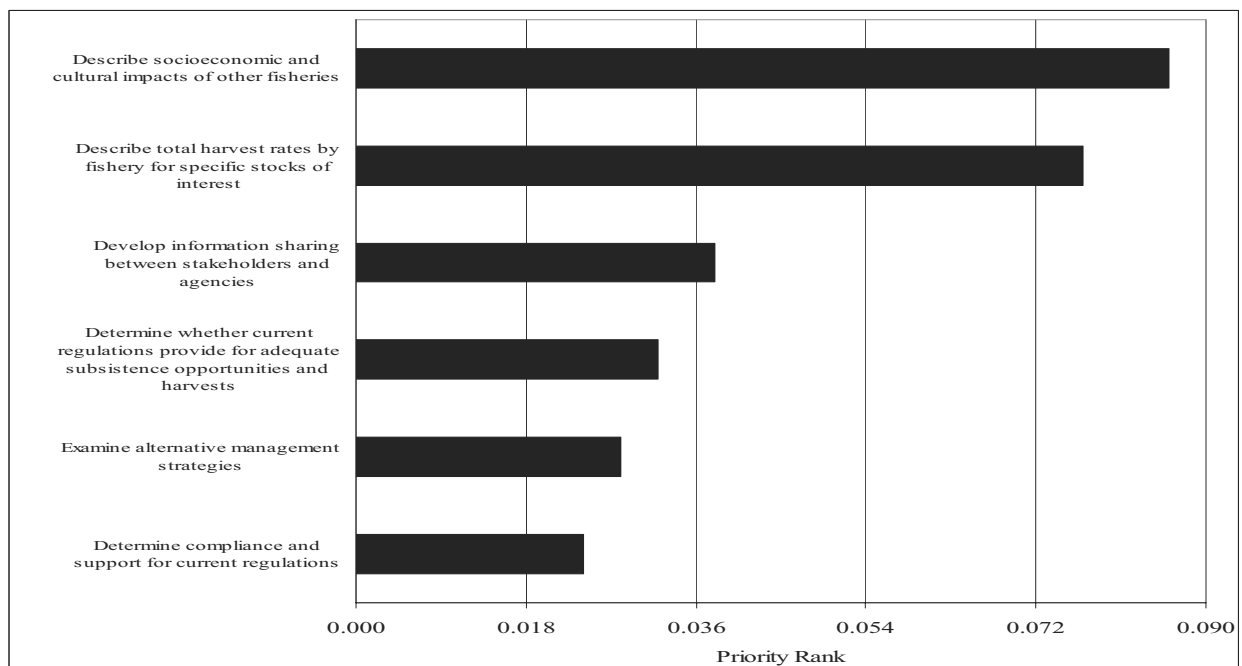


Figure 12. Structurally adjusted importance of the six information needs for Goal 3 of the Bristol Bay-Chignik non-salmon fisheries unit planning framework: Effective management to provide for subsistence uses.

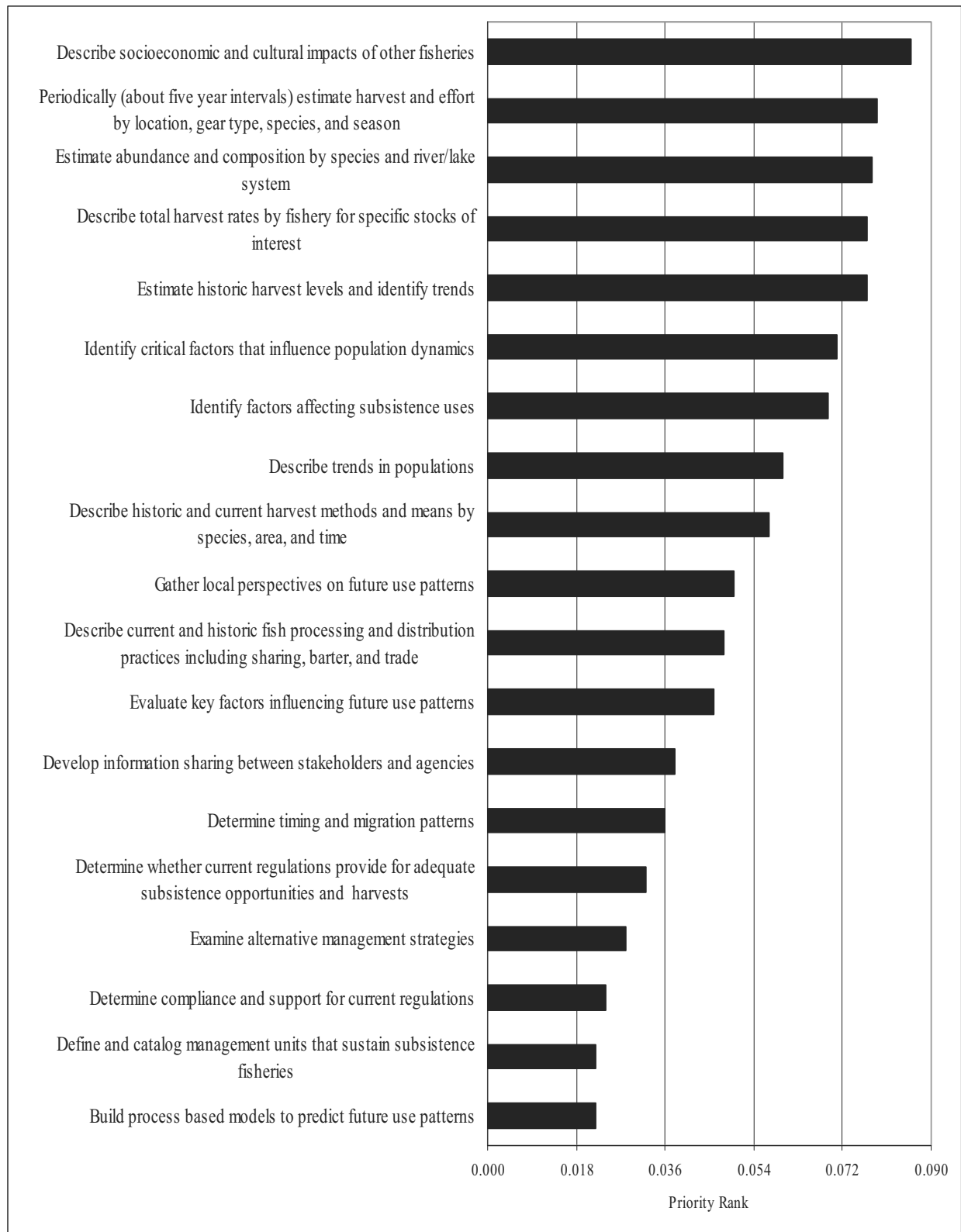


Figure 13. Structurally adjusted importance of all 19 information needs within the Bristol Bay-Chignik non-salmon fisheries unit planning framework.

rivers are entirely under state management control, while water quality and invasive species concerns are handled by state and federal programs outside OSM. BBNA has provided the Council with reports containing issues and information needs voiced by residents during village meetings and surveys, and the Council used these reports in developing and updating their issues and information needs list for the Monitoring Program.

All information needs on the Council's list that meet the requirement of Federal nexus are either explicitly or implicitly included within the Monitoring Program framework plan. For salmon, both the Council and workgroup identified similar resources of importance, including Lake Clark sockeye salmon, Perryville coho salmon, and Clark River late-run sockeye salmon; and, both expressed a similar need to improve assessment methods. While the Council voiced a general need to assess and monitor salmon stocks, the workgroup developed three specific information needs to address this issue: "Describe the relationship between escapement and production," "Relate historic harvest to current productivity", and "Identify critical factors that affect population dynamics". The Council's concerns regarding impacts of beluga whales, seals and beaver dams on salmon populations fit within the framework need of identifying critical factors affecting population dynamics.

For non-salmon species, both the Council and workgroup identified similar resources of importance, including Lake Clark whitefish and Togiak Dolly Varden. Again, while the Council included a general need to assess and monitor these resources, the workgroup developed more specific information needs concerning life history and population dynamics in addition to estimates of abundance and distribution.

Conversely, for both salmon and non-salmon species, the Council identified specific information needs concerning effects of catch and release sport fishing, jet boats, and commercial fishing on subsistence fishery resources and uses. The workgroup addressed these in a more general way at the population level, stating the need to "Identify critical factors that affect population dynamics", and at the fishery level, by including the need to "Assess impacts of other fisheries on subsistence fisheries". The Council and workgroup share similar concerns in documenting subsistence fishing activities, although the workgroup also identified a need to verify permit data and project future subsistence use patterns. Finally, the Council identified specific needs to document traditional ecological knowledge, while the workgroup viewed documentation and analysis of traditional knowledge as a valuable method that could be used to address information needs throughout the plan.

STUDY INVENTORY AND GAP ANALYSIS

The final phase of the strategic plan was the February 9-11 workshop where the workgroup completed study inventories and gap analyses for each fisheries unit.

METHODS

Participants

All but one of 19 participants scheduled to attend were present during the three-day February 2005 workshop (Appendix C). Most participants were the same ones that had attended the previous workshop. While the participant representing a local research group, Bristol Bay Science and Research Institute, was unable to attend, three Council members were present during most of the second workshop.

Study Inventory

A comprehensive inventory of all relevant studies, past and present, was drafted prior to the workshop for each information need. The workgroup provided a broad base of expertise to develop this inventory across organizations and funding sources. Several months prior to the second workshop, participants were asked to complete a spreadsheet template for their organization that summarized relevant studies for each information need by subsistence fishery unit. Requested information for each study included: study title, location, lead agency or organization, species addressed, summary of the specific activity, and study duration. FIS staff coalesced each participant's submission into a single spreadsheet, which was organized within the context of the plan framework at the information need level. FIS staff supplemented participant submissions with information on studies funded by the Monitoring Program as well as other relevant studies and publications found during searches on the Internet. At the February workshop, participants formed subgroups to review and edit the study inventory for each goal within each fisheries unit. Subgroup findings were discussed with the entire workgroup.

Gap Analysis

The study inventory provided the basis to conduct the gap analysis. FIS staff drafted an initial gap analysis prior to the workshop and provided this to all participants. At the workshop, participants formed subgroups to evaluate gaps in knowledge, review the draft gap analysis, and make recommendations. Subgroup evaluations and recommendations were presented to the entire workgroup for further consideration and final refinement. The workgroup made two assessments for each information need within the gap analysis. Using the study inventory, they first summarized the current state of knowledge for each information need. Second, they provided recommendations of what action should be taken to address each information need. Standardized responses were developed for each assessment to clarify both what is known and what needs to be done for subsistence fisheries management and assessment. For the draft gap analysis, three categories were used to summarize the current state of knowledge for each information need ("adequately addressed", "partially addressed", and "inadequately or not addressed"), and three standardized responses were used to describe what needs to be done: "action not needed to maintain or improve information", "action may be needed to maintain or improve information", and "action is needed to obtain information"; Appendix F). For example, while an information need may be judged to be adequately addressed, action is needed because there is an annual need for this information and funding has not been secured for 2007 and beyond. Conversely, while an information need may be inadequately or not addressed, action is not needed because existing methods cannot be successfully applied or results of studies that will provide this information are still pending.

In preparing the final strategic plan, standardized responses were modified to more clearly portray their meaning and intent (Table 4 and Appendix F). The current state of knowledge was more simply described as “adequate” (equivalent to “adequately addressed”), “incomplete” (equivalent to “partially addressed”), or “lacking” (equivalent to “inadequately or not addressed”). Responses to what needs to be done were more clearly stated to reflect the action to be taken as either “do not consider proposals” (equivalent to “action not needed to maintain or improve information”) or “consider proposals” (equivalent to “action is needed to obtain information”). The initial standard response of “action may be needed to maintain or improve information” was felt to be too ambiguous to provide guidance for the Monitoring Program, so the action to be taken for these information needs was changed to “consider proposals”. Associated definitions were also slightly modified, but care was taken to retain the intent of workshop results. To ensure that no changes were inadvertently made and that responses were still accurately depicted, a draft of this report was reviewed by all workshop participants.

RESULTS AND DISCUSSION

Bristol Bay and Chignik Salmon Subsistence Fisheries Units

For the Bristol Bay and Chignik salmon fisheries units, the workgroup identified a total of 138 unique studies that have relevance to information needs identified in the strategic plan (Appendix G). Some studies pertain to an information need at a specific location for a single species (study 1: “Escapement estimation for Ugashik River drainage” for sockeye salmon), while others have general relevance to all salmon species on a larger scale (study 57: “NPAFC salmon tagging” for all salmon species). Several studies address more than one information need, and 29 studies address information needs under two or three goals. Studies are not evenly distributed among information needs. No studies were identified for any of the information needs under Goal 2 (“Document subsistence uses”) for Objective C (“Project future use patterns”). About 72% of the 138 studies (99) relate to Goal 1, which contains 35% (8) of the 23 information needs; about 18% of the studies (25) relate to Goal 2, which contains 43% (10) of the information needs; and about 33% of the studies (46) relate to Goal 3, which contains 22% (5) of the information needs.

Using the information from the study inventory, the workgroup identified knowledge gaps for Federal management of Bristol Bay and Chignik salmon subsistence fisheries (Table 5 and Appendix H). Of the 23 information needs identified for the Bristol Bay and Chignik salmon subsistence fisheries units, the workgroup judged the state of knowledge to be “adequate” for only five, and for two of those five information needs, knowledge was judged to be “adequate” only for Bristol Bay sockeye salmon. For most information needs, the state of knowledge was judged to be “incomplete”. However, for seven information needs, the state of knowledge was judged to be “lacking” for one or more species: two under Goal 1 (“Describe relationship between escapement and production” for Bristol Bay coho and Chinook salmon; “Relate historic salmon harvest to current productivity of river/lake systems” for Bristol Bay coho and Chinook salmon and Chignik sockeye and coho salmon), three under Goal 2 (“Gather local perspectives on future use patterns”, Evaluate key factors influencing future use patterns”, and “Build process based models to predict future use patterns” for both Bristol Bay and Chignik), and two under Goal 3 (“Describe socioeconomic and cultural impacts of other fisheries” and “describe total harvest rates by fishery for specific stocks of interest” for Chignik)

Table 4. Standardized responses for assessments by information need, Bristol Bay-Chignik gap analysis.

Current state of knowledge	What needs to be done?
<p>Knowledge is adequate</p> <p>Situation: There is little uncertainty regarding this information need. The existing program provides sufficiently accurate and timely information to give meaningful guidance to managers.</p>	<p>Do not consider proposals</p> <p>Reason: Studies that effectively address this need are in place or have been completed. Funding is committed and adequate through the next funding cycle.</p> <p>Consider proposals</p> <p>Reason: Continued information collection is needed, but funding is not committed or is inadequate to address this information need through the next funding cycle.</p>
<p>Knowledge is incomplete</p> <p>Situation: There is some uncertainty regarding this information need. The existing program provides some useful information; however, information may need to be updated or existing studies may need to be improved to give better guidance to managers.</p>	<p>Do not consider proposals</p> <p>Reason: Studies that acceptably address this need are either in place or have been completed. Funding is committed and adequate through the next funding cycle. While improvements may be possible, circumstances do not warrant additional studies.</p> <p>Consider proposals</p> <p>Reason: Funding is not committed or is inadequate to address this information need through the next funding cycle. Circumstances warrant improvement of existing studies or conduct of additional studies to increase knowledge.</p>
<p>Knowledge is lacking</p> <p>Situation: There is much uncertainty regarding this information need. The existing program provides little or no information. Few, if any, studies have been conducted; or study results are inadequate to give meaningful guidance to managers.</p>	<p>Do not consider proposals</p> <p>Reason: While there is a lack of information, it is either highly unlikely existing methods can be successfully applied, or circumstances do not warrant additional studies.</p> <p>Consider proposals</p> <p>Reason: Funding is not committed or is inadequate to address this information need through the next funding cycle. Circumstances warrant improvement of existing studies or conduct of additional studies to increase knowledge.</p>

Following assessment of knowledge gaps for each information need, proposals could be considered for 16 Bristol Bay and 18 Chignik information needs for 2007 (Table 5). Although the state of knowledge was judged to be “adequate” for some of these information needs, for example, “Obtain reliable estimates of spawning escapement” for Bristol Bay sockeye salmon, funds will be required to continue collecting some of this information after 2007. Conversely, when the state of knowledge was judged to be “incomplete” or “lacking” for an information need, the workgroup did not always recommend that proposals be considered. For example, the workgroup did not recommend considering proposals to obtain information needed to “Relate historic salmon harvest to current productivity of river/lake systems” for Bristol Bay sockeye salmon, although the state of knowledge is judged to be “incomplete”. This recommendation was made because analysis of lake sediment cores from Becharof, and Ugashik lakes indicated that sockeye salmon abundance fluctuations over the last 300 years appeared to be influenced more by decadal climatic variability than harvests, and additional core samples taken from Lake Clark, Becharof and Ugashik lakes have not yet been analyzed.

Gap analysis results were used in conjunction with importance ranking of information needs to identify the highest strategic priorities for the Bristol Bay and Chignik salmon fisheries units (Figures 14 and 15). Results for both salmon fisheries units were very similar, and proposal solicitation for 2007 could be focused on the top half of the 16 to 18 information needs within each fisheries unit for which proposals could be considered. These eight or nine information needs would account for about 53% of the structurally adjusted total weight of information needs within each of the salmon fisheries units.

Bristol Bay-Chignik Non-salmon Species

For the Bristol Bay-Chignik non-salmon species subsistence fishery unit, the workgroup identified a total of 94 unique studies that have relevance to information needs identified in the strategic plan (Appendix I). As was noted for the salmon fisheries units, some studies pertain to an information need at a specific location for a single species (study 4: “Tazimina River rainbow trout assessment”), while others have general relevance to many species at a larger scale (study 22: “Electrofishing induced mortality and injury to rainbow trout, Arctic grayling, humpback whitefish, least cisco, and northern pike”). Several studies address more than one information need, and 20 studies address information needs under two goals. Studies are not evenly distributed among information needs. No studies were identified for any of the information needs under Goal 2 (“Document subsistence uses”) for Objective B (“Project future use patterns”). About 45% of the 93 studies (42) relate to Goal 1, which contains 26% (5) of the 19 information needs; about 37% of the studies (35) relate to Goal 2, which contains 42% (8) of the information needs; and about 39% of the studies (37) relate to Goal 3, which contains 32% (6) of the information needs.

Using information from the study inventory, the workgroup identified knowledge gaps for Federal management of Bristol Bay-Chignik non-salmon species subsistence fisheries (Table 6; Appendix J). Of the 19 information needs identified for the Bristol Bay-Chignik non-salmon species subsistence fishery unit, the workgroup judged the state of knowledge to be “adequate” for only four, and for two of those four information needs, knowledge was judged to be “adequate” only for Bristol Bay rainbow trout. For most information needs, the state of knowledge was judged to be “incomplete”. However, for eight information needs, the state of

Table 5. Summary of state of knowledge (gap analysis) and decisions on whether to consider Monitoring Program study proposals for Bristol Bay (BB) and Chignik (C) salmon fisheries unit information needs. Chinook salmon were not considered an important subsistence species for the Chignik area, so proposal consideration is not applicable (N/A) there for this species. Decisions on whether to consider proposals will be used for 2007 Request for Proposals, but may be changed in succeeding years based on gap analysis reassessment.

Information Need	State of Knowledge			Consider Proposals	
	Adequate	Incomplete	Lacking	BB	C
1A1. Obtain reliable estimates of spawning escapement					
sockeye salmon	BB	C		No	Yes
coho salmon		BB&C		Yes	Yes
Chinook salmon		BB		Yes	N/A
1A2. Describe relationship between escapement and production					
sockeye salmon		BB&C		Yes	No
coho salmon		C	BB	Yes	Yes
Chinook salmon			BB	Yes	N/A
1A3. Identify critical factors that affect population dynamics					
sockeye salmon		BB&C		Yes	No
coho salmon		BB&C		Yes	Yes
Chinook salmon		BB		Yes	N/A
1A4. Determine the quantity of salmon by river/lake system that should be allowed to escape to sustain ecosystem functions		BB&C		Yes	Yes
1A5. Relate historic salmon harvest to current productivity of river/lake systems					
sockeye salmon		BB	C	No	Yes
coho salmon			BB&C	Yes	Yes
Chinook salmon			BB	Yes	N/A
1B1. Estimate abundance of total run by species and river/lake system					
sockeye salmon		BB&C		Yes	No
coho salmon		BB&C		No	No
Chinook salmon		BB		No	N/A
1B2. Determine adult timing and migration patterns by stock, sex, size, and age					
sockeye salmon	BB&C			No	No
coho salmon		BB&C		Yes	No
Chinook salmon		BB		Yes	N/A

-continued-

Table 5. Continued.

Information Need	State of Knowledge			Consider Proposals	
	Adequate	Incomplete	Lacking	BB	C
1B3. Define and catalog management units that sustain subsistence fisheries	BB&C			No	No
2A1. Annually estimate subsistence harvest effort by location, gear type, and date	BB&C			No	No
2A2. Independently verify permit data		BB&C		Yes	Yes
2B1. Estimate historic harvest levels and effort, and evaluate trends and data quality		BB&C		Yes	Yes
2B2. Identify and evaluate factors affecting subsistence uses		BB&C		Yes	Yes
2B3. Document changes in harvest timing and factors influencing it		BB&C		Yes	Yes
2B4. Describe current and historic fish processing and distribution practices including sharing, barter, and trade		BB&C		No	Yes
2B5. Describe historical and current harvest methods and means by species and area	BB	C		No	Yes
2C1. Gather local perspectives on future use patterns			BB&C	Yes	Yes
2C2. Evaluate key factors influencing future use patterns			BB&C	Yes	Yes
2C3. Build process based models to predict future use patterns			BB&C	No	No
3A1. Evaluate usefulness and effectiveness of current regulations		BB&C		No	Yes
3A2. Develop information sharing between stakeholders and agencies		BB&C		Yes	Yes
3A3. Evaluate alternative management strategies		BB&C		Yes	Yes
3B1. Describe socioeconomic and cultural impacts of other fisheries		BB	C	No	Yes
3B2. Describe total harvest rates by fishery for specific stocks of interest		BB	C	Yes	Yes

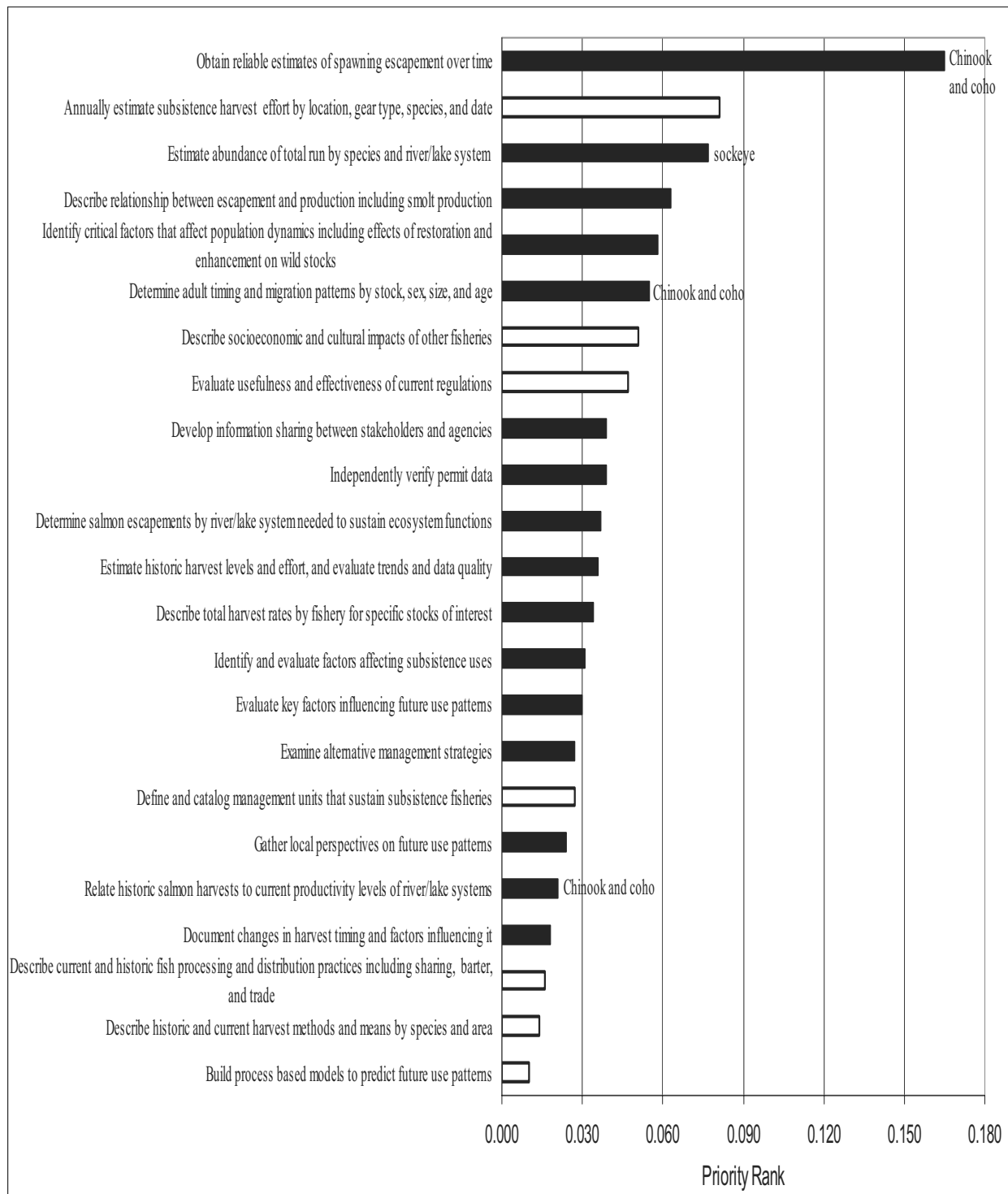


Figure 14. Gap analysis results showing information needs for which proposals should either be considered (black bars) or not considered (open bars) for the structurally adjusted Bristol Bay salmon fisheries unit planning framework. Decisions on whether to consider proposals will be used for 2007 Request for Proposals, but may be changed in succeeding years based on gap analysis reassessment. Proposals for sockeye, Chinook, and coho salmon will be considered, unless fewer species are shown next to a bar. See Table 1 for the most important stocks to study.

