# **Meeting Summary**

A. GROUP: Exxon Valdez Oil Spill Public Advisory Group (PAG)

a a series i

n n ja n **na s**erie and a series and the series of the ser

- B. DATE/TIME: August 2-3, 1994
- C. LOCATION: Anchorage, Alaska
- D. MEMBERS IN ATTENDANCE:
  - <u>Name</u>

Rupert Andrews Pamela Brodie Kim Benton (for Sturgeon) Jim Cloud Jim Diehl Donna Fischer, Vice-Chair John French James King Vern McCorkle Gerald McCune Brad Phillips, Chair (8-3) Chuck Totemoff Lew Williams (McCorkle alt. for Eliason) (McCune alt. for McMullen)

#### E. NOT REPRESENTED:

<u>Name</u>

Cliff Davidson (*ex officio*) Richard Knecht Don McCumby (alternate) Drue Pearce (*ex officio*)

#### F. OTHER PARTICIPANTS:

#### <u>Name</u>

Jim Ayers (via telecon 8-2)

Mark Broderson David Bruce Dan Hull Bob Loeffler Mary McBurney Molly McCammon

Charles McKee Jerome Montague Doug Mutter

Eric Myers Joan Ostercamp Sandy Rabinowitch



te la comercia da comercia en su

Principal Interest TRUSTER COUNCIL Sport HuntingADAMNISTRATIVE RECORD

Environmental Forest Products Public-at-Large Recreation Users Local Government Science/Academic Conservation Public-at-Large Commercial Fishing Commercial Tourism Native Landowners Public-at-Large Public-at-Large Aquaculture

#### Principal Interest

Alaska State House Subsistence Public-at-Large Alaska State Senate

#### Organization

Executive Director, EVOS Restoration Office AK Dept. Envir. Conservation AK Dept. Envir. Conservation Cordova Dist. Fishermen United AK Dept. Envir. Conservation Alternate for McCune Director of Operations, EVOS Restoration Office Self AK Dept. Fish and Game Designated Federal Officer Dept. of the Interior Project Coordinator Univ. of Alaska Fairbanks National Park Service

Walt Sheridan Bob Spies Kim Sundberg Craig Tillery Ray Thompson Chief Scientist AK Dept. of Fish and Game AK Dept. of Law U.S. Forest Service

C Conners

Federal Interagency Ecosystem Management Task Force (8-3): Jim Pipkin DOI Office of Secretary Soil Conserv. Service Diane Gelburd Roger Griffis Nat. Oceanic Atmos. Admin Fish & Wildlife Service ------Sean Furniss Dept. of Justice Louise Milkman Nat. Oceanic Atmos. Admin Andrea Ray ale -Susan Hute Soil Conserv. Service

#### G. SUMMARY:

The meeting was opened August 2 at 9:45 a.m. by Vice-Chairperson Donna <u>Fischer</u>. The June 28, 1994 meeting summary was accepted.

Vern <u>McCorkle</u> and Mary <u>McBurney</u> presented recommendations for changing the structure of PAG meetings and for the FY 1995 PAG budget (see attachment #1). The recommendations were discussed, amended, and unanimously passed (motion by Jim <u>Cloud</u>, second by John <u>French</u>). Molly <u>McCammon</u> noted that the budget assumes full attendance at meetings, which does not usually occur leaving additional funds to support incidental PAG travel. Rupert <u>Andrews</u> suggested scheduling all meetings for the year in advance, but since the PAG meetings revolve around Trustee Council meetings and they are not set, this would be difficult at this time. Chuck <u>Totemoff</u> invited the PAG to meet in Chenega.

Jim <u>Ayers</u> gave the Executive Director's report. He noted that the Trustee Council was supportive in general of the recommendations to improve PAG meetings. He stated that the Trustee Council wished the PAG to be a deliberative body, and not just tally votes. He explained the FY 1995 work plan materials and the aims for the budget reserve. An ecosystem approach to restoration is what the Trustee Council desires, which means combining projects and grouping them in logical ways.

Public comment was accepted at 11:30 a.m. Dan <u>Hull</u> spoke in support of the Prince William Sound Aquaculture Corporation's revised FY 1995 project proposal for salmon restoration. Charles <u>McKee</u> offered his comments.

Craig <u>Tillery</u> briefed the PAG on the issue of endowments/restoration reserve (see attachment #2). <u>Tillery</u> explained that since the Trustee Council must maintain its discretion for the use of funds and cannot turn them over to an independent body, as might be required with an endowment, a reserve was preferred to an endowment. The Trustee Council is trying to obtain a better interest rate on money ---- held in the Federal Court, and wents to keep interest income within the restoration fund. A \$12 million per year deposit is anticipated for the reserve (totaling \$120 to \$150 million by 2001). PAG comments are solicited regarding what level of long-term support should be provided by the reserve funds (e.g., a declining balance, inflation proofing, a permanent reserve, etc.) as well as what the reserve should be used for. McCorkle recommended on page 5, second line of the draft resolution, changing the term "showing" to "finding". Jim <u>King</u> stated that the Trustee Council should listen to the public comment in support of creating an endowment and explore ways to get this accomplished. Lew Williams called for additional fundsities put aside each year and a method to protect the reserve against "raids". Pam Brodie stated that the reserve should be available for all types of authorized restoration work. French moved (second by <u>McCorkle</u>) to endorse the draft Resolution of the Exxon Valdez Trustee Council on the budget reserve, with modifications to strengthen the reserve against raids and to make a minimum of \$12 million in deposits per year (passed by 9 to 5, Brodie, Diehl, McCune, McMullen (proxy with McCune), and Benton opposed).

an An An

> Walt <u>Sheridan</u> discussed the "less than fee" and "public access" draft policies (see attachment #3). Kim <u>Benton</u>, Chuck <u>Totemoff</u>, Jim <u>Cloud</u>, and Pam <u>Brodie</u> participated in work sessions on the policies. <u>Benton</u> suggested this be called an advisory statement or guideline, not a hard and fast policy, so that the Trustee Council can be flexible in dealing with individual situations. In addition, the PAG wanted to make it clear that the issue of public access not be "make or break" for negotiations. <u>Brodie</u> moved (second by <u>Andrews</u>) that the discussion draft be adopted as "guidelines" not as "policy" and that the comments of the PAG be passed on to the Trustee Council (passed unanimously).

<u>McCammon</u> provided a status report on the Restoration Plan and Draft Environmental Impact Statement (EIS). Public comments were due August 1. The Trustee Council will choose a final alternative at their August 23, 1994 meeting. The Record of Decision will be issued around the end of October.

<u>King</u> suggested that PAG members each compile a list of issues of concern to them and their constituents, along with alternatives to resolve them, and submit the list to <u>McCammon</u> by September 1, 1994 who will compile the issues for PAG discussion at their October meeting. This could serve as a "final" report for this term of the PAG. <u>Williams</u> made the motion to adopt this suggestion (second by <u>French</u>) (passed unanimously).

<u>McCammon</u> opened discussions of the FY 1995 Work Plan (see attachment #8). She mentioned the "Five-year Status Report" and the "Invitation for Proposals" as the places to begin Work Plan review. 178 proposals totalling \$68 million were

10-21ved -- Recommendations from the ray investor of the ecor and Chief Scientist are expected in mid October--after which the Trustee Council will make their decisions. She explained the categories under which the proposed projects were classified. French noted that the ecosystem approach was a major shift in the direction for approving restoration projects. It was suggested that the PAG focus on category one projects and any other projects of member interest for consideration and action at the October meeting. McCammon recommended considering sustainability and the need for continued funding as well as what makes sense to do when deliberating on projects. Special workshops will be held in September-October to discuss projects and direction sockeye salmon, herring, public outreach, and the Prince William Sound System Investigation.

Bob Spies reviewed Table 1--Research Projects. Kim Sundberg summarized and responded to questions about the Seward Institute of Marine Sciences project. Jerome Montaque provided an overview of the fisheries situation in the spill Spies reviewed Table 3--Monitoring Projects. area. McCammon reviewed Table 2--General Restoration Projects, Table 4--Habitat Protection and Acquisition Projects, and Table 5--Administration and Public Information Projects. Mark Broderson discussed the status of oiled beaches. Some of the points raised were: the validity of Kenai sockeye salmon studies, the relationship of the University and the Seward Center, why resources are not recovering, the study of the many bird species in the area that could be injured but have not been studied, do not overextend money on projects at this time, why no recreation/tourism projects are in category 1, ask lawyers "how to do it" not "whether it can be done", and reducing administrative costs.

Jim <u>Pipkin</u> provided an overview of the Federal Interagency Ecosystem Management Task Force (see attachment #9) and had each member introduce themselves. They are looking at Prince William Sound as an ecosystem study area. The Task Force asked several questions of the PAG.

The meeting adjourned at 11:50 a.m. on August 3, 1994.

#### H. FOLLOW-UP:

1342 M The mark mark

- 1. Brad <u>Phillips</u> will present a summary of PAG actions at the August 23, 1994 Trustee Council meeting.
- 2. <u>McCammon</u> will determine the number of requests and Trustee Council desire for transcripts of PAG meetings.
- 3. <u>Ayers</u> will distribute to the PAG a spreadsheet on the status of habitat protection activities.
- 4. <u>McCammon</u> will attach the section of the PAG meeting transcript with comments on the restoration reserve resolution to be presented to the Trustee Council.

<u>McCammon</u> will also attach the section of the PAG meeting transcript on the "less than fee" and "public access" guidelines to be presented to the Trustee Council.

- 5. PAG members will compile a list of restoration and related issues they believe are important, along with alternative solutions, and submit them to <u>McCammon</u> by September 1, 1994. She will compile the list for discussion at the October PAG meeting.
- 6. <u>McCammon</u> will provide the PAG with a report on the information requests received at the Oil Spill Public Information Center.
- **I. NEXT MEETING:** October 12-13, 1994 in Anchorage.

#### J. ATTACHMENTS:

1. Recommendations for improving PAG meetings and for the FY 1995 budget

Reference to previously distributed PAG packet:

- 2. Draft Resolution of the Trustee Council on the Restoration Reserve
- 3. Draft policies for "Less than fee" and "public access"
- 4. PAG comments on the Environmental Impact Statement
- 5. Update on Draft FY 1995 Work Plan
- 6. Tables of Proposed FY 1995 Projects
- 7. Third Supplement: FY 1995 Brief Project Descriptions

For those not in attendance:

- 8. FY 1995 Work Plan Agenda
- 9. Federal Interagency Ecosystem Management Task Force

#### K. CERTIFICATION:

PAG Chairperson

Date

Recommentation improving PAG Meeti and Y 1995 Budget

#### I. Meetings

- A. Change meeting format to provide more meeting time
  - 1. Start meetings at 8:30 a.m.
  - 2. Provide refreshments and sack lunches to allow PAG to work through the lunch hour and reduce time spent on breaks
  - 3. Streamline public input
    - a. encourage the public to submit written comments ahead of time for incorporation into the PAG agenda
    - b. holding the public comment period as the last agenda item of day one of the meeting
    - c. limiting the time allowed for public presentations
    - d. limiting comments to agenda topics or subjects requested by PAG members
    - e. informing the public of rules and time for comments ahead of time
    - f. allowing PAG members to request a specific topic or persons be placed on the agenda
- B. Schedule six regular PAG meetings per year
  - Four quarterly two-day duration meetings in Anchorage
    - a. first day to review agenda items, hear reports from staff, ask questions, take public comment
    - b. second day to conduct formal deliberation and decision-making
  - 2. Two one or two-day duration meetings in spillaffected communities
    - a. send PAG chair and/or staff person to set up meeting and make local contacts
    - b. conduct public meeting including updates on research of local interest or take a field trip to project site(s)

## II. Staff

- A. Prepare materials for PAG members
  - 1. Provide a synopsis of Trustee Council meetings
  - 2. Deliver copies of PAG minutes not less than ten days before the next scheduled meeting
  - 3. Prepare a weekly or bi-weekly calendar of other meetings which PAG members may attend on a drop-in basis