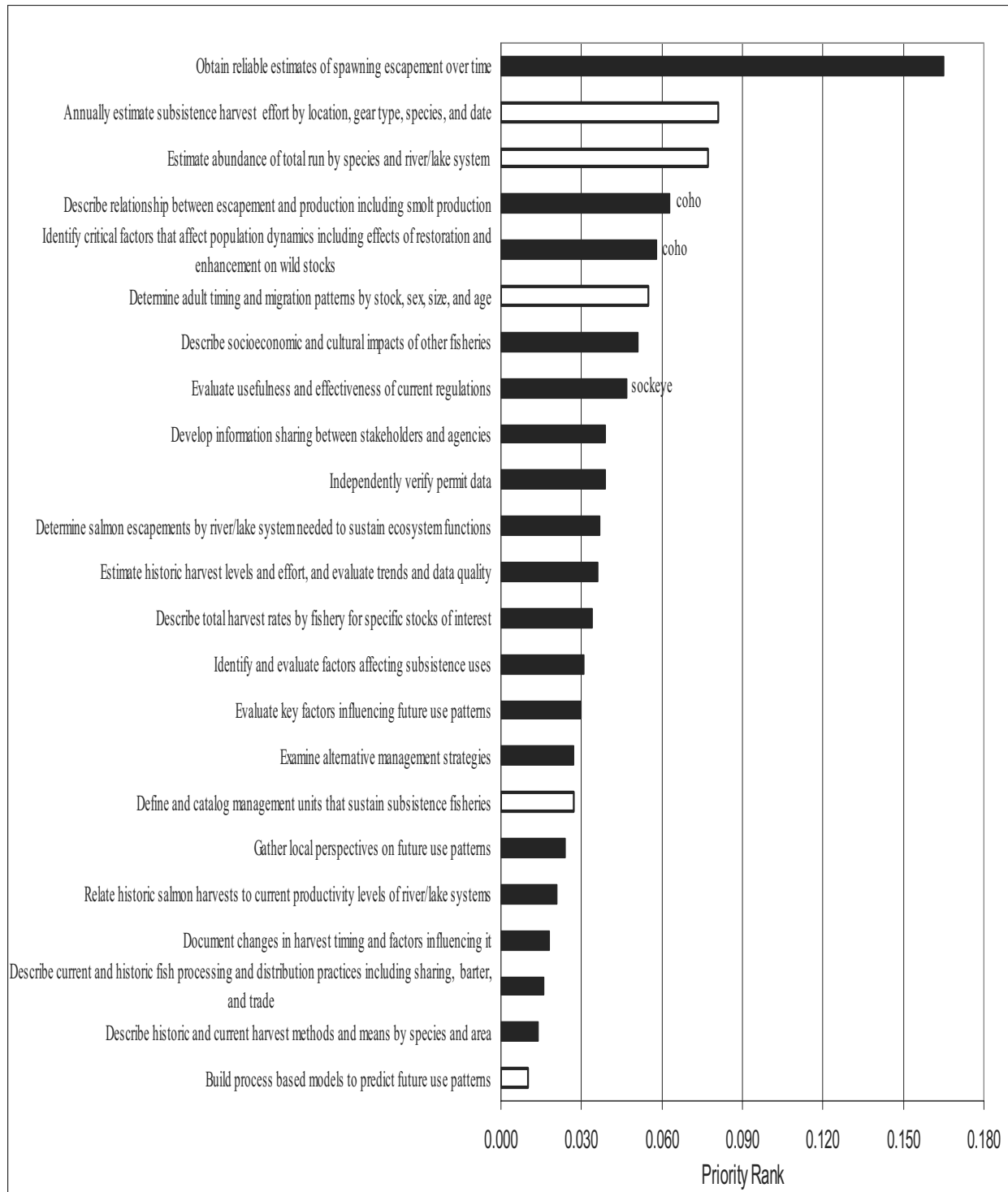


Figure 15. Gap analysis results showing information needs for which proposals should either be considered (black bars) or not considered (open bars) for the structurally adjusted Chignik salmon fisheries unit planning framework. Decisions on whether to consider proposals will be used for 2007 Request for Proposals, but may be changed in succeeding years based on gap analysis reassessment. Proposals for sockeye, Chinook, and coho salmon will be considered, unless fewer species are shown next to a bar. See Table 1 for the most important stocks to study.

Table 6. Summary of state of knowledge (gap analysis) and decisions on whether to consider Monitoring Program study proposals for Bristol Bay-Chignik non-salmon fisheries unit information needs. Decisions on whether to consider proposals will be used for 2007 Request for Proposals, but may be changed in succeeding years based on gap analysis reassessment.

Information Need	State of Knowledge			Consider Proposals
	Adequate	Incomplete	Lacking	
1A1. Estimate abundance and composition by species and river/lake system				
Arctic grayling		X		Yes
northern pike and smelt			X	Yes
rainbow trout				No
Dolly Varden		X		No
whitefish			X	No
1A2. Define and catalog management units that sustain subsistence fisheries				
Dolly Varden		X		Yes
rainbow trout	X			No
Arctic grayling		X		No
whitefish, northern pike, and smelt			X	No
1A3. Identify critical factors that affect population dynamics			X	Yes
1A4. Determine timing and migration patterns				
rainbow trout		X		Yes
Arctic grayling, northern pike, and smelt			X	Yes
Dolly Varden		X		No
whitefish			X	No
1A5. Describe trends in populations				
Arctic grayling		X		Yes
northern pike and smelt			X	Yes
rainbow trout and Dolly Varden		X		No
whitefish			X	No
2A1. Periodically (about five year intervals) estimate harvest and effort by location, gear type, species, and season		X		Yes
2A2. Estimate historic harvest levels and identify trends		X		Yes
2A3. Identify factors affecting subsistence uses		X		No
2A4. Describe historic and current harvest methods and means by species, area, and time		X		No

-continued-

Table 6. Continued.

Information Need	State of Knowledge			Consider Proposals
	Adequate	Incomplete	Lacking	
2A5. Describe current and historic fish processing and distribution practices including sharing, barter, and trade		X		No
2B1. Gather local perspectives on future use patterns			X	Yes
2B2. Evaluate key factors influencing future use patterns			X	Yes
2B3. Build process based models to predict future use patterns			X	No
3A1. Determine whether current regulations provide for subsistence opportunities and harvests		X		No
3A2. Develop information sharing between stakeholders and agencies		X		Yes
3A3. Evaluate alternative management strategies	X			No
3A4. Determine compliance and support for current regulations	X			No
3B1. Describe socioeconomic and cultural impacts of other fisheries		X		Yes
3B2. Describe total harvest rates by fishery for specific stocks of interest		X		No

knowledge was judged to be “lacking” for one or more species: all five under Goal 1 (mostly for northern pike, smelt, and whitefish), and three under Goal 2 (“Gather local perspectives on future use patterns”, Evaluate key factors influencing future use patterns”, and “Build process based models to predict future use patterns” for both Bristol Bay and Chignik).

Following assessment of knowledge gaps for each information need, proposals could be considered for 11 information needs for 2007 (Table 6). Similar to salmon, information needs judged to have an “adequate” state of knowledge were not recommended for proposal consideration in 2007, and not all information needs for which the state of knowledge was “incomplete” or “lacking” were recommended for proposal consideration. For example, the workgroup did not recommend considering proposals to obtain information needed to “Estimate abundance and composition by species and river/lake system” for whitefish, although the state of knowledge is judged to be “lacking”. This recommendation was made because results of a recently funded Monitoring Program study on humpback whitefish distribution, movement patterns, and age structure are needed before a study to estimate abundance can be properly designed. Gap analysis results were used in conjunction with importance ranking of information needs to identify the highest strategic priorities for the Bristol Bay-Chignik non-salmon fisheries unit (Figure 16). Proposal solicitation for 2007 could be focused on the top half of the 11 information needs for which proposals could be considered. These six information needs would account for about 45% of the structurally adjusted total weight of information needs

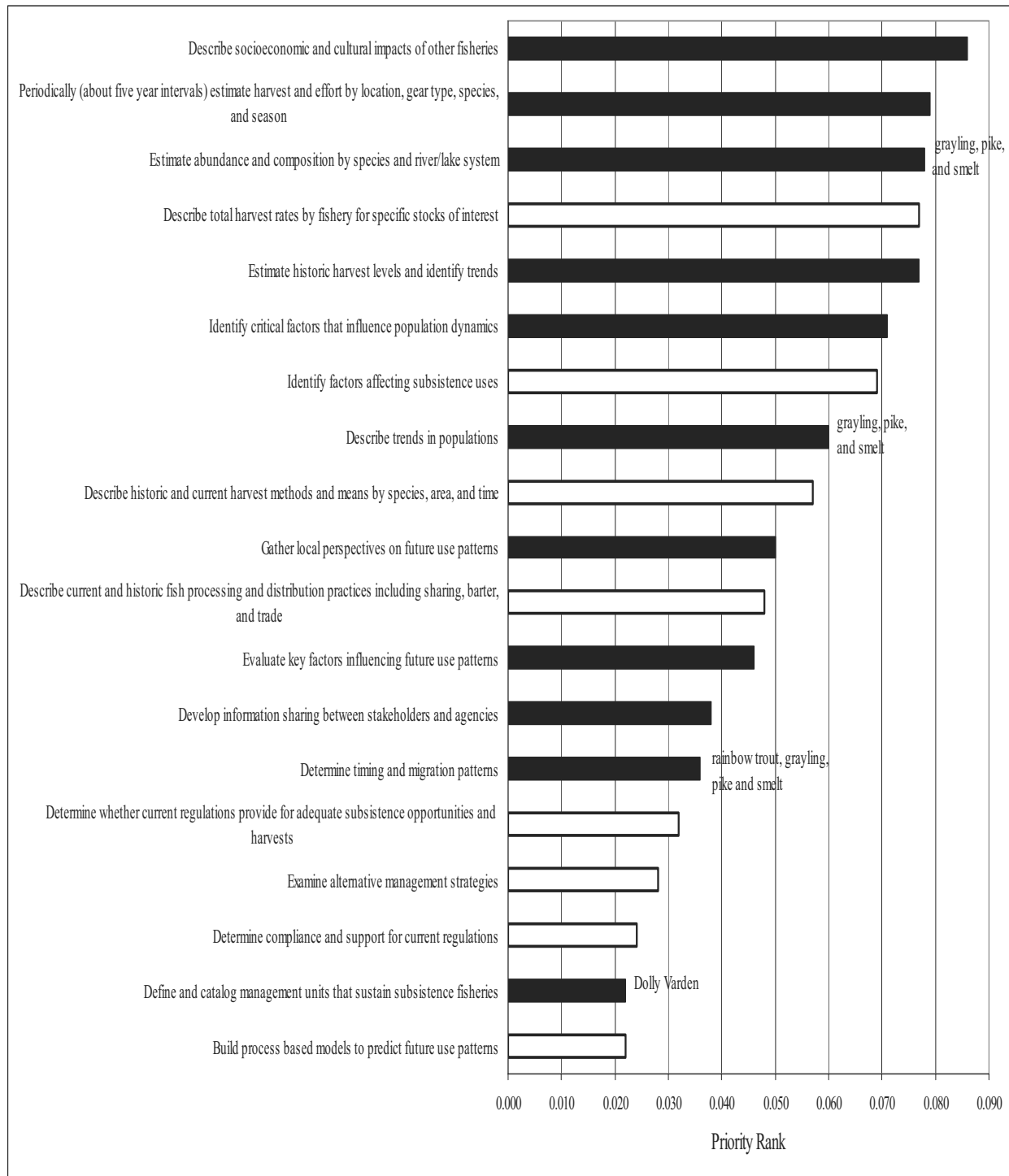


Figure 16. Gap analysis results showing information needs for which proposals should either be considered (black bars) or not considered (open bars) for the structurally adjusted Bristol Bay-Chignik non-salmon fisheries unit planning framework. Decisions on whether to consider proposals will be used for 2007 Request for Proposals, but may be changed in succeeding years based on gap analysis reassessment. Proposals for rainbow trout, whitefish species, Dolly Varden, smelt species, Arctic grayling, and northern pike will be considered, unless fewer species are shown next to a bar. See Table 1 for the most important stocks to study.

within this fisheries unit. However, differences among importance rankings for Bristol Bay-Chignik non-salmon fisheries unit information needs (range: 2.2% to 8.6% of total weight) were not as great as those for the salmon fisheries units (range: 1.0% to 16.5% of total weight).

CONCLUSIONS

The Bristol Bay-Chignik strategic planning process will help to ensure that the Monitoring Program remains focused on the highest priorities for management of Federal subsistence fisheries within this area during the 3-5 year plan horizon. The plan is envisioned as being dynamic in that the gap analysis will be updated annually, providing a timely mechanism to identify strategic priorities for information in each year's Annual Monitoring Plan. This strategic plan should provide an explicit and rigorously developed forum for researchers, the Technical Review Committee, the Council, and the Federal Subsistence Board to focus Monitoring Program funding towards the highest informational priorities in the Bristol Bay and Chignik areas.

Major achievements of the strategic planning process were:

- Identification and prioritization of three subsistence fisheries units including 17 species or species groups by river/lake system within these fisheries units
- Development of planning frameworks for all three fisheries units
- Prioritization of goals, objectives, and information needs for all three fisheries units
- Preparation of study inventories and formulation of gap analyses for all three fisheries units
- Construction of a prioritized list of information needs to guide Monitoring Program proposal consideration over the next 3-5 years for all three fisheries units

Additional results were:

- Development of a dialog among stakeholders, including government management agencies, government and private research organizations, regional Alaska Native and tribal organizations, and subsistence users
- Increased knowledge and awareness of research and management concerns fostered through facilitated discussions
- Training and experience in using a systematic approach to planning and problem-solving
- Recognition of the need to explore alternative subsistence fisheries management strategies and paradigms

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Appendix A. Letter from Tom Boyd, Assistant Regional Director, Office of Subsistence Management, outlining strategy to determine priority

Information needs for the Subsistence Fisheries Resource Monitoring Program, February 17, 2004.



OFFICE OF SUBSISTENCE MANAGEMENT



**3601 C Street, Suite 1030
Anchorage, Alaska 99503-6199**

STRATEGY TO DETERMINE PRIORITY INFORMATION NEEDS

**for the
Fisheries Resource Monitoring Program**

Over the past five years, the Office of Subsistence Management has successfully developed and implemented the Fisheries Resource Monitoring Program in support of Federal subsistence fisheries management. Over 200 monitoring and research studies have been implemented on Federal lands across Alaska. A cornerstone of the Monitoring Program has been identification of Issues and Information Needs through the Regional Advisory Councils, which have been used to guide solicitation of proposals for the Monitoring Program. I would like to build upon the Issues and Information Needs process by implementing a broad-based strategic planning effort to ensure the Monitoring Program is focused on our highest priorities for management of Federal subsistence fisheries.

To ensure strategic use of our limited funds, the Office of Subsistence Management will facilitate a collaborative process to develop three products for the Monitoring Program:

- (1) goals, objectives, and information needs by region for Federal subsistence fishery management; (2) identification of gaps in knowledge for each information need; and
- (3) prioritization of information needs for solicitation of study proposals. The results of this effort will yield a more focused Request for Proposals for the Fisheries Resource Monitoring Program.

For each region, the Fisheries Information Services (FIS) Division in my office, will take the lead to convene a facilitated workshop of regional managers, scientists, Council members, and stakeholders to identify key information needed to better manage Federal subsistence fisheries. The Fisheries Information Services Division will solicit workshop participation from appropriate Federal agencies, the Alaska Department of Fish and Game, academia, Alaska Native, and rural organizations to collectively develop and prioritize regional management and regulatory information needs. To effectively transition from Issues and Information Needs already developed through the Regional Advisory Councils, we will also ask the appropriate Regional Advisory Councils to provide up to two members for each regional workshop.

Results from these workshops will provide the basis for FIS staff to draft reports that address products discussed in the second paragraph of this letter. Where appropriate, efforts of existing regional planning groups will be utilized to help accomplish these tasks.

We will be employing a facilitated approach in these workshops using the Analytic Hierarchy Process as the methodology to frame discussion, formulate recommendations, and document results. This methodology has been widely used for 35 years in planning and problem solving for many applications worldwide and most recently as part of similar planning efforts for fisheries assessment in the Yukon, Kuskokwim, Southeast Alaska, and marine areas of Alaska.

Planning efforts will be conducted in 7 regions to cover the entire state, and one to two workshops will be conducted in each region. For 2004, we will focus planning efforts on the Southcentral region and the Bristol Bay portion of the Southwest region. Draft reports for Bristol Bay and Southcentral will be presented to the appropriate Regional Advisory Councils for review and comment at the fall 2004 meetings. Final reports will then be prepared and will provide the basis for prioritizing information needs in the subsequent Request for Proposals, and for assessing strategic priority during evaluation of proposals.

Overall, it is our intent to complete planning efforts to determine prioritized information needs for the Bristol Bay and Southcentral regions this year. We will implement these same efforts for the Northern, Southeast, and Kodiak portion of the Southwest region in the fall of 2005. We intend to utilize results from the comprehensive and collaborative planning exercises already underway for Kuskokwim and Yukon salmon to develop information needs for these two regions. All regional plans will be presented to the appropriate Regional Advisory Councils as drafts, and we intend to complete all plans by November 2006.

Our strategic planning efforts will be a major undertaking over the next two years, but these efforts will provide a rigorous and comprehensive analysis of information needs to focus the Monitoring Program on our highest priorities for management of Federal subsistence fisheries. We look forward to your support and involvement in completing these plans.

Sincerely,

/s/ Thomas H. Boyd

Thomas H. Boyd
Assistant Regional Director

Appendix B. A glossary of terms and phrases from discussions in the development of a strategic plan to support the Fisheries Resource Monitoring Program in Bristol Bay-Chignik, 2005.

ADF&G – Acronym for Alaska Department of Fish and Game, the state agency responsible subsistence management. Three divisions are associated with subsistence fisheries research and management: Subsistence (S); Commercial Fisheries (CF), including both the Gene Conservation (GCL) and Mark, Tag, and Age (MTAL) laboratories; and Sport Fish (SF), including Research and Technical Services (RTS).

AHP – Acronym for Analytic Hierarchy Process, a widely used method to facilitate decision-making by breaking complex problems into more manageable units.

ANILCA - Acronym for Alaska National Interest Lands Conservation Act, the legal basis for Federal subsistence management in Alaska.

ASL Data - Age, sex, and length data commonly collected from fishes to help managers to assess the status of populations and stocks.

Anadromous – Refers to fishes that spawn in fresh waters and migrate to marine waters to rear. In Alaska, several species of Pacific salmon, char, smelt, whitefish, and lampreys are anadromous.

BBNA – Acronym for Bristol Bay Native Association, which represents the interests of Tribal Councils and Alaska Natives of the Bristol Bay and Chignik areas. The Natural Resources Program (NRP), within the Division of Lands and Resources (DLR), works with villages to advance resource management goals, including protection of subsistence resources.

BIA – Acronym for Bureau of Indian Affairs, one of five federal agencies involved in Alaska subsistence management. BIA works with Alaska Tribe on various economic and social issues.

BLM – Acronym for Bureau of Land Management, one of five federal agencies involved in Alaska subsistence management. BLM administers public lands in Alaska for multiple uses, including subsistence hunting and fishing. The National Wild Rivers administered by BLM in Alaska are managed as federal Conservation Unit under ANILCA.

Capacity Building - Providing opportunities for rural residents, communities, and organizations to participate in planning, conducting, and applying information from Monitoring Program studies.

Conservation Units - Public lands, listed in ANILCA, over which the Federal government has subsistence fishery management authority.

Customary Trade - The cash trade of fish or fish parts between subsistence fishers and other individuals. This practice has a long history, is poorly documented, is allowed under Federal regulations for fishes harvested on Conservation Units, but is illegal under State regulations.

Appendix B. Continued

Enhancement - Human efforts, including activities such as lake fertilization, instream incubators, and predator control, to increase the production and numbers of fishes so that harvests can be increased. While Monitoring Program studies may evaluate effects of enhancement on subsistence fisheries or provide information useful for enhancement, enhancement activities themselves cannot be funded through this program.

Escapement - Pacific salmon that escape harvest within fisheries and enter freshwater systems to spawn.

Expert Judgment - A conclusion based on previous relevant experience supported by rationale thought and knowledge.

Exploitation Rate – The fraction or proportion, by number, of fish in a population at a give time that is harvested.

FIS - Acronym for Fisheries Information Services Division within the Office of Subsistence Management (OSM). FIS administers the Fisheries Resource Monitoring Program.

FWS – Acronym for U.S. Fish and Wildlife Service, one of five federal agencies involved in Alaska subsistence management. FWS works with other agencies and stakeholders to conserve, protect, and enhance natural resources for the American people. The National Wildlife Refuges administered by FWS in Alaska are managed as federal Conservation Unit under ANILCA. Within FWS, the Office of Subsistence Management (OSM) coordinates all Alaska subsistence management activities. The Gene Conservation Laboratory (GCL), King Salmon Fish and Wildlife Field Office (KSFWFO), and Togiak National Wildlife Refuge (Togiak NWR) have all conducted Fisheries Resource Monitoring Program studies within the Bristol Bay and Chignik areas.

Federal Nexus – The connection or link associating a proposed Fisheries Resource Monitoring Program study with Federal subsistence fishery management. Proposed studies concerning fisheries or fish resources occurring within or adjacent to a Conservation Unit have a Federal nexus and can be considered for funding. However, studies with a weak Federal nexus are less likely to receive funding. For example, a proposed study of high seas harvest of salmon stocks spawning within Conservation Units would have a low chance of receiving funding since results would probably not affect Federal subsistence fishery management.

Fish Population - A group of similarly adapted, interbreeding fish of the same species. Fish populations are largely reproductively isolated and adapted to local conditions.

Fish Stock – Populations or groups of populations of a fish species used as the basic unit for management. Fish stocks have been defined by genetic, phenotypic, life history, habitat characteristics.

Appendix B. Continued

Fishery Interactions - The effects of commercial and sport fisheries on subsistence fisheries, which would include displacement of subsistence fishers, changes in subsistence fishing patterns or methods, and alterations of social and economic conditions.

Fishing Effort - The total fishing gear used for a specified time period. This factor is poorly documented for subsistence fisheries, particularly since fishers often do not record time periods on permits when they fished and made no harvest.

Goals - Long term achievements that contribute to accomplishing the mission of a program or study.

Harvest Rate - Number or weight of fishes harvested during a specified time.

Index - A number that represents the value or level of something in comparison to something else or an established base number. In fisheries, harvests and survey counts have often been used as measures of actual abundance. For various reasons, however, these relationships have often proved to be faulty since harvests and survey counts are usually not directly proportional to actual abundance.

Management Regime – The established system or way of managing fisheries, including regulations, procedures, and strategies.

Management Unit – The fish population, stock, or group of stocks that form the basis for the management regime. Definitions have been based on various factors, including run timing, geographic area, genetics, and morphology.

Mission - The overall purpose of a program that is met by achievement of long term goals and specific objectives.

NOAA – Acronym for the National Oceanographic and Atmospheric Administration, which includes the National Marine Fisheries Service (NMFS) and the Auk Bay Laboratory (ABL). NMFS is responsible for salmon management within Federal marine waters, the Exclusive Economic Zone that extend from 3 to 200 nautical miles offshore, in conjunction with Regional Fishery Management Councils, and coordinates management with states as well as interstate and tribal commissions.

NPS – Acronym for the National Park Service, one of five federal agencies involved in Alaska subsistence management. NPS administers public lands in Alaska to preserve natural and cultural resources and values for the American people. Most National Parks and Preserves in Alaska are managed as federal Conservation Unit under ANILCA.

Appendix B. Continued

Node - A point of intersection. In the context of AHP, this refers to a grouping of elements at the same level. For example, a “parent node” is a specific objective under which are information needs relevant to that objective.

Paradigm – A philosophical or theoretical framework of any kind. In science, a generally accepted model of how ideas relate to one another, forming a conceptual framework within which research is conducted and theories, laws, and generalizations are formulated and carried out.

Strategy – A plan developed to achieve a desired outcome.

Survival Rate – The number of fish alive after a specified time period, divided by the initial number. For anadromous fishes, freshwater survival refers to the number of juveniles that sea divided by the number of eggs deposited or number of juveniles hatched from these eggs; while marine survival refers to the number of adults returning to spawn in freshwater divided by the number of juveniles that migrated to sea.

Sustainable Fishery –A fish stock managed so that its abundance and other biological attributes, as well as the socioeconomic value of the fishery, will be maintained over a long time period. To accomplish this many issues need to be addressed including responsible fishing, resource status monitoring, ecosystem functions maintenance, and socioeconomic considerations.

UAF – Acronym for University of Alaska Fairbanks, which contains the Institute of Marine Science (IMS) and the School of Fisheries and Ocean Sciences (SFOS).

USFS – Acronym for U.S. Forest Service, one of five federal agencies involved with Alaska subsistence management. USFS manages National Forests for multiple uses. Most National Forest lands in Alaska are managed as federal Conservation Unit under ANILCA, but there are no National Forests within the Bristol Bay and Chignik areas.

USGS – Acronym for U.S. Geological Service. USGS provides scientific information for a variety of purposes, including management of water and biological resources. The Biological Science Office (BSO) within the Alaska Science Center (ASC) has conducted Fisheries Resource Monitoring Program studies within Bristol Bay.

UW – Acronym for University of Washington, which contains the School of Aquatic and Fishery Sciences (SAFS), formerly the Fisheries Research Institute (FRI), and the Joint Institute for the Study of the Atmosphere and the Ocean (JISAO).

Appendix C. Participants in Bristol Bay-Chignik workshops.

Bristol Bay-Chignik workshop, Anchorage, May 11-13, 2004.

Organization	Name
^a U.S. Fish and Wildlife Service, Office of Subsistence Management, Fisheries Information Services Division, Anchorage	Stephen Fried
^a U.S. Fish and Wildlife Service, Office of Subsistence Management, Fisheries Information Services Division, Anchorage	Polly Wheeler
U.S. Fish and Wildlife Service, Office of Subsistence Management, Coastal Division, Anchorage	Cliff Edenshaw
U.S. Fish and Wildlife Service, Togiak National Wildlife Refuge, Dillingham	Patrick Walsh
U.S. Fish and Wildlife Service, King Salmon Fish and Wildlife Field Office, King Salmon	Jim Larson
University of Alaska Fairbanks, Alaska Cooperative Fish and Wildlife Research Unit, Fairbanks	Joe Margraf
National Park Service, Lake Clark National Park and Preserve, Port Alsworth	Dan Young
Bureau of Land Management, Anchorage	Taylor Brelsford
U.S. Geological Survey, Alaska Science Center, Biologist Resources Division, Anchorage	Carol Ann Woody
Bureau of Indian Affairs, Alaska Regional Office, Subsistence Branch Anchorage	Glenn Chen
Alaska Department of Fish and Game, Division of Sport Fish, Anchorage	Dan Sharp
Alaska Department of Fish and Game, Division of Commercial Fisheries, Anchorage	Jim Edmundson
Alaska Department of Fish and Game, Division of Subsistence, Anchorage	Jim Fall
Bristol Bay Native Association, Department of Natural Resources, Dillingham	John Chythlook
Bristol Bay Economic Development Corporation, Bristol Bay Science and Research Institute, Dillingham	Michael Link
^b Bristol Bay Subsistence Regional Advisory Council, Naknek	Daniel O'Hara

Support Staff:

Facilitator - Margaret Merritt, Private Consultant, Resource Decision Support, Fairbanks

Recorder - Beth Spangler, Office of Subsistence Management, Fisheries Information Services Division, Anchorage

Notes - Jerry Berg, Office of Subsistence Management, Coastal Division, Anchorage

^a Workshop co-chair

^b Left before start of workshop due to unanticipated circumstances

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Appendix C. Continued.

Bristol Bay-Chignik workshop, Anchorage, February 9-11, 2005.

Organization	Name
^a U.S. Fish and Wildlife Service, Office of Subsistence Management, Fisheries Information Services Division, Anchorage	Stephen Fried
^a U.S. Fish and Wildlife Service, Office of Subsistence Management, Fisheries Information Services Division, Anchorage	Amy Craver
U.S. Fish and Wildlife Service, Office of Subsistence Management, Coastal Division, Anchorage	Cliff Edenshaw
U.S. Fish and Wildlife Service, Togiak National Wildlife Refuge, Dillingham	Patrick Walsh
U.S. Fish and Wildlife Service, King Salmon Fish and Wildlife Field Office, King Salmon	Jim Larson
University of Alaska Fairbanks, Alaska Cooperative Fish and Wildlife Research Unit, Fairbanks	Joe Margraf
National Park Service, Lake Clark National Park and Preserve, Port Alsworth	Dan Young
Bureau of Land Management, Anchorage	Taylor Brelsford
U.S. Geological Survey, Alaska Science Center, Biological Resources Division, Anchorage	Carol Ann Woody
Bureau of Indian Affairs, Alaska Regional Office, Subsistence Branch Anchorage	Pat Petrivelli
Alaska Department of Fish and Game, Division of Sport Fish, Anchorage	Dan Sharp
Alaska Department of Fish and Game, Division of Commercial Fisheries, Anchorage	Lowell Fair
Alaska Department of Fish and Game, Division of Subsistence, Anchorage	Jim Fall
Bristol Bay Native Association, Department of Natural Resources, Dillingham	Ralph Andersen
Bristol Bay Native Association, Department of Natural Resources, Dillingham	Robin LaVine
^b Bristol Bay Economic Development Corporation, Bristol Bay Science and Research Institute, Dillingham	Michael Link
Bristol Bay Subsistence Regional Advisory Council, Naknek	Daniel O'Hara
Bristol Bay Subsistence Regional Advisory Council, Togiak	Peter Abraham
Bristol Bay Subsistence Regional Advisory Council, Dillingham	Dan Dunaway

Support Staff:

Facilitator - Margaret Merritt, Private Consultant, Resource Decision Support Fairbanks

Recorder - Beth Spangler, Office of Subsistence Management, Fisheries Information Services Division, Anchorage

Notes - Kathleen Orzechowski, Office of Subsistence Management, Fisheries Information Services Division, Anchorage

^a Workshop co-chair

^b Unable to attend workshop

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Appendix C. Continued.

Affiliations and responsibilities of Bristol Bay-Chignik workshop participants.