ARCO

والوالية المراجب

B. PAG put ic r tions

1. Include a section in the Restoration Update newsletter to report on PAG meetings and activities

#### III. Budget

#### A. Currently proposed PAG budget for FY 1995:

| Per meeting:   | travel/per diem<br>printing/copying<br>postage/courier<br>transcription services<br>advertising<br>ADA compliance | \$      | 10,000<br>800<br>250<br>2,500<br>1,500<br>200 |  |  |  |  |
|----------------|---|---------|---|--|--|--|--|
|                | total:  | \$      | 15,250  |  |  |  |  |
| Four PAG meeti | \$  | 61,000  |   |  |  |  |  |
| Staff support: | ADF&G (1.0 FTE)<br>DOI (0.1 FTE)  |         | 46,100<br>6,000                               |  |  |  |  |
| General & admi | General & administrative:   |         |   |  |  |  |  |
| Total current: | \$  | 122,400 |   |  |  |  |  |

#### B. Proposed budget additions for FY 1995:

Four two-day PAG meetings in Anchorageo additional

Drinks/snacks and working lunch on day one(@ \$400/mtg x 4 mtgs): \$ 1,600

Two one or two-day PAG community-based meetings/field visits: 37,300

@ \$18,650 each: (e.g., \$9,200 added for 20 people Anchorage to Cordova: travel @ \$4,500, two nights per diem @ \$ 4,600, room cost @ \$100; plus travel for 9 people to Anchorage @ \$4,200; plus other per meeting costs from above)

Travel for PAG members to attend working groups and other EVOS-related meetings 12,000

Staff support/supplies for synopses/regular communication: no additional

Total additional: \$ 50,900

Exxon Valdez Oil Spill-Trustee-Council-**Restoration Office** 645 G Street, Suite 401, Anchorage, Alaska 99501-3451 Phone: (907) 278-8012 Fax: (907) 276-7178 MEMORANDUM TO: Public Advisory Group Molly McCammon, Director of Operations FROM: DATE: October 11, 1995 Distribution of Revised Brief Project Descriptions (BRDS) VALUEZ OIL SPILL SUBJ: TRUSTEE COUNCIL

ADMINISTRATIVE RECORD

14 2.136

Since publication of FY 95 brief project description proposals (BPDs) in the Draft Fiscal Year 1995 Work Plan — Supplement Volume I (Evaluation Category 1 and 2 projects) and the companion Draft Fiscal Year 1995 Work Plan — Supplement Volume II (Evaluation Category 3, 4, 5, and 6 projects), several project proposals have been revised and resubmitted.

The revised BPDs include:

- a packet of nine projects that you were mailed in mid-August, most of which involve subsistence restoration proposals, as shown in the attached listing; and
- an additional set of revised BPDs that are included with this memo as shown in the attached listing, largely concerning proposed forage fish-sea bird interaction projects revised to integrate a number of projects submitted independently of one another as well as a recently received second revision to PWSAC's proposal concerning restoration of wild salmon stocks.

attachment

Sound Waste Management Plan

| Project Number:              |   |
|------------------------------|---|
| <b>Restoration Category:</b> | General Restoration (new)   |
| Proposed By:                 | Prince William Sound Economic Develop   |
| Lead Trustee Agency:         | ADMINISTRATIVE RECORD   |
| Cost FY 95:                  | \$284,500   |
| Cost FY 96:                  | \$ 15,600 to complete Phase I. Additional funds may be needed for Phase II, see below for explanation.  |
| Total Cost:                  | Unknown   |
| Duration:                    | Unknown   |
| Geographic Area:             | Prince William Sound  |
| Injured Resource/Service:    | Intertidal and subtidal organisms, harlequin ducks, black<br>oystercatchers, sea otters, harbor seals, and other seabirds,<br>shorebirds and marine mammals. The services most likely to<br>benefit are subsistence and recreation, both of which are<br>affected by the visual recognition of pollution. |

# **INTRODUCTION and NEED FOR THE PROJECT**

Abstract: The Sound Waste Management Plan (SWMP) is a comprehensive plan to identify and remove the major sources of marine pollution and solid waste in Prince William Sound that may be affecting recovery of resources and services injured by the *Exxon Valdez* Oil Spill. The first phase of the plan will identify the major sources of marine pollution and solid waste, identify their significance, and recommend solutions to reduce the effects that can be implemented by municipalities, state and federal governments, private industry, or trustee agencies. The following phases of the plan will be to implement these solutions. Only the first phase is proposed for FY 1995, and will be implemented using funds from the Alaska Department of Commerce and Economic Development as well as from *Exxon Valdez* Trustee Council.

In total, the plan will use funds from a variety of sources to effect a unified regional effort to permanently reduce the incremental damage being done to the environment of Prince William Sound from marine pollution. In this way, it will reduce stresses on recovering resources and services and protect their habitat.

33373

*Buckground:* Despite the panophy of state and federal laws that govern the discharge of pollutants into the marine environment, there remain a number of important waste streams that still foul the environment of Prince William Sound. Complete restoration from the oil spill requires permanent protection from on-going chronic pollution sources that may be degrading the quality of marine habitat for injured resource and services, or may be stressing populations or sub-populations of resources and services.

In many cases, there is currently no easy or no feasible method of meeting state and federal laws designed to protect the Sound's environment. The communities of Prince William Sound, the Coast Guard, EPA, and ADEC are working on parts of these problems, but there is no<sup>+-</sup> regional approach. Currently, the lack of a coordinated, comprehensive approach may preclude effective, regional solutions, and may result in some important, regional problems not being addressed. The lack of a region approach may also preclude cost-effective solutions that are beyond the capacity of individual agencies or communities. As a result, there may be increased stress on the resources and services injured by the spill, especially on local populations important for communities, recreation, and subsistence use.

The major waste types that appear to have the greatest potential to affect injured resources and services are below.

• Waste Oil. Engine oil and bilge water are sources of waste oil, much of which is discharged into the waters of Prince William Sound.

*Engine Oil.* Vessels and communities in Prince William Sound generate large quantities of used motor oil and other lubricants. Nationwide, regulatory and financial issues have discouraged people from properly disposing of waste oil; more often than not, waste oil was illegally dumped in landfills, sewer systems, or other open sites. In 1992, the U.S. Environmental Protection Agency estimated that 170 million of the 190 million gallons of waste oil generated in the nation found its way into the environment due to improper disposal; this represents approximately 16 times the amount of oil spilled by the *Exxon Valdez*. Most areas of the country have more, or more convenient facilities than does the spill area.

Cordova, Valdez, and Whittier all have at least one waste oil burner. The burners take waste oil and provide heat for community buildings or electricity for the municipality. In some cases, more capacity may be needed. These facilities have made it feasible for vessels and engine owners to conveniently dispose in a safe and non-polluting manner. For example, there are three waste-oil burners in Cordova, which is the site of a large fishing fleet. One burners, operated by Cordova Electric Cooperative, collected and burned 21,000 gallons of waste oil last year and used the heat for two buildings. Homer, though outside of Prince William Sound, typically serves 850 boats in the harbor at any one time, burned approximately 6,000 gallons per year of waste oil to heat two buildings.

Tatitlek and Chenega lack waste oil burners. These two communities are currently installing docks facilities for handling more boat traffic. The increased activity is likely to increase the potential for inappropriate disposal of waste oil near the communities. For that reason, federal law requires that public docks with significant traffic have solid waste

and waste oil collection — a requirement that is nequently not metric small, fural communities because of the difficulty in disposing of the collected material.

*Bilge Water.* Bilge water includes grease and oil from engines and machinery. There is currently no feasible and convenient method in the Sound for fishing, commercial, or recreational vessels to legally dispose of bilge water. There is no community with facilities to conveniently accept bilge water, and as a result, much is probably dumped into Prince William Sound. Much of it is probably dumped in or near the small boat harbors.

- Stormwater Runoff. Stormwater runoff contains grease and oil from city streets, chemicals from laws and buildings, and other polluting residues. Cordova, Valdez, and Whittier all have stormwater systems that discharge directly into the bay, in some cases into habitats such as the Valdez Duck Flats that are essential for resources injured by the spill.
- Oily Waste. Oily waste is the residue of materials that contain oil. Oil filters, absorbent pads, and cleaning materials are examples of oily waste. In most communities there is no alternative but to place oily waste in the landfill. Valdez is working to acquire a crusher to press the oil out of old filters and material. This will reduce the amount of oil in other waste materials, but in most communities, the waste becomes part of the landfill. None of the landfills or dumps in Prince William Sound have an impermeable membrane, and some portions of the oil migrates to water sources.
- Sewage. Sources of sewage include the communities, vessels, and land-based and floating remote lodges. There is no feasible or convenient method for the fishing, commercial, or recreational vessels to legally dispose of the sewage. While some of the large vessels have sewage disposal systems on board, most dump the waste overboard with minimal if any treatment. There have been reports that some remote camps are out of compliance and causing local habitat problems due to improper sewage disposal. In some locations, the amount of sewage may be safely dispersed without significant effect on the local environment. In other locations, there is potential for significant effect.
- Solid Waste. Currently each community in Prince William Sound is out of compliance with federal regulations as it relates to permitting of waste sites. Improper solid waste disposal has the potential to affect water sources and upland habitat used by injured resources. Blowing garbage is a problem in the two communities without a sanitary landfill (Chenega and Tatitlek). Cordova's landfill currently includes diked off tideland areas and the lower portion of the landfill is inundated by the tide. As a result, landfill leachate may contaminate Orca Inlet. In addition, leachate from Valdez's landfill probably reaches Port Valdez.
- Household Hazardous Waste. The three incorporated communities have methods of feasibly disposing of household hazardous waste, but collection is infrequent. The two unincorporated communities do not collect household hazardous waste. As a result, much hazardous waste is probably improperly dumped.

\*\*\*\*

Fish Wastes. Sources of fish Wasterinclude, shore-based processors, floating processors, and sports-fish cleaning stations (usually in small boat harbors).

Shore-based Processors. There appears to be problems with accumulation of offal from fish processors in Valdez and Cordova. The accumulation of many year's of processing wastes in the shallow inlet off Cordova appears to have created an anaerobic zone on the inlet's floor — unusable habitat to the fish, subtidal, and marine mammal resources of the area. There have been recent incidents in Valdez where an unusual stench may be traceable to an accumulation of offal near the processors. In both cases, there are activities by the cities, state, EPA, and fish processors to solve the problems, but no solution is as yet apparent.

Fleating Processors. In some cases, there may be similar problems with floating processors accumulating wastes in one location. In other cases, the floating processors may distribute their fish wastes without significant harm to the local environment.

Sport-fish Cleaning Stations. The largest sports fishery in Prince William Sound is based out of Valdez, though significant fisheries exists from Cordova and Whittier. In each case, cleaning occurs at sports fish stations in the small boat harbor, and the wastes concentrate in the boat harbor beneath the station. This can overburden waters of the small boat harbor and reduce water quality below federal or state minimums.

Two examples show the potential effects of these problems. The first, Valdez Duck Flats, is adjacent to the Valdez Small-boat Harbor. It is an Area Meriting Special Attention in the Valdez Coastal Management Plan because of its important habitat value. It includes 450 acres of mud flats and 460 acres of saltwater marsh. It provides habitat for rearing salmon and has been recognized by state and federal agencies as providing essential waterfowl habitat for species injured by the spill. The habitat of the Duck Flats may be degraded by the storm water runoff which empties into the area, or by discharges from boats outside the harbor, landfill contamination flowing down Valdez Creek, or sewage disposal in the Port.

Orca Inlet, outside Cordova has the largest pupping concentration of sea otters in Prince William Sound, and is also important for sport fishing, hunting, and is seasonally used by large concentrations of seabirds and waterfowl, including many resources injured by the spill. It is a part of the largest contiguous wetland in the western hemisphere which, during migrations, hosts the largest concentration of shorebirds in the world. The Cordova waterfront hosts most of the problems referenced above. The shoreline includes the solid-waste landfill, which is built in part on tidelands and is inundated by the tide twice each day; storm-water and sewer outfalls, and outfalls for fish-processing offal which has created an anaerobic zone on the inlet floor. · · · · · The table below Januarizes procledistic metanices of fines william found. .....