Stephen Fried: Dr. Fried is a fishery biologist with U.S. Fish and Wildlife Service, Office of Subsistence Management, Fisheries Information Services Division, which administers and provides technical oversight over the Monitoring Program. He is responsible for these functions for fisheries stock status and trends studies in the Southwest Region (Bristol Bay, Chignik, Kodiak, Alaska Peninsula, and Aleutian Islands areas).

Polly Wheeler: Dr. Wheeler is an anthropologist with U.S. Fish and Wildlife Service, Office of Subsistence Management, Fisheries Information Services Division, and is responsible for administering and providing technical oversight over the Monitoring Program for harvest monitoring and traditional ecological studies on a statewide basis.

Amy Craver: Ms. Craver is an anthropologist with U.S. Fish and Wildlife Service, Office of Subsistence Management, Fisheries Information Services Division, and is responsible for administering and providing technical oversight over the Monitoring Program for harvest monitoring and traditional ecological studies in the Southwest as well as the Northern (Seward Peninsula, Northwest Arctic, North Slope) region.

Cliff Edenshaw: Mr. Edenshaw is a Regional Coordinator with U.S. Fish and Wildlife Service, Office of Subsistence Management, Coastal Regions Division, which provides support for the Federal subsistence regulatory process; including the inter-agency Staff Committee, Subsistence Regional Advisory Councils, and the Federal Subsistence Board. Mr. Edenshaw serves as the primary contact between the Bristol Bay Council and regional office staff of the five Federal agencies involved in subsistence issues.

Patrick Walsh: Mr. Walsh is the Supervisory Fish and Wildlife Biologist for Togiak National Wildlife Refuge, U.S. Fish and Wildlife Service, which administers National Wildlife Refuge lands and waters for the conservation, management, and restoration for fish, wildlife and plant resources. His staff has served as investigators on Monitoring Program studies.

Jim Larson: Mr. Larson is Project Leader for King Salmon Fish and Wildlife Field Office, U.S. Fish and Wildlife Service, which administers the fisheries program in Southwest region. He is a fishery biologist and serves as the Fishery Subsistence Manager for Bristol Bay and Chignik areas, as well as an investigator on Monitoring Program studies.

Joe Margraf: Dr. Margraf is Leader of the Alaska Cooperative Fish and Wildlife Research Unit, University of Alaska Fairbanks, which is a partnership among Federal and State agencies and academia and provides a strong link between U.S. Geological Survey and both Federal and State management agencies. He is a fishery biologist and conducts research, education and outreach emphasizing Alaska natural resource management, and also provides information and trained personnel to help implement management.

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Appendix C. Continued.

Affiliations and responsibilities of Bristol Bay-Chignik workshop participants. (Continued)

Dan Young: Mr. Young is a fisheries biologist with National Park Service, Lake Clark National Park and Preserve, which monitors and manages multiple uses on this park, including subsistence uses. He has served as an investigator on Monitoring Program studies.

Taylor Brelsford: Mr. Brelsford is senior advisory on Alaska subsistence fisheries matters for Bureau of Land Management, which monitors and manages multiple uses on the Alagnak (Branch) Wild and Scenic River in the Bristol Bay Area, including subsistence uses. Mr. Brelsford is an anthropologist and has served as a member of the Technical Review Committee for the Monitoring Program, and a member of the Staff Committee for the Federal Subsistence Board.

Carol Ann Woody: Dr. Woody is a research fishery biologist for U.S. Geological Survey, Alaska Science Center, Biological Resources Division, Marine and Freshwater Ecology Branch, which is the lead biological science agency within the Department of Interior for conducting research on fish and wildlife resources, including research in support of U.S. Fish and Wildlife Service management functions. She has served as an investigator on Monitoring Program studies.

Glenn Chen: Dr. Chen Bureau is a fishery biologist with Bureau of Indian Affairs, Alaska Regional Office, Subsistence Branch, which administers and manages a wide range of functions and services for Alaska Natives, including subsistence uses. He has served as an investigator on Monitoring Program studies, a member of the Technical Review Committee for the Monitoring Program, and a member of the Staff Committee for the Federal Subsistence Board.

Pat Petrivelli: Mr. Petrivelli is an anthropologist with Bureau of Indian Affairs, Alaska Regional Office, Subsistence Branch and has served as a member of the Technical Review Committee for the Monitoring Program. She is a former staff member of the Office of Subsistence Management.

Dan Sharp: Mr. Sharp is Regional Management Biologist for Kodiak and Bristol Bay with Alaska Department of Fish and Game, Division of Sport Fish, which monitors and manages sport and freshwater personal use and subsistence fisheries. His staff has served as investigators on Monitoring Program studies.

Lowell Fair: Mr. Fair is Bristol Bay Research Project Leader with Alaska Department of Fish and Game, Division of Commercial Fisheries, which monitors and manages commercial and marine personal use and subsistence fisheries. Division of Commercial Fisheries staff has served as investigators on Monitoring Program studies.

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Appendix C. Continued.

Affiliations and responsibilities of Bristol Bay-Chignik workshop participants. (Continued)

Jim Fall: Dr. Fall is Regional Program Manager for Southwest and Southcentral regions with Alaska Department of Fish and Game, Division of Subsistence, which monitors and assesses subsistence fisheries. He and his staff have served as investigators for Monitoring Program studies.

Ralph Andersen: Mr. Anderson is Deputy Director with Bristol Bay Native Association, Department of Natural Resources, which works with villages to advance their natural resource management goals and to protect their right to continue to meet their subsistence, cultural and economic needs. He and his staff have served as investigators for Monitoring Program studies, and he supervises two Partners for Fisheries Monitoring positions funded through the Office of Subsistence Management.

John Chythlook: Mr. Chythlook is a fishery biologist with Bristol Bay Native Association, Department of Natural Resources. His position is funded through the Office of Subsistence Management's Partners for Fisheries Monitoring Program.

Robin LaVine: Ms. LaVine is a social scientist with Bristol Bay Native Association, Department of Natural Resources. Her position is funded through the Office of Subsistence Management's Partners for Fisheries Monitoring Program.

Michael Link: Mr. Link is Executive Director of Bristol Bay Science and Research Institute within Bristol Bay Economic Development Corporation and Managers of the Alaska Office of LGL Ltd. Environmental Research Associates, a private consulting firm specializing and providing expertise in ecosystem research, environmental planning, and resource management. Mr. Link is a fisheries biologist and has served as an investigator for Monitoring Program studies.

Dan O'Hara: Mr. O'Hara is Chair of the Bristol Bay Subsistence Regional Advisory Council. He is subsistence and commercial fisher as well as a commercial pilot.

Peter Abraham: Mr. Abraham is a member of the Bristol Bay Subsistence Regional Advisory Council and also works as an Information Technician for Togiak National Wildlife Refuge, U.S. Fish and Wildlife Service. He is a subsistence fisher.

Dan Dunaway: Mr. Dunaway is a member of the Bristol Bay Subsistence Regional Advisory Council. He is retired from Alaska Department of Fish and Game, Division of Sport Fish, where he served as Regional Management Biologist for Bristol Bay. He is a subsistence and sport fisher.

Appendix D. Relationship of information needs developed through the Monitoring Program strategic planning process with those identified by Bristol Bay Native Association through village meetings.

I. Issues and Information Needs that Fit within FRMP Strategic Plan *Bristol Bay Salmon Fisheries Unit*

Information Need 1A1: Obtain reliable estimates of spawning escapement over time

- In-season harvest and escapement monitoring of sports, commercial and subsistence fishing in Kvichak area *[Editors' note: Lake Clark and Tazimina drainages are focus of Federal subsistence management within this area.]*
- Continue all of the studies relating to the Kvichak River watershed *[Editors' note: Lake Clark and Tazimina drainages are focus of Federal subsistence management within this watershed.]*

Information Need 1A3: Identify critical factors that affect population dynamics including effects of restoration and enhancement on wild stocks

- Large numbers of beavers in the Kvichak area; Beaver dams interfering with Kvichak salmon spawning streams; Beaver dams and natural blockages of Kvichak spawning areas *[Editors' note: Lake Clark and Tazimina drainages are focus of Federal subsistence management within this area.]*
- Impact seals are having on salmon returning to Kvichak River *[Editors' note: Lake Clark and Tazimina drainages are focus of Federal subsistence management within this drainage.]*
 - Regarding the impacts of the hydroelectric power plant on the Tazimina River affecting spawning habitat
 - Impacts from jet boats on spawning grounds on Kvichak and Alagnak rivers and tributaries *[Editors' note: Lake Clark and Tazimina drainages are focus of Federal subsistence management within Kvichak drainage.]*
 - Impacts of jet boats and sports fishers on spawning and rearing on upper and lower Ugashik lakes and narrow outlets to the lagoon
 - Sports fishermen using small streams and disturbing spawning areas in Togiak area; Impact of sports fishing on spawning grounds in streams away from the river in shallow water in Togiak area
 - Effects of catch and release on fish in the Kvichak, and Alagnak rivers and tributaries *[Editors' note: Lake Clark and Tazimina drainages are focus of Federal subsistence management within Kvichak drainage.]*
 - Effects of catch and release on king (Chinook) salmon in the King Salmon River *[Editors' note: Egegik area]*
 - Impact of commercial fishing on stocks above the Wood River commercial fishing district *[Editors' note: Igushik and Snake rivers are focus of Federal subsistence management within this area.]*

Information Need 2A1: Annually estimate subsistence harvest effort by location, gear type, species, and date

- Monitor harvest of salmon for subsistence use in Kvichak drainage *[Editors' note: Lake Clark and Tazimina drainages are focus of Federal subsistence management within this drainage.]*
- Need to continue the Togiak Subsistence Harvest Monitoring Study
- TEK on uses and harvests on the Kvichak and Alagnak rivers *[Editors' note: Lake Clark and Tazimina drainages are focus of Federal subsistence management within Kvichak drainage.]*

Appendix D Continued.

Information Need 2B3: Document changes in harvest timing and factors influencing it

- TEK on uses and harvests on the Kvichak and Alagnak Rivers *[Editors' note: Lake Clark and Tazimina drainages are focus of Federal subsistence management within Kvichak drainage.]*

Information Need 2B4: Describe current and historic fish processing and distribution practices including sharing, barter, and trade

- Customary trade limits on subsistence fishing in Kvichak area *[Editors' note: Lake Clark and Tazimina drainages are focus of Federal subsistence management within this drainage.]*
- Being able to continue customary trade practices for cash in Nushagak area *[Editors' note: Igushik and Snake rivers are focus of Federal subsistence management within this area.]*

Information Need 3A1: Evaluate usefulness and effectiveness of current regulations

- Information on State's method for establishing catch limits and harvest priorities in Kvichak fisheries *[Editors' note: Effects on Alagnak and Lake Clark drainages are focus of Federal subsistence management within this area.]*
- Length of subsistence fishing gear (10 fathom limit) in the Nushagak commercial district *[Editors' note: Effects on Igushik and Snake rivers are focus of Federal subsistence management in area.]*
- Mesh size used for subsistence fishing nets in Nushagak Bay *[Editors' note: Effects on Igushik and Snake rivers are focus of Federal subsistence management within this area.]*
- Should use mid-sized mesh for subsistence fishing in Nushagak Bay *[Editors' note: Effects on Igushik and Snake rivers are focus of Federal subsistence management within this area.]*

Information 3A2: Develop information sharing between stakeholders and agencies

- What do sports fishers in Togiak area do with their fish?

Information 3B1: Describe socioeconomic and cultural impacts of other fisheries

- Assessments and conflicts among sports, commercial and subsistence fishing in Togiak, Kvichak, and Nushagak areas and the impacts on subsistence harvests, methods, and locations *[Editors' note: Effects on Alagnak and Lake Clark drainages are focus of Federal subsistence management within Kvichak area, while Igushik and Snake rivers are focus within Nushagak area.]*
- Large number of sport fishers on Togiak River

Information Need 3B2: Describe total harvest rates by fishery for specific stocks of interest

- In-season harvest and escapement monitoring of sports, commercial and subsistence fishing in Kvichak Bay and drainage
- Creel survey on the King Salmon *[Editors' note: Egegik area]* and Ugashik Lake (narrows and outlet to lagoon)
- Impact of commercial fishing on stocks above the Wood River commercial fishing district *[Editors' note: Igushik and Snake rivers are focus of Federal subsistence management in area.]*
- How many fish are being taken by sports fishermen in Togiak?

Appendix D Continued.

Chignik Salmon Fisheries Unit

Information Need 1A3: Identify critical factors that affect population dynamics including effects of restoration and enhancement on wild stocks

- Impacts of rain and high water levels on spawning grounds
- Large numbers of beavers in the area; Beaver dams interfering with salmon spawning streams; Beaver dams and natural blockages of spawning areas
- Study of keeping Chignik weir open too long
- What are white cysts in reds [*sockeye salmon*] and silvers [*coho salmon*]

Information Need 1B1: Estimate abundance of total run by species and river/lake system

- Information on salmon returning to West Fork, Black Lake, Clark River, and Scow River [*Editors' note: Chignik drainage*]

Information Need 1B2: Determine adult timing and migration patterns by stock, sex, size, and age

- The first run of sockeye in 2002 had smaller fish than normal [*Editors' note: Chignik drainage*]
- Hard to find silvers (coho salmon) in the Alec (Scow) River [*Editors' note: Chignik drainage*]

Information Need 2B2: Identify and evaluate factors affecting subsistence uses

- Study of keeping the Chignik weir open too long
- The first run of sockeye in 2002 had smaller fish than normal [*Editors' note: Chignik drainage*]
- What are white cysts in reds and silvers [*Editors' note: sockeye and coho salmon*]

Information 3B1: Describe socioeconomic and cultural impacts of other fisheries

- Assessments and conflicts among sports, commercial and subsistence fishing and the impacts on subsistence harvests, methods, and locations

Bristol Bay-Chignik Non-salmon species Fisheries Unit

Information Need 1A2: Identify critical factors that affect population dynamics

- Effects of catch and release on fish in the Kvichak, and Alagnak rivers and tributaries [*Editors' note: Lake Clark and Tazimina drainages are focus of Federal subsistence management within Kvichak drainage.*]
- Fish that are skinny and long caused by catch and release in Togiak

Information Need 1A4: Determine timing and migration patterns

- Monitor all freshwater fish within Iliamna area to find out migratory routes and impacts while migrating [*Editors' note: Lake Clark and Tazimina drainages are focus of Federal subsistence management within Kvichak drainage.*]

Information Need 2A2: Estimate historic harvest levels and identify trends

- TEK on uses and harvests on the Kvichak, and Alagnak Rivers [*Editors' note: Lake Clark and Tazimina drainages are focus of Federal subsistence management within Kvichak drainage.*]

Appendix D Continued.

Information Need 2A5. Describe current and historic fish processing and distribution practices including sharing, barter, and trade

- Customary trade limits on subsistence fishing in Kvichak area *[Editors' note: Lake Clark and Tazimina drainages are focus of Federal subsistence management within this drainage.]*
- Being able to continue customary trade practices for cash in Nushagak area *[Editors' note: Igushik and Snake rivers are focus of Federal subsistence management within this area.]*

Information 3A1: Develop information sharing between stakeholders and agencies

- What do sports fishers in Togiak area do with their fish?

Information Need 3A2. Determine whether current regulations provide for adequate subsistence opportunities and harvests

- TEK on uses and harvests on the Kvichak, and Alagnak Rivers *[Editors' note: Lake Clark and Tazimina drainages are focus of Federal subsistence management within Kvichak drainage.]*

Information Need 3B1. Describe socioeconomic and cultural impacts of other fisheries

- Assessments and conflicts among sports, commercial and subsistence fishing in Togiak, Kvichak, and Nushagak areas and the impacts on subsistence harvests, methods, and locations *[Editors' note: Effects on Alagnak and Lake Clark drainages are focus of Federal subsistence management within Kvichak area, while Igushik and Snake rivers are focus within Nushagak area.]*
- Large number of sport fishers on Togiak River
- Fish that are skinny and long caused by catch and release in Togiak

Information Need 3B2: Describe total harvest rates by fishery for specific stocks of interest

- Creel survey on the King Salmon *[Editors' note: Egegik area]* and Ugashik Lake (narrows and outlet to lagoon)
- How many fish are being taken by sports fishermen in Togiak?

II. Issues and Information Needs that Do Not Fit within FRMP Strategic Plan

Naknek, Nushagak, and Wood rivers do not have nexus to Federal Subsistence Management

- Pink salmon research on the Naknek River
- Effects of catch and release on fish in the Naknek River and tributaries
- Impacts from jet boats on spawning grounds of Naknek River and tributaries
- TEK on uses and harvests on the Naknek River
- Low numbers of salmon returning to the Gibraltar River, Lake Iliamna
- Bank erosion and channel changes causes sediment in Lake Iliamna drainage spawning beds
- Report on return to New Stuyahok *[Nushagak drainage]*
- Why do returning stocks vary in the Nushagak drainage?
- Amount of fishing time for subsistence fishing in Nushagak Bay
- Sports fishermen use small streams and disturb spawning areas in Nushagak River; Impact of sports fishing on spawning grounds in streams away from the river in shallow water in Nushagak River
- Effects of motor boats (jet and prop) on salmon escapement and spawning in Nushagak River – Affecting spawning beds in shallow water
- Regarding survival-mortality rates of catch and release salmon fishing in Nushagak River and impacts on subsistence harvests
- Impacts of belugas on salmon in the Nushagak River

Appendix D Continued.

II. Issues and Information Needs that Do Not Fit within FRMP Strategic Plan (continued)

Naknek, Nushagak, and Wood rivers (continued)

- TEK of fishing on the Nushagak River
- Mesh sizes on sex ratio in the Nushagak drainage
- Wanton waste of fish impacting subsistence fishing in Nushagak River
- Impacts of using rod and reel for subsistence fishing for rainbow trout in Nushagak River
- Need for population assessment of coho going up the Wood River
- Closure of subsistence fishing on the Wood River during commercial fishing

River/lake system issues outside Bristol Bay and Chignik areas

- Effects of catch and release on king (Chinook) salmon in the Meshik River [*Editors' note: Aniakchak National Monument and Preserve is within Kodiak-Aleutians area*]

Issues better addressed by other programs

- Contaminant assessment, evaluation, and monitoring - Water quality from different uses (boat, float planes) of the Togiak River
- Habitat protection, restoration, and enhancement - River bank erosion from large numbers of boats and float planes on the Togiak River
- Law enforcement -
 - Transplanting or introducing invasive fish in Kvichak area
 - Lack of monitoring and enforcement of sports fishers in Kvichak drainage
 - Trespass on Native allotment and corporate lands by sports fishers and non-shareholders in Kvichak area
 - Wanton waste of fish impacting subsistence fishing in Nushagak River

No nexus to Federal subsistence fisheries management

- Expand beluga study to include beluga festival in Kvichak area

Appendix E. Relationship of information needs developed through the Monitoring Program strategic planning process with those identified by Bristol Bay Subsistence Regional Advisory Council and used for 2005 Request for Monitoring Program proposals.

I. Issues and Information Needs that Fit within FRMP Strategic Plan

Bristol Bay and Chignik Salmon Fisheries Units

Information Need 1A1: Obtain reliable estimates of spawning escapement over time

- Monitor coho salmon escapements into Alagnak, Egegik, King Salmon River (Mother Goose Lake drainage), Ugashik and rivers
- Monitor Chinook salmon escapements into Alagnak, Egegik, King Salmon rivers (Mother Goose Lake drainage)

Information Need 1A3: Identify critical factors that affect population dynamics including effects of restoration and enhancement on wild stocks

- Determine impacts of predators, especially beluga whales and seals, on salmon stocks
- Determine effects of beaver dams on subsistence salmon stocks

Information Need 1B1: Estimate abundance of total run by species and river/lake system

- Assess and monitor Lake Clark sockeye salmon stocks
- Distribution and abundance of sockeye salmon spawners in the Chignik area, with emphasis on late-run Clark River stocks, and West Fork spawners
- Assess and monitor coho salmon runs to Perryville area streams between Stepovak Bay and Chignik, including Kametolook River run
- Improve salmon escapement assessment methods, especially within the Togiak River drainage

Information Need 2A1: Annually estimate subsistence harvest effort by location, gear type, species and date

- Document subsistence fishing activities including number of each species harvested, when and where harvests occur, and participation levels
- Improve subsistence harvest monitoring for Alagnak River, Lake Clark, King Salmon River (Mother Goose Lake drainage), and Togiak River

Information Need 2B3: Document changes in harvest timing and factors influencing it

- Document traditional ecological knowledge of subsistence practices, including harvest methods and uses for Alagnak River, Becharof Lake, Lake Clark and lower Alaska Peninsula

Information Need 2B4: Describe current and historic fish processing and distribution practices including sharing, barter and trade

- Document customary trade of subsistence fishery harvests
- Document historical customary trade of subsistence fishery harvests

Information Need 3B1: Describe socioeconomic and cultural impacts of other fisheries

- Effects of sport fishing activities and harvests on subsistence fishing activities and harvests within Alagnak River, Becharof Lake, Chignik area drainages, King Salmon River (Mother Goose Lake drainage), and Togiak area drainages and Ugashik Lakes
- Effects of commercial fishing activities and harvests on subsistence fishing activities and harvests

Appendix E. Continued.

Bristol Bay-Chignik Non-salmon species Fisheries Unit

Information Need 1A1. Estimate abundance and composition by species and river/lake system

- Monitor rainbow trout stocks in Tazimina, Togiak, Ungalikthluk and Negukthlik rivers
- Monitor status of Dolly Varden stocks in Togiak River
- Monitor status of whitefish, char and grayling in Becharof Lake, Lake Clark (particularly Tazimina River) and Ugashik Lake
- Monitor status of northern pike stocks in the Alagnak River
- Assess and monitor smelt, particularly in Togiak River

Information Need 1A2. Identify critical factors that affect population dynamics

- Effects of catch and release sport fishing on long term mortality, reproduction and growth of subsistence fishery resources
- Effects of jet boats and other sport fishing activities on spawning and production
- Commercial fishing, including effects on abundance and quality (sex ratios, size composition, etc.) of escapement

Information Need 2A1. Periodically estimate harvest and effort by location, gear type, species and season

- Improve subsistence harvest monitoring for Dolly Varden and freshwater fish

II. Issues and Information Needs that Do Not Fit within FRMP Strategic Plan

Naknek, Nushagak, and Wood rivers do not have nexus to Federal Subsistence Management

- Monitor coho salmon escapements into Nushagak, and Wood rivers
- Monitor Chinook salmon escapements into Nushagak River

Appendix F. Standardized responses and their definitions initially used for Bristol Bay-Chignik knowledge gap analysis. Equivalent standardized responses used in final plan shown in parentheses.

Current state of knowledge	What needs to be done?
Responses for: “Summary of current situation.”	<p>Information need is adequately addressed. (Knowledge is adequate)</p> <ul style="list-style-type: none"> There is little uncertainty regarding this information need. The existing program provides sufficiently accurate and timely information to guide management. <p>Information need is partially addressed. (Knowledge is incomplete)</p> <ul style="list-style-type: none"> There is some uncertainty regarding this information need. The existing program provides some useful information to guide management but needs to be further developed, expanded, updated, or otherwise improved. <p>Information need is inadequately or not addressed. (Knowledge is lacking)</p> <ul style="list-style-type: none"> There is a great deal of uncertainty regarding this information need. The existing program provides little or no information to guide management, or information is inaccurate, imprecise, incomplete, unclear, or ambiguous.
Responses for: “What needs to be Done?”	<p>Action not needed to maintain or improve information. (Do not consider proposals)</p> <ul style="list-style-type: none"> Monitoring Program project proposals addressing this need should not be solicited or considered for funding because adequate information exists or is being collected. <p>Action may be needed to maintain or improve information. (Consider proposals)</p> <ul style="list-style-type: none"> Monitoring Program project proposals addressing this need may need to be solicited and considered for funding because 1) available information is becoming dated, 2) improvements in information accuracy or precision could lessen uncertainty and improve management, or 3) ongoing projects that collect routinely used information may lose funding. <p>Action is needed to obtain information. (Consider proposals)</p> <ul style="list-style-type: none"> Monitoring Program project proposals addressing this need should be solicited and considered for funding because insufficient or no information is available.

Appendix G. Information inventory for Bristol Bay and Chignik salmon fisheries units.

Study Number and Title	Lead Agency/ Organization	Location	Species	Description	Duration
1A1 Bristol Bay - Obtain reliable estimates of spawning escapement over time					
1 Escapement estimation for Ugashik River drainage	ADF&G - CF K. Weiland	Lower Ugashik Lake outlet	sockeye	Visual counts of salmon from towers, collection of age, sex, and length data, and estimation of escapement.	ongoing since 1961
2 Escapement estimation for Egegik River drainage	ADF&G - CF L. Fair	Becharof Lake outlet (Egegik River)	sockeye	Visual counts of salmon from towers, collection of age, sex, and length data, and estimation of total escapement.	ongoing since 1957
3 Escapement estimation in Kvichak River drainage	ADF&G - CF S. Morstad	Lake Iliamna outlet (Kvichak River)	sockeye	Visually count salmon from towers, obtain ASL samples, and estimation of total escapement.	ongoing since 1956
4 Escapement estimation and population monitoring for Lake Clark (FIS 01-095 and 05-401; UW School of Fisheries Circular 69-5)	NPS D. Young	Lake Clark outlet (Newhalen River)	sockeye	Visual counts of salmon from towers, collection of age, sex, and length data, and estimation of total escapement. (Prior to 2001, UW-FRI counted salmon from one bank of the Newhalen River)	ongoing since 1960s
5 Escapement estimation for Snake River drainage	ADF&G - CF L. Fair	Lake Nunavaguluk outlet (Snake River)	sockeye	Visual counts of salmon from towers or census at weir, collection of age, sex, and length data, and estimation of total escapement.	1960-1982
6 Escapement estimation for Igushik River drainage	ADF&G - CF L. Fair	Amanka Lake outlet (Igushik River)	sockeye	Visual counts of salmon from towers, collection of age, sex, and length data, and estimation of total escapement.	ongoing since 1958
7 Escapement estimation for Togiak River drainage	ADF&G - CF L. Fair	Togiak Lake outlet (Togiak River)	sockeye	Visual counts of salmon from towers, collection of age, sex, and length data, and estimation of total escapement.	ongoing since 1960
8 Escapement estimation for Alagnak River drainage (FIS 00-031)	ADF&G - CF S. Morstad	Alagnak River	sockeye and Chinook	Visual counts of salmon from towers, collection of age, sex, and length data, and estimation of total escapement.	ongoing since 2000; 1957-1976
9 Escapement estimation for Ugashik lakes system (FIS 01-204)	FWS - KSFWO J. Larsen	Lower Ugashik Lake outlet	coho	Visual counts of salmon from towers, collection of age, sex, and length data, and estimation of total escapement.	2001-2003

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Appendix G. Continued.

Study Number and Title		Lead Agency/ Organization	Location	Species	Description	Duration
1A1 Bristol Bay (continued)						
10	Escapement estimation for Egegik River drainage	FWS - KSFWO J. Larsen	Becharof Lake outlet (Egegik River)	coho	Visual counts of salmon from towers, collection of age, sex, and length data, and estimation of total escapement.	1995-1996
11	Ugashik District aerial surveys	ADF&G - CF K. Weiland	Ugashik River system	all	Visual counts of salmon from small fixed wing aircraft or helicopters, and documentation of distribution.	ongoing since 1974
12	Egegik District aerial surveys	ADF&G - CF K. Weiland	Egegik River and nearby systems	all	Visual counts of salmon from small fixed wing aircraft or helicopters, and documentation of distribution.	ongoing since 1974
13	Abundance and run timing of adult Pacific salmon for Big Creek	FWS - KSFWO J. Larsen	Big Creek (Egegik River)	all	Census of salmon passing weir and collection of age, sex, and length data.	2000-2004
14	Abundance and movement of resident and anadromous fish with a bi-directional fish weir on Gertrude Creek	FWS - KSFWO J. Larsen	Gertrude Creek, King Salmon River (Egegik)	all	Census of salmon passing weir and collection of age, sex, and length data.	1997-1999
15	Naknek-Kvichak District aerial surveys	S. Morstad	Kvichak and Naknek river systems	all	Visual counts of salmon from small fixed wing aircraft or helicopters, and documentation of distribution.	ongoing since 1971
16	Abundance and run timing of salmon in the Kulukak River	FWS - KSFWO Jim Larsen	Kulukak River	all	Visual counts of salmon from towers, collection of age, sex, and length data, and estimation of total escapement.	1994-1996
17	Togiak District aerial survey	ADF&G - CF T. Sands	Togiak system and other drainages	all	Visual counts of salmon from small fixed wing aircraft or helicopters, and documentation of distribution.	ongoing since 1979
18	Feasibility of using weirs and video technology to estimate salmon escapement for Togiak River (FIS 00-010 Phases I and II)	FWS - KSFWO J. Larsen	Togiak and Ongivimuk rivers	all	Assessment of feasibility of using a weir or video technology to estimate salmon escapement. (Weir not feasible; video limited to clear water.)	2000-2002
19	Salmon escapement estimates for Togiak River using sonar	FWS - KSFWO Jim Larsen	Togiak River	all	Estimation of salmon escapement with single beam sonar. (Estimates not reliable due to species apportionment problems.)	1997-1998, and 1987-1990

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Appendix G. Continued.