<u>Key</u>

 $\mathbf{E}$  = Some of waste stream likely enters marine waters.

ff = Facilities or community program available (though not necessarily adequate).

| Waste Stream:  | Corc | lova | Val | dez | Tati | tlek | Chen | lega | Whi | ttier |
|--|------|------|-----|-----|------|------|------|------|-----|-------|
| Waste Oil<br>Engine Oil<br>Bilge Water                   | Þ    | ff   | Þ   | ff  | Þ    | -    |      |      | Þ   | ff    |
| Stormwater Runoff  | Þ    |      | Þ   |     |      | ,    |      |      | Þ   | 2     |
| Oily Waste   | Þ    |      | ▶   |     | Þ    |      | Þ    |      | Þ   |       |
| Sewage<br>Community<br>Vessels                           | Þ    | ff   | Þ   | ff  | Þ    |      | Þ    |      | Þ   | ff    |
| Solid Waste  | Þ    | ff   | Þ   | ff  | Þ    | ff   | Þ    | ff   |     | ff    |
| Household<br>Hazardous Waste                             | Þ    | ff   | Þ   | ff  | ►    |      | Þ    |      | Þ   |       |
| Fish Wastes<br>Processors<br>Sport-fish cle<br>ani<br>ng | •    |      |     |     |      |      |      |      | Þ   |       |

The problems referenced above may be affecting resources and services injured by the spill, including disruption of important habitat. Any decrease in local pollution would have the effect of decreasing the stress on injured resources and services that rely on clean water. Those resources and services likely to benefit the most are those that feed in the intertidal or near-shore waters in the vicinity of community waterfronts and small boat harbors. These resources most likely to benefit include harlequin ducks, black oystercatchers, sea otters, harbor seals, and other seabirds, shorebirds and marine mammals. The services most likely to benefit are subsistence and recreation, both of which are affected by the visual recognition of pollution.

*Project Description.* A three phase approach is proposed. This project, however, includes funding for only the first phase. The project will be managed by the Prince William Sound Economic Development Council in conjunction with the Alaska Department of Environmental Conservation.

In continuing the efforts of the Prince William Sound Economic Development Commission, costs for the project are defrayed by shared transportation, teleconference and meeting costs from each participating community and organization. The regional approach resulted in the

the main development of this project, and is the overall approach of each phase of the project that is a second

With each community independently combating some of the problems of marine pollution, by coming together as a region, ideas are shared and discussed in a manner that leads to more efficient and cost-effective solutions which is the theme of the proposal. The success of this regional approach by the regional committee is the impetus for this project and will be maintained.

- Phase I will use a request for proposals to solicit a contractor to undertake a
- comprehensive review of pollution sources, their significance, and provide alternative costeffective solutions.
- Phase II will handle required ADEC/EPA permitting to implement solutions.
- Phase III is the implementation of the Sound Waste Management Plan implementing ... permanent solutions to the existing chronic problems. These solutions may take the formof a construction, such as a regional solid waste facility or facilities to accommodate bilge water, or they may take the form of programs to prevent pollution such as increased recycling.

*Contributions from Other Funding Sources.* The funding contributed by the Trustee Council for Phase I would be coordinated with funding proposed by the City of Valdez, and that contributed by the Alaska Department of Transportation and Public Facilities. In addition, many of the solutions proposed as a result of Phase I, are likely to be funded all or in part by municipalities, villages, private industry, the federal government, and the State of Alaska. Some solutions may be appropriate for funding from the civil settlement.

The proposed budget for the City of Valdez for calendar year 1995 includes \$100,000 to investigate long-term solutions to the solid waste problems in Valdez. The questions that study will investigate include some of those to be investigated by this proposal. Valdez will not act upon its budget proposal before Trustee Council action is expected. However, if passed, the Valdez appropriation would be coordinated by Bill Wilcox, Valdez City Engineer and Director of Public Works. Mr. Wilcox is also on Prince William Sound Economic Development Commission's Solid Waste Subcommittee that would oversee this project. Thus, the City's proposed appropriation is another financial contribution to this project.

The Alaska Department of Transportation and Public Facilities has given a contribution for a related project. The department has given \$100,000 grant to each of Cordova and Valdez to implement a junk car and scrap metal recycling project. Valdez has an inventory of 1,500 old cars, and Cordova has 500. The grants would enable these communities to crush and recycle these cars and other scrap metals. This would eliminate waste stream from the landfills (and because of oil and other toxics associated with the cars, it may have some effect on eliminating those sources from entering marine waters). The two grants were coordinated by the Prince William Sound Economic Development Commission, and will be implemented so that the crusher can be used regionally — for materials from Chenega, Tatitlek, and if feasible, Whittier.

PROJECT LESION

SEALCHE L SCIEN

A. Objectives. The development of the Sound Waste Management Plan originated with Prince William Sound Economic Development Council's regional Solid Waste Management Committee.

The following outlines the objectives to be accomplished as part of Phase I:

## 1. Identifying options.

- a. Use existing information and where necessary gather new information to identify the major sources of marine pollution and solid waste, and evaluate which waste streams are priority for reduction.
- b. Analyze waste management reduction, processing, transportation, and disposal alternatives appropriate for Prince William Sound. Information for some or all alternatives should include regulatory requirements, site information, cost estimates, transportation methods, and funding sources.
- c. Recommend solutions to reduce the effects that can be implemented by municipalities, state and federal governments, private industry, or trustee agencies. Many of these may involve regional coalitions of groups.
- 2. Community choice. This project is not solely technical; rather, communities and agencies must implement the technical solutions. For that reason, the project objectives include establishing a public participation program to understand and address community concerns and needs. The public participation needs not involve public meeting or other mass participation mechanisms. However, it should ensure that communities are involved, and understand the problems and possible solutions in order to build consensus for actions to reduce marine pollution and solid waste that will restore Prince William Sound. Accomplishing this objective requires communities and agencies to choose which options to implement.

# **B.** Methods

1. Community Participation Component. As a regional project, local input and coordination is crucial to the long-term success of the SWMP project by creating local ownership. Agreeing on and implementing effective solutions to waste management problems requires the participation of the communities that will implement them. A comprehensive, coordinated, regional approach requires participation by all communities in Prince William Sound. This proposal was developed and intended to be coordinated by Prince William Sound Economic Development Council's Solid Waste Management Committee with representation from all of the Sound's communities. The project will be completed in cooperation with ADEC.

permain new rates DEC and do the fisterial additional states in the control states in the BEC and do in the second s

- b. Prince William Sound Economic Development Council's Solid Waste Management Committee with participation from each of the Prince William Sound communities, DEC, and possibly with EPA and the US Coast Guard will manage the contract. This participation is important for the results of the project — that the recommended solutions will be agreed to and implemented by the appropriate communities and regulatory agencies.
- firm to accomplish the objectives of Phase I.

C. Schedule (FY 95 - Plan of Work)

November 15, 1994Begin writing RFPNovember 30, 1994Advertise RFPFebruary 1, 1995Award ContractAugust 1, 1995Draft Report to the PWS Economic Development Council and ADECSeptember 1, 1995Final Report

# D. Technical Support

All technical support will be provided by the Prince William Sound Economic Development Council's regional Solid Waste Management Committee, and by the Alaska Department of Environmental Conservation.

# E. Location

Prince William Sound

# **PROJECT IMPLEMENTATION**

For the most part, solutions to the identified problems will be implemented by communities and local groups. They must be the major part of the process to identify and choose these solutions. To maintain the direct link from development and implementation of the SWMP, Prince William Sound Economic Development Council's regional Solid Waste Management Committee in cooperation with DEC will implement this regional project in cooperation with ADEC.

The Contractor will be selected by competitive solicitation. PWS Economic Development Council will manage the contract under agreement to ADEC. The Economic Development Council is an Alaska Regional Development Organization (ARDOR) which under AS 36.30.850 may receive funds from the state without competitive solicitation. (The contractor will be selected using normal, State of Alaska competitive procedures.)

#### FUBLIC PROCESS

This project will be administered, in cooperation with DEC, by representatives of the affected communities. The Prince William Sound Economic Development Council includes representatives of each community, and industry representatives including the fishing, tourism, and petroleum industries. The process will continue with public review at local city council and village council meetings for comment as part of the SWMP. An integral part of the SWMP is community education.

se orrente e une

\*\*\*\*

338 33 M C. C.

## **COOPDINATION OF INTEGRATED RESEARCH EFFORT**

Frank Cart, A. A

This project is not research, and integration with other Trustee research activities is unnecessary.

## FY 95 BUDGET (\$K)

| Personnel      | \$12.8      |
|----------------|-------------|
| Travel         | 6.0         |
| Contractual    | 245.6       |
| Commodities    | 1.0         |
| Equipment      | 0.0         |
| Capital Outlay | <u>0.0</u>  |
| Subtotal       | \$265.4     |
| Gen. Admin.    | <u>19.1</u> |
| Total          | \$284.5     |

## 1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET October 1, 1994 - September 30, 1995

**Project Description:** This project will explore various options for regional management of waste oil, associated toxics and solid waste. This project  $is_{j_{i-1}}$  intended to reduce the pollutants introduced into the environment injured by the *Exxon Valdez* oil spill so that natural recovery may proceed as quickly as possible.

į.

- 4

......

| Budget Category:               | 1994 Project No.  | '94 Report/                           | Remaining           |                |                  |  |  |  |  |
|--------------------------------|-------------------|---------------------------------------|---------------------|----------------|------------------|--|--|--|--|
|                                | ]                 | '95 Interim*                          | Cost**              | Total          |                  |  |  |  |  |
|                                | Authorized FFY 94 | FFY 95                                | FFY 95              | FFY 95         | FFY 96           | Comment  |  |  |  |
|                                |                   |                                       |                     |                |                  | FFY 96 expenses to complete Phase I.             |  |  |  |
| Personnel                      | \$0.0             | \$0.0                                 | \$12.8              | \$12.8         |                  | \$7.0  |  |  |  |
| Travel                         | \$0.0             | \$0.0                                 | \$6.0               | \$6.0          |                  | \$3.8  |  |  |  |
| Contractual                    | \$0.0             | \$0.0                                 | \$245.6             | \$245.6        |                  | \$3.0  |  |  |  |
| Commodities                    | \$0.0             | \$0.0                                 | \$1.0               | \$1.0          |                  | \$0.5  |  |  |  |
| Equipment                      | \$0.0             | \$0.0                                 | \$0.0               | \$0.0          |                  | \$0.0  |  |  |  |
| Capital Outlay                 | \$0.0             | \$0.0                                 | \$0.0               | \$0.0          | \$0.0            | \$0.0  |  |  |  |
| Subtotal                       | \$0.0             | \$0.0                                 | \$265.4             | \$265.4        | \$0.0            | \$14.3   |  |  |  |
| General Administration         | \$0.0             | \$0.0                                 | \$19.1              | \$19.1         | \$0.0            | \$1.3  |  |  |  |
| Project Total                  | \$0.0             | \$0.0                                 | \$284.5             | \$284.5        | TBD              | \$15.6   |  |  |  |
| Full-time Equivalents (FTE)    | 0.0               | 0.0                                   | 0.2                 | 0.2            |                  | 0.1  |  |  |  |
|                                | Dollar an         | nounts are sh                         | own in thousa       | ands of dollar |                  |  |  |  |  |
| Budget Year Proposed Personnel | :                 | Reprt/Intrm                           | Reprt/Intrm         | Remaining      | Remaining        | FFY 96 activities and costs for Phase II         |  |  |  |
| Position Description           |                   | Months                                | Cost                | Months         | Cost             | (primarily permitting and preparation for imple- |  |  |  |
|                                |                   |                                       |                     |                |                  | mentation in Phase III) can only be determined   |  |  |  |
| Restoration Specialist (R-2)   | 3)                | 0.0                                   | \$0.0               | 1.0            | \$6. <b>9</b>    | following substantial completion of Phase        |  |  |  |
| Restoration Specialist         |                   | 0.0                                   | \$0.0               | 1.0            | \$5.9            | which will dentify regional and community        |  |  |  |
|                                |                   |                                       |                     |                |                  | solutions for marine pollution affecting         |  |  |  |
|                                |                   |                                       |                     |                |                  | Prince William Sound.                            |  |  |  |
|                                |                   |                                       |                     |                |                  |  |  |  |  |
|                                |                   |                                       |                     |                |                  | NEPA Cost: \$0.0                                 |  |  |  |
|                                | D (T)             |                                       |                     |                |                  | *Oct 1, 1994 - Dec 31, 1994                      |  |  |  |
|                                | Personnel Iotal   | 0.0                                   | \$0.0               | 2.0            | \$12.8           | **Jan 1, 1995 - Sep 30, 1995                     |  |  |  |
| 06/01/94                       | 8                 | 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 | , f <sub>63</sub> f | ÷              | s                | 3 · · · · · · · · · · · · · · · · · · ·          |  |  |  |
|                                | Proje             | ct Number:                            | 95115               |                | FORM 2A          |  |  |  |  |
| 1005 Page 1 o                  | f 3 Proje         | ct Title: So                          | ound Waste          | Manageme       | PROJECT          |  |  |  |  |
| 1999                           | Agen              | icy: AK De                            | DETAIL              |                |                  |  |  |  |  |
| Printed: 9/28/94               | 9:15 AM           |                                       |                     |                | н <sub>ър.</sub> |  |  |  |  |

## 1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

н. . . 1

ξ¥

| Travel:                                    |   |                   | Reprt/Intrm    | Remaining      |
|--|---|-------------------|----------------|----------------|
|  |   |                   |                | . *            |
| Juneau to Anchorage and PWS (\$450/tri     | ip + 2 days per diem @ \$150/day x 8 trips)   |                   | \$0.0          | \$6.0          |
|  |   |                   |                | . •.           |
|  | Travel Total   Total   Travel Total   Total |                   |                | • <b>8</b>     |
|  |   |                   |                |                |
|  |   |                   |                |                |
|  |   |                   |                |                |
|  | 3   |                   |                |                |
|  |   |                   |                | ч.,<br>,       |
|  |   |                   |                |                |
|  |   | , и               |                | 4              |
|  |   |                   |                | -∎#:>-         |
|  |   |                   |                | , *            |
|  |   | Travel Tetal      | \$0.0          | 68.0           |
|  |   |                   | \$0.0          | \$0.0          |
| Long distance phone and fax                |   |                   | \$0.0          | 61.0           |
| Moil and courier                           |   |                   | \$0.0<br>\$0.0 | \$0.8          |
|  |   |                   | \$0.0<br>\$0.0 | \$2.0          |
| Eroight and cartage                        |   |                   | \$0.0<br>\$0.0 | \$2.0<br>\$1.2 |
| Plane/baliconter charter to Prince William | Sound communities   | ¥ 10              | \$0.0<br>\$0.0 | \$2.0          |
| Film processing                            | Sound communities   |                   | \$0.0<br>\$0.0 | \$0.1          |
| Contract for consultant to develop region  | nal waste Management Plan   |                   | \$0.0          | \$210.0        |
| BSA with Prince William Sound Develop      | ment Council to manage contract through March 1996  |                   | \$0.0          | \$29           |
| Project Manager 320 hours @ \$47/h         | r \$15.0  |                   | 1010           | + = 0          |
| Travel                                     | \$12.5  |                   |                |                |
| Teleconference fees                        | \$2.0   |                   |                | ana.<br>La     |
|  |   |                   |                | • •            |
|  |   |                   |                |                |
|  |   |                   |                | $\dot{r}$      |
|  |   | Contractual Total | \$0.0          | \$245.6        |
| 07/14/93 Γ                                 |   |                   |                |                |
| []   | Project Number: 95115   |                   |                | 0014 23        |
|  |   |                   |                |                |
| <b>1995</b>   Page 2 of 3                  | Project Litle: Sound Waste Management Plan  |                   | P              | ROJECT         |
|  | Agency: AK Dept. of Environmental Conservatior  | 1                 |                | DETAIL         |
| Printed: 9/28/94 9:15 AM                   | ·   |                   | ] [            |                |

## 1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

in spit

1

1

Į.

October 1, 1994 - September 30, 1995

| Commodities: |                          |  | ······································ | Reprt/Intrm                             | Remaining      |
|--------------|--------------------------|--|--|---|----------------|
| 0.00         |                          |  |  | 10.0                                    | 10.0           |
| Office sup   |                          |  |  | \$0.0                                   | \$0.6<br>\$0.4 |
| Computer     | supplies                 |  |  | \$0.0                                   | 20.4           |
|              |                          |  |  |   |                |
|              |                          |  |  |   |                |
|              |                          |  |  |   |                |
|              |                          |  |  |   |                |
|              |                          |  |  |   |                |
|              |                          |  |  |   |                |
|              |                          |  | 1 194 1                                |   | (* s.          |
|              |                          |  |  |   |                |
|              |                          |  | Commodities Total                      | \$0.0                                   | \$1.0          |
| Equipment:   |                          |  |  | ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,, |                |
| 4 - F.       |                          |  |  |   |                |
|              |                          |  |  |   |                |
|              |                          |  |  |   |                |
|              |                          |  |  |   |                |
|              |                          |  |  |   |                |
|              |                          |  |  |   |                |
|              |                          |  |  |   | ,<br>,         |
|              |                          |  |  |   | -              |
|              |                          |  |  |   | · · · · ·      |
|              |                          |  |  |   | i.<br>N        |
|              |                          |  |  |   |                |
|              |                          |  | int to man                             |   |                |
| 07/14/93     |                          |  | Equipment Total                        | \$0.0                                   | \$0.0          |
| ·····        |                          | Project Number: 95115                          |  |   | OBM 20         |
|              | Page 3 of 3              | Project Title: Sound Waste Management Plan     |  |   |                |
| 1995         |                          | Agency: AK Dent of Environmental Concervation  |  |   |                |
|              | Printed: 9/28/94 9:15 AM | Agency. An Dept. of Environmental Conservation |  |   |                |
|              |                          |  |  | J                                       |                |

# **Exxon Valdez Oil Spill Trustee Council**

Restoration Office 645 G Street, Suite 401, Anchorage, Alaska 99501-3451 Phone: (907) 278-8012 Fax: (907) 276-7178



- TO: Project Reviewers
- FROM: Molly McCammon M-Director of Operations
- SUBJECT: Revised Proposals

DECEIVED

EXXON VALUEZ OIL SPILL TRUSTEE COUNCIL ADMINISTRATIVE RECORD

DATE: October 6, 1994

Enclosed you will find a revised package of Brief Project Descriptions for Forage Fish/Marine Bird Interactions: Project 95163.



# United States Department of the Interior

FISH AND WILDLIFE SERVICE 1011 E. Tudor Rd. Anchorage, Alaska 99503-6199

IN REPLY REFER TO:

James R. Ayers, Executive Director Exxon Valdez Oil Spill Trustee Council Restoration Office 645 G Street Suite 401 Anchorage, Alaska 99501-3451



OCT

5 1994

EXXON VALUEZ OIL SPILL TRUSTEE COUNCIL ADMINISTRATIVE RECORD

Dear Mr. Ayers:

Thank you for your recommendations regarding the scope and scale of forage fish investigations for FY 95 in your September 7, 1994 letter. As planned, a forage fish work session was held in Anchorage on September 19-20 and another work session was held September 26-27. Through a combination of these meetings, the comments from the chief scientist, and much work, we have developed a Seabird/Forage Fish package for FY95 and are now functioning as a team rather than several independent projects. The cover proposal and the brief project descriptions for each subproject are attached.

.

We have tried to be responsive to the chief scientist's comments, and to that end, we reduced the project budget from about \$2.4 million to about \$1.4 million. However, reducing the budget caused a reduction in the scope of work. We reduced the area of the Forage Fish Assessment (95163A) component from all of Prince William Sound to a portion of the Sound, and we reduced the field season from April through September to just July and August. We also deleted the assessment of demersal fish in the Pigeon Guillemot (95163F) component. The Puffin component (95163D) was reduced to a minimal feasibility study.

If more funds are available, an additional cruise for the Forage Fish Assessment component would provide valuable data for the seabird pre-laying period. For about an additional \$100K (a 25% increase) the total amount of data collected could be increased 50%, because of fixed costs associated with the project that would not increase.

Below we have addressed the chief scientist's comments on the Seabird/Forage Fish project. Brief project descriptions for each subproject have been modified to respond to comments specific to the subprojects.

#### Program Management and Integration

We agree with the chief scientist's comments that projects addressing food limitation need to be carefully coordinated. In our recent work sessions, we have made great strides in coordination among the Seabird/Forage Fish project components and we will continue to work out details throughout the winter with monthly coordination meetings. All the Principal Investigators of the subprojects recognize that complete integration is a necessity to put forth a comprehensive, efficient research effort to address food limitation questions that involve multiple trophic levels. In the cover proposal we have outlined the sharing of data and logistical support among projects; details on the specific needs of each project will be addressed in our monthly coordination meetings. We will also discuss contingency planning for integral parts of the package and outline alternatives.

Quality assurance will be accomplished in many ways. All detailed project descriptions will be reviewed by all Principal Investigators, by the proposed Seabird/Forage Fish project Technical Steering Committee, and by the Trustee Council Interim Review Board. Annual reports, including the synthesis report, will go through the same review process. A biometrician will be contracted to review sampling designs and data analyses. Interim progress will be tracked by review of overall progress at the annual January Science Workshop and by review of the annual subproject reports and annual synthesis report.

The Principal Investigators for each subproject of the Seabird/Forage Fish project have appointed us (David Irons and Bruce Wright) as Interim Project Coordinators for this project. We plan to take on the program management tasks outlined in the subproject brief project description (95163I), including but not limited to, coordination within and among projects to maximize data and logistics sharing, facilitating communications with the oil spill restoration office, and scheduling performance milestones and ensuring they are met. We plan to hire a Project Coordinator midway through FY95 to assume these important tasks, and we are committed to identifying an individual who is acceptable to all Principal Investigators and can work effectively with their counterparts in SEA, Nearshore Vertebrate Predators, and other relevant EVOS projects.

Coordination between the Seabird/Forage Fish project and other projects has already begun. Dr. Irons contacted Dr. Cooney of the SEA package and set up the first coordination meeting for mid October, which will result in a list of issues and a schedule of coordination meetings. Dr. Cooney was very interested and positive about coordination of the two packages. Dr. Cooney and Dr. Irons are confident that the two packages can be coordinated to ensure efficiency in the Exxon Valdez Trustee Council Work Plan. A coordination plan with the Nearshore Vertebrate Predator project, other marine bird projects, and the information management projects will be set up in October. All data that are collected by the Seabird/Forage Fish project will be available to the SEA and the Trustee Council data base management systems.

#### Research Program Design

We agree with the chief scientist's recommendation to focus on pigeon guillemots and blacklegged kittiwakes initially. Because puffins offer a potential cost-saving method of sampling forage fish, we propose to conduct a small feasibility study in the core sampling area around Naked and Smith Islands to determine if those puffin colonies are accessible for use.

Regarding the Pigeon Guillemot project (old number 94173, new number 95163F), past studies have shown that guillemots appear to prefer sand lance, a schooling fish, over demersal fish, and some evidence suggests their reproductive success tends to be higher when they feed on sand lance compared to demersal fish. In the late 1970's guillemots at Naked Island ate many sand lance, but in 1994 birds at Naked Island ate few sand lance or other schooling fish and many demersal fish, while birds at Jackpot Island ate many schooling fish (i.e., herring and smelt but not sand lance). We feel it is important to assess the abundance and species composition of demersal fish as well as that of schooling fish. However, considering the larger question of food limitation for several species, the assessment of demersal fish is less important than assessment of schooling fish. To try to meet the budget recommended by the chief scientist, we removed the work relating to the assessment of demersal fish from the FY95 Pigeon Guillemot proposal.