Study Number and Title	Lead Agency/ Organization	Location	Species	Description	Duration
1A1 Chignik - Obtain reliable estimates of spawning escapement over time					
20 Chignik salmon weir (ADF&G Regional Information Reports 4K93-22, 4K02-34, and K03-44; UW School of Fisheries Circulars 36 and 98)	ADF&G - CF G.M. Watchers	Chignik River	sockeye	Census of salmon passing weir using video technology and collect of age, sex, and length data.	ongoing since 1950s
21 Chignik Lake aerial surveys	ADF&G - CF K. Bouwens	Chignik Lake tributaries	sockeye	Visual counts of salmon from small fixed wing aircraft or helicopters, and documentation of distribution.	ongoing
22 Estimation of late-run sockeye salmon and coho salmon escapement in Clark River, a tributary to Chignik River (FIS 02-099 and 05-405)	FWS - KSFWO Jim Larsen	Clark River (Chignik Lake)	sockeye and coho	Visual counts of salmon from stream walking surveys and documentation of timing and distribution using radio telemetry.	ongoing since 2002
23 Estimation of escapement in streams adjacent to Perryville (FIS 03-043 and 05-405)	FWS - KSFWO J. Larsen	Perryville systems	coho	Visual counts of salmon from helicopters, and documentation of distribution.	2003-2007
24 Survey of salmon runs on the Pacific Coast of the Alaska Peninsula and Becharof National Wildlife refuges	FWS - KSFWO J. Larsen	Yantarni Bay and other areas	coho	Visual counts of salmon from small fixed wing aircraft or helicopters, and documentation of distribution.	1994-1996
25 Estimate salmon escapement and carrying capacity in Kametolook, Three Star, and Long Beach rivers (FIS 02-098)	FWS - KSFWO J. Larsen	Kametolook, Three Star, Long Beach rivers	coho	Estimation of available habitat for juvenile rearing, juvenile wintering, and adult spawning; and visual counts of salmon from stream walking surveys.	2002-2004
1A2 Bristol Bay - Describe relationship between escapement and production including smolt production					
26 Ugashik River smolt enumeration	ADF&G - CF L. Fair	Lower Ugashik Lake outlet (Ugashik River)	sockeye	Estimation of smolt abundance using upward-looking sonar arrays, and collection of age and size data using fyke nets.	1983-2002
27 Egegik River smolt enumeration	ADF&G - CF L. Fair	Becharof Lake outlet (Egegik River)	sockeye	Estimation of smolt abundance using upward-looking sonar arrays, and collection of age and size data using fyke nets.	1982-2001
28 Kvichak River smolt enumeration	ADF&G - CF L. Fair	Upper Kvichak River	sockeye	Estimation of smolt abundance using sideward-looking dual-beam sonar (upward-looking sonar used prior to 2002), and collection of age and size data using fyke nets.	Ongoing since 1970

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Appendix G. Continued.

Study Number and Title	Lead Agency/ Organization	Location	Species	Description	Duration
1A2 Bristol Bay (continued)					
29 Abundance and age of Lake Clark sockeye salmon juveniles and smolt (UW School of Fisheries Circulars 186, 66-13, and 68-11)	UW-FRI R.F. Orrell	Lake Clark (Kvichak River system)	sockeye	Estimation of smolt abundance and collection of age and size data.	1962-1967
30 Snake River smolt enumeration	ADF&G - CF L. Fair	Lake Numavagluk outlet (Snake River)	sockeye	Estimation of smolt abundance using upward-looking sonar arrays, and collection of age and size data using fyke nets.	1977-1980
31 Togiak River smolt enumeration	ADF&G - CF L. Fair	Togiak Lake outlet (Togiak River)	sockeye	Estimation of smolt abundance using upward-looking sonar arrays, and collection of age and size data using fyke nets.	1988
32 Lake core analysis - Historical salmon production in Lake Clark National Park and Preserve: Relevance to emerging subsistence use issues	UAF - IMS B. Finney	Lake Clark (Kvichak River system)	sockeye	Collection of lake sediment cores to assess changes in salmon abundance and primary productivity and examine relationships between salmon abundance and climate, productivity and commercial harvest, and carcass nutrients and production.	ongoing
33 Historical productivity of Becharof and Ugashik lakes	FWS - KSFWO J. Larsen	Becharof and Ugashik lakes (Egegik and Ugashik rivers)	sockeye	Collection of lake sediment cores to assess historical patterns of salmon abundance.	ongoing since 2000
34 Biological studies and estimates of optimum escapements of sockeye salmon in the major river systems in southwestern Alaska (1969 article in Fishery Bulletin)	UW - FRI R.L. Burgner	Bristol Bay	sockeye	Collection of biological and physical data from nursery lakes and synthesis with other available data to estimate escapement levels needed to sustain runs and provide for fisheries.	1969
35 Age distribution of Chinook escapement samples (FWS Fishery Data Series Reports 97-2 and 98-4)	FWS – Togiak NWR R. MacDonald	Togiak River and other systems	Chinook	Collection of age, sex, and length data from spawners.	1992-1997

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Appendix G. Continued.

Study Number and Title	Lead Agency/ Organization	Location	Species	Description	Duration
1A2 Bristol Bay (continued)					
36 Triennial salmon escapement goal review	ADF&G - CF J. Edmundson	Bristol Bay	all	Evaluation, modification, and setting of salmon escapement goals. (ADF&G regulatory requirement conducted in alignment with Alaska Board of Fisheries' three year regulatory review cycle.)	ongoing
1A2 Chignik - Describe relationship between escapement and production including smolt production					
37 Investigations of salmon populations, hydrology, and limnology of Chignik Lakes (SAFS/FRI-UW Reports 9302, 9907, 2002, 0102, and 0403)	UW - SAFS R. Hilborn	Chignik lakes (Chignik River)	sockeye	Monitoring of spring through fall juvenile rearing conditions (abundance and size, predator and competitor abundance, biological and physical factors) to evaluate changes in adult production and potential for habitat restoration.	Ongoing since 1950's
38 Sockeye salmon smolt investigations on the Chignik River system (ADF&G Regional Information Reports 4K97-28, 4K98-4, 4K00-35, 4K03-8, 4K04-24)	ADF&G - CF K.A. Bouwens	Chignik River system	sockeye	Estimation of smolt abundance and collection of age and size data.	1996, 1997, 1999, 2002, and 2003
39 Triennial salmon escapement goal review (ADF&G Regional Information Report 4K01-66; FRI-UW Report 7401)	ADF&G - CF P.A. Nelson	Chignik	all	Evaluation, modification, and setting of salmon escapement goals. (ADF&G regulatory requirement conducted in alignment with Alaska Board of Fisheries' three year regulatory review cycle.)	ongoing
Also see study number 25					
1A3 Bristol Bay - Identify critical factors that affect population dynamics including effects of restoration and enhancement on wild stocks					
40 Limnological perspectives on stock and recruitment for Egegik and Ugashik River	ADF&G - CF J. Edmundson	Becharof (Egegik) and Ugashik lakes	sockeye	Examination of freshwater aspects of sockeye salmon production through integration of limnology data, juvenile production, and stock-recruitment dynamics.	1997-2002
41 Stable isotope analysis of components of the lacustrine food webs in Becharof and Ugashik lakes	FWS - KSFWO J. Larsen	Becharof (Egegik River) and Ugashik lakes	sockeye	Determination of stable carbon and nitrogen isotope (δ 13 C and δ 15 N) ratios of lake zooplankton and adult sockeye salmon.	1998-1999

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Appendix G. Continued.

	Study Number and Title	Lead Agency/ Organization	Location	Species	Description	Duration
1A3 Bristol Bay (continued)						
42	Ecosystem Modeling of Becharof Lake (Alaska Sea Grant College Program. AK-SG-99-01)	UAF - SFOS O.A. Mathisen	Becharof Lake (Egegik River)	sockeye	Construction of ecosystem model based on the ECOPATH program using information obtained by FWS-KSFWO, UAF-SFOS, and ADF&G-CF.	1999
43	Limnological monitoring of Lake Becharof	FWS - KSFWO J. Larsen	Becharof Lake (Egegik River)	sockeye	Collection of limnology data to examine influence of magma and airborne sea salts on water chemistry and salmon production.	1996
44	Juvenile sockeye salmon assessment and limnological studies of Lake Iliamna	ADF&G - CF J. Edmundson	Lake Iliamna (Kivichak River)	sockeye	Examination of freshwater aspects of sockeye salmon production through integration of limnology data, juvenile production, and stock-recruitment dynamics.	1961- 2004
45	Predator-prey relationship between char and sockeye salmon smolt, and attempts to reduce predation in Wood River Lakes (FRI-UW Report 72-7)	ADF&G J.H. Clark	Agulukpak and Aguluwak rivers (Wood River)	sockeye	Estimation and attempted reduction of char predation on smolt migrating through rivers connecting a system of lakes.	1970's
46	Selective predation by brown bears foraging on spawning sockeye salmon (2000 article in Canadian Journal of Zoology)	UW - SFAS G.T. Ruggerone	Wood River Lakes (Wood River)	sockeye	Documentation of selective predation and predation rates of brown bears foraging on spawning sockeye salmon in a small creek.	1986 and 1990- 1992
47	Impacts of climatic change and fishing on Pacific salmon abundance over the past 300 years (2000 article in Science)	UAF - IMS B. Finney	Bristol Bay (Ugashik, Becharof, Tazimina) and Kodiak Island (Karluk, Frazer, Red, Akalura) lakes	sockeye	Collection and analysis of lake sediment cores to assess changes in salmon abundance and primary productivity and examine relationships between salmon abundance and climate, productivity and commercial harvest, and carcass nutrients and production.	2000
48	Ocean Carrying Capacity Program	NOAA - NMFS/ABL E. Farley	Eastern Bering Sea between Cape Fearful and Ugashik River	sockeye	Description of migration and distribution of juvenile salmon, measurement of early marine growth using scales, stomach fullness, diet analysis, and juvenile density; assessment of stock origin identification; and quantification of habitat through oceanographic observations.	ongoing since 1999

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Appendix G. Continued.

Study Number and Title	Lead Agency/ Organization	Location	Species	Description	Duration
1A3 Bristol Bay (continued)					
49 Bristol Bay sockeye salmon production: an exploratory analysis of the 1996 and 1997 decline in sockeye salmon returns (1998 NPAFC Doc. 34)	NOAA - NMFS/ABL E. Farley	Kvichak, Egegik, and Naknek rivers	sockeye	Determination of improvements to forecasting run abundance through use of time series models with environmental variables.	1998
50 Pre-season forecast of Bristol Bay sockeye salmon migration timing based on oceanographic and biological variables	Natural Resources Consultants G.T. Ruggerone	Port Moller and inshore Bristol Bay	sockeye	Updating of previously used (1995-2000) migration timing model based on oceanographic conditions and biological variables.	2003-2004
51 Age, weight, and length statistics of resident fishes, and collection of physical and chemical data (FWS Alaska Fisheries Data Series Reports 96-3, 96-5, and 98-5)	FWS - Togiak NWR R.D. Nelle	Togiak NWR rivers and lakes	all	Inventory of fishes; and collection of age, weight, size, and limnological data.	1984-1990, 1993-1995, 1997, 2000-2002
Also see study numbers 32-34					
1A3 Chignik - Identify critical factors that affect population dynamics including effects of restoration and enhancement on wild stocks					
52 Kametolook River subsistence project (EVOS Restoration Project 247)	ADF&G - S L. Hutchinson-Scarbrough	Kametolook River	coho	In-stream incubation of eggs to improve their survival and increase subsequent adult production.	1997-2002
53 Juvenile salmon assessment and limnological studies of Chignik lakes (FRL-UW Report 7902; SFAS/FRL-UW Reports 8810, 8914, 9107, 9117, 9214, and 9804; ADF&G Regional Information Report 4K94-36)	UW - SAFS R. Hilborn	Chignik and Black lakes	sockeye	Examination of freshwater aspects of sockeye salmon production through integration of limnology data, juvenile production (including predation), and stock-recruitment dynamics.	ongoing since 1980s
54 A survey of the Kodiak and Chignik management areas for oil spill contaminants. 30 March to 3 July 1990 (ADF&G Regional Information Report 4K90-26)	ADF&G - CF B.M. Barrett	Kodiak and Chignik	all	Survey of salmon management areas for contamination one year after Exxon Valdez oil spill.	1990

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Appendix G. Continued.

Study Number and Title	Lead Agency/ Organization	Location	Species	Description	Duration
1A3 Chignik (continued)					
Also see study numbers 25 and 37					
1A3 General Relevance - Identify critical factors that affect population dynamics including effects of restoration and enhancement on wild stocks					
55 Use of genetic stock identification to determine distribution, migration, early marine survival, and relative stock abundance of Western Alaska sockeye salmon	NOAA - NMFS/ABL R. Willmot	Bering Sea and Gulf of Alaska	sockeye	Update genetic baseline with Western Alaska sockeye salmon stock data to help identify critical factors affecting population dynamics during marine residency.	2002-2004
56 Use of genetic stock identification to determine distribution, migration, early marine survival, and relative stock abundance of sockeye and chum salmon in the Bering Sea	ADF&G - CF/CGL J. Seeb	Bering Sea	sockeye, chum	Collection of salmon tissue samples from Bering Sea and adjacent Pacific to provide information on stock composition, abundance, migratory routes and timing, and determine factors affecting oceanic distribution and abundance of regional stocks.	2002-2004
57 NPAFC Salmon Tagging	NOAA - NMFS/ABL J. Helle	Bering Sea and Gulf of Alaska	all	Mark and release about 1,000 salmon with plastic discs and electronic tags that record sea temperature, depth, and daily position to provide information on migratory routes and factors affecting salmon oceanic distribution and abundance.	2002-2003
58 Bering-Aleutian Salmon International Survey (BASIS) NPAFC	US component - NOAA-NMFS	Bering Sea	all	Description of seasonal stock-specific salmon migration patterns; determination of key biological, climatic, and oceanographic factors affecting long-term changes in salmon food production and salmon growth rates; examination of trends in production and survival among salmon populations; and determination of limits to salmon production and effects of hatchery salmon.	ongoing since 2002

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Appendix G. Continued.

Study Number and Title	Lead Agency/ Organization	Location	Species	Description	Duration
1A3 General Relevance (continued)					
59 High Seas Salmon Research Program	UW - SAFS K. Myers	North Pacific Ocean	all	Coordination of NPAFC research, including studies on Bering Sea salmon migration and food habits, Eastern Bering Sea Chinook salmon stock identification, Global Ocean Ecosystems Dynamics, and age and growth of juvenile Chinook salmon in Southeast Alaska coastal marine waters.	ongoing since 1953
60 A Pacific interdecadal climate oscillation with impacts on salmon production (1997 article in Bulletin of the American Meteorological Society)	UW - JISAO N. Mantua	Pacific Coast of North America	all	Analysis of climate records and selected commercial salmon landings to determine whether relationships exist.	1997
1A4 Bristol Bay - Determine salmon escapements by river/lake systems needed to sustain ecosystem functions					
See study numbers 32, 33, 41-48, 51, and 52					
1A4 Chignik - Determine salmon escapements by river/lake systems needed to sustain ecosystem functions					
See study number 40					
1A4 General Relevance - Determine salmon escapements by river/lake systems needed to sustain ecosystem functions					
61 Influence of carcass-derived nutrients on sockeye productivity of Karluk Lake: Importance in the assessment of an escapement goal (1998 article in NAJFM)	ADF&G - CF D.C. Schmidt	Karluk Lake, Kodiak Island	sockeye	Synthesis of available information on sockeye salmon escapement, limnology, and sediment cores for Karluk Lake to develop spawner-recruit models and examine the importance of marine-derived nutrients from salmon carcasses.	1998
62 Effects of spawning sockeye on small streams in Wood River Lakes (1999 article in Transactions of the American Fisheries Society; 1996 Univ. Washington MS thesis)	UW - SFAS D.P. Peterson	Wood River Lakes, Wood River system	sockeye	Examination of invertebrate drift caused by female salmon digging redds and feeding responses of other fishes.	1996
63 Evaluation of the use of nitrogen stable isotope ratios to establish escapement levels for Pacific salmon (2001 article in Fisheries; 1996 article in Canadian J. Fisheries and Aquatic Sciences)	Weyerhaeuser Co. R.E. Bilby	Washington	coho	Measurement of stable isotope signatures in juveniles and comparison with values in returning adults	1996 and 2001

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Appendix G. Continued.

Study Number and Title	Lead Agency/ Organization	Location	Species	Description	Duration
1A4 General Relevance (continued)					
64 Pacific salmon, nutrients, and the dynamics of freshwater and riparian ecosystems (2002 article in Ecosystems)	UW - SFAS R.J. Naiman	Pacific northwest	all	Review and synthesis of information on role of Pacific salmon in aquatic ecosystems	2002
65 Pacific salmon in aquatic and terrestrial systems (Bioscience)	USFS S. Genden	Pacific northwest	all	Review and synthesis of information on role of Pacific salmon in aquatic and terrestrial ecosystems.	2002
66 Towards Sustainable Fisheries: Balancing Conservation and Use of Salmon and Steelhead in the Pacific Northwest (1999 book by Sustainable Fisheries Foundation)	USGS E. Knudsen	Pacific northwest	all	Documentation of conference proceedings on historical perspectives and ideas for developing a sustainable Pacific salmon fisheries management strategy in which society and government agencies establish a shared vision, common policies, and a process for collaborative management.	1996
67 Pacific salmon and wildlife ecological contexts, relationships, and implications for management (2001 Special Edition Technical Report, Wash. Dept. Fish and Wildlife)	Wash. Dept. Fish and Wildlife D. Johnson	Washington and Oregon	all	Synthesis of information on salmon and wildlife species relationships within the broad context of the ecosystems they inhabit.	2001
68 Impacts of marine derived nutrients on stream ecosystem functioning (2003 article in Proceedings of the Royal Society of London)	Univ. British Columbia, Canada Y. Zhang	Mayfly Creek, BC, Canada	chum	Examination of effects of marine-derived nutrients from chum carcasses on detritus processing by stream invertebrates.	2003
69 Nutrients in salmonid ecosystems: Sustaining production and biodiversity (2003 book by American Fisheries Society)	Univ. British Columbia, Canada J. Stockner	Pacific northwest	all	Documentation of conference proceedings on role and importance of marine-derived nutrients in salmonid ecosystems, and how this information can be used to help manage and rebuild salmon stocks.	2001
70 Ecological effects of spawning salmon on several southcentral Alaskan streams (1995 Univ. Alaska Fairbanks Ph.D. thesis)	UAF R.J. Piorkowski	Southcentral Alaska	all	Examination of effects of salmon carcasses on macroinvertebrate community structure and relative amounts of marine-derived nitrogen.	1995
Also see study numbers 46 and 47					

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Appendix G. Continued.

Study Number and Title	Lead Agency/ Organization	Location	Species	Description	Duration
1A5 Bristol Bay - Relate historic salmon harvests to current productivity levels of river/lake systems					
See study numbers 32, 33, 36, and 48					
1A5 Chignik - Relate historic salmon harvests to current productivity levels of river/lake systems					
See study number 39					
1A5 General Relevance- Relate historic salmon harvests to current productivity levels of river/lake systems					
See study numbers 62 and 65					
1B1 Bristol Bay - Estimate abundance of total run by species and river/lake system					
71 Bristol Bay subsistence salmon permit system	ADF&G - S M. Chythlook	Bristol Bay	all	Estimation and documentation of annual salmon harvests from subsistence net fisheries using data obtained from fishing permits.	ongoing since 1980's
72 Bristol Bay salmon commercial catch and escapement sampling	ADF&G - CF L. Fair	King Salmon, Dillingham	sockeye, Chinook, coho, chum	Collection of commercial landing samples to obtain age, sex, length, and weight data; and compilation and synthesis of these data from all catch and escapement monitoring studies.	ongoing since 1956
73 ADF&G commercial fish ticket receipt program	ADF&G - CF C. DiCostanzo	Alaska	all	Compilation of annual commercial harvest records for all salmon fisheries from delivery receipts.	ongoing
74 Statewide Harvest Survey of sport fishing catch and effort	ADF&G - SF/RTS D. Bernard	Statewide	all	Estimation of annual sport catches and harvests from responses to a mailed survey.	ongoing
75 Statewide logbook program for guided freshwater sport fishing catch and effort	ADF&G - SF/RTS D. Bernard	Statewide	all	Compilation of annual guided sport fishing harvest records for all salmon fisheries from a mandatory logbook program for guides	ongoing since 2005
76 Estimate catch and harvest of resident and anadromous fish at the Ugashik Narrows	FW/S - KSF/WO J. Larson	Ugashik Narrows, Ugashik River system	sockeye, coho	Assessment of sport fishing catch, effort, and harvest.	1988 and 2000
77 Stock composition of sockeye salmon harvests in northern Alaska Peninsula commercial harvests (ADF&G Regional Information Reports 5J89-11)	ADF&G - CF H.J. Geiger	Northern Alaska Peninsula	sockeye	Estimation of northern Alaska Peninsula commercial harvest stock composition using scale growth and age differences.	1989

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Appendix G. Continued.

	Study Number and Title	Lead Agency/ Organization	Location	Species	Description	Duration
1B1	Bristol Bay (continued)					
78	Stock composition of sockeye salmon harvests in southern Alaska Peninsula (Area M) commercial harvests during June (ADF&G Regional Information Reports 5J88-03, 5J89-06, 5J97-17, 5J95-05, and 5J00-05; ADF&G Fishery Research Bulletin 91-01)	ADF&G - CF D.M. Eggers	Southern Alaska Peninsula	sockeye	Estimation of stock composition of commercial sockeye salmon harvests in Area M of the southern Alaska Peninsula using scale growth differences, tags, and genetic stock identification techniques.	1987- 2000
79	Harvest assessment of the recreational fishery for salmon in the Alagnak River (FIS 00-033 and 01-173)	ADF&G - SF J. Dye	Alagnak River	Chinook	Assessment of sport fishing catch, effort, and harvest using angler counts and interviews; and collection of age, sex, and length data.	1989, 1993, 1998, 2000 - 2002
80	Chinook salmon bycatch in groundfish fisheries of the Bering Sea/Aleutian Islands and Gulf of Alaska (ADF&G Regional Information Report 5J91-02, 5J91-07, 5J91-08, 5J94-16, and 5J91-10, Alaska Fishery Research Bulletin 9(1) 2000)	ADF&G - CF D. Ackley	Bering Sea - Aleutians and Gulf of Alaska	Chinook	Estimation of trawl fishery Chinook salmon bycatch by continent of origin using NMFS groundfish fishery observer program data.	1990- 2000
81	Estimate catch and harvest of resident and anadromous fish in the Egegik River	FWS - KSFWO J. Larson	Egegik River	coho	Assessment of sport fishing catch, effort, and harvest.	1994- 1996
82	Estimate catch and harvest of resident and anadromous fish at Gertrude Creek	FWS - KSFWO J. Larson	Gertrude Creek, King Salmon River system (Egegik)	coho	Assessment of sport fishing catch, effort, and harvest	1991 and 1996
83	Bristol Bay salmon historic commercial catches	ADF&G - CF L. Fair	Bristol Bay	coho, chum, pink	Documentation of historical commercial salmon harvests	1893- 1984

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Appendix G. Continued.

Study Number and Title	Lead Agency/ Organization	Location	Species	Description	Duration
IB1 Bristol Bay (continued)					
84 Interceptions of coho salmon in commercial fisheries south of Unimak Island, in the Shumagin Islands, and areas outside Chignik (ADF&G Regional Information Report 5J89-12, 5J91-14&15, and 5J95-09)	ADF&G - CF D.M. Eggers	Alaska Peninsula	coho	Examination of estimating stock composition of commercial coho salmon harvests along the southern Alaska Peninsula using run timing and scale growth differences.	1989- 1995
85 Interceptions of coho salmon in Japanese land based driftnet fishery (Univ. Washington reports to North Pacific Fisheries Commission)	UW - FRI R. Walker	North Pacific	coho	Examination of scale growth differences as a method to determine continent of origin of Japanese high seas and land based commercial coho salmon harvests.	1981- 1991
Also see study numbers 1-10, 13, 14, 16, and 36					
IB1 Chignik - Estimate abundance of total run by species and river/lake system					
86 Chignik salmon commercial catch sampling and scale pattern analysis (ADF&G Regional Information Reports 4K02-2, 4K03-1, 4K04-30)	ADF&G-CF M.J. Witteveen	Chignik system	sockeye	Collection of age, sex, and length data from commercial landings, measurement of scale growth, and estimation of proportions of Black and Chignik lakes stocks in catches.	ongoing
87 Sport fishing effort and harvest of Chinook salmon in Chignik River (ADF&G Fishery Data Series Reports 84 and 90-31)	ADF&G-SF L.J. Schwarz	Chignik River	Chinook	Assessment of sport fishing catch, effort, and harvest for Chinook salmon.	1988- 1989
88 Chignik area annual subsistence harvest assessment (ADF&G Technical Paper 230)	ADF&G - S L. Scarborough	Chignik area	all	Estimation and documentation of annual salmon harvests from subsistence net fisheries using data obtained from fishing permits.	ongoing since 1993
Also see study numbers 20, 73-75, 78, 80, 84, and 85					
IB2 Bristol Bay - Determine adult run timing and migration patterns by stock, sex, size, and age					
89 Estimating run timing of Lake Clark sockeye salmon relative to other Kvichak River drainage populations (FIS 04-411)	ADF&G - CF/CGL C. Habicht	Kvichak River	sockeye	Estimation of abundance over time of Lake Clark adult sockeye salmon migrating past Iliamna Lake tower site using genetic stock identification; and examination of feasibility of estimating abundance over time of Lake Clark smolt at the Kvichak River smolt enumeration site using similar techniques.	2004- 2006

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Appendix G. Continued.

Study Number and Title	Lead Agency/ Organization	Location	Species	Description	Duration
90 Port Moller offshore test fishing	UW-SFAS R. Hilborn	Port Moller area of Bristol Bay	sockeye	Estimation of sockeye salmon run abundance, timing, size and age using gillnet catches from a chartered commercial vessel fishing along a transect extending offshore from Port Moller.	ongoing since 1960
Also see study numbers 1-17, 50, 73, 77, 78, 80, 84, and 85					
1B2 Chignik - Determine adult run timing and migration patterns by stock, sex, size, and age					
91 Sockeye salmon tagging experiments at Chignik (UW School of Fisheries Circular 83)	UW-FRI F. V. Thorsteinson	Chignik	sockeye	Documentation of migration patterns through a tagging study.	1956
See study numbers 20-23, 37, 77, 78, 80, 84, and 85					
1B3 Bristol Bay - Define and catalog management units that sustain subsistence fisheries					
92 Bottleneck signals evidenced by loss of microsatellite alleles in river-spawning populations of sockeye salmon from the Kvichak River drainage (2004 article in Environmental Biology of Fishes)	ADF&G - CF/CGL C. Habicht	Kvichak River	sockeye	Examination of genetic variation in Kvichak River drainage sockeye salmon spawning populations.	2004
93 Sockeye collections for DNA analysis from Bristol Bay drainages	ADF&G - CF/CGL C. Habicht	Kvichak, Naknek, Egegik, Ugashik, Wood, Nushagak, and Togiak rivers	sockeye	Collection of allozyme and microsatellite data for sockeye salmon spawning populations throughout Bristol Bay and from smolt at the outlet of Lake Iliamna.	1999- 2003
94 Use of elemental analysis in stock discrimination of Bristol Bay sockeye salmon	NOAA - NMFS/ABL E. Farley	Kvichak, Egegik, and Ugashik river	sockeye	Determination of concentration of nine elements in freshwater zone of smolt otoliths using a chemical microprobe; and examination of technique as a stock separation tool.	ongoing
95 Genetic stock identification of Pacific Rim sockeye salmon (2001 NPAFC Doc. 562)	ADF&G - CF/CGL C. Habicht	Pacific Rim	sockeye	Integration of allozyme data for sockeye salmon from existing Pacific Rim baseline collections for use in mixed stock analysis studies.	2001

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Appendix G. Continued.