We agree with the chief scientist that hydroacoustic surveys and net sampling provide data on only the relative abundance and distribution of forage fish and we recognize that forage fish might be present but unavailable to birds. There are three subprojects that will provide data to determine the availability of forage fish to birds. The Forage Fish Assessment/Birds component will collect bird distribution and behavior data simultaneously with hydroacoustic surveys. These data will provide information on two aspects of fish availability: depth of fish schools and distance from bird colonies to fish. The Kittiwake and Pigeon Guillemot components will provide data on foraging ranges from colonies, diets of birds, and habitats used by foraging birds. After data from 1994 are analyzed, we will know if the Forage Fish Assessment component is sufficiently sampling habitat used by foraging seabirds. If it is not, the sampling design will be restratified to sample more in areas used by birds.

## Integration with SEA (95320)

Regarding integration with the SEA project, as mentioned earlier, Dr. Cooney and Dr. Irons discussed the importance of coordinating the two projects and planned a meeting in mid October to discuss coordination and plan future meetings. The principal investigators of both projects are aware of the necessity of good coordination. As the chief scientist pointed out, it is essential that the hydroacoustic data from both projects be compatible to maximize the coverage of data on distribution, abundance, and composition of forage fish (which include juvenile herring and salmon) in Prince William Sound. All other opportunities to collaborate and share data or logistics will be explored. All data collected by the Seabird/Forage Fish project will be made available to the SEA database.

We feel that we are well on the way to developing an efficient, comprehensive, integrated research effort that will provide valuable information on the question of whether food is limiting the recovery of injured resources.

۰.

Bruce Wright and I coordinated closely in writing this letter, but he was unable to be present to sign it.

Sincerely,

David B. Irons

**Co-Project Coordinator** 

· . . .

| Project Number:           | 95163A-I                       |                        |
|---------------------------|--------------------------------|------------------------|
| Restoration Category:     | Research (new)                 |                        |
| Proposed By:              | DOI, NOAA, ADFG                |                        |
| Cost FY 95:               | \$1,446K (includes write-up of | of 1995 report)        |
| Cost FY 96:               | \$2,400K (includes write-up c  | of 1996 report)        |
| Total Cost:               | Unknown                        |                        |
| Duration:                 | 5 years                        |                        |
| Geographic area:          | Prince William Sound           |                        |
| Injured Resource/Service: | Multiple resources             | NOV 0 8 1994           |
|                           |                                | EXXON VALUEZ OIL SPILL |

TRUSTEE COUNCIL

# INTRODUCTION

Populations of several piscivorous marine bird and mammal species have declined in Prince William Sound (PWS) since 1972; conversely, species that feed on benthic invertebrates have not declined. Marbled murrelets, pigeon guillemots, arctic terns, black-legged kittiwakes, glaucous-winged gulls, tufted puffins, and harbor seals feed primarily on schooling forage fish and have declined by more than 50%. Harlequin ducks, goldeneyes, black oystercatchers, and sea otters feed on benthic invertebrates and have not declined throughout PWS, although some species were affected by the *Exxon Valdez* oil spill. This pattern of declines in piscivorous species and absence of declines in species consuming benthic invertebrates suggests that marked changes in the forage fish community abundance, distribution, and species composition occurred over the last 20 years. Sand lance was an important component of pigeon guillemot diets in the late 1970's that has virtually disappeared from their diets in the 1990's.

If populations of piscivorous seabirds that were injured by the *Exxon Valdez* oil spill (i.e., common murre, marbled murrelet, and pigeon guillemot) are currently limited by food, recovery of these populations is not likely. Therefore, an important hypothesis to be addressed by restoration research is that the recovery of injured species is limited by food. The goal of this study is to determine if the distribution, abundance, availability, and species composition of forage fish in PWS are limiting recovery of injured seabird populations.

Reproductive success of seabirds is largely dependent upon foraging constraints experienced by breeding adults. Previous studies of seabird reproductive energetics have indicated that

• 1, •

productivity is energy-limited. Forage fish vary considerably in energy density. Therefore, knowledge of energy content of prey provisioned to seabird nestlings is critical for understanding the effects of changes in the forage fish resources on the productivity of seabird populations.

To address questions about food limitation for seabirds, species must be studied for which productivity and parameters that indicate food stress can be measured. Surface-feeding species and diving species should each be studied because of differential ability to pursue prey. In PWS, kittiwakes (surface feeders) and pigeon guillmots (divers) are the two most appropriate species to study. Both species are widespread and the necessary data can be collected for them relatively easily.

Food limitation may have been the cause for recent low seabird productivity and consequent population declines in other parts of Alaska. Some black-legged kittiwake colonies in the Gulf of Alaska have declined over the past ten to fifteen years. There are indications that capelin, an important component of seabird diets in the 1970's, declined drastically in 1978 and has remained low. Kittiwakes and murres at some colonies in the Bering Sea have suffered chronically low productivity in the past 15 years and food supply has been implicated as the prime factor.

Investigations of the relationships between pelagic seabirds and their prey have been conducted in the Gulf of Alaska, the Bering Sea, the North Atlantic Ocean, and the Southern Ocean using counts of birds and associated hydroacoustic data. This work has been short-term and the general objective has been to understand the mechanisms (e.g., oceanographic features) that make prey available to seabirds. However, there have been multi-year studies in limited areas of the North Atlantic that compared relative abundance of forage fish to reproductive performance in seabirds. Relationships between some seabird foraging and reproductive parameters and forage fish relative abundance were found that indicated food was more limiting in some years than others.

Assessing the abundance and composition of seabird prey in a large area, such as the Gulf of Alaska or the Bering Sea, is a very complex, expensive, and difficult task. However, nesting tufted puffins have been used to sample species composition of the fish communities in selected areas of the northern Gulf of Alaska. This technique is potentially useful and inexpensive, but needs more ground truthing with independent data on fish composition before it can be substituted for shipboard net sampling.

#### NEED FOR THE PROJECT

The *Exxon Valdez* Oil Spill Trustee Council scientists identified the long-term declines in PWS piscivorous marine bird and mammal species as a high-priority ecosystem issue.

Several injured species were in decline before the oil spill and might not recover due to food limitation. Ecosystem processes are complex and involve multiple resources at several trophic levels. Therefore, restoration projects to address this issue must involve an integrated, collaborative, multi-disciplinary approach.

The Seabird/Forage Fish project has several interrelated components (Table 1) that together address the food limitation hypothesis. These components are ecologically and conceptually linked (Figure 1) and therefore must be conducted concurrently and collaboratively to achieve the project goals. Each subproject is dependent upon others for data and logistical support. The Forage Fish Assessment and Forage Fish Assessment/Birds components provide information on amount and quality of seabird prey available. The Puffin project might provide an inexpensive method to assess fish composition. The Seabird Energetics and Forage Fish Composition components provide information on the energetic constraints that prey availability and quality place on seabird productivity. The Pigeon Guillemot and Kittiwake components provide information on the extent of food stress and on reproductive success of seabirds. The Forage Fish Diets component investigates the overlap in diets between forage fish and juvenile salmon. Together, these components provide information on how the amount and quality of prey might limit seabird productivity and population recovery.

The Seabird/Forage Fish project will ensure that a comprehensive, cooperative, and efficient research effort is developed to collect information to address the food limitation hypothesis. This information is crucial for understanding the factors constraining recovery of marine birds and mammals damaged by the spill and for designing management initiatives to enhance productivity of species that are failing to recover.

#### **PROJECT DESIGN**

#### A. Objectives

To determine if the distribution, abundance, and species composition of forage fish are limiting recovery of injured seabird resources.

#### B. Methods

The Seabird/Forage Fish project comprises nine subprojects, the specific objectives and methods of which are outlined in the attached subproject descriptions.

• •

. . . . .

| October 1994-May 1995 | Prepare for field season                                     |
|-----------------------|--|
| -                     | Monthly coordination meetings of Principal Investigators     |
|                       | Regularly scheduled coordination meetings with SEA and other |
|                       | projects   |
| May-September 1995    | Field work   |
| October-December 1995 | Data analysis  |
| January 1996          | Presentation at Science Workshop                             |
| 31 January 1996       | Draft annual reports due                                     |
| February-March 1996   | Reports reviewed by Technical Steering Committee, Trustee    |
| -                     | Core Reviewers, and other Principal Investigators            |
| March 1996            | Prepare Fy 96 Proposal                                       |
| 31 March 1996         | Final annual reports due                                     |
| May-September 1996    | Field Work   |
| 30 June 1996          | Draft annual synthesis report due                            |
| July-August 1996      | Reports reviewed by Technical Steering Committee, Trustee    |
|                       | Core Reviewers and other Principal Investigators             |
| 31 August 1996        | Final annual synthesis report due                            |

#### D. Technical Support

We plan to establish a Technical Steering Committee of three experts on seabird/forage fish interactions that will provide external review, advice, and guidance on the technical aspects of the overall project as well as on specific components.

Requirements for technical support for each component are identified in attached subproject descriptions.

# E. Location

The focus of the study is in Prince William Sound (Figure 2) in 1995. In future years it is expected to expand into the northern Gulf of Alaska. Specific study sites are shown in Figure 2.

# **PROJECT IMPLEMENTATION**

The Fish and Wildlife Service, National Biological Survey, National Marine Fisheries Service, Alaska Department of Fish and Game, University of Alaska, and Texas A&M University will collaborate on this project. Opportunities for public involvement in data collection and synthesis and review of reports are present in the subprojects. The responsibilities for implementing this program were divided up based on expertise and prior experience with the methods, venues, and resources proposed for the research.

#### COORDINATION OF INTEGRATED RESEARCH EFFORT

There will be two major elements of coordination to ensure efficiency in this research program: coordination among the subprojects within the Seabird/Forage Fish project and coordination between the Seabird/Forage Fish project and other projects. Because of the links inherent in research involving multiple trophic levels, the components of the Seabird/Forage Fish project are highly dependent upon each other (Figure 3). The Forage Fish Diets component will provide information to the Forage Fish Assessment component on the dietary overlap among species, which will provide insight into possible competition. The Puffin component is linked with the Forage Fish Assessment component in that it might be another method of sampling forage fish; the Puffin study will also provide samples to the Seabird Energetics component. The Forage Fish Assessment component will provide data on fish distribution, abundance, and species composition to the Forage Fish Assessment/Birds, the Pigeon Guillemot, and the Kittiwake components. The Forage Fish Assessment/Birds component will provide data on foraging behavior in relation to fish distribution and abundance to the Pigeon Guillemot and Kittiwake components. The Pigeon Guillemot and Kittiwake components will share information on the distribution of foraging birds and will compare their data to those of the Forage Fish Assessment/Bird component. Also, much data will be shared between the Seabird Energetics component and the Pigeon Guillemot and Kittiwake components. The Forage Fish Composition component will provide data to the Seabird Energetics component.

Logistics will be coordinated to minimize cost and maximize data collection through the program management and integration process and regular meetings among the Principal Investigators. The Forage Fish Assessment component will provide logistical support for the Forage Fish Assessment/Birds component. The Pigeon Guillemot, Kittiwake, Puffin, and Seabird Energetics components will share field camps and logistical support where practical.

The Seabird/Forage Fish project will coordinate with several other projects in PWS to increase the overall efficiency of the *Exxon Valdez* Trustee Council work plan (Figure 4). Coordination with the SEA study is imperative to maximize sharing of data and logistical support. All data collected by the Seabird/Forage Fish project will be available to the data base management system that is maintained by the SEA program (95320J) and to the oil spill office information management system (95089). Data collected on forage fish distribution, abundance, composition, and energy content will be provided to the marine mammal studies and other marine bird projects. The Nearshore Vertebrate Predators project will collect information on ecosystem health using bioindicators, which will provide valuable information on the level of toxins that might affect seabirds.

The program coordinator for the Seabird/Forage Fish project will ensure that coordination within the project and between this and other projects occurs, facilitate communication with the oil spill restoration office, ensure that performance milestones are met, prepare annual synthesis presentations and reports, and explore opportunities for data management and systems modelling in cooperation with SEA project (95320J) and Project 95089.

# FY 95 BUDGET (\$K)

See Table 1 for a list of subproject budget totals and attached subproject descriptions for budgets of each subproject.

| New<br><u>Number</u> | Old<br><u>Number</u> | Subproject<br><u>Name</u>             | Proposed<br>Budget(\$K) | Revised<br>Budget(\$K) |
|----------------------|----------------------|---------------------------------------|-------------------------|------------------------|
| 9 <b>5</b> 163 A     | 95163                | Forage Fish Assessment                | 842                     | 483                    |
| 95163 B              | <b>95</b> 163        | Forage Fish Assessment/Birds          | 221                     | 155                    |
| 96163 C              | 95163                | Forage Fish Diets                     | 258                     | 77                     |
| 95163 D              | 95019                | Puffins as Samplers                   | 271                     | 32                     |
| 95163 E              | 95033                | Kittiwakes as Indicators              | 199                     | 180                    |
| 95163 F              | 95173                | Pigeon Guillemot Recovery             | 409                     | 260                    |
| 95163 G              | BAA-118              | Seabird Energetics                    | 141                     | 141                    |
| 95163 H              | BAA-120              | Energy Composition of Fish            | 43                      | 43                     |
| 95163 I              | -                    | Program Management<br>and Integration | -                       | 75                     |
|                      |                      | TOTAL                                 | \$2,384K                | \$1,446K               |

Table 1.List of subprojects in the Marine Bird/Forage Fish project (95163A-I)and their budgets.

- . . •

•

Table 2.Matrix of temporal data needs for abundance, distribution, and species composition of forage fish by<br/>subproject and proposed cruise dates.

|                           | April | May  |  | June |  | July   | I | August | I         | September |  |
|---------------------------|-------|------|--|------|--|--------|---|--------|-----------|-----------|--|
| Pigeon Guillemot Recovery |       |      |  |      |  | ***    |   |        |           |           |  |
| Kittiwakes as Indicaters  | <br>  | <br> |  |      |  |        |   | *****  | <b>~~</b> |           |  |
| Puffins as Samplers       |       |      |  |      |  |        |   |        |           |           |  |
| Seabird Energetics        |       |      |  |      |  |        |   | ,<br>, |           |           |  |
| Proposed Cruises          |       |      |  |      |  | ****** |   | ****   |           |           |  |



·. •

Figure 1. Conceptual framework for the Seabird/Forage Fish project (95163A-I) showing ecological links to factors that may control avian productivity and recovery.





Figure 3. Data exchange among the Seabird/Forage Fish subprojects (95163A-H). Subprojects are indicated by the project letter.


Figure 4. Coordination and information flow between Seabird/Forage Fish project and other projects, which include: SEA-95320 E,H,I,N,T,U; nearshore 95025C; marine mammal projects 95001, 95064, 95117; murre & murrelet projects 95039 & 95031; and the information management projects 95089 and 95320J.

# Abundance and Distribution of Forage Fish and Their Influence on **Recovery of Injured Species**

**Project Number:** 

. . . .

95163A (formerly 95163)

**Restoration Category:** Research (continuation of 94163)

DOI & ADFG

NOAA

**Cooperating Agencies:** 

Cost FY95:

**Proposed By:** 

Cost FY96:

Total Cost:

**Duration:** 

Geographic Area:

\$482,700

Unknown

\$482,700

6 years minimum

Prince William Sound

**Injured Resource/Service:** Multiple Resources

# ECE

EXXON VALUEZ OIL SPILL TRUSTEE COUNCIL DMINISTRATIVE RECORD

## INTRODUCTION

A better understanding is needed of how prey availability affects distribution, abundance, growth, and reproductive success of apex predators. Efforts to restore predatory species affected by the oil spill, particularly harbor seals, pigeon guillemots, marbled murrelets, and black-legged kittiwakes, could be delayed or completely unsuccessful without understanding distribution, abundance, and availability of important forage fish including herring, pollock, sand lance, capelin, and invertebrate species such as macrozooplankton and squid.

## NEED FOR THE PROJECT

This is a core component of the Seabird/Forage Fish project (95163A-I), a multi-disciplinary project designed to understand the Prince William Sound (PWS) food web and the associated effects on the injured species.

This project will concentrate on determining distribution, abundance, and availability of important prey species (e.g., herring, pollock, sand lance, capelin, macrozooplankton, squid) to predatory species affected by the oil spill (harbor seals, pigeon guillemots, marbled murrelets, black-legged kittiwakes). This information, trophic position and niche overlap among species, will be used to establish the basic structure of future ecosystem models. The

models of changing oceanographic regimes and prey species productivity and distribution are necessary for understanding recovery of predatory species, and useful in guiding recovery activities.

#### **PROJECT DESIGN**

This project will evaluate existing field methods used in determining distribution, abundance, availability, and class composition of forage fish. Provisions will be included to model effects of changing oceanographic regimes on forage fish species' distribution, abundance, and productivity.

The 1995 sampling program will be a continuation of the 1994 pilot project (94163) to determine distribution, densities, and species composition of forage fish species. Field surveys will determine where apex predators forage (95163B), and this project (95162A) will determine distribution, abundance, and availability of forage fish of both nearshore and offshore waters within selected areas of PWS. Ecosystem models to estimate biomass and productivity of forage fish species will be evaluated and initiated (95163I) in coordination with SEA project (95320J).

#### A. Objectives

Overall objectives: Determine temporal and spatial distribution, abundance, species composition, and availability of important prey species (e.g., herring, pollock, sand lance, capelin, macrozooplankton, squid) in PWS waters. Determine how important biotic and abiotic factors affect both short- and long-term distribution and abundance of prey species in the oil spill area. Determine how predator distribution, abundance, and foraging strategy coincide with forage fish distribution, abundance, and availability.

1995 objectives:

- 1. Evaluate existing field methods used in determining distribution, abundance and availability of forage fish.
- 2. Determine temporal and spatial distribution, abundance, and availability of prey species using hydroacoustic surveys and net sampling.
- 3. Investigate the relationships between forage fish abundance and distribution to oceanographic parameters.
- 4. Initiate development of ecosystem models to understand factors influencing distribution, abundance, and composition of forage fish.
- 5. Investigate relationships of forage fish abundance to seabird and marine mammal abundance and productivity, in conjunction with complementary studies (95163 B-I, 95001, 95031, 95039, 95064, 95117, 95320H, 95320N, and 94320T).

#### B. Methods

Conduct both coarse- and fine-scale hydroacoustic surveys and determine forage fish composition and sizes by net sampling. Coarse scale surveys will consist of line transects spaced throughout the study area. Fine-scale surveys will be located at sites known to be seabird or marine mammal feeding areas. Both coarse- and fine-scale surveys will be conducted during the two 20-day surveys. Survey timing is during the times most important for seabird nesting, July and August (see Figure 1). Four permanent hydroacoustics stations will be established to observe temporal patterns in prey abundances within and between years.

Figure 1. Periods in which forage fish distribution and abundance data, and samples should be collected to support 95163 projects.

| Species/<br>Project #         | Apr | il | Ma | ау | Jun | e | July | 1 | Aug | ust | Sept | • |
|-------------------------------|-----|----|----|----|-----|---|------|---|-----|-----|------|---|
| Puffins/<br>95163D            |     |    |    |    |     |   |      |   | X   | x   | X    |   |
| Kittiwakes/<br>95163E         | X   | Х  | X  | X  | X   | X | Х    | X | X   | X   |      |   |
| Pigeon Guillemots/<br>95163F  |     |    |    |    |     |   | X    | X | X   |     |      |   |
| Seabird Energetics/<br>95163G |     |    |    |    |     |   | X    | X | X   | X   |      |   |

During hydroacoustic surveys, simultaneous seabird and marine mammal surveys will take place from the same vessel (95163B). Data from this study will be used to understand foraging behavior in relation to abundance and distribution of prey. These data will also be combined with data from other seabird studies to compare relative fish abundance to foraging behavior and reproductive success, marbled murrelets (95031), pigeon guillemots (95163F), and black-legged kittiwakes (95163E).

Forage fish will be sampled in nearshore and offshore areas using nets. Each species will be identified and length and weight measured on a minimum of 150 individuals randomly selected in each sample. Fifteen fish from each species will be preserved from each sample for later analysis of stomach contents (95163C). Additional samples will be collected for later lipid and stable isotope analysis (94320I).

#### C. Schedule

्रें कुल्ल अ

The forage fish surveys will be conducted under contract. The contractor will conduct two 20-day hydroacoustic and net sampling surveys during July and August. Annual reports will include progress on refining the forage fish models. A project status report will be submitted by the contractor in December, 1994 (94163), which will discuss existing field methods used in determining distribution, abundance, and availability of important prey species, and the process and justifications for selected survey techniques. The report will present and discuss the results of the field surveys including locations of forage fish, and when possible, the biomass of these species, and forage fish prey, as determined from stomach content analysis.

The 1995 report, due April 1996, will present and discuss the results of the FY95 field surveys. The contractor, in collaboration with NOAA, ADF&G, USFWS, 95320J, and 95163I, will report on the correlation of forage fish distribution and abundance with seabirds (marbled murrelet, pigeon guillemot, black-legged kittiwake) and marine mammal abundance and productivity. The report will also describe and evaluate ecological models to estimate productivity of important prey species, and a sampling program to fulfill requirements of ecological models. Annual reports will include progress on refining the productivity models. The contractor will participate in development of a synthesis report prepared by 95163I.

July 1995 - August 1995Contractor field samplingSeptember 1995 - 31 March 1996Analyze data and prepare annual report

#### D. Technical Support

This project will generate data which will be useful to the monitoring projects and studies currently underway in PWS. To insure access to these data, the information collected from this project will be incorporated into a data base managed by the Trustee Council (95089) and SEA project (95320J).

#### E. Location

This project will concentrate its initial activities within PWS. The research area consists of three core study blocks: Valdez Arm south to and including the waters around Glacier and Bligh Islands, waters around Naked Island south to The Needles, and waters in the Jackpot Bay/Dangerous Passage area. These areas are not key survey areas for the SEA hydroacoustic studies (95320H and 95320N). However, some of the data from the SEA hydroacoustic studies may be useful in refining the productivity models.

#### **PROJECT IMPLEMENTATION**

This project will be contracted and coordinated by NOAA with cooperative components conducted by ADF&G and USFWS.

#### **COORDINATION OF INTEGRATED RESEARCH EFFORT**

There are two major components of coordination to insure efficiency in this research package, coordination among the subprojects within the Seabird/Forage Fish project, and coordination between the project and other studies. The Forage Fish Diets component (95163C) will provide information to the Forage Fish Assessment component (95163A) on the dietary overlap among forage fish species, which may provide insight into competition among forage fish. The Puffins as Samplers component (95163D) is linked to the Forage Fish Assessment component in that it may prove to be another method of sampling forage fish. The Forage Fish Assessment component will provide data on fish distribution, abundance, and composition to the Forage Fish Assessment/Birds component (95163B), the Pigeon Guillemot component (95163F), and the Kittiwake component (95163E).

The Forage Fish Assessment component and the Pigeon Guillemot and Kittiwake components will provide complementary and integral information to determine if food is limiting the recovery of seabird species. Data on seabird foraging and reproductive parameters will be compared to the forage fish assessment data to investigate the relationship of food availability or limitation to seabird productivity.

The Forage Fish Assessment component will also provide data on forage fish abundance, distribution, and availability to marine mammal studies (95001, 95064, 95117) to support marine mammal abundance and productivity model development.

The Forage Fish Assessment component will also be highly integrated with several components of the SEA Program and several of the seabird and marine mammal projects. The Physical Oceanography, Nearshore Fish, Zooplankton, and Phytoplankton components of SEA will collect data relevant to forage fish distribution and production. Within the SEA Physical Oceanography component, conductivity-temperature-depth (CTD) profilers and Acoustic Doppler Current Profilers (ADCP) will be deployed from a mid-water trawl vessel. Within the SEA Nearshore Fish component, hydroacoustic data will be obtained in offshore habitats from a mid-water trawl vessel and in nearshore habitats from small hydroacoustic survey boats. Within the SEA Zooplankton and Phytoplankton components, zooplankton and water samples will be collected using nets and water bottles. The Salmon Growth and Salmon Predation components of SEA will collect forage fish samples for later stomach contents analysis in offshore and nearshore habitats using mid-water trawls, and beach and purse seines. Age-weight-length data will be collected from the forage fish to accompany hydroacoustic data.