Study Number and Title	Lead Agency/ Organization	Location	Species	Description	Duration
1B3 Bristol Bay (continued)					
96 Genetic stock identification of Alaska Chinook salmon (ADF&G Regional Information Report No. 5196-16)	ADF&G - CF/CG L. Seeb	Alaska	Chinook	Collection of Chinook salmon tissue samples throughout Alaska; development of screen for microsatellite loci variation; and estimation of accuracy of mixed stock analyses using known mixtures and baseline data from west coast North America stock group samples.	1996
97 Genetic stock identification of Pacific Rim Chinook salmon (1999 NPAPFC Doc. 440)	ADF&G - CF/CG L. Seeb	Pacific Rim	Chinook	Estimation of accuracy of mixed stock analyses using known mixtures and baseline allozyme data from Pacific Rim Chinook salmon samples.	1999
98 Allelic standardization for microsatellite loci in Pacific salmonids	USGS - ASC J. Nielsen	Alaska	all	Standardization of allelic signatures for salmonid microsatellite loci across different laboratory platforms, amplification equipment, and laboratories.	ongoing
Also see study numbers 1-19, 36, and 74					
1B3 Chignik - Define and catalog management units that sustain subsistence fisheries					
99 Genetic stock analysis of sockeye salmon within Chignik watershed (ADF&G Regional Information Report 5199-08)	ADF&G- CF/CG L. W. Templin	Chignik system	sockeye	Collection of allozyme data for sockeye salmon spawning populations within Chignik system; description of genetic variation; and estimation of accuracy of mixed stock analysis using known mixtures and baseline data from Chignik and a Cook Inlet system (Tustemena).	1999
Also see study numbers 20-25, 37, 39, 88, 95, and 98					
2A1 Bristol Bay - Annually estimate subsistence harvest effort by location, gear type, species, and date					
100 Bristol Bay regional subsistence profile (ADF&G Technical Paper 114)	ADF&G - S J. Wright	Bristol Bay	all	Documentation of species used, harvest estimates, seasonal rounds of harvest, and subsistence area use maps for 21 communities in seven subregions: Togiak, Nushagak Bay, Nushagak River, Iliamna Lake, Upper Alaska Peninsula, Chignik, and Lower Alaska Peninsula.	1985

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Appendix G. Continued.

Study Number and Title	Lead Agency/ Organization	Location	Species	Description	Duration
2A1 Bristol Bay (continued)					
101 Fish and wildlife harvests in Pilot Point, Ugashik and Port Heiden (ADF&G Technical Paper 158)	ADF&G - S J. Fall	Pilot Point, Ugashik, Port Heiden	all	Documentation of harvest quantities, participation levels, and harvest areas over the course of a year using household surveys.	1986- 1987
102 Subsistence harvests and uses in Levelock, Southwest Alaska (ADF&G Technical Paper 184)	ADF&G - S M. Chythlook	Levelock	all	Documentation of harvest quantities, participation levels, and harvest and preservation methods over the course of a year using systematic household surveys and key respondent interviews; and comparison of 1987-1988 and 1973 data.	1987- 1988, and 1973
103 Wild resource harvests and uses by residents of Manokotak, Togiak and Twin Hills (ADF&G Technical Papers 275 and 152)	ADF&G - S P. Cooley- Kenner	Manokotak, Togiak, Twin Hills	all	Documentation of harvest quantities, participation levels, social organization, harvest areas, and uses of fishes over the course of a year using household surveys, key respondent interviews, and fish camp observations.	1999- 2000, 1985, and 1973- 1974
104 Harvest and use of freshwater fish in Togiak and Manokotak,	BBNA - DLR/NRP R. Anderson	Manokotak and Togiak	all	Documentation of harvests and uses of fishes over the course of a year using household surveys.	1994- 1995
105 Togiak River subsistence harvest monitoring (FIS 01-047)	BBNA - DLR/NRP R. Anderson	Togiak River	all	Documentation of harvests and locations using in-season surveys, catch sampling, and post-season household surveys.	2001- 2003
106 Subsistence fishing patterns on the Togiak River and the impact of sport fishing (ADF&G Technical Paper 203)	ADF&G - S J. Gross	Togiak River	mainly Chinook and coho	Documentation of harvest quantities, targeted species, timing of effort, harvest locations and methods, and problems with recreational fisheries using key respondent interviews.	1987
107 Naknek River Subsistence and Personal Use Fisheries	ADF&G - S J. Fall	Naknek River	all	Documentation of harvests, uses, and distribution patterns using permit holder surveys.	1982

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Appendix G. Continued.

Study Number and Title	Lead Agency/ Organization	Location	Species	Description	Duration
2A1 Bristol Bay (continued)					
108 Fish and wildlife uses in Alaska Peninsula communities (ADF&G Technical Papers 151 and 202)	ADF&G - S J. Fall	Egegik, Chignik, Chignik Lagoon, Chignik Lake, Perryville, and Ivanof Bay	all	Documentation of harvest levels and uses of resources over the course of a year using systematic household surveys; and comparison of 1989 and 1984 data.	1984 and 1989
109 Alaska Subsistence Harvest Database update and report preparation (FIS 04-751)	ADF&G - S R. Walker	Alaska	all	Update of Alaska Subsistence Fisheries Database with 2003-2005 salmon data, historic (pre-1988) salmon data; 2003-2005 non-salmon fish and marine invertebrate data, and historic (pre-2003) non-salmon data.	2004- 2006
110 Implementation of Statewide Subsistence Fisheries Harvest Assessment Strategy (FIS 01-107)	ADF&G - S J. Fall	Alaska	all	Review of study 00-017 recommendations, harvest assessment methods, and data usage through regional workshops; determination of need for subsistence harvest assessment program operational plans; production of 2001 and 2002 annual subsistence fisheries reports; and update of Alaska Subsistence Fisheries Database with 2001 and 2002 data	2001- 2003
111 Statewide Subsistence Fisheries Harvest Monitoring Strategy (FIS 00-017)	ADF&G - S J. Fall	Alaska	all	Review and evaluation of subsistence fisheries and harvest assessment programs (including methods and reporting standards) through regional workshops; development of recommendations for a unified strategy for assessing subsistence fisheries harvests (including training programs to implement cooperative harvest assessment programs); production of 1999 annual subsistence fisheries report; and update of Alaska Subsistence Fisheries Database with 1999 data.	2000
Also see study number 71					

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Appendix G. Continued.

Study Number and Title	Lead Agency/ Organization	Location	Species	Description	Duration
2A1 Chignik - Annually estimate subsistence harvest effort by location, gear type, species, and date					
112 Status of subsistence uses In Exxon Valdez Oil Spill Area communities	ADF&G - S J. Fall	Includes Chignik Bay, Chignik Lake, Chignik Lagoon, and Perryville	all	Documentation of harvests, trends, fish stock status, and other factors affecting subsistence uses using household surveys.	1989, 1990- 1993, 1998, 2004, and 2005
113 Overview of subsistence salmon and other finfish fisheries of the Chignik management area (ADF&G Technical Paper 230)	ADF&G - S L. Scarborough	Chignik area	all	Documentation of harvest quantities, methods, and means, processing and preservation methods, uses, and case studies of fishing households using systematic household surveys and key respondent interviews, fishery observations, and historic background and harvest data.	early 1990's
Also see study number 88, and 108-111					
2A2 Bristol Bay - Independently verify permit data					
See study numbers 71, 100-108, 112, and 113					
2A2 Chignik - Independently verify permit data					
See study numbers 86, 108, and 110-113					
2B1 Bristol Bay - Estimate historic harvest levels and effort, and evaluate trends and data quality					
114 Bristol Bay subsistence harvest and sociocultural systems inventory (MMS Report 92-0036)	Social Science Research Associates J. Endter- Wada	Bristol Bay	all	Report listed but available on MMS website.	1992
115 Collection of Traditional Ecological Knowledge on Sockeye Salmon Harvest Patterns in Nondalton, Alaska (FIS 01-075)	NPS M. McBunney	Lake Clark	sockeye	Documentation of historical information on fish abundance, spawning areas, harvest methods, fishing locations, and storage methods using key respondent interviews.	2001
116 Oral history and traditional ecological knowledge gathering within Togiak National Wildlife Refuge	FWS – Togiak NWR M. Lisac	Manokotak, Togiak, and Quinhagak	all	Documentation of changes in the environment and subsistence species over village elders' lifetimes using key respondent interviews.	2002- 2003
Also see study numbers 71 and 100-111					

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Appendix G. Continued.

Study Number and Title	Lead Agency/ Organization	Location	Species	Description	Duration
2B1 Chignik - Estimate historic harvest levels and effort, and evaluate trends and data quality					
See study numbers 85 and 106-111					
2B2 Bristol Bay - Identify and evaluate factors affecting subsistence uses					
117 Pebble Mine studies	ADF&G - S J. Fall	Port Alsworth, Pedro Bay, Nondalton, Iliamna, Newhalen	all	Estimation of harvests for each fish species and documentation of trends and related information using key respondent interviews and surveys.	2004- 2005
118 Traditional knowledge and customs of Bristol Bay and Chignik area fishing communities (FIS 00-012 and 01-109)	ADF&G - S T. Krieg	Bristol Bay- Chignik	all	Documentation of subsistence uses and traditional knowledge concerning harvest sites; timing; methods of preparation; indicators of run strength, arrival, and location; historical observations, events, and stories of subsistence fishing; life histories; taxonomy; movements of resident species; observations of changes in habitats used by targeted species; identification of management issues using key respondent interviews, field notes, trip reports, audio tapes, and technical papers; and entry of this information into a searchable text database.	2000- 2002
Also see study numbers 106, 108 and 115-116					
2B2 Chignik - Identify and evaluate factors affecting subsistence uses					
Chignik cooperative commercial fishery (ADF&G Regional Information Reports 4K02-52, 4K03-54, 4K03-55)	ADF&G - CF K.J. Clark	Chignik Bay	all	Documentation of commercial cooperative fishery, including effects of fixed-leads.	ongoing since 2002
See study numbers 108, 112, and 118					
2B3 Bristol Bay - Document changes in harvest timing and factors influencing it					
Also see study numbers 100-106, 108, 115, 117, and 118					
2B3 Chignik - Document changes in harvest timing and factors influencing it					
See study numbers 108, 112, and 113					

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Appendix G. Continued.

Study Number and Title	Lead Agency/ Organization	Location	Species	Description	Duration
2B4 Bristol Bay - Describe current and historic fish processing and distribution practices including sharing, barter, and trade					
119 Use of fish and wildlife resources by residents of the Bristol Bay Borough (ADF&G Technical Paper 123)	ADF&G-S J. Morris	South Naknek, Naknek, and King Salmon	all	Documentation of resource harvest areas, harvesting groups, and resource distribution networks using systematic household surveys.	1982-1984
120 Sharing, bartering, and trading in subsistence resources in Bristol Bay (FIS 04-454)	ADF&G - S T. Krieg	Bristol Bay	all	Documentation of past and present barter and customary trade practices using key respondent Interviews.	2004-2006
121 Subsistence production and exchange in the Iliamna Lake region	ADF&G - S J. Morris	Port Alsworth, Nondalton, Iliamna, Newhalen, Pedro Bay, Kokhanok, Igiulik	all	Documentation of harvest and exchange patterns using key respondent interviews.	1983
Also see study numbers 102-104, 106, 108, 115, and 118					
2B4 Chignik - Describe current and historic fish processing and distribution practices including sharing, barter, and trade					
See study numbers 108, 113, and 118					
2B5 Bristol Bay - Describe historic and current harvest methods and means by species and area					
See study numbers 100-108, 115, and 117-119					
2B5 Chignik - Describe historic and current harvest methods and means by species and area					
See study numbers 108, 112, 113, and 118					
2C1 Bristol Bay and Chignik – Gather local perspectives on future use patterns					
No studies					
2C2 Bristol Bay and Chignik - Evaluate key factors influencing future use patterns					
No studies					
2C3 Bristol Bay and Chignik - Build process based models to predict future use patterns					
No studies					

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Appendix G. Continued.

Study Number and Title	Lead Agency/ Organization	Location	Species	Description	Duration
3A1 Bristol Bay - Evaluate usefulness and effectiveness of current regulations					
122 Biocomplexity and fisheries sustainability (2003 article in Proceedings of the National Academy of Sciences)	UW - SAFS R. Hilborn	Bristol Bay	sockeye	Examination of the role of biocomplexity in stabilizing and sustaining Bristol Bay sockeye salmon using analyses of climate records, commercial salmon landings, recruit per spawner, and production from various types of spawning habitats; and evaluation of ADF&G's fixed escapement management policy as a means to protect biocomplexity.	2003
123 Bristol Bay priority information needs assessment	BBNA - DLR/NRP R. Anderson	Bristol Bay- Chignik	all	Documentation of natural resource issues using community and tribal meetings conducted about every three years. Resulting report provided to Bristol Bay Regional Advisory Council	ongoing
Also see study numbers 47, 110, and 111					
3A1 Chignik - Evaluate usefulness and effectiveness of current regulations					
See study numbers 110 and 111					
3A1 General Relevance - Evaluate usefulness and effectiveness of current regulations					
124 Subsistence as an economic system in Alaska: Theoretical and policy implications (ADF&G Technical Paper 67)	ADF&G - S D. Lonner	Alaska	all	Attempt to better define subsistence use in Alaska by drawing upon research findings in economic anthropology, and to describe implications for subsistence management.	1980
Also see study number 66					
3A2 Bristol Bay - Develop information sharing between stakeholders and agencies					
125 Togiak National Wildlife Refuge study database	FWS – Togiak NWR M. Lisac	TNWR	all	Maintenance of reports and other products resulting from studies conducted by FWS-TNWR staff	ongoing
126 Alaska Subsistence Harvest Database and reporting	ADF&G - S R. Walker	Alaska	all	Maintenance of searchable database of subsistence fisheries harvest information and publication of annual reports. Database can be accessed from a website and is available on CD.	ongoing since 1980

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Appendix G. Continued.

Study Number and Title	Lead Agency/ Organization	Location	Species	Description	Duration
3A2 Bristol Bay (continued)					
127 Alaska Subsistence Harvest Database GIS integration (FIS 02-043)	ADF&G - S B. Davis	Alaska	all	Integration of Alaska Subsistence Fisheries Database records with a system of maps depicting communities and harvest locations. Database is available on CD.	2002-2003
128 Fisheries Resource Monitoring Program database	OSM - FIS V. McClain	Alaska	all	Maintenance of reports and other products resulting from FRMP studies. Copies of reports can be downloaded from a website.	ongoing since 2000
129 ADFS publications database	ADF&G - S, SF, CF K. Savikko	Alaska	all	Maintenance of reports and other products resulting from work conducted by ADF&G staff. Copies of reports can be downloaded from a website	ongoing
130 USGS, Alaska Science Center, Biological Science Office Fisheries study information	USGS - ASC M. Hood	Alaska	all	Maintenance of reports and other products resulting from work conducted by USGS-ASC-BSO staff.	ongoing since 1971
131 Project information and access system (FIS 01-154)	ADF&G - SF S. Darr	Alaska	all	Development of prototype for a web-based searchable information system for studies, project manager contacts, and publications.	2001-2002
132 ADF&G statewide data warehouse of salmon size, age and growth records	ADF&G - CF/MTAL B. Alger	Alaska	all	Inventory of salmon age, size, and growth records, and establishment of steering committee, composed of state, federal and research interests, to develop protocols and strategic approaches.	2003-2004
133 University of Washington, School of Aquatic and Fisheries Science publications database	UW - SAFS C. Boatright	Pacific Coast of North America, including Bristol Bay and Chignik	all	Maintenance of reports and other products resulting from work conducted by UW-SFAS staff.	ongoing since 1973
134 Historical salmon scale collections and electronic database	UW - SAFS K. Myers	North Pacific and Bering Sea, including Bristol Bay and Chignik	all	Maintenance of salmon scales, acetate scale impressions, and associated biological and scale measurement data; and coordination of information requests to U.S. government for NPAFC-related scale sample and data exchanges.	ongoing since 1955

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Appendix G. Continued.

Study Number and Title	Lead Agency/ Organization	Location	Species	Description	Duration
3A2 Bristol Bay (continued)					
135 Fisheries Biotechnician Training Program (FIS 03-046)	NPS M. McBurney	Lake Clark (Kivichak River)	all	Training of local residents in skills needed for work as fishery technicians on salmon assessment studies.	2004
Also see study number 109-111, 118, and 123					
3A2 Chignik - Develop information sharing between stakeholders and agencies					
136 Exxon Valdez Trustees Council publications database	Exxon Valdez Oil Spill Trustees Council	Areas affected by 1989 oil spill, including Chignik area	all	Maintenance of reports and other products resulting from Exxon Valdez oil spill damage assessment and restoration work. Copies of reports can be downloaded from a website.	ongoing since 1989
Also see study numbers 109-111 and 118					
3A2 General Relevance - Develop information sharing between stakeholders and agencies					
137 North Pacific Anadromous Fish Commission high seas tagging database	UW - SAFS K. Myers	North Pacific and Bering Sea	all	Maintenance of high seas salmon tag release and recovery database (including coded-wire tag database) using data obtained from NPAFC member nations; and reporting of tag recoveries to NPAFC.	ongoing since 1956 (coded- wire tag since 1980)
3A2 General Relevance (continued)					
138 North Pacific Ecosystem Metadata and Reporting	North Pacific Marine Science Organization (PICES) NOAA B. Megrey	North Pacific	all	Development of indexed, annotated catalog (metadata) of information about data, reports, databases, catalogs, proposals, and other media on ecosystems of the North Pacific Ocean and its marginal seas; and periodic reporting of status and trends of North Pacific marine ecosystems including consideration of factors causing, or expected to cause, changes in the near future.	ongoing since 2002
3A3 Bristol Bay and Chignik - Examine alternative management strategies					
No studies					
3A3 General Relevance - Examine alternative management strategies					
See study numbers 66 and 124					
3B1 Bristol Bay - Describe socioeconomic and cultural impacts of other fisheries					
See study numbers 106 and 123					

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Appendix G. Continued.

Study Number and Title	Lead Agency/ Organization	Location	Species	Description	Duration
3B1 Chignik - Describe socioeconomic and cultural impacts of other fisheries					
See study number 123					
3B2 Bristol Bay - Describe total harvest rates by fishery for specific stocks of interest					
See study numbers 36, 71-85					
3B2 Chignik - Describe total harvest rates by fishery for specific stocks of interest					
See study numbers 39, 73-75, 78, 80, 84-88					

Appendix H. Gap analysis results for Bristol Bay and Chignik salmon subsistence fisheries units, 2005.

GOAL 1: SUSTAIN HEALTHY SALMON POPULATIONS THAT SUPPORT SUBSISTENCE USES

OBJECTIVE 1A: Determine spawning escapement needed to sustain subsistence fisheries

Information Need 1A1: Obtain reliable estimates of spawning escapement over time

Knowledge is adequate for Bristol Bay sockeye salmon and incomplete for Chinook and coho salmon.

- Reliable escapement estimates and associated ASL data are available each year for all but one of the important sockeye salmon systems. Only minimum counts are currently available for Kulukak River each year from aerial surveys, although reliable estimates were obtained from a counting tower study during 1994-1996. Counting towers are being used to obtain reliable annual escapement estimates on all other important systems including Lake Clark, which is funded through the Monitoring Program through 2007.
- No reliable escapement estimates and associated ASL data are currently available each year for any of the important Chinook or coho salmon systems, although minimum counts are obtained from aerial surveys. Three annual, reliable Chinook salmon annual escapement estimates were obtained from a counting tower study on Kulukak system (1994-1996); and three or four reliable coho salmon annual escapement estimates were obtained within the last 10 years from counting tower studies on Kulukak (1994-1996), Egegik (1994-1996) and Ugashik (2001-2003) systems, and weir studies on Gertrude (1997-1999) and Big (2000-2004) creeks. Past attempts to develop an annual escapement monitoring program for Togiak River Chinook and coho salmon using a weir, sonar, and video equipment have not been successful.

Consider proposals for Bristol Bay Chinook, and coho salmon.

- Additional work is needed to develop reliable, annual escapement monitoring programs for important Chinook and coho systems, particularly Togiak River system. A large portion of the funding to accomplish this for Togiak River system should come from sources outside the Monitoring Program since improved escapement information would be of greatest use to commercial rather than subsistence fishery stakeholders and managers.
- Funding will be needed after 2007 to continue Lake Clark sockeye salmon escapement monitoring.

Knowledge is incomplete for Chignik sockeye and coho salmon.

- Reliable escapement estimates and associated ASL data are available each year for Chignik River system sockeye salmon through a weir and video imaging study operated by ADF&G. However, only minimum counts of the important Clark River late-run component are available from helicopter surveys.
- No reliable total escapement estimates or ASL data are available for any important coho salmon systems, although minimum counts are available for all these systems from helicopter surveys.

Consider proposals for Chignik sockeye and coho salmon.

- It is still not clear whether large numbers of late-run Clark River sockeye salmon enter Chignik River system each year after the ADF&G weir is removed, although results from 2002 and 2004 radiotelemetry work suggest that this may occur. Aerial survey calibration studies, if feasible, could provide a method to convert minimum aerial counts into abundance estimates or indices.
- Due to the relatively large number and nature (small, remote, and prone to seasonal high water events) of important coho salmon systems, it would be very difficult and expensive to obtain reliable escapement estimates. At current levels of subsistence use and management intensity, minimum counts from helicopter surveys are probably sufficient. Helicopter surveys are currently funded through 2007 from the Monitoring Program, so funding will be needed after 2007 to continue this work.

Information Need 1A2: Describe relationship between escapement and production

Knowledge is incomplete for Bristol Bay sockeye salmon and lacking for Chinook and coho salmon.

- While the relationship between sockeye salmon escapement and total adult production is generally well described for most important systems, this information is not available for Lake Clark and could be improved

Appendix H. Continued.

Information Need 1A2: Continued

Knowledge is incomplete for Bristol Bay sockeye salmon and lacking for Chinook and coho salmon.

for Alagnak and Kulukak river systems. A time series of reliable escapement data is currently being obtained for Lake Clark and Alagnak (Information Need 1A1), but total production cannot be estimated without information on the contribution of these runs to mixed stock commercial harvests. ADF&G intends to seek funding to conduct genetic mixed stock analysis of Naknek-Kvichak District commercial harvests within the next three to five years (Information Need 3B2). While long time series of escapement and total run data are available for Togiak River, these are under estimated since reliable escapement information below Togiak Lake outlet counting tower is not available (Information Need 1A1).

- The relationship between sockeye salmon escapement and smolt production has been estimated for only one important system, Egegik River, although smolt estimates have not been available for this system since 2001. Smolt abundance estimates are not available for other important systems, although Monitoring Program proposals to obtain annual estimates of Lake Clark smolt production are being considered for funding in 2006.
- The relationship between Chinook and coho salmon escapement and total adult production is poorly described for Togiak system, and not known for other important systems because long time series of reliable escapement (Information Need 1A1) and total run (Information Need 1B1) information are not available.
- The relationship between Chinook and coho escapement and smolt production is not known for important systems because long time series of escapement (Information Need 1A1) and smolt production information are not available.

Consider proposals for Bristol Bay sockeye, Chinook, and coho salmon.

- The relationship between sockeye salmon escapement and adult production has been described for all important systems rivers except Lake Clark. Before the relationship can be described for this system, a time series of reliable escapement estimates (Information Need 1A1) and total run estimates (Information Need 1B1) is needed. The relationship between escapement and adult production is poorly described for Alagnak and Kulukak rivers since a time series of reliable escapement (Information Need 1A1) and total run estimates are needed both systems (Information Need 1B1). Lake Clark smolt production estimates may be available for 2006-2008, if 2006 Monitoring Program funding is obtained. There is no immediate need to obtain smolt production estimates for other important systems.
- The relationship between Chinook and coho salmon escapement and total adult production is only poorly described for one important system, Togiak River. Before this relationship can be described for other important systems, and improved for Togiak River, reliable escapement estimates are needed (Information Need 1A1). Until reliable escapement estimates can be obtained, there is no need to estimate smolt production for these systems. While habitat-based assessments to estimate spawning and smolt production capacity could be conducted, such studies would be difficult to implement due to the size and complexity of these systems.

Knowledge is incomplete for Chignik sockeye and coho salmon.

- While the relationship between sockeye salmon escapement and total adult production is generally well described for Chignik system, this information is not available for the important Clark River component of this system.
- The relationship between sockeye salmon escapement and smolt production is not known for Clark River sockeye salmon because neither total escapement nor smolt production is monitored.
- The relationship between coho salmon escapement and total adult production is not known for important systems because long time series of escapement and total run information are not available.

The relationship between escapement and smolt production is not known for important systems because long time series of escapement and smolt production information are not available. However, a recent habitat-based assessment study (02-098) for three important systems, Kametolook, Three Star, and Long Branch rivers, suggested each of these systems was capable of producing about 20,000 to 36,000 smolt and that 850 to 1,400 spawners would be needed to maintain this level of smolt production (about 25 smolt per spawner). At maximum smolt production

Appendix H. Continued.

Information Need 1A2: Continued

levels, about 660 adults would be available for harvest each year (100-400 from each system), assuming average marine survival was 5%.

Consider proposals for Chignik coho salmon but not for sockeye salmon.

- Before the relationship between sockeye salmon escapement and total adult production for Clark River can be described, time series of reliable escapement (Information Need 1A1) and total run (Information Need 1B1) estimates are needed. Until reliable escapement estimates can be obtained, there is no need to estimate smolt production
- Before the relationship between coho salmon escapement and total adult production for important systems can be described, time series of reliable escapement (Information Need 1A1) and total run (Information Need 1B1) estimates are needed. While it is not feasible to obtain reliable escapement estimates at this time, potential juvenile and adult production can be determined for these systems by assessing availability of juvenile rearing and adult spawning habitat. This has been done for the Kametolook, Three Star and Long Brand systems, but not for important systems draining into Ivanof, Humpback, Anchor, and Ivan bays, which have been receiving more subsistence effort. There is no immediate need to obtain such estimates for Clark River at this time.

Information Need 1A3: Identify critical factors (including effects of restoration and enhancement) that affect population dynamics

Knowledge is incomplete for Bristol Bay sockeye, Chinook, and coho salmon.

- Information on critical freshwater factors is available for only one important sockeye salmon system, Egegik River, where available spawning habitat appears to limit adult production. Lake sediment cores have been obtained from both the Egegik and Lake Clark systems, but not yet been analyzed. Analyses may suggest whether lake primary productivity, climate, commercial harvest, and marine-derived nutrients are critical factors affecting salmon abundance. Studies in other systems suggest that predation by fishes and bears is probably only a critical factor at very low levels of sockeye salmon abundance.
- No information on critical freshwater factors is available for important Chinook and coho salmon systems, although some baseline limnological information is available for Togiak River system.
- Climate variability appears to be one of the most important factors affecting salmon population dynamics, and seems to have its greatest effect on juvenile salmon in estuarine and near shore marine waters.
- Marine studies of critical factors have produced broad-based rather than population-specific information since it is difficult to identify individual stocks in mixed aggregations; while freshwater studies have focused on populations in specific drainages or portions of drainages. More studies have been conducted on sockeye than on either Chinook or coho salmon.

Consider proposals for Bristol Bay sockeye, Chinook, and coho salmon.

- Information on critical freshwater factors is needed for important Chinook and coho salmon systems. Some information is available for important sockeye salmon systems, and further studies for Lake Clark and Becharof Lake should not be considered until results of studies using lake sediment cores are available.
- NOAA is the most appropriate agency to coordinate and fund marine salmon studies, since it has primary management authority for salmon in marine waters. However, the Monitoring Program can make useful contributions to these efforts by continuing to support studies that expand and improve genetic baseline data collections that improve the resolution of mixed stock identification models.

Knowledge is incomplete for Chignik sockeye and coho salmon.