All data collected as part of SEA will be provided to the Information and Modeling component (95320J) and the Seabird/Forage Fish synthesis component (95163I) for use in development and implementation of ecosystem models.

# FY 95 BUDGET (\$K)

| Personnel     | 42.8  |
|---------------|-------|
| Travel        | 6.0   |
| Contractual   | 400.0 |
| Commodities   | 1.0   |
| Equipment     | 6.0   |
| Subtotal      | 455.8 |
| Gen. Admin.   | 26.9  |
| Project Total | 482.7 |

## **Forage Fish Assessment/Birds**

**Project Number:** 

95163B (formerly 95163)

DOI

\$155,000

\$200,000

Unknown

6 years

Research (continuation of 94163)

**Restoration Category:** 

**Proposed By:** 

Cost FY 95:

Cost FY 96:

**Total Cost:** 

**Duration:** 

Geographic Area:

Injured Resource/Service: Picivorous birds

NOV 0 8 1994

EXXON VALUEZ OIL SPILL TRUSTEE COUNCIL ADMINISTRATIVE RECORD

## INTRODUCTION

Seabirds were severely impacted by the *Exxon Valdez* oil spill; 30,000 carcasses were recovered and estimates of losses exceed several hundred thousand. Three species (common murre, marbled murrelet, and pigeon guillemot) have not recovered from the population perturbation. In addition, recent black-legged kittiwake nesting failures may be linked to the spill. Pinnipeds within Prince William Sound (PWS) have also been declining. These declining species are picivorous. Avian species recovering from the spill forage on other foods. These data suggest that several picivorous species share a common food limitation.

Prince William Sound

#### NEED FOR THE PROJECT

Food limitation on seabirds can result from three possible changes in the forage resource:

- 1. A reduction in the total forage biomass.
- 2. A shift in the species composition of the forage resource resulting in lower food quality species becoming dominant.
- 3. Food is present in the ecosystem but no longer available to birds.

Each of these changes, or some combination of them, could have occurred in the spill area. A perturbation or other environmental change could have resulted in a decline in forage fish

#### Forage Fish Assessment/Birds

recruitment that caused a decline in total biomass. It is also probable that a perturbation caused only some species of the forage fish guild to decline and others have responded to the availability of resources, freed by competitor declines, by increased recruitment. If forage fish guild composition shifts resulted in species of lower food quality becoming dominant, food may become limiting to predator species. A shift in forage fish guild composition could also result in dominance of species that spend most of their life history in water too deep for foraging birds, thereby causing food limitation. Of the proposed subprojects, this is the primary component to determine if food limitation has resulted from item 3, above.

. . . .

#### **PROJECT DESIGN**

This project will be expanding upon established approaches and methods used to investigate forage fish/seabird interactions. Several similar investigations have been conducted at distant study sites (see papers by Schneider, Safina, Piatt, Obst, and Erikstad) as well as Alaska coastal areas (see papers by Piatt and Hunt). Improved data collection equipment, larger sample sizes, and temporal replication will result in a greater insight into forage fish/seabird interactions. The 1995 project will be an expansion of the 1994 project and will be developed in concert with the forage fish assessment subproject (95163A).

#### A. Objectives

This study will contribute to the objective of the Seabird /Forage Fish project: to determine if food limitation is preventing the recovery of injured seabirds. The overall objective of this subproject is to determine if food limitation is the result of unavailable food resources.

Specifically, the objectives are to determine the following:

- 1. What are the characteristics and distribution of foraging patches exploited by seabirds?
- 2. How abundant are foraging patches and what is the rate of their exploitation by seabirds?
- 3. How does the behavior of seabirds change with changes in food availability?

#### B. Methods

Seabird and marine mammal surveys will be conducted simultaneously with hydroacoustic surveys (hydroacoustic survey methods are described in proposal 95163A). Mammal and bird surveys will be conducted using standard techniques used previously in seabird and mammal population surveys in PWS. During hydroacoustic transects, all birds and mammals observed within 100 meters of the survey ship will be recorded. Categorical data will also be collected

#### Forage Fish Assessment/Birds

on bird behavior. Times of observations will be recorded to allow direct comparison of hydroacoustic data to bird and mammal data.

Foraging patches will be defined as sites at which two or more birds are observed foraging. Hydroacoustics data will be used to determine species composition of foraging patches, water depth to patch, and size of patch. Hydroacoustics data will be further analyzed to determine the frequency of occurrence of patches suitable for bird foraging. The rate of exploitation of available forage patches will then be determined. Repeating the surveys for several years will provide data on how forage fish populations are changing and the behavioral responses of seabirds to changes in prey abundance by tracking the rate of forage patch exploitation and the distribution of birds.

## C. Schedule

Because of budget constraints only two forage fish surveys and limited nearshore work will be conducted during 1995. Coordination will be made with the SEA project's Nearshore Fish component (95320N) to make up for data shortfalls.

| April - July 1995        | Coordinate with other studies for data collection |
|--------------------------|---|
| July - August 1995       | Forage fish assessment cruises                    |
| July 1995 - January 1996 | Analyze field data and prepare reports            |
| 31 January 1996          | Draft report due                                  |
| 31 March 1996            | Final report due                                  |

#### D. Technical Support

This project will generate data that will be important to other monitoring projects and studies being conducted in PWS. To facilitate access to project data, the information collected from this study will be incorporated into a data base managed by the Trustee Council and by SEA.

#### E. Location

This project will concentrate its initial activities within PWS. However in the future some sampling may be performed in the Gulf of Alaska, adjacent to PWS.

#### **PROJECT IMPLEMENTATION**

The U. S. Fish and Wildlife Service (USFWS) will obtain necessary data from the Forage Fish Assessment subproject (95163A) and will conduct all other phases of this study. The USFWS has demonstrated that it is the most appropriate entity to conduct this project through its previous monitoring and research on seabirds in PWS.

## COORDINATION OF INTEGRATED RESEARCH EFFORT

This subproject is an integral part of the Seabird/Forage Fish project and will provide key information to the synthesis report. This component will be developed in close association with the contractor for the Forage Fish Assessment subproject (University of Alaska). Data collected will be used by the Puffins as Samplers (95163D), Kittiwakes as Indicators (95163E), and Pigeon Guillemot Recovery (95163F) subprojects. Coordination will be made with the SEA project's Juvenile Salmon and Herring Integration component (95320E) and Nearshore Fish (95320N) components to integrate data collection efforts.

#### FY 95 BUDGET (\$K)

| Personnel   | 117.00 |
|-------------|--------|
| Travel      | 8.0    |
| Contractual | 0.0    |
| Commodities | 0.0    |
| Equipment   | 10.0   |
| Subtotal    | 135.0  |
| Gen. Admin. | 20.0   |
| Total       | 155.0  |

## **Competition and Prey of Forage Fish**

120

| Project Number:              | 95163C (was 95163)   |                        |
|------------------------------|----------------------|------------------------|
| <b>Restoration Category:</b> | Research             |                        |
| Proposed By:                 | ADF&G                | DECEIVE                |
| <b>Cooperating Agencies:</b> | NOAA & DOI           | NOV 0 8 1994           |
| Cost FY95:                   | \$76,600             | EXXON VALUEZ OIL SPILL |
| Cost FY96:                   | \$76,600             | ADMINISTRATIVE RECORD  |
| Total Cost:                  | Unknown              |                        |
| Duration:                    | 6 years minimum      |                        |
| Geographic Area:             | Prince William Sound |                        |
| Injured Resource/Service:    | Multiple Resources   |                        |

## INTRODUCTION

A better understanding is needed of how prey availability affects distribution, abundance, growth, and reproductive success of apex predators. Efforts to restore predatory species affected by the oil spill, particularly harbor seals, pigeon guillemots, marbled murrelets, and black-legged kittiwakes, could be delayed or completely unsuccessful without understanding distribution, abundance, and availability of important forage fish. Factors controlling the life history of the forage fish, such as prey and competition, must also be understood.

## NEED FOR THE PROJECT

This is a subproject of the Seabird/Forage Fish project (95163A-I), a multi-disciplinary project designed to understand the Prince William Sound food web and the associated effects on the injured species.

This subproject will concentrate on determining diet overlap and prey selection among forage fish species. This information, trophic position and niche overlap among species, will be used to establish the basic structure of future ecosystem models. The models of changing oceanographic regimes and prey species productivity, diet overlap and prey selection, and distribution are necessary for understanding recovery of predatory species, and useful in guiding recovery activities.

Forage Fish Diets

. . .

#### **PROJECT DESIGN**

The 1995 sampling program will be a continuation of the 1994 pilot project (94163) to determine diet overlap and prey selection among forage fish species. This project will also provide information on sex, age, growth, food habits, recruitment, and mortality of forage fish species.

#### A. Objective

Determine forage fish prey using stomach contents analysis for fish collected from nearshore and offshore sites, and estimate degree of diet overlap among species.

#### B. Methods

Forage fish will be sampled in nearshore and offshore areas using nets. Each species will be identified and length and weight measured on a minimum of 150 individuals randomly selected in each sample. Fifteen fish from each species will be preserved from each sample for later analysis of stomach contents.

#### C. Schedule

The forage fish surveys will be conducted under contract. The contractor work will conduct hydroacoustic and net sampling surveys during July and August. Additional samples will be collected by the Salmon Growth and Salmon Predation components of SEA (95320N) for later stomach contents analysis.

July - August 1995Contractor net samplingApril - November 1995SEA net samplingJune - 31 December 1995Conduct stomach contents analysisI January - 31 March 1996Analyze data and prepare annual report

#### D. Technical Support

This project will generate data that will be useful to the monitoring projects and studies currently underway in Prince William Sound. In order to insure access to these data, the information collected from this project will be incorporated into a data base managed by the Trustee Council (95089) and the SEA project (95320J).

#### E. Location

This project will concentrate its initial activities within Prince William Sound.

Forage Fish Diets

## **PROJECT IMPLEMENTATION**

This project will be contracted and coordinated by ADF&G with cooperative components conducted by NOAA, USFWS, and SEA.

#### **COORDINATION OF INTEGRATED RESEARCH EFFORT**

This project will be highly integrated with several components of the Seabird/Forage Fish project, several components of the SEA project, and marine mammal projects. The Salmon Growth and Salmon Predation components of SEA will collect forage fish samples for later stomach contents analysis in offshore and nearshore habitats using mid-water trawls, and beach and purse seines. Age-weight-length data will be collected from the forage fish to accompany hydroacoustic data. All data collected as part of SEA will be provided to the Information and Modeling component 95320J for use in development and implementation of ecosystem models.

#### FY 95 BUDGET (\$K)

| Personnel     | 25.0 |
|---------------|------|
| Travel        | 3.0  |
| Contractual   | 40.0 |
| Commodities   | 2.0  |
| Equipment     | 0.0  |
| Sub-total     | 70.0 |
| Gen. Admin.   | 6.6  |
| Project Total | 76.6 |

# Distribution and Abundance of Forage Fish as Indicated by Puffin Diet Sampling

| Project Number:           | 95163D (formerly 95019)                                | DECEIVED                                 |
|---------------------------|--|--|
| Restoration Category:     | Research (new)   |  |
| Proposed By:              | DOI  | EXXON VALUEZ OIL SPILL                   |
| Cost FY95:                | \$32,250   | TRUSTEE COUNCIL<br>ADMINISTRATIVE RECORD |
| Cost FY96:                | \$42,250 (includes \$10,000 for analysis and write-up) |  |
| Total Cost:               | Unknown  |  |
| Duration:                 | 6 years  |  |
| Geographic Area:          | Prince William Sound                                   |  |
| Injured Resource/Service: | Multiple resources                                     |  |

## INTRODUCTION

٠.