- Estimates of potential freshwater sockeye salmon production are available for the Black and Chignik lake components of Chignik River system, but not for the important Clark River component. Recent work has focused on changes in Black Lake, which drains into Chignik Lake, since dramatic natural changes have decreased its sockeye salmon production capacity. If habitat restoration and enhancement efforts are conducted in Black Lake, results could benefit Clark River juveniles since greater numbers of Black Lake juveniles would rear in Black Lake rather than Chignik Lake. Additionally, commercial fishery removals can greatly affect the

Appendix H. Continued.

Information Need 1A3: Continued

abundance of late-run sockeye salmon spawning in Clark River. Recent actions by the Alaska Board of Fisheries will allow an additional 25,000 sockeye salmon to enter the Chignik system in August, which should provide more Clark River spawners.

- Information on potential freshwater coho salmon production is available for the important Kametolook, Long Branch, and Three Star rivers but not other important Perryville systems or Clark River. Results of a recent habitat-based assessment study (02-098) indicate smolt production in Kametolook, Long Branch, and Three Star rivers is limited by juvenile wintering habitat availability. Since Kametolook River runs have been poor, ADF&G attempted to restore the run through instream incubation of eggs obtained from adults returning to this system. These efforts were recently discontinued, but there is still interest in planting eggs obtained from adults returning to nearby systems.
- Climate variability appears to be one of the most important factors affecting salmon population dynamics, and seems to have its greatest effect on juvenile salmon in estuarine and near shore marine waters.
- Marine studies of critical factors have produced broad-based rather than population-specific information since it is difficult to identify individual stocks in mixed aggregations; while freshwater studies have focused on populations in specific drainages or portions of drainages. More studies have been conducted on sockeye than on either Chinook or coho salmon.

Consider proposals for Chignik coho salmon but not for sockeye salmon.

- A great deal of information on critical factors affecting sockeye salmon during freshwater residence is available for Chignik River sockeye salmon, and there is no great need to specifically study the Clark River component. While the Chignik commercial fishery affects the number of adult sockeye salmon reaching Clark River, recent regulatory changes will restrict this fishery to allow a greater number of sockeye salmon to enter the Chignik system during August. Effects of this regulation change can be monitored without the need for additional studies.
- A substantial amount of information exists on factors influencing freshwater coho salmon production for Kametolook, Three Star, and Long Branch river systems, and it would be useful to obtain similar information for Perryville area systems draining into Ivanof, Humpback, Anchor, and Ivan bays or Clark River system. Effects of commercial fishing on these runs cannot be determined until information on the stock composition of commercial harvests can be obtained. If out-of-system egg takes are used to rehabilitate the Kametolook run, studies may be needed to assess effects of these efforts.
- NOAA is the most appropriate agency to coordinate and fund marine salmon studies, since it has primary management authority for salmon in marine waters. However, the Monitoring Program can make useful contributions to these efforts by continuing to support studies that expand and improve genetic baseline data collections that improve the resolution of mixed stock identification models.

Information Need 1A4: Determine the quantity of salmon by river/lake system that should be allowed to escape to sustain ecosystem functions

Knowledge is incomplete for Bristol Bay and Chignik salmon.

- Salmon play a vital role in shaping coastal ecosystems by transporting energy and nutrients from the ocean, and studies have traced the contribution of marine-derived nitrogen from salmon carcasses through components of both freshwater and terrestrial ecosystems. Effects of marine-derived nutrients can vary greatly based on such factors as physical characteristics of the ecosystem and availability of alternative nutrient sources.
- Both State and Federal fishery management agencies agree that the role of salmon in ecosystem functioning should be evaluated and considered in making management decisions and setting escapement goals. The Federal subsistence fishery management system conforms to Sustainable Fisheries Foundation criteria for developing sustainable salmon fisheries: a system of community-based, watershed-oriented councils, including all stakeholders and agency representatives. Additionally, the State has a regulatory Sustainable Salmon Fisheries Policy includes evaluation and consideration of the role of salmon in ecosystem functioning in harvest management decisions and setting escapement goals.

Appendix H. Continued.

Information Need 1A4: Continued

- Protocols and methods to determine the quantity of salmon needed to sustain ecosystem functions have not been developed. Initial efforts to determine escapement levels needed to sustain ecosystem funds have included attempts to estimate the amount of marine-derived nutrients and organic matter needed to support juvenile salmon rearing habitat capacities or to saturate marine-derived nutrient levels in rearing juvenile salmon.

Consider proposals for Bristol Bay and Chignik salmon.

- This information need is only partially addressed, but it is not clear what types of studies are needed to determine the quantity of salmon needed to sustain ecosystem function. Rather than just documenting marine-derived nutrient and energy flow through an ecosystem, proposals considered for this information need must provide a clear link to subsistence fisheries management. For example, a study that collects and synthesizes information to develop salmon spawning escapement goals that sustain ecosystem functions, as well as subsistence fishing opportunities and salmon populations.

Information Need 1A5: Relate historic salmon harvests to current productivity levels in river/lake systems

Knowledge is incomplete for Bristol Bay sockeye salmon and lacking for Chinook and coho salmon.

- Historic salmon harvests are an important data component used to assess salmon escapement goals, but few studies have been done for sockeye salmon that relate historic harvests to system productivity. Results from a Bristol Bay study, based on analysis of lake sediment cores from Becharof, Ugashik, and Tazimina (a control site with no sockeye salmon run) lakes, showed that sockeye salmon abundance fluctuated greatly over the last 300 years, but that these changes appeared to be more strongly related to decadal climatic variability than harvests. Investigators postulated that harvesting may not have strong impacts on the productivity of Becharof and Ugashik lakes because marine-derived nutrients from salmon carcasses comprised relatively low proportions of total lake nutrients. Cores from Lake Clark, as well as additional cores from Becharof and Ugashik lakes, have been collected but not analyzed. Results from these analyses, particularly from Lake Clark, could provide further insight into effects of commercial harvests and climate on system productivity. However, there is no clear indication that increased marine-derived nutrients fluxes result in a higher capacity for Bristol Bay nursery lakes to produce sockeye salmon as was found from studies of Karluk Lake on Kodiak Island.
- No studies have been done for Chinook or coho salmon that relate historic harvests to system productivity. Lake sediment core analyses used for sockeye salmon are not applicable to Chinook and coho salmon since they spawn and rear in riverine systems. Studies concerning the quantity of adult salmon needed to sustain ecosystem functions (Information Need 1A4) provide some insight into potential effects of harvests on current productivity levels of watersheds. While marine-derived nutrients from salmon carcasses have been shown to affect productivity and composition of stream, riparian, and soil communities, the large amount of marine-derived nutrients stored in the riparian zone and soil along with internal cycling of these nutrients, could initially mask effects from long-term declines in salmon runs.

Consider proposals for Bristol Bay Chinook, and coho but not for sockeye salmon.

- Before additional studies are conducted in sockeye salmon nursery lakes, work on sediment cores collected from Lake Clark, Becharof Lake, and Ugashik Lakes should be completed.
- This information need is not addressed for Chinook and coho salmon, although it may be more difficult to obtain this information for rivers and streams, where Chinook and coho salmon spawn and rear, than for lakes, where most sockeye salmon rear, since it may not be possible to obtain undisturbed sediment cores that cover long time periods. While there may be other techniques that be used to examine the relationship between historic harvests and current productivity levels for rivers and streams, storage of marine-derived nutrients in the riparian zone could make it difficult to obtain this information.

Knowledge is lacking for Chignik sockeye and coho salmon.

- No studies relating historic harvests to current productivity levels in river/lake systems have been done for Chignik sockeye and coho salmon.

Appendix H. Continued.

Consider proposals for Chignik sockeye and coho salmon.

- This information need is not addressed for sockeye salmon Chignik lakes, although methods are available to do this.
- This information need is not addressed for coho salmon, although it may be more difficult to obtain this information for rivers and streams, where coho salmon spawn and rear, than for lakes, where most sockeye salmon rear, since it may not be possible to obtain undisturbed sediment cores that cover long time periods. While there may be other techniques that be used to examine the relationship between historic harvests and current productivity levels for rivers and stream, storage of marine-derived nutrients in the riparian zone could make it difficult to obtain this information.

OBJECTIVE 1B: Characterize and define abundance, composition timing of salmon populations

Information Need 1B1: Estimate abundance of total run by species and river/lake system

Knowledge is incomplete for Bristol Bay sockeye, Chinook, and coho salmon.

- Total sockeye salmon run estimates are available for all important systems except Lake Clark and Kulukak River systems, but can be improved for Togiak and Alagnak river systems. Commercial harvest estimates are not available for Lake Clark; reliable annual escapement information is not available for Kulukak River system (Information Need 1A1); annual escapement information for Togiak River system does not include reliable estimates for tributaries below the Togiak Lake outlet counting tower site (Information Need 1A1); and commercial harvest estimates for Alagnak River are based on assumption that stock ratios in harvests are the same as those in Kvichak drainage escapements.
- Total Chinook and coho salmon abundance estimates are available each year only for Togiak system, although Togiak information is not based on reliable escapement estimates (Information 1A1). While harvest information is available each year from all important systems, total abundance estimates cannot be made or improved until reliable escapement (Information Need 1A1) and, in some cases, stock-specific harvest (Information Need 3B2) estimates are available.

Consider proposals for Bristol Bay sockeye but not for Chinook, and coho salmon.

- Total sockeye salmon run estimates could be made for Lake Clark and improved for Alagnak River, if reliable stock specific commercial harvest information was available. Methods to accomplish this are available, and ADF&G intends to seek funding to conduct genetic mixed stock analysis of Naknek-Kvichak District commercial harvests within the next three to five years (also see Information Need 3B2). Total run estimates for Kulukak and Togiak rivers cannot be improved until reliable annual escapement estimates are available (Information Need 1A1).
- Total Chinook and coho salmon run estimates cannot be made or improved until reliable escapement (Information Need 1A1) and stock specific commercial harvest (Information Need 3B2) estimates are available.

Knowledge is incomplete for Chignik sockeye and coho salmon.

- Total sockeye salmon run estimates are not available for Clark River. Scale growth differences have been used to apportion the commercial harvest into Chignik and Black lake components, but it is unlike this method could be used to identify the Clark River component in harvest samples. Genetic baseline data (allozymes) suggest mixed stock analysis would be possible (Information Need 1B3).
- Total coho salmon run estimates are not available for important systems since reliable escapement (Information Need 1A1) and total harvest information are not available.

Do not consider proposals for Chignik sockeye and coho salmon.

- Total abundance estimates for important sockeye and coho systems cannot be made until reliable escapement (Information Need 1A1) and stock specific commercial harvest (Information Need 3B2) estimates are available.

Appendix H. Continued.

Information Need 1B2: Determine adult timing and migration patterns by stock, sex, size, and age

Knowledge is adequate for Bristol Bay sockeye salmon and incomplete for Chinook and coho salmon.

- Adult sockeye salmon timing and migration patterns for inshore waters are well described for all important river/lake systems from a series of studies that monitor runs as they first enter Bristol Bay (Port Moller offshore test fishing), as they travel through commercial fishing districts (harvest monitoring) and up rivers (in-river test fishing), and finally as they enter lake systems to spawn (tower counting and aerial surveys).
- Adult Chinook salmon timing and migration patterns for inshore waters are generally known for all important river/lake systems from information obtained as they travel through commercial fishing districts (harvest monitoring) and when they arrive on spawning grounds (aerial surveys).
- Adult coho salmon timing and migration patterns for inshore waters are generally known for all important river/lake systems from information obtained as they travel through commercial fishing districts (harvest monitoring) and when they arrive on spawning grounds (aerial surveys).

Consider proposals for Bristol Bay Chinook and coho salmon but not for sockeye salmon.

- Chinook salmon timing and migration information could be improved for Togiak and Kulukak rivers, particularly during the in-river portion of the spawning migration. This would be accomplished through radiotelemetry work or through improvements to current escapement monitoring efforts (Information Need 1A1).
- Coho salmon timing and migration information could be improved for Togiak, Kulukak, Ugashik, and Egegik rivers during the upriver portion of the spawning migration. This could be accomplished by radiotelemetry work or through improvements to current escapement monitoring efforts (Information Need 1A1).
- No additional studies are needed to improve or maintain timing and migration information for sockeye salmon returning to important systems.

Knowledge is adequate for Chignik sockeye and incomplete for coho salmon.

- Adult Clark River sockeye salmon timing and migration patterns in the Chignik River system are generally known from information obtained through radiotelemetry work and helicopter surveys. Although, information on timing and migration patterns through the commercial fishing district is not available.
- Adult coho salmon timing and migration patterns in inshore waters are generally known for important systems from information obtained as they travel through commercial fishing districts (harvest monitoring) and when they arrive on spawning grounds (helicopter surveys). However, stock-specific information on timing through commercial fishing districts is not known.

Do not consider proposal.

- No additional studies are needed to improve or maintain timing and migration information for sockeye and coho salmon returning to important systems at current levels of subsistence use and management intensity.

Information Need 1B3: Define and catalog management units that sustain subsistence fisheries

Knowledge is adequate for Bristol Bay and Chignik salmon.

- The existing catch and escapement data collection program, supplemented by stock identification results, has adequately defined management units for all important salmon runs that sustain subsistence fisheries.

Do not consider proposals for Bristol Bay and Chignik salmon.

- No additional information to define and catalog subsistence fishery management units is needed at this time.

Appendix H. Continued.

GOAL 2: DOCUMENT SUBSISTENCE USES

OBJECTIVE 2A: Document the current fishery

Information Need 2A1: Annually estimate subsistence harvest effort by location, gear type, and date

Knowledge is adequate for Bristol Bay and Chignik salmon.

- Annual harvest estimates have been made since the 1980s for subsistence salmon net fisheries based on information from permits as well as periodic household surveys and key respondent interviews. This information is highly reliable since the use of local vendors and systematic follow-up contacts results in completion and return of 80-90% of permits. Information from earlier years may also be available for some communities.
- The Monitoring Program funded a series of workshops (study 00-017) that reviewed and evaluated regional harvest monitoring programs, and developed a statewide subsistence harvest strategy. This study and others (01-107 and 04-751) also funded annual updating of the Alaska Subsistence Harvest Database and annual reporting of harvest information.

Do not consider proposals for Bristol Bay and Chignik salmon.

- Funding will be needed after 2006 to continue annual updating of the Alaska Subsistence Harvest Database and annual reporting of harvest information, but this a need of statewide importance.

Information Need 2A2: Independently verify permit data

Knowledge is incomplete for Bristol Bay salmon.

- While no studies have specifically addressed verification of permit data, periodic household surveys and key respondent interviews contribute some measure of the reliability of annual permit data. Also, two studies have partially addressed this information need for Togiak subsistence salmon fisheries (ADF&G Technical Paper 203 and Monitoring Program study 01-147).

Consider proposals for Bristol Bay salmon.

- While permit data is generally reliable, information on subsistence harvests using rod and reel and retained from commercial catches may not be completely reported. As recommended by the statewide harvest strategy study (00-017), improvements in outreach and methods would ensure collection of more accurate subsistence harvest data from permits as well as commercial fish tickets.

Knowledge is incomplete for Chignik salmon.

- While no studies have specifically addressed verification of permit data, periodic household surveys and key respondent interviews contribute some measure of the reliability of annual permit data. Post-season surveys are being conducted through 2005 (Exxon Valdez Oil Spill Trustee Council study).

Consider proposals for Chignik salmon.

- While permit data is generally reliable, information on subsistence harvests using rod and reel and retained from commercial catches may not be completely reported. As recommended by the statewide harvest strategy study (00-017), improvements in outreach and methods would ensure collection of more accurate subsistence harvest data from permits as well as commercial fish tickets.

OBJECTIVE 2B: Identify and describe trends in past and present use patterns

Information Need 2B1: Estimate historic harvest levels and effort, and evaluate trends and data quality

Knowledge is incomplete for Bristol Bay salmon.

- The Alaska Subsistence Fisheries Database maintained by ADF&G provides a basis to analyze trends and quality of historic harvest data, and pre-1988 information is currently being added to this database (Monitoring Program study 04-751). Information on historic harvest levels and effort exists in a Bristol Bay community

Appendix H. Continued.

Information Need 2B1: Continued

baseline study (Minerals Management Service Report 92-00360) and Traditional Ecological Knowledge studies have documented changes over time for the villages of Nondalton (Monitoring Program study 01-075) and Togiak (ongoing Togiak NWR study).

Consider proposals for Bristol Bay salmon.

- Historic harvest levels and effort have been well documented, and data quality appears to be good. However, more studies are needed to evaluate trends.

Knowledge is incomplete for Chignik salmon.

- The Alaska Subsistence Fisheries Database maintained by ADF&G provides a basis to analyze trends and quality of historic harvest data, and pre-1988 information is currently being added to this database (Monitoring Program study 04-751). Harvest trend information had been periodically collected from households in the villages of Chignik Bay, Chignik Lake, Chignik Lagoon, Ivanof Bay, and Perryville beginning in 1989 (Exxon Valdez Oil Spill Trustee Council study). ***Consider proposals for Chignik salmon.***
- Historic harvest levels and effort have been well documented, and data quality appears to be good. While the need for additional information on trends should be evaluated after an Exxon Valdez Oil Spill Trustee Council study is completed in 2005 and results are evaluated, effects of the Chignik commercial fishing cooperative on trends should be assessed (Information Need 2B4).

Information Need 2B2: Identify and evaluate factors affecting subsistence uses

Knowledge is incomplete for Bristol Bay salmon.

- Information on effects of demographic, social, economic, and ecosystem factors have been obtained from several studies in which interviews were conducted with residents of various communities. Some of these factors may directly affect subsistence fishing (for example, displacement of subsistence fishing activities by sport fishing), some may indirectly affect subsistence fishing through effects on salmon production (for example, beaver dams), and some may have both direct and indirect effects on subsistence fishing (for example, weather conditions, earthquakes, and pollution).
- An ongoing ADF&G study associated with Pebble Mine development is addressing this information need for the communities of Port Alsworth, Pedro Bay, Nondalton, Iliamna, Igiugig, Kakhonak, and Newhalen.

Consider proposals for Bristol Bay salmon.

- Baseline studies done in the 1980's need to be revisited and revised based on documentation of current demographic, economic, and social factors affecting subsistence uses. However, the need for additional information from communities near Lake Clark National Park should be evaluated after completion of an ongoing ADF&G study associated with Pebble Mine development.

Knowledge is incomplete for Chignik salmon.

- Except for an Exxon Valdez Oil Spill Trustee Council study, there do not appear to be any other studies concerning factors affecting subsistence uses.

Consider proposals for Chignik salmon.

- More information on factors affecting subsistence uses needs to be collected, including effects of the recently developed Chignik commercial fishing cooperative (if it continues to operate).

Information Need 2B3: Document changes in harvest timing and factors influencing it

Knowledge is incomplete for Bristol Bay salmon.

- Permit data is of use in documenting changes in harvest timing, but not in explaining why changes occurred and what factors influence these changes.
- Changes in harvest timing and factors influencing it have been well documented for Nondalton (01-075), Togiak, and some communities in Alaska Peninsula and Becharof National Wildlife Refuges (study 01-109).

Appendix H. Continued.

Information Need 2B3: Continued

The ongoing ADF&G study associated with Pebble Mine development should provide some information on harvest timing for Port Alsworth, Pedro Bay, Nondalton, Iliamna, Igiugig, Kakhonak, and Newhalen.

Consider proposals for Bristol Bay salmon.

- It is not clear where additional studies are needed to document changes in harvest timing and factors influencing it. The need for this information may best be addressed as specific issues are identified. Studies on communities near Lake Clark National Park should not be done until results from an ongoing ADF&G study associated with Pebble Mine development are available for evaluation.

Knowledge is incomplete for Chignik salmon.

- Information on current and historic harvest timing was collected for communities in the Chignik area during the early 1990s through interviews and household survey by ADF&G. The current ADF&G system of permits and post-season surveys continues to provide some harvest timing information for subsistence salmon fisheries.

Consider proposals for Chignik salmon

- There may be a need for additional collection of information on harvest timing and factors influencing it, since available information is over 10 years old. Information on effects of the Chignik commercial fishing cooperative on subsistence harvest timing may be of particular interest (also see Information Need 2B4).

Information Need 2B4: Describe current and historic fish processing and distribution practices including sharing, barter, and trade

Knowledge is incomplete for Bristol Bay salmon.

- Information on current and historic fish processing is available for the communities of Levelock, Manokotak, Togiak, Twin Hills, Egegik Ugashik, and Pilot Point.
- Information on past and present barter and customary trade of fishes within the Bristol Bay area is currently being documented by a Monitoring Program study (04-454). Some information on this topic was also collected during an earlier Monitoring Program study conducted in the community of Nondalton (01-075).

Do not consider proposals for Bristol Bay salmon.

- No additional efforts are needed to collect information on current and historic fish processing practices.
- The need for additional information on distribution practices should be evaluated after completion of an ongoing Monitoring Program study (04-454) on barter and customary trade within Bristol Bay. However, documentation efforts pertaining to the concept of sharing need to be broadened, and differences between the concepts of sharing and bartering need to be better explained.

Knowledge is incomplete for Chignik salmon.

- Information on current and historic fish processing methods was collected for communities in the Chignik area during the early 1990s through interviews and household survey by ADF&G.

Consider proposals for Chignik salmon.

- The need for additional information on distribution practices should be evaluated after completion of an ongoing Monitoring Program study (04-454) on barter and customary trade within Bristol Bay. However, documentation efforts pertaining to the concept of sharing need to be broadened, and differences between the concepts of sharing and bartering need to be better explained.
- There may be a need for additional collection of information on current fish processing since available information is over 10 years old.

Appendix H. Continued.

Information Need 2B5: Describe historic and current harvest methods and means by species and area

Knowledge is adequate for Bristol Bay salmon.

- Historic and current harvest methods and means have been well documented for most communities. Information has been reported in various ADF&G technical papers and documented in a free-form text database (Monitoring Program study 02-034).

Do not consider proposals for Bristol Bay salmon.

- No additional efforts are needed to collect information on historic and current harvest methods and means.

Knowledge is incomplete for Chignik salmon.

- Information on harvest methods and means was collected for Chignik area communities during the early 1990s through interviews and household surveys conducted by ADF&G. The current ADF&G system of permits and post-season surveys continues to document this information for subsistence salmon fisheries.

Consider proposals for Chignik salmon.

- While no additional efforts are needed to collect information on historic and current harvest methods and means, effects of the Chignik commercial fishing cooperative on current harvest methods and means may need to be examined, if this commercial fishery is allowed to continue (Information Need 2B4).

OBJECTIVE 2C: Project future use patterns.

Information Need 2C1: Gather local perspectives on future use patterns

Knowledge is lacking for Bristol Bay and Chignik salmon.

- No studies concerning local perspectives on future use patterns appear to have been conducted.

Consider proposals for Bristol Bay and Chignik salmon.

- Studies would be needed to address this information need.

Information Need 2C2: Evaluate key factors influencing future use patterns

Knowledge is lacking for Bristol Bay and Chignik salmon.

- No studies concerning key factors influencing future use patterns appear to have been conducted.

Consider proposals for Bristol Bay and Chignik salmon.

- Studies would be needed to address this information need.

Information Need 2C3: Build process based models to predict future use patterns

Knowledge is lacking for Bristol Bay and Chignik salmon.

- Process based models to predict future use patterns have not been developed.

Do not consider proposals for Bristol Bay and Chignik salmon.

- Process based models should not be developed until information needs 2C1 and 2C2 are addressed with key informant interviews.

GOAL 3: EFFECTIVE MANAGEMENT TO PROVIDE FOR SUBSISTENCE USES

OBJECTIVE 3A: Develop and evaluate management strategies to provide for subsistence fisheries

Information Need 3A1: Evaluate usefulness and effectiveness of current regulations

Knowledge is incomplete for Bristol Bay salmon.

The Federal Subsistence Board evaluates usefulness and effectiveness of subsistence fishing regulations in considering regulatory proposals using information from agencies, Regional Advisory Councils, and users.

Appendix H. Continued.

Information Need 3A1: Continued

- Information exists that support the State of Alaska's spawning escapement goal and sustainable salmon fisheries regulatory policies.

Do not consider proposals for Bristol Bay salmon.

- While there appears to be little published information and few studies available on the usefulness and effectiveness of subsistence fishing regulations, this issue is addressed by the Federal Subsistence Board, with input from agencies, Advisory Councils, and users, when considering changes to existing or setting new regulations. At this time, there does not seem to be a need to evaluate current regulations, although there is some interest in documenting and evaluating management systems used by indigenous people (Information Need 3A3) to determine whether some of these practices would make current management more effective.

Knowledge is incomplete for Chignik salmon.

- The Federal Subsistence Board evaluates usefulness and effectiveness of subsistence fishing regulations when considering regulatory proposals using information provided by agencies, Regional Advisory Councils, and users.
- Information exists that support the State of Alaska's spawning escapement goal and sustainable salmon fisheries regulatory policies.
- Establishment of a cooperative commercial salmon fishery for the Chignik River system in 2002 may have affected subsistence fishing opportunities, and residents stated they were unable to harvest enough salmon in 2004.

Consider proposals for Chignik salmon.

- While there appears to be little published information and few studies available on the usefulness and effectiveness of subsistence fishing regulations, this issue is addressed by the Federal Subsistence Board, with input from agencies, Advisory Councils, and users, when considering changes to existing or setting new regulations.
- There may be a need to determine effects on subsistence fishing of State regulations that established a cooperative commercial fishery for Chignik River system salmon in 2002. While the regulations establishing a cooperative commercial fishery is being litigated, this fishery was allowed to occur in 2005 under emergency regulations established by the Alaska Board of Fisheries. Aside from this issue, there does not seem to be a need to evaluate effects of management strategies on other subsistence fisheries in this area, although there is some interest in documenting and evaluating management systems used by indigenous people (Information Need 3A3) to determine whether some of these practices would make current management more effective.

Information Need 3A2: Develop information sharing between stakeholders and agencies

Knowledge is incomplete for Bristol Bay and Chignik salmon.

- The Monitoring Program supports development of all forms of information sharing, including written reports, oral and poster presentations, databases; websites, and workshops. The Alaska Subsistence Fisheries Database is maintained on the Internet by ADF&G, and annual updates for 2001-2005, as well as inclusion of pre-1988 data and GIS enhancements have been funded through the Monitoring Program (studies 01-107, 02-043, and 04-751). Searchable inventories of subsistence fishery-related reports and publications are maintained on the Internet by the Office of Subsistence Management (Monitoring Program reports), ADF&G, USGS, and University of Washington (School of Aquatic and Fisheries Science). The Monitoring Program also funded a study (01-154) that allowed ADF&G to develop and test a prototype, as well as estimate costs, for implementing an interactive, integrated, web-based information system.
- Collections of scales and otoliths, along associated age, sex, and length data, are maintained by ADF&G and University of Washington (School of Aquatic and Fisheries Science). Associated databases will eventually be available on the Internet.
- The North Pacific Marine Science Organization (PICES) is developing a metadatabase to serve as a gateway for accessing data, reports, databases, catalogs, proposals, and other media on ecosystems of the North Pacific.

Appendix H. Continued.

Information Need 3A2: Continued

Consider proposals for Bristol Bay and Chignik salmon.

- Existing databases need to be maintained and updated to ensure continued usefulness. Annual updates, expansion, and enhancements of the Alaska Subsistence Fisheries Database, maintained by ADF&G, are supported with Monitoring Program funding only through 2005.
- Efforts are needed to evaluate the effectiveness of information sharing efforts, including the degree to which databases and other forms of information sharing are being used. Development of a metadatabase for subsistence fisheries information, similar to ongoing efforts for PICES, should be examined.

Information Need 3A3: Examine alternative management strategies

Knowledge is incomplete for Bristol Bay and Chignik salmon.

- While information on alternate management strategies is not available for Bristol Bay subsistence salmon fisheries, the Sustainable Fisheries Foundation has been coordinating and supporting efforts to develop a general strategy for sustainable salmon fisheries based on an ecosystem-based approach to managing human activities. To transition to this approach, the Foundation recommends adoption of a system of community-based, watershed-oriented councils that include all stakeholders and agency representatives, and development of specific management objectives that include quantifiable measures of progress.

Consider proposals for Bristol Bay and Chignik salmon.

- Studies that document salmon management systems used by the indigenous people, and assess the use of habitat-based escapement goals may prove useful (also see Information Need 3A1). Additionally, agencies and stakeholders should keep current, and become involved as needed, in Sustainable Fisheries Foundation efforts.

OBJECTIVE 3B: Assess impacts of other fisheries on subsistence fisheries

Information Need 3B1: Describe socioeconomic and cultural impacts of other fisheries

Knowledge is incomplete for Bristol Bay salmon.

- Some information exists on interactions between subsistence and recreational fisheries on Togiak River. Four problems were identified: resident concerns about biological impacts, displacement of subsistence fishers from traditional sites, trespass on Native lands, and cultural objections to catch and release fishing.
- Potential socioeconomic and culture impacts of commercial fisheries on subsistence fisheries can be substantial, but studies assessing socioeconomic and cultural impacts on subsistence fisheries have not been conducted for this area. Salmon returning to spawn in Bristol Bay systems are caught in mixed stock commercial fisheries conducted along the southern and northern coasts of the Alaska Peninsula, as well as in more stock-specific terminal harvest areas within Bristol Bay (Information Need 3B2). However, regulations and management actions seek to avoid impacting subsistence fishing opportunities. High seas harvests are not thought to greatly affect subsistence fisheries, although stock-specific information is not available.
- Subsistence users often describe impact of other fisheries through letters and oral testimony at Regional Advisory Council, Federal Subsistence Board, and Alaska Board of Fisheries meetings.

Do not consider proposals for Bristol Bay salmon.

- The need for additional studies should be addressed as specific information needs are identified, but no specific needs were identified. Impacts of the Alagnak River Special Harvest Area commercial fishery on Lake Clark subsistence users could become a future issue. Information may also be obtained in conjunction with Information Needs 2B4 and 2B5.

Knowledge is lacking for Chignik salmon.

- No studies or reports were identified that provide information on socioeconomic and culture impacts of other fisheries on subsistence fisheries. However, commercial and sport fishing regulations and management actions seek to avoid impacting subsistence fishing opportunities. High seas harvests are not thought to greatly affect subsistence fisheries, although stock-specific information is not available.

Appendix H. Continued.

Information Need 3B1: Continued

- Subsistence users often describe impact of other fisheries through letters and oral testimony at Regional Advisory Council, Federal Subsistence Board, and Alaska Board of Fisheries meetings.

Consider proposals for Chignik salmon.

- The need for additional studies should be addressed as specific information needs are identified. Effects of the Chignik cooperative commercial fishery may need to be assessed. Information may also be obtained in conjunction with Information Needs 2B4 and 2B5.

Information Need 3B2: Describe total harvest rates by fishery for specific stocks of interest

Knowledge is incomplete for Bristol Bay salmon.

- Total harvest rate estimates are available all important species and systems except Lake Clark sockeye salmon, although some of these estimates are not based on reliable escapement (Information Need 1A1) or commercial harvest (Information Need 1B1) information. Commercial harvest information for specific stocks of interest is generally not available from mixed stock fisheries conducted along the southern and northern coasts of the Alaska Peninsula or from high seas fisheries.

Consider proposals for Bristol Bay salmon.

- Total sockeye salmon harvest rate estimates could be made for Lake Clark and improved for Alagnak River, if reliable stock specific commercial harvest information was available. Genetic baseline information to accomplish this is available, and ADF&G intends to seek funding to conduct genetic mixed stock analysis of Naknek-Kvichak District commercial harvests within the next three to five years (also see Information Need 1B1). Total harvest rate estimates for Kulukak and Togiak rivers cannot be improved until reliable annual escapement estimates are available (Information Need 1A1). While estimates for important populations could be improved if stock-specific harvest estimates were available from mixed stock inshore and high seas fisheries, this would probably result in only small increases in estimated rates for important species and systems.
- Total Chinook and coho salmon harvest rate estimates could be made, if reliable escapement estimates were available (Information Need 1A1). While estimates for all important populations could be improved if stock specific harvest estimates were available from mixed stock inshore and high seas fisheries, this would probably result in only small increases in estimated rates for important species and systems.

Knowledge is lacking for Chignik salmon.

- Total harvest rate estimates are not available for important species and systems since reliable escapement (Information Need 1A1) and commercial harvest (Information Need 1B1) information is not available.

Consider proposals for Chignik salmon.

- Total harvest rate estimates could be made for Clark River sockeye and coho salmon as well as Perryville area coho salmon, if reliable stock specific commercial harvest (Information Need 1B1) and escapement (1A1) information was available. Genetic baseline information to accomplish this for the Chignik River commercial fishery is available for Clark River sockeye salmon (Information Need 1B3). It is not feasible to obtain stock specific harvest estimates from mixed stock high seas fisheries, but this would probably result in only small increases in estimated rates for important species and systems.

Appendix I. Information inventory for Bristol Bay-Chignik non-salmon fisheries unit.

Study Number and Title	Lead Agency/ Organization	Location	Species	Description	Duration
1A1 Estimate abundance and composition by species and river/lake system					
1 Ungalikthluk and Negukthlik rivers rainbow trout assessment (FIS 04-401)	FWS - Togiak NWR M.J. Lisac	Ungalikthluk and Negukthlik rivers	rainbow trout	Mark-recapture estimation of population size; and collection of length data and tissue samples for future genetic analyses.	2004
2 Age, length, and seasonal movement of rainbow trout populations in the Negukthlik and Ungalikthluk Rivers	FWS - Togiak NWR M.J. Lisac	Negukthlik and Ungalikthluk rivers	rainbow trout	Collection of length frequency, age distribution, and movement data.	1989, 1990, and 2003
3 Seasonal movement and distribution of rainbow trout in the Togiak River watershed	FWS - Togiak NWR R.D. Nelle	Togiak River system	rainbow trout	Documentation of habitat use and seasonal movements using radio telemetry.	2000- 2001
4 Tazimina River rainbow trout assessment (FIS 04-415)	ADF&G – SF C. Schwanke	Tazimina River	rainbow trout	Mark-recapture estimation of population size, and collection of length-at-maturity data.	2004
5 Estimation of population statistics for rainbow trout in the Kvichak River (ADF&G Fisheries Data Series Report 92-51)	ADF&G – SF D.O. Dunaway	Kvichak River	rainbow trout	Mark-recapture estimation of population size and survival, and collection of length-at-maturity data.	1986- 1996
6 Status of rainbow trout in Gertrude Creek a tributary of the King Salmon River, Becharof National Wildlife Refuge	FWS- KSFWO J. Larson	King Salmon River (Egegik River drainage)	rainbow trout	Mark-recapture estimation of population size, collection of length-at-maturity data, and monitoring of seasonal movements at weir site.	1990- 1992
7 Status of rainbow trout in tributaries of the upper King Salmon River, Becharof National Wildlife Refuge	FWS- KSFWO J. Larson	King Salmon River (Egegik River drainage)	rainbow trout	Mark-recapture estimation of population size, collection of length-at-maturity data, and documentation of seasonal movements with radio telemetry.	1990- 1992
8 Wood River lakes rainbow trout stock assessment	ADF&G – SF J. Dye	Wood River Lakes	rainbow trout	Identification of critical habitats, and estimation of abundance and dynamic rates (survival, cause-specific mortality, movement, etc.).	ongoing since 1990
9 Status of rainbow trout stocks in the Agulowak and Agutkpak rivers (ADF&G Fishery Data Series Report 93-41)	ADF&G – SF D.O. Dunaway	Agulowak and Agutkpak rivers (Wood River system)	rainbow trout	Mark-recapture estimation of population size and survival, and collection of length-at-maturity data.	1992

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Appendix I. Continued.

	Study Number and Title	Lead Agency/ Organization	Location	Species	Description	Duration
1A1	(continued)					
10	Abundance and movement of the rainbow trout spawning stock in the upper Naknek River (2002 University of Wyoming M.S. Thesis; 2004 article in North American Journal of Fisheries Management)	ADF&G – SF C.J. Schwanke	Naknek River	rainbow trout	Evaluation of sampling effectiveness (catch rates, length frequencies, and sex ratios) of hook-and-line, beach seine, and gill nets; mark-recapture estimation of population size; collection of length and sex composition data; and description of movement patterns using radio telemetry.	2000-2001
11	Estimating abundance of Dolly Varden in tributaries of the Togiak River	FWS - Togiak NWR M.J. Lisac	Togiak River tributaries	Dolly Varden	Mark-recapture estimation of spawning population size.	2003
12	Stock status of Arctic grayling and Dolly Varden in Featherly Creek	FWS- KSFWO J. Larson	Featherly Creek, Becharof NWR	Dolly Varden and Arctic grayling	Mark-recapture estimation of population size.	1995 and 1996
13	Estimating abundance of Dolly Varden in tributaries of the Togiak River	FWS - Togiak NWR M.J. Lisac	Togiak River tributaries	Dolly Varden	Mark-recapture estimation of spawning population size.	2003
14	Stock status of Arctic grayling in three tributaries to Becharof Lake	FWS- KSFWO J. Larson	Becharof, Otter, and Bear creek, Becharof NWR	Arctic grayling	Collection of relative abundance and length frequency data.	2000
15	Stock status of Arctic grayling in three tributaries to Becharof Lake, 1991 and 1992	FWS- KSFWO J. Larson	Becharof, Featherly, and Bear creek in, Becharof Lake	Arctic grayling	Collection of relative abundance and length frequency data.	1991 and 1992
16	Stock assessment of northern pike in Lake Aleknagik.	ADF&G – SF J. Dye	Lake Aleknagik	northern pike	Mark-recapture estimation of population size and survival, and collection of length data.	1998-99
17	Estimate the abundance of Ugashik Lake resident fishes	FWS- KSFWO J. Larson	Ugashik Lakes	whitefish species, Arctic char, lake trout	Examination of feasibility of abundance estimation using downward looking sonar and gillnets to estimate fish species abundance.	2005-2006

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Appendix I. Continued.

Study Number and Title	Lead Agency/ Organization	Location	Species	Description	Duration
1A1 (continued)					
18 Ugashik Lake resident fish survey	FW/S- KSFWO J. Larson	Ugashik Lakes	whitefish species, Arctic char, lake trout	Collection of relative abundance, distribution, and ecology data.	2003- 2004
1A2 Identify critical factors that influence population dynamics					
19 Distribution, seasonal movement, and life history of humpback whitefish in the Lake Clark watershed (FIS 05-403)	USGS - ASC/BSO J. Meka	Lake Clark	humpback whitefish	Collection of age, length, age-at-maturity, fecundity, and anadromy data, and documentation of habitat use and seasonal movements using radio telemetry.	ongoing
20 Alagnak River rainbow trout seasonal movement, migratory behavior, and habitat use	USGS - ASC/BSO J. Meka	Alagnak River	rainbow trout	Documentation of seasonal movements over several years using radio telemetry.	1997- 1999
21 Effects of global warming on distribution of steelhead trout populations on the Alaska Peninsula (USFWS Alaska Fisheries Technical Report 33).	USFWS - KSFWO D.M. Eaton	Meshik River, King Salmon River-Mother Goose Lake, Chignik River, Sandy River, Sapsuk River, and Russell Creek.	rainbow trout	Documentation of distribution and population characteristics of steelhead trout on Alaska Peninsula as part of a global climate change component of long-term study (Fishery Resources Status and Trends) to assess possible effects of climatic warming on fishery resources.	1991- 1994
22 Electrofishing induced mortality and injury to rainbow trout, Arctic grayling, humpback whitefish, least cisco, and northern pike (ADF&G Fishery Manuscript 90-3, 92-3, and 96-1)	ADF&G – SF S.M. Roach	Statewide application	rainbow trout, Arctic grayling, humpback whitefish, least cisco, and northern pike	Determination of injuries, survival, growth and capture rates of fishes caused by pulsed direct current electrofishing; and determination of egg mortality caused by electroshocking parents or eggs at different developmental stages.	1990 and 1996

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Appendix I. Continued.

Study Number and Title	Lead Agency/ Organization	Location	Species	Description	Duration
1A2 (continued)					
23 National Wild Fish Health Survey: Occurrence of fish disease organisms in rainbow trout and Dolly Varden in Southwest Alaska, with special attention to whirling disease.	FWS - Togiak NWR P. Walsh	Including Togiak River	Rainbow trout and Dolly Varden	Collection of tissue samples from 10 rainbow trout populations, 2 Dolly Varden populations, and 1 Arctic char population to establish a baseline for several diseases including whirling disease, using established protocols and procedures; and entry of resulting data into National Wild Fish Health Database at Montana State University. (Alaska has strict regulations regarding transport of fish, and no live salmonids have been legally imported into the state for over 20 years.)	1998
Also see study numbers 3 and 8 for rainbow trout					
1A3 Describe trends in populations					
24 Oral history and traditional ecological knowledge gathering within Togiak National Wildlife Refuge	FWS – Togiak NWR M. Lisac	Manokotak, Togiak, and Quinhagak	all	Documentation of changes in the environment and subsistence species over village elders' lifetimes using key respondent interviews.	2002- 2003
25 Sampling bias of hook and line gear used to capture rainbow trout in southwest Alaska	FWS- KSFWO J. Larson	King Salmon River (Egegik)	rainbow trout	Evaluation of size selectivity of hook and line sampling.	1996- 1999
26 Aging rainbow trout with a Master Growth Increment Chronology	USGS - ABSC/BSO E. Knudsen	Kvichak River	rainbow trout	Feasibility of estimating age of an individual by comparing its scale growth increment history to a master growth increment chronology developed from known age individuals from the same population.	ongoing
27 Precision of ages estimated from scales for rainbow trout in Bristol Bay (ADF&G Fishery Data Series Report 94-26)	ADF&G – SF L.G.. Coggins	Bristol Bay	rainbow trout	Estimation of within- and between-reader variability of age interpretations using scales from lacustrine and riverine populations.	1990's
28 Documentation and evaluation of methods used to estimate rainbow trout ages from scales (ADF&G Special Publication 98-2 and Fisheries Data Series Report 94-26)	ADF&G – SF J. Dye	Bristol Bay	rainbow trout	Documentation and evaluation of aging methods, including protocol used by ADF&G to sample, sort, clean, mount, press, and age scales, including a standardized method to train scale readers.	1990's

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Appendix I. Continued.

Study Number and Title	Lead Agency/ Organization	Location	Species	Description	Duration
1A3 (continued)					
29 Compilation of age, weight, and length statistics for Arctic grayling samples collected in Southwest Alaska (ADF&G Fishery Data Series Report 92-52)	ADF&G – SF L. G. Coggins	Southwest Alaska	Arctic grayling	Compilation of collected age and length statistics.	1964- 1989
30 Age, weight, and length statistics of resident fishes, and collection of physical and chemical data (FWS Alaska Fisheries Data Series Reports 96-3, 96-5, and 98-5)	FWS - Togiak NWR R.D. Nelle	Togiak NWR rivers and lakes	all	Inventory of fishes; and collection of age, weight, size, and immological data.	1984- 1990, 1993- 1995, 1997, 2000- 2002
31 Precision of ages determined from six bony structures of humpback whitefish and least cisco (ADF&G Fisheries Data Series Report 91-50)	ADF&G – SF L.S. Timmons	Statewide application	humpback whitefish and least cisco	Evaluation of estimated ages from scales by comparing results to those from five whole bone structures and five sectioned structures.	1991
32 Evaluations of age determination in northern pike (ADF&G Fishery Manuscript 92-4)	ADF&G – SF G.A. Pearse	Statewide application	northern pike	Evaluation of estimated ages from scales, vertebrae, and cleithra collected from three different populations.	1992
Also see study numbers 1, 2 and 5-8 for rainbow trout;					
1A4 Determine timing and migration patterns					
33 Migratory behavior and seasonal distribution of Dolly Varden in the Togiak River watershed, Togiak National Wildlife Refuge	FWS - Togiak NWR M.J. Lisac	Togiak River	Dolly Varden	Documentation of seasonal distribution using radio telemetry.	1999
34 Life history attributes of rainbow smelt in Togiak River	FWS - Togiak NWR R.D. Nelle	Togiak River	rainbow smelt	Collection of life history and run timing data.	2002
Also see study numbers 2, 3, 6, 7, 10, and 20 and 21 for rainbow trout, and 19 for humpback whitefish					
1A5 Define and catalog management units that sustain subsistence fisheries					
35 Compilation of age and size information for Southwest Alaska rainbow trout (ADF&G Fisheries Data Series Reports 91-62 and 94-17.)	ADF&G – SF J. Dye	Southwest Alaska	rainbow trout	Compilation of collected age and length statistics.	ongoing since 1954

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Appendix I. Continued.

Study Number and Title	Lead Agency/ Organization	Location	Species	Description	Duration
1A5 (continued)					
36 Collection of rainbow trout <i>Oncorhynchus mykiss</i> genetic tissue samples from Osviak River, Togiak National Wildlife Refuge, 2002.	FWS - Togiak NWR R.D. Nelle	Osviak River	rainbow trout	Collection of tissue samples from various watersheds within Togiak NWR for future genetic analyses.	2002
37 Genetic differentiation of rainbow trout in Togiak National Wildlife Refuge	FWS - Togiak NWR M.J. Lisac	Togiak NWR	rainbow trout	Examination of molecular genetics.	ongoing
38 Genetic population structure of Alagnak River rainbow trout.	USGS - ASC/BSO J. Meka	Alagnak River	rainbow trout	Examination of molecular genetics.	ongoing
39 Survey of the Dolly Varden and rainbow trout populations in the Iliamna River (ADF&G Fishery Data Series Report 99-25)	ADF&G – SF M.J. Jaenicke	Iliamna River	rainbow trout and Dolly Varden	Collection of age and length data using hook-and-line, hoop nets and beach seines; and estimation of Dolly Varden abundance using ground surveys.	1996 and 1997
40 Genetic baseline development for Dolly Varden in Togiak River (FIS 00-011)	FWS – GCL P. Crane	Togiak River	Dolly Varden	Collection of tissue samples, development of microsatellite loci, and determination of mixed stock analysis feasibility.	2000-2001
41 Ecology of Arctic char and Dolly Varden in Becharof Lake Drainage	FWS – KSFWO J. Larson	Becharof Lake	Dolly Varden and Arctic char	Examination of morphometric differences between deep- and shallow-water populations.	1998-1999
42 Genetic relationships between lake trout populations on Togiak National Wildlife Refuge	FWS - Togiak NWR P. Walsh	Togiak NWR	lake trout	Collection of tissue samples, development of microsatellite loci, and examination of genetic diversity and structure.	2004-2007
Also see study numbers 20 for rainbow trout, 19 for humpback whitefish, 33 for Dolly Varden, and 34 for rainbow smelt					
2A1 Periodically (about five year intervals) estimate harvest and effort by location, gear type, species, and season					
43 Bristol Bay regional subsistence profile (ADF&G Technical Paper 114)	ADF&G - S J. Wright	Bristol Bay	all	Documentation of species used, harvest estimates, seasonal rounds of harvest, and subsistence area use maps for 21 communities in seven subregions: Togiak, Nushagak Bay, Nushagak River, Iliamna Lake, Upper Alaska Peninsula, Chignik, and Lower Alaska Peninsula.	1985

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Appendix I. Continued.

Study Number and Title	Lead Agency/ Organization	Location	Species	Description	Duration
2A1 (continued)					
44 Nonsalmon fish harvests and traditional knowledge in Togiak, Manokotak, and Twin Hills (FIS 05-452)	ADF&G-S T. Krieg	Togiak, Twin Hills, Manokotak	all	Documentation of harvests, trends, methods, means, and factors affecting uses.	2005
45 Wild resource harvests and uses by residents of Manokotak, Togiak and Twin Hills (ADF&G Technical Papers 275 and 152)	ADF&G - S P. Cooley-Kenner	Manokotak, Togiak, Twin Hills	all	Documentation of harvest quantities, participation levels, social organization, harvest areas, and uses of fishes over the course of a year using household surveys, key respondent interviews, and fish camp observations.	1999-2000, 1985, and 1973-1974
46 Togiak River subsistence harvest monitoring (FIS 01-047)	BBNA - DLR/NRP R. Anderson	Togiak River	all	Documentation of harvests and locations using in-season surveys, catch sampling, and post-season household surveys.	2001-2003
47 Harvest and use of freshwater fish in Togiak and Manokotak,	BBNA - DLR/NRP R. Anderson	Manokotak and Togiak	all	Documentation of harvests and uses of fishes over the course of a year using household surveys.	1994-1995
48 Subsistence fisheries assessment: Kvichak River watershed resident species (FIS 02-034)	ADF&G-S T. Krieg	Kvichak River system	all	Documentation of harvest quantities, and description of use patterns, and trends.	2002-2003
49 Subsistence harvests and uses in Levelock, Southwest Alaska (ADF&G Technical Paper 184)	ADF&G - S M. Chythlook	Levelock	all	Documentation of harvest quantities, participation levels, and harvest and preservation methods over the course of a year using systematic household surveys and key respondent interviews; and comparison of 1987-1988 and 1973 data.	1987-1988, and 1973
50 Pebble Mine studies	ADF&G - S J. Fall	Port Alsworth, Pedro Bay, Nondalton, Iliamna, Newhalen	all	Estimation of harvests for each fish species and documentation of trends and related information using key respondent interviews and surveys.	2004-2005

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Appendix I. Continued.

Study Number and Title	Lead Agency/ Organization	Location	Species	Description	Duration
2A1 (continued)					
51 Subsistence harvests of fish other than salmon by Pedro Bay and Levelock residents (ADF&G Technical Paper 247)	ADF&G - S J. Fall	Lake Iliamna	all	Documentation of harvests by gear type, and harvest locations over the course of a year.	1996- 1997, 1992- 1993, 1987- 1988, 1982- 1983, 1973- 1974
52 Fish and wildlife uses in Alaska Peninsula communities (ADF&G Technical Papers 151 and 202)	ADF&G - S J. Fall	Egegik, Chignik, Chignik Lagoon, Chignik Lake, Perryville, and Ivanof Bay	all	Documentation of harvest levels and uses of resources over the course of a year using systematic household surveys; and comparison of 1989 and 1984 data.	1984 and 1989
53 Fish and wildlife harvests in Pilot Point, Ugashik and Port Heiden (ADF&G Technical Paper 158)	ADF&G - S J. Fall	Pilot Point, Ugashik, Port Heiden	all	Documentation of harvest quantities, participation levels, and harvest areas over the course of a year using household surveys.	1986- 1987
54 Status of subsistence uses In Exxon Valdez Oil Spill Area communities	ADF&G - S J. Fall	Includes Chignik Bay, Chignik Lake, Chignik Lagoon, and Perryville	all	Documentation of harvests, trends, fish stock status, and other factors affecting subsistence uses using household surveys.	1989, 1990- 1993, 1998, 2004, and 2005
55 Overview of subsistence salmon and other finfish fisheries of the Chignik management area (ADF&G Technical Paper 230)	ADF&G - S L. Scarborough	Chignik area	all	Documentation of harvest quantities, methods, and means, processing and preservation methods, uses, and case studies of fishing households using systematic household surveys and key respondent interviews, fishery observations, and historic background and harvest data.	early 1990's

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Appendix I. Continued.

Study Number and Title		Lead Agency/ Organization	Location	Species	Description	Duration
2A1 (continued)						
56	Alaska Subsistence Harvest Database update and report preparation (FIS 04-751)	ADF&G - S R. Walker	Alaska	all	Update of Alaska Subsistence Fisheries Database with 2003-2005 salmon data, historic (pre-1988) salmon data; 2003-2005 non-salmon fish and marine invertebrate data, and historic (pre-2003) non-salmon data.	2004-2006
57	Implementation of Statewide Subsistence Fisheries Harvest Assessment Strategy (FIS 01-107)	ADF&G - S J. Fall	Alaska	all	Review of study 00-017 recommendations, harvest assessment methods, and data usage through regional workshops; determination of need for subsistence harvest assessment program operational plans; production of 2001 and 2002 annual subsistence fisheries reports; and update of Alaska Subsistence Fisheries Database with 2001 and 2002 data	2001-2003
58	Statewide Subsistence Fisheries Harvest Monitoring Strategy (FIS 00-017)	ADF&G - S J. Fall	Alaska	all	Review and evaluation of subsistence fisheries and harvest assessment programs (including methods and reporting standards) through regional workshops; development of recommendations for a unified strategy for assessing subsistence fisheries harvests (including training programs to implement cooperative harvest assessment programs); production of 1999 annual subsistence fisheries report; and update of Alaska Subsistence Fisheries Database with 1999 data.	2000
2A2 Estimate historic harvest levels and identify trends						
59	Oral history and traditional ecological knowledge gathering within Togiak National Wildlife Refuge	FWS – Togiak NWR M. Lisac	Manokotak, Togiak, and Quinhagak	all	Documentation of changes in the environment and subsistence species over village elders' lifetimes using key respondent interviews.	2002-2003

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Appendix I. Continued.

Study Number and Title	Lead Agency/ Organization	Location	Species	Description	Duration
2A2 (continued)					
60 Bristol Bay subsistence harvest and sociocultural systems inventory (MMS Report 92-0036)	Social Science Research Associates J. Endter-Wada	Bristol Bay	all	Report listed but available on MMS website.	1992
Also see study numbers 24 and 44-58					
2A3 Identify factors affecting subsistence uses					
61 Traditional knowledge and customs of Bristol Bay and Chignik area fishing communities (FIS 00-012 and 01-109)	ADF&G - S T. Krieg	Bristol Bay- Chignik	all	Documentation of subsistence uses and traditional knowledge concerning harvest sites; timing; methods of preparation; indicators of run strength, arrival, and location; historical observations, events, and stories of subsistence fishing; life histories; taxonomy; movements of resident species; observations of changes in habitats used by targeted species; identification of management issues using key respondent interviews, field notes, trip reports, audio tapes, and technical papers; and entry of this information into a searchable text database.	2000- 2002
62 Subsistence fishing patterns on the Togiak River and the impact of sport fishing (ADF&G Technical Paper 203)	ADF&G - S J. Gross	Togiak River	Dolly Varden	Documentation of harvest quantities, targeted species, timing of effort, harvest locations and methods, and problems with recreational fisheries using key respondent interviews.	1987
Also see study numbers 24, 44, 50, 54, and 59					
2A4 Describe historic and current harvest methods and means by species, area, and time					
See study numbers 43-55, 61 and 62					
2A5 Describe current and historic fish processing and distribution practices including sharing, barter, and trade					
63 Sharing, bartering, and trading in subsistence resources in Bristol Bay (FIS 04-454)	ADF&G - S T. Krieg	Bristol Bay	all	Documentation of past and present barter and customary trade practices using key respondent Interviews.	2004- 2006

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Appendix I. Continued.

Study Number and Title	Lead Agency/ Organization	Location	Salmon Species	Description	Duration
2A5 (continued)					
64 Subsistence production and exchange in the Iliamna Lake region	ADF&G - S J. Morris	Port Alsworth, Nondalton, Iliamna, Newhalen, Pedro Bay, Kokhanok, Iglingik	all	Documentation of harvest and exchange patterns using key respondent interviews.	1983
65 Use of fish and wildlife resources by residents of the Bristol Bay Borough (ADF&G Technical Paper 123)	ADF&G-S J. Morris	South Naknek, Naknek, and King Salmon	all	Documentation of resource harvest areas, harvesting groups, and resource distribution networks using systematic household surveys.	1982- 1984
Also see study numbers 45, 47, 49, 52, 55, and 61					
2B1 Gather local perspectives on future use patterns					
No studies					
2B2 Evaluate key factors influencing future use patterns					
No studies					
2B3 Build process based models to predict future use patterns					
No studies					
3A1 Develop information sharing between stakeholders and agencies					
66 Togiak National Wildlife Refuge study database	FWS – Togiak NWR M. Lisac	TNWR	all	Maintenance of reports and other products resulting from studies conducted by FWS-TNWR staff	ongoing
67 Alaska Subsistence Harvest Database and reporting	ADF&G - S R. Walker	Alaska	all	Maintenance of searchable database of subsistence fisheries harvest information and publication of annual reports. Database can be accessed from a website and is available on CD.	ongoing since 1980
68 Alaska Subsistence Harvest Database GIS integration (FIS 02-043)	ADF&G - S B. Davis	Alaska	all	Integration of Alaska Subsistence Fisheries Database records with a system of maps depicting communities and harvest locations. Database is available on CD.	2002- 2003
69 Fisheries Resource Monitoring Program database	OSM - FIS V. McClain	Alaska	all	Maintenance of reports and other products resulting from FRMP studies. Copies of reports can be downloaded from a website.	ongoing since 2000

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Appendix I. Continued.

Study Number and Title	Lead Agency/ Organization	Location	Species	Description	Duration
3A1 (continued)					
70 ADFS publications database	ADF&G - S, SF, CF K. Savikko	Alaska	all	Maintenance of reports and other products resulting from work conducted by ADF&G staff. Copies of reports can be downloaded from a website	ongoing
71 USGS, Alaska Science Center, Biological Science Office Fisheries study information	USGS - ASC M. Hood	Alaska	all	Maintenance of reports and other products resulting from work conducted by USGS-ASC-BSO staff.	ongoing since 1971
72 Project information and access system (FIS 01-154)	ADF&G - SF S. Darr	Alaska	all	Development of prototype for a web-based searchable information system for studies, project manager contacts, and publications.	2001-2002
73 University of Washington, School of Aquatic and Fisheries Science publications database	UW - SAFS C. Boatright	Pacific Coast of North America, including Bristol Bay and Chignik	all	Maintenance of reports and other products resulting from work conducted by UW-SFAS staff.	ongoing since 1973
74 Exxon Valdez Trustees Council publications database	Exxon Valdez Oil Spill Trustees Council	Areas affected by 1989 oil spill, including Chignik area	all	Maintenance of reports and other products resulting from Exxon Valdez oil spill damage assessment and restoration work. Copies of reports can be downloaded from a website.	ongoing since 1989
Also see study numbers 56-58 and 61					
3A2 Determine whether current regulations provide for adequate subsistence opportunities and harvests					
75 Bristol Bay priority information needs assessment	BBNA - DLR/NRP R. Anderson	Bristol Bay- Chignik	all	Documentation of natural resource issues using community and tribal meetings conducted about every three years. Resulting report provided to Bristol Bay Regional Advisory Council	ongoing
3A3 Examine alternative management strategies					
76 Subsistence as an economic system in Alaska: Theoretical and policy implications (ADF&G Technical Paper 67)	ADF&G - S D. Lonner	Alaska	all	Attempt to better define subsistence use in Alaska by drawing upon research findings in economic anthropology, and to describe implications for subsistence management.	1980
3A4 Determine compliance and support for current regulations					
See study numbers 75 and 76					

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Appendix I. Continued.

Study Number and Title	Lead Agency/ Organization	Location	Salmon Species	Description	Duration
3B1 Describe socioeconomic and cultural impacts of other fisheries					
77 Effects of catch-and-release fishing on the physiology and hooking injury of rainbow trout	USGS - ASC/BSO J. Meka	Alagnak River	Rainbow trout	Examination of catch-and-release fishing effects by assessing incidence of hooking injury and measuring immediate physiological stress response to duration of angling and handling during hook removal. Addresses issues of whether different tackle, methods (fly vs. spin), time fish are played and landed, experience of anglers, and water temperature influence physiological stress levels and hooking injuries in rainbow trout.	ongoing
78 Mortality of northern pike captured and released with sport fishing gear (ADF&G Fishery Data Series Report 92-3)	ADF&G – SF A. Burkholder	Statewide application	Northern pike	Conducted experiments to estimate mortality of northern pike captured with four commonly used lures. No differences in mortality rates were found for double treble-hook lures, large treble-hook lures, single-hook lures, and small treble-hook lures.	1992
79 Mortality of Arctic char and large Arctic grayling captured and released with sport fishing gear (ADF&G Fishery Data Series Report 93-1)	ADF&G – SF T.R. McKinley	Hatchery-based study	Arctic grayling and Arctic char	Conducted hatchery experiments to estimate mortality of Arctic grayling and char captured with five commonly used lures.	1993
Also see study numbers 62 and 75					
3B2 Describe total harvest rates by fishery for specific stocks of interest					
80 Statewide Harvest Survey of sport fishing catch and effort	ADF&G - SF/RTS D. Bernard	Statewide	all	Estimation of annual sport catches and harvests from responses to a mailed survey.	ongoing
81 Statewide logbook program for guided freshwater sport fishing catch and effort	ADF&G – SF/RTS D. Bernard	Statewide	all	Compilation of annual guided sport fishing harvest records for all salmon fisheries from a mandatory logbook program for guides	ongoing since 2005
82 Creel and escapement statistics for the Togiak River during 1989 (ADF&G Fishery Data Series Report 90-26)	ADF&G – SF D.O. Dunaway	Togiak River	All fishes	Creel census of sport fishery on 24 mile section of lower Togiak River during August and September 1989.	1989

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Appendix I. Continued.

	Study Number and Title	Lead Agency/ Organization	Location	Salmon Species	Description	Duration
3B2	(continued)					
83	Estimated public use within Togiak National Wildlife Refuge, 1984-1989	FWS - Togiak NWR M.J. Lisac	Togiak NWR	All fishes	Public use survey.	1984- 1989
84	Creel and escapement statistics for the Togiak River during 1989 (ADF&G Fishery Data Series Report 90-26)	ADF&G – SF D.O. Dunaway	Togiak River	All fishes	Creel census of sport fishery on 24 mile section of lower Togiak River during August 11 - Sept. 14, 1989.	1989
85	Survey of the rainbow trout sport fishery on the upper Alagnak River during June 1997 (ADF&G Fishery Data Series Report 98-27)	ADF&G – SF M.J. Jaenicke	Alagnak River	Rainbow trout	Creel census of sport fishery on upper Alagnak River during June 1997.	1997
86	Survey of the rainbow trout sport fishery on the Nonvianuk and Alagnak rivers, 1996 (ADF&G Fishery Data Series Report 98-13)	ADF&G – SF M.J. Jaenicke	Alagnak and Nonvianuk rivers	Rainbow trout	Creel census of sport fishery on upper Alagnak River during June 1996. Investigators tagged some rainbow trout during the creel census, and also captured rainbow trout from June to Sept. to obtain age and length information.	1996
87	Catch, harvest, and size statistics for the rainbow trout fishery in the Tazimina River during 1987 and 1989 (ADF&G Fishery Data Series Report 112)	ADF&G – SF T.E. Brookover III	Tazimina River	Rainbow trout, Arctic grayling	Collected sport fishing catch, effort, harvest and boat use. Investigators used hook and line, seines, and minnow traps to collect rainbow trout and Arctic grayling to obtain age and length information, and also marked some rainbow trout with external tags.	1987 and 1988
88	Estimate catch and harvest of resident and anadromous fish in the Egegik River	FWS - KSFWO J. Larson	Egegik River	Rainbow trout, Arctic grayling, Dolly Varden	Assessment of sport fishing catch, effort, and harvest.	1994- 1996
89	Estimate catch and harvest of resident and anadromous fish at Gertrude Creek	FWS - KSFWO J. Larson	Gertrude Creek, King Salmon River system (Egegik)	Rainbow trout	Assessment of sport fishing catch, effort, and harvest	1991 and 1996

-continued-

Appendix I. Continued.

Study Number and Title	Lead Agency/ Organization	Location	Salmon Species	Description	Duration
3B2 (continued)					
90 Estimate catch and harvest of resident and anadromous fish at the Ugashik Narrows	FWS – KSF&W J. Larson	Ugashik Narrows, Ugashik River system	Arctic grayling, Dolly Varden	Assessment of sport fishing catch, effort, and harvest.	1988 and 2000
91 Estimates of sport fishing effort, catch, and harvest at Ugashik Narrows and Outlet, 1987-1988 (ADF&G Fishery Data Series Report 91-3)	ADF&G – SF S.C. Meyer	Ugashik lakes	All fishes	Creel census of sport fishery during summers of 1987 and 1988, including collection of length information for Dolly Varden, and Arctic grayling.	1987- 1988
92 Survey of the sport fishery at Ugashik Narrows, 1998 (ADF&G Fishery Data Series Report 00-11)	ADF&G – SF M. J. Jaenicke	Ugashik lakes	All fishes	Creel census of sport fishery during June and September 1988, including collection of length information for Dolly Varden, and length and age information for Arctic grayling.	1998
93 Survey of the rainbow trout sport fishery on the Agulukpak River, Alaska, 1996 (ADF&G Fishery Data Series Report 97-38)	ADF&G – SF L.M. Rogan	Wood River Lakes	Rainbow trout	Creel census of sport fishery on Agulukpak River during the summer of 1996.	1996
94 Effort, catch, and harvest statistics for the sport fisheries of the Agulukpak and Agulowak rivers, 1986-1988 (ADF&G Fishery Data Series Report no. 90)	ADF&G – SF R.E. Minard	Wood River Lakes	All fishes	Creel census of sport fishery during summers of 1986, 1987, and 1988, including collection of age and length information for rainbow trout.	1986- 1988
Also see study numbers 43-58					

Appendix J. Gap analysis results for Bristol Bay-Chignik non-salmon subsistence fisheries unit, 2005.

GOAL 1: SUSTAIN HEALTHY FISH POPULATIONS THAT SUPPORT SUBSISTENCE USES

OBJECTIVE 1A: Characterize life history, population structure and dynamics, and estimate abundance

Information Need 1A1: Estimate abundance and composition by species and river/lake system

Knowledge is adequate for rainbow trout; incomplete for Dolly Varden and Arctic grayling; and lacking for whitefish, northern pike, and smelt.

- For Bristol Bay rainbow trout, abundance estimates are available for many populations, including recent mark-recapture work on populations in the Tazimina, Ungalikthluk, and Negukthlik rivers funded through the Monitoring Program (studies 04-401 and 04-415).
- For Togiak Dolly Varden, mark-recapture work to assess spawner abundance was recently conducted (2003) in Togiak River tributaries by FWS.
- For Bristol Bay Arctic grayling, abundance estimates are available for the Egegik and Ugashik systems. The most recent work was done in 2000 for Becharof Lake and in 1992 for Ugashik Lake.
- For Lake Clark whitefish, Bristol Bay northern pike, Togiak smelt species, and Bristol Bay-Chignik rainbow smelt, abundance estimates are not available for important systems.

Consider proposals for Arctic grayling, northern pike, and smelt; but not for rainbow trout, Dolly Varden, and whitefish.

- For Bristol Bay Arctic grayling, it is not clear which river/lake systems in addition to Egegik and Ugashik need studies to estimate abundance. Abundance information for Egegik has been collected recently (2000), but information for Ugashik is about 10 years old.
- For Bristol Bay northern pike, Togiak smelt, and Bristol Bay-Chignik rainbow smelt, it is not clear which river/lake systems need studies to estimate abundance.
- For Lake Clark whitefish, studies to estimate abundance may be needed, but should not be attempted until results of a recently funded Monitoring Program study (05-403) on humpback whitefish are available. This study will provide information on distribution, movement patterns, and age structure.
- For Bristol Bay rainbow trout and Togiak Dolly Varden, there does not appear to be a need to fund additional studies to estimate population abundance at this time.

Information Need 1A2: Define and catalog management units that sustain subsistence fisheries

Knowledge is adequate for rainbow trout; incomplete for Dolly Varden and Arctic grayling; and lacking for whitefish, northern pike, and smelt.

- For Bristol Bay rainbow trout, management units are well defined. There is a great deal of information on various populations, including age and size composition, seasonal movements (Alagnak River), and genetic structure (Alagnak River and Togiak NWR).
- For Togiak Dolly Varden, management units are reasonably well defined. Information is available on genetic structure of the spawning population (Monitoring Program study 00-011) and seasonal movement patterns. Stock structure of wintering aggregations is not well described.
- For Bristol Bay Arctic grayling, management units are reasonably well defined. Information is available on age, size, and distribution for various populations including those in Togiak, Egegik, and Ugashik rivers. Based on this information, different areas within the same river/lake system are sometimes treated as different management units by ADF&G.
- For Lake Clark whitefish, management units are not well defined. However, information on age, size, and seasonal movements will be collected during a recently funded Monitoring Program study (05-403), which will improve knowledge.
- For smelt, management units are not well defined. Information on life history is available for Togiak rainbow smelt, but information is lacking for other Togiak smelt species as well as rainbow smelt in other areas.

Appendix J. Continued.

Information Need 1A2: Continued

- For Bristol Bay northern pike, management units are not well defined. Information on age, size, and distribution is available for Togiak River and Lake Aleknagik.

Consider proposals for Dolly Varden, but not for rainbow trout, whitefish, Arctic grayling, northern pike, and smelt.

- For Togiak Dolly Varden, additional work may be needed to complete genetic baseline data to better define spawning populations and determine the stock composition of wintering aggregations.
- For Bristol Bay rainbow trout, there is no need to fund additional studies to define and catalog management units at this time.
- For Lake Clark whitefish, no further work should be funded until results of a current Monitoring Program study (05-403) on humpback whitefish are available.
- For Bristol Bay Arctic grayling and northern pike, Togiak smelt species, and Bristol Bay-Chignik rainbow smelt, there is no need to fund studies to define and catalog management units at existing levels of use and management intensity.

Information Need 1A3: Identify critical factors that affect population dynamics

Knowledge is lacking for no-salmon species.

- Except for a few studies that examined habitat use by rainbow trout, no other studies concerning critical factors affecting population dynamics of non-salmon species have been conducted.

Consider proposals for non-salmon species.

- Studies are needed to address this information need for all important non-salmon species.

Information Need 1A4: Determine timing and migration patterns

Knowledge is incomplete for rainbow trout and Dolly Varden, and is lacking for Arctic grayling, whitefish, northern pike, and smelt.

- For Bristol Bay rainbow trout, timing and migration patterns are adequately described for Togiak, Negukthlik, Ungalikthluk, and King Salmon (Egegik) river systems, but not for other river/lake systems.
- For Togiak Dolly Varden, timing and migration are adequately described.
- For Lake Clark humpback whitefish, timing and migration will be described by an ongoing Monitoring Program study (05-403).
- For Bristol Bay Arctic grayling, Bristol Bay northern pike, Togiak smelt species, and Bristol Bay-Chignik rainbow smelt, no studies concerning timing and migration patterns appear to have been conducted. However, general timing of spawning is known for all these species.

Consider proposals for rainbow trout, Arctic grayling, northern pike, and smelt; but not for Dolly Varden, and whitefish.

- Studies are needed to address this information need for Tazimina rainbow trout, Bristol Bay Arctic grayling, northern pike, Bristol Bay-Chignik rainbow smelt, and Togiak smelt species.

Information Need 1A5: Describe trends in populations

Knowledge is incomplete for rainbow trout, Dolly Varden, and Arctic grayling; and lacking for whitefish, northern pike, and smelt.

- For Bristol Bay rainbow trout, some abundance, age, and size trend information is available for Negukthlik, Ungalikthluk rivers, and recent baseline abundance, age, and size information has been obtained for King Salmon (Egegik; 1990s) and Tazimina (2004) river systems. Aging protocols and sampling gear selectivity have been well described, which will allow valid comparisons to be made when examining trends.
- For Togiak Dolly Varden, recent (2003) baseline abundance information for future comparisons has been obtained.

Appendix J. Continued.

Information Need 1A5: Continued

- For Bristol Bay Arctic grayling, some abundance and size trend information is available for Ugashik River system. Recent baseline abundance and size information for future comparisons has been obtained for various Becharof Lake tributaries (1990s and 2000).
- For Lake Clark humpback whitefish, baseline age and size information for future comparisons will be obtained during an ongoing Monitoring Program study (05-403). Aging protocols have been described, which will allow valid comparisons to be made when examining trends.
- For Bristol Bay northern pike, Togiak smelt species, and Bristol Bay-Chignik rainbow smelt, no studies concerning abundance, age, or size trends appear to have been conducted. However, recent baseline size information for future comparisons has been obtained for Togiak rainbow smelt (2002).

Consider proposals for Arctic grayling, northern pike, and smelt; but not for rainbow trout, Dolly Varden, and whitefish.

- Studies are needed to address this information need for Bristol Bay northern pike, Bristol Bay-Chignik rainbow smelt, and Togiak smelt species other than rainbow smelt.
- There is no need to conduct studies for Bristol Bay rainbow trout, Togiak Dolly Varden, and Lake Clark humpback whitefish since recent baseline information has been, or is being, collected.

GOAL 2: DOCUMENT SUBSISTENCE USES

OBJECTIVE 2A: Identify past and present use patterns

Information Need 2A1: Periodically (about five year intervals) estimate harvest and effort by location, gear type, species, and season

Knowledge is incomplete for non-salmon species.

- Harvest and effort information is currently being collected, or was collected in 2003, for Kvichak River drainage communities, and will be collected for Togiak, Twin Hills, and Manokotak (05-452). Information for the remainder of Bristol Bay and Chignik is more than five years old.

Consider proposals for non-salmon species.

- It appears that studies to collect harvest and effort location are needed for all Bristol Bay and Chignik communities except those within the Kvichak River drainage, Togiak, Twin Hills, and Manokotak.

Information Need 2A2: Estimate historic harvest levels and identify trends

Knowledge is incomplete for non-salmon species.

- Historic harvest levels and trends for subsistence harvests of non-salmon species have been well documented for Bristol Bay and Chignik communities. Recent work includes Monitoring Program studies to gather information for Togiak, Twin Hills, and Manokotak (05-452) and communities within the Kvichak River drainage (02-034).
- The Monitoring Program has funded efforts to develop a unified strategy for harvest assessments of subsistence fisheries, including updates to the Alaska Subsistence Fisheries Database with information on non-salmon species (studies 00-017, 01-107, and 04-751).

Consider proposals for non-salmon species.

- Efforts to collect, compile, and report annual harvest information need to be maintained, and gaps in data need to be evaluated and filled, particularly for Chignik. Monitoring Program funding for these efforts extends through 2005.

Appendix J. Continued.

Information Need 2A3: Identify factors affecting subsistence uses

Knowledge is incomplete for non-salmon species.

- Several studies have been conducted that provide information on factors affecting subsistence uses over both short (seasonal cycles) as well as long (several years to several decades) time periods in the Bristol Bay and Chignik areas. Information on environmental and habitat changes that affect harvests as well as impacts of commercial and sport fishing will be collected for Togiak, Manokotak, and Twin Hills by a Monitoring Program study (05-452).

Do not consider proposals for non-salmon species.

- It is not clear whether or where additional studies are needed to document factors affecting subsistence uses. The need for this information may best be addressed as specific issues are identified.

Information Need 2A4: Describe historic and current harvest methods and means by species, area, and season

Knowledge is incomplete for non-salmon species.

- Historic harvest methods and means information has been well documented for both the Bristol Bay and Chignik areas for the 1980s and early 1990s by ADF&G. Historic information is available for the 1970s for only a few communities (Manokotak, Pedro Bay, and Levelock). Historic harvest by gear type information (pre-2003) will be available for many Bristol Bay and Chignik communities through the Alaska Subsistence Database, which is being updated with Monitoring Program funding (study 04-751).
- Current harvest methods and means information for the late 1990s and early 2000s has been well documented for Togiak, Twin Hills, Manokotak, and Kvichak River drainage communities. Current harvest by gear type information (2003-2005) will be available for most Bristol Bay and Chignik communities through the Alaska Subsistence Database and annual reports, which are being funded through the Monitoring Program (study 04-751).

Do not consider proposals for non-salmon species.

- It is not clear whether it is possible or necessary to document harvest methods and means information prior to the 1970's. Some of this information may exist in books, interview transcripts, and other sources.
- There does not appear to be a need to collect additional information on current harvest methods and means. Recent information is either available or being collected for most communities.

Information Need 2A5: Describe current and historic fish processing and distribution practices including sharing, barter, and trade

Knowledge is incomplete for non-salmon species.

- Information on current and historic fish processing is available for the communities of Levelock, Manokotak, Togiak, Twin Hills, Egegik Ugashik, and Pilot Point.
- Information on past and present barter and customary trade of fishes within the Bristol Bay area is currently being documented by a Monitoring Program study (04-454). Some information on this topic was also collected during an earlier Monitoring Program study conducted in the community of Nondalton (01-075).
- Information on current and historic fish processing methods was collected for communities in the Chignik area during the early 1990s through interviews and household survey by ADF&G.

Do not consider proposals for non-salmon species.

- The need for additional information on distribution practices should be evaluated after completion of an ongoing Monitoring Program study (04-454) on barter and customary trade. However, documentation efforts pertaining to the concept of sharing need to be broadened, and differences between the concepts of sharing and bartering need to be better explained.
- There may be a need for additional collection of information on current fish processing practices for Chignik, since available information is over 10 years old, but not for Bristol Bay communities.

Appendix J. Continued.

OBJECTIVE 2B: Project future use patterns

Information Need 2B1: Gather local perspectives on future use patterns

Knowledge is lacking for non-salmon species.

- No studies concerning local perspectives on future use patterns appear to have been conducted.

Consider proposals for non-salmon species.

- Studies are needed to address this information need.

Information Need 2B2: Evaluate key factors influencing future use patterns

Knowledge is lacking for non-salmon species.

- No studies concerning key factors influencing future use patterns appear to have been conducted.

Consider proposals for non-salmon species.

- Studies are needed to address this information need.

Information Need 2B3: Build process based models to predict future use patterns

Knowledge is lacking for non-salmon species.

- Process based models to predict future use patterns have not been developed.

Do not consider proposals for non-salmon species.

- Process based models should not be developed until information needs 2B1 and 2B2 are addressed.

GOAL 3: EFFECTIVE MANAGEMENT TO PROVIDE FOR SUBSISTENCE USES

OBJECTIVE 3A: Develop and evaluate management strategies to provide for subsistence fisheries

Information Need 3A1: Determine whether current regulations provide for subsistence opportunities and harvests

Knowledge is incomplete for non-salmon species.

- The Federal Subsistence Board evaluates usefulness and effectiveness of subsistence fishing regulations when considering regulatory proposals using information provided by agencies, Regional Advisory Councils, and users. Recently, the Federal Subsistence Board allowed directed subsistence fishing with hook-and-line gear for rainbow trout within Bristol Bay to provide additional harvest opportunities. This included opening the season on April 10, which is about two months prior to the opening of sport fishing (June 8).
- Evaluation of and improvements to collecting and reporting subsistence harvest information, which form the basis of determining whether regulations provide for subsistence opportunities and harvests, have been funded through the Monitoring Program (studies 00-017 and 01-107).
- Information is available supporting the State of Alaska's regulatory policies concerning transport of salmonids, including rainbow trout and Dolly Varden, into and within the State to prevent introduction and spread of diseases.

Do not consider proposals for non-salmon species.

- While there appears to be little published information and few studies available on the usefulness and effectiveness of subsistence fishing regulations, this issue is addressed by the Federal Subsistence Board, with input from agencies, Advisory Councils, and users, when considering changes to existing or setting new regulations. At this time, there does not seem to be a need to evaluate current regulations, although there is some interest in documenting and evaluating management systems used by indigenous people (Information Need 3A3) to determine whether some of these practices would make current management more effective.

Appendix J. Continued.

Information Need 3A2: Develop information sharing between stakeholders and agencies

Knowledge is incomplete for non-salmon species.

- Information sharing can take many forms, including oral presentations, articles and technical reports, and databases. The Monitoring Program has supported development of all these forms of information sharing by requiring investigators to prepare Annual and Final study reports that are posted on the Office of Subsistence Management web site, and also encouraging them to present study results at public and technical meetings to publish results in popular and professional magazines, newsletters, and journals.
- A searchable database on Alaska subsistence fisheries harvest information (Alaska Subsistence Fisheries Database) is maintained on the Internet by ADF&G. Annual updates for 2001-2005, as well as inclusion of pre-1988 data and GIS enhancements have been funded thorough Monitoring Program studies (01-107, 02-043, and 04-751).
- Searchable inventories of fisheries publications and technical reports concerning subsistence fisheries and resources are maintained on the Internet by the Office of Subsistence Management (Monitoring Program study Annual and Final abstracts and reports); ADF&G (staff publications and reports); and USGS, Alaska Science Center, Biological Science Office (staff publications and reports). The Monitoring Program recently funded a study (01-154) that documented existing ADF&G information sources and systems, and described a process and cost for implementing an interactive, integrated, web-based information system.

Consider proposals for non-salmon species.

- Existing databases need to be maintained and updated to ensure continued usefulness. Annual updates, expansion, and enhancements of the Alaska Subsistence Fisheries Database, maintained by ADF&G, are supported with Monitoring Program funding through 2006.
- Efforts are needed to evaluate the effectiveness of information sharing efforts, including the degree to which databases and other forms of information sharing are being used. Development of a metadatabase for subsistence information should be examined.

Information Need 3A3: Examine alternative management strategies

Knowledge is adequate for non-salmon species.

- Little information appears to be available on alternate management strategies for subsistence non-salmon species fisheries. Evaluation of and improvements to collecting and reporting subsistence harvest information, including providing a greater role for subsistence users in obtaining this information, have been funded through the Monitoring Program (studies 00-017 and 01-107).
- Some regulatory changes have been made to Bristol Bay non-salmon subsistence fishery regulations, but no inseason management actions have been taken for any of these fisheries. There was initially some concern with allowing directed Federal subsistence fisheries on Bristol Bay rainbow trout, but actual harvests have been small. The regulatory requirement for subsistence harvest permits for Dolly Varden and rainbow trout was removed by the Federal Subsistence Board during their January 2005 meeting.

Do not consider proposals for non-salmon species.

- Studies that document non-salmon fishery management systems used by the indigenous people, and assess the use of habitat-based escapement goals may prove useful (also see Information Need 3A1). Additionally, agencies and stakeholders should keep current, and become involved as needed, in Sustainable Fisheries Foundation efforts.
- It is not clear whether, or what types of, studies are needed to examine alternative management strategies since the existing management system appears to adequately provide for subsistence opportunities and the sustainability of subsistence non-salmon fishery resources. The need to develop specific studies may best be addressed as specific information needs are identified.

Appendix J. Continued.

Information Need 3A4: Determine compliance and support for current regulations

Knowledge is adequate for non-salmon species.

- Little information appears to be available on compliance and support for current subsistence non-salmon fishery regulations. However, poor compliance and support for regulations occurs when regulations either fail to account for or satisfy basic needs or when rural residents are not aware of or involved with management. The Federal management system encourages and provides rural residents with many opportunities to participate in subsistence management, and the Federal Subsistence Board considers compliance and support when considering regulatory proposals using information provided by Regional Advisory Councils, users, and agencies.

Do not consider proposals for non-salmon species.

- It is not clear whether, or what types of, studies are needed to determine compliance and support for regulations since the existing management system appears to adequately consider this information need in setting and modifying regulations. The need to develop specific studies may best be addressed as specific information needs are identified.

OBJECTIVE 3B: Assess impacts of other fisheries on subsistence fisheries

Information Need 3B1: Describe socioeconomic and cultural impacts of other fisheries

Knowledge is incomplete for non-salmon species.

- Studies have focused on effects of catch-and-release sport fishing on mortality of rainbow trout, Dolly Varden, northern pike, and Arctic grayling. There are no directed commercial fisheries on non-salmon species, although small incidental catches of anadromous species, including Dolly Varden and whitefish species, occur that are either kept for personal use or discarded.
- Subsistence users often describe impacts of other fisheries through letters and oral testimony at Regional Advisory Council, Federal Subsistence Board, and Alaska Board of Fisheries meetings. Regulations and management actions seek to avoid impacting subsistence fishing opportunities. Regional Councils now have seats for sport and commercial representatives to improve communication among stakeholders.

Consider proposals for non-salmon species.

- The need for additional studies should be addressed as specific information needs are identified. Some information may also be obtained in conjunction with Information Needs 2A4 and 3B2. The primary biological issue, mortality of fishes from catch-and-release sport fisheries, appears to have been adequately addressed. However, cultural objections to catch-and-release sport fishing still remain as well as complaints that increased sport fishing effort has displaced some subsistence activities from traditional sites.

Information Need 3B2: Describe total harvest rates by fishery for specific stocks of interest

Knowledge is incomplete for non-salmon species.

- Estimates of subsistence and sport harvest rates are available for major drainage systems, although not for specific populations within these drainages. There currently are no commercial fisheries directed at non-salmon species, except small incidental catches of anadromous species, including Dolly Varden and whitefish, are either kept for personal use or discarded.

Do not consider proposals for non-salmon species.

- Total harvest rate estimates can already be made for major river systems, since estimates for both subsistence and sport harvests are available. Currently, the only non-salmon Federal subsistence fishery in which a potential over-harvest problem has been identified is the one for Lake Clark whitefish, and this issue is already being explored through the Monitoring Program (study 05-403). There does not appear to be a need for studies concerning other species or river/lake systems at this time.