Tufted puffins are widely distributed in breeding colonies throughout the *Exxon Valdez* oil spill area. During the chick-rearing period, adults make several trips daily to the nest, carrying fresh prey to their young. By intercepting those food deliveries, it is possible to sample the nestling diet of puffins systematically and nonconsumptively. Puffins and other seabirds (murres, murrelets, guillemots, kittiwakes, and others) rely in summer on a food base consisting primarily of forage fish (capelin, sand lance, juvenile pollock, juvenile herring, myctophids, and others). This project will use puffin diet sampling as a means to quantify seasonal, annual, and geographic variation in the composition of the forage fish community at selected stations within the spill area. The project will complement traditional, more costly approaches involving hydroacoustics and net sampling and will also provide a reliable source of seabird prey specimens for laboratory analyses proposed in other projects.

#### NEED FOR THE PROJECT

Three species of seabirds (common murre, marbled murrelet, and pigeon guillemot) and one pinniped (harbor seal) were injured by the Exxon Valdez oil spill and are not recovering. An additional species (black-legged kittiwake) showed early effects on reproduction (comparing oiled and unoiled areas) and has experienced widespread breeding failure throughout Prince William Sound (PWS) in the last two years. The summer diets of these and other members of the pelagic community of vertebrate predators (birds, mammals, and fish) are known to

#### Puffins as Samplers

overlap. One hypothesis to explain the failure of recovery of injured species is that adverse changes are occurring in the quantity or quality of these species' prey. To test that hypothesis, it is necessary to quantify the status and trends of prey populations, particularly the forage fish that constitute an important part of the summer diet. Few data are available on the distribution and abundance of forage fish, because most species are not commercially harvested, and traditional methods of fishery science tend to be difficult and expensive. In the Gulf of Alaska, tufted puffins have proved to be excellent samplers of the forage fish community, providing annual indices of the distribution and relative abundances of keystone species such as capelin, sand lance, pollock, myctophids, and squids. Conducted over a span of years, this approach offers a cost-effective means of monitoring key components of the pelagic ecosystem and testing the hypothesis that recovery of seabirds and marine mammals is influenced by changes in the composition of marine fish stocks.

Seabirds in general, and puffins in particular, may constitute an important mortality factor on the early life stages of commercially important species. In the Gulf of Alaska, tufted puffins took 11 billion pollock from mid July to mid September in 1986, roughly one-tenth of the first-year juveniles available just prior to chick-rearing and ten times the number of fish surviving to the following March (Hatch and Sanger 1992). On the Barren Islands in 1993, puffins frequently delivered juvenile sockeye salmon, although the smolt were too large to be readily ingested by the chicks, and many went to waste (A. Kettle, pers. comm.).

Whether seabird predation proves to be a significant source of mortality or not, previous results suggest that diet sampling can provide an early indication of year-class strength in some species. For instance, the proportion of pollock in tufted puffin diets at the Semidi Islands (western Gulf of Alaska) was strongly correlated over three years with independent measures of year-class strength obtained in fishery investigations (Hatch and Sanger 1992). A similar outcome might be obtained for sockeye salmon at the Barren Islands or pink salmon in Hinchinbrook Entrance to PWS, where an out-migration of juveniles in late summer and fall (PWS Fisheries Research Planning Group, 1993) would encounter the sizeable puffin colonies on Porpoise Rocks and the Wooded Islands.

Because puffins deliver whole, undamaged prey to their chicks, this project can serve as a source of specimens for determination of prey quality (composition and energy density), population structure (age-sex ratios, genetic stock identification), and trophic studies (fish stomach contents, stable isotope ratios, and/or lipid analysis). Puffin samples have also been used to estimate daily growth increments of juvenile sand lance and pollock (Hatch 1984, Hatch and Sanger 1992).

•

#### **PROJECT DESIGN**

#### A. Objectives

- 1. Annually assess the species composition of the forage fish community near selected colonies of seabirds in the northern portion of the Exxon Valdez oil spill area.
- 2. Cross check the species composition of forage fish as determined by puffin diet sampling and hydroacoustic/net sampling techniques.
- 3. Assess the timing and magnitude of puffin predation on commercially important prey species including Pacific herring, pink salmon, and sockeye salmon.
- 4. Furnish whole prey specimens on demand for complementary studies of prey energetics, food web relationships, and fish population characteristics.

### B. Methods

Puffin diet samples are collected most efficiently by placing wire screens over the entrances to burrows. Unable to enter, returning adults drop their food loads on or near the screens, which are removed when the samples are retrieved after 1-3 h. Samples are washed, bagged and preserved for later analysis in the laboratory. Any temporal sampling scheme desired can be implemented, but for maximizing the quantity of food obtained, morning hours are productive because puffins generally make a food delivery soon after first daylight.

One issue raised by this sampling approach is whether puffins take different types of prey in proportion to their relative abundances in the water column. Therefore, a desirable element of the field work during the first year of this project would be a comparison of the results from puffin diet sampling with simultaneous deployment of hydroacoustics and net sampling offshore at one or more colonies. The offshore work is not budgeted for in this proposal, but it is anticipated that the coordinated study would be achieved through cooperation with the Forage Fish Assessment subproject (95163A) and SEA components proposed for fiscal year 1995.

Puffins as Samplers

| C. Schedule             |  |
|-------------------------|--|
| November - June 1995    | Recruit personnel, safety training, boat and collection equipment preparation.   |
| June 1995               | Reconnaissance of Naked Island group and vicinity for potential sampling sites.  |
| July - August 1995      | Field collection of puffin diet samples at Naked Island, Smith<br>Island, or other locations in the core study area of the<br>Seabird/Forage Fish project. |
| September 1995          | Laboratory analysis of food samples.   |
| October - December 1995 | Complete laboratory analysis; data analysis and report writing.  |
| January 1996            | Draft annual report.   |
| March 1996              | Final annual report.   |

#### D. Technical Support

No technical support is required during the first year of study. An expanded program in the future may result in sufficient samples to warrant contracting for the identification and measurement of prey items.

#### E. Location

The intended sampling area during the first year of this project includes Naked Island and/or neighboring islands within the core study area delineated for the Seabird/Forage Fish project (95163A-I). There is a possibility that an insufficient number of puffins, or inaccessibility of their nesting habitat, could preclude the use of the proposed sampling techniques in this area. Thus, a minimum of equipment will be purchased initially, and a reconnaissance of potential sampling sites will be carried out in June, prior to first hatching of puffins. If a determination is made during the June reconnaissance that puffin diet sampling cannot be conducted safely and productively on Naked Island, Smith Island, or other nearby locations, the project will not be further implemented in 1995 and remaining funds will be returned to the EVOS Restoration Office for distribution to other projects.

#### **PROJECT IMPLEMENTATION**

This project will be implemented by the National Biological Survey, Alaska Science Center. Center personnel developed the field techniques proposed for puffin diet sampling and have successfully applied the method at more than 20 puffin colonies in the Gulf of Alaska since 1985.

#### COORDINATION OF INTEGRATED RESEARCH EFFORT

Coordination with offshore operations that sample forage fish by traditional methods is a recommended component of this project. The project will contribute to and draw upon SEA investigations of Juvenile Salmon and Herring Integration (95320), and will use information on physical oceanography generated by other EVOS funded studies in the interpretation of seasonal, annual, and geographic variation in forage fish communities.

#### PERSONNEL QUALIFICATIONS

Scott A. Hatch, Principal Investigator, is employed as a Supervisory Research Biologist in the Alaska Science Center, National Biological Survey. Dr. Hatch has conducted research on the population dynamics and feeding ecology of seabirds in Alaska since 1975. He has published more than 30 papers on those topics and has managed interagency programs for seabird research and monitoring since 1987. Curriculum vitae are filed and available on request from the Restoration Office, Exxon Valdez Oil Spill Trustee Council.

#### FY 95 BUDGET (\$K)

| Personnel            | 15.0 |
|----------------------|------|
| Travel               | 2.0  |
| Contractual services | 0.0  |
| Commodities          | 2.0  |
| Equipment            | 11.0 |
| Subtotal             | 30.0 |
| Gen. Admin.          | 2.3  |
| Total                | 32.3 |

#### LITERATURE CITED

- Hatch, S.A. 1984. Nestling diet and feeding rates of rhinoceros auklets in Alaska. Pp. 106-115 in D.N. Nettleship, G.A. Sanger, and P.F. Springer, eds. Marine birds: their feeding ecology and commercial fisheries relationships. Can. Wildl. Serv. Spec. Pub., Ottawa.
- Hatch, S.A. and G.A. Sanger. 1992. Puffins as samplers of juvenile pollock and other forage fish in the Gulf of Alaska. Mar. Ecol. Prog. Ser. 80:1-14.
- PWS Fisheries Research Planning Group. 1993. Sound ecosystem assessment: initial science plan and monitoring program. Rep. No. 1, Cordova, AK.

# Kittiwakes as Indicators of Forage Fish Availability

| Project Number:              | 95163E (formerly 95033)   | NOV 0 8 1994           |  |
|------------------------------|---|------------------------|--|
| <b>Restoration Category:</b> | Research (new)  | EXXON VALUEZ OIL SPILL |  |
| Proposed By:                 | DOI   | ADMINISTRATIVE RECORD  |  |
| Cost FY 95:                  | S198 (includes data analysis and report writing costs)                              |                        |  |
| Cost FY 96:                  | S198 (includes data analysis and report writing costs)                              |                        |  |
| Total Cost:                  | \$819,000   |                        |  |
| Duration:                    | Five years, depending on the frequency and duration of Seabird/Forage Fish project. |                        |  |
| Geographic area:             | Prince William Sound  |                        |  |
| Injured Resource/Service:    | Multiple resources  |                        |  |

d) eceive n

## **INTRODUCTION**

•••

Populations of several species of marine birds and mammals that prey on forage fish have declined in Prince William Sound (PWS) since 1972; conversely, species that feed on benthic invertebrates have not declined. Marbled murrelets, pigeon guillemots, arctic terns, black-legged kittiwakes, glaucous-winged gulls, tufted puffins and harbor seals feed on schooling forage fish and have declined by more than 50%. Harlequin ducks, goldeneyes, black oystercatchers, and sea otters feed on benthic invertebrates and have not declined throughout PWS, although some species were affected by the *Exxon Valdez* oil spill. This pattern of declines in piscivorous species and the absence of declines in species consuming benthic invertebrates suggests that marked changes in the forage fish community distribution, abundance, or composition occurred over the last 20 years.

If populations of piscivorous marine birds and mammal populations that were injured by the *Exxon Valdez* oil spill-(i.e., common murre, marbled murrelet, pigeon guillemot, and harbor seal) are currently limited by food, recovery of these populations is not likely. Therefore, an important question concerning the recovery of these injured species is, are their populations limited by food. The goal of this study is to evaluate the relative availability of forage fish for kittiwake populations in PWS, which were damaged by the oil spill and may serve as an indicator of other seabird species. This study, in collaboration with other components of the Seabird/Forage Fish project, will provide data to investigate the question; is food limiting?

The Trustee Council funded a kittiwake damage assessment study in 1990, which found that

#### Kittiwakes as Indicators

reproductive success of kittiwakes was damaged by the oil spill. Prior to and after the spill the U.S. Fish and Wildlife Service (USFWS) monitored kittiwake population size and reproductive success in PWS. The USFWS study demonstrated that reproductive success of kittiwakes in PWS has not recovered since the spill. The USFWS monitoring also suggested that food availability to kittiwakes nesting in PWS has decreased. The USFWS monitoring will continue and the proposed study would complement the monitoring effort and provide stronger data to answer the question of food as a limiting factor.

#### NEED FOR THE PROJECT.

The common murre, marbled murrelet, pigeon guillemot, and harbor seal are piscivorous injured species. A major question concerning the recovery of these injured species is; are their populations limited by food?

To answer this question, the best species to study are those that are widespread throughout PWS and for which data on foraging and breeding parameters can easily be collected. In PWS kittiwakes are well suited to address the food limitation question. There are 25 colonies spread throughout PWS, and because kittiwakes are colonial cliff-nesting birds, productivity and brood size can easily be obtained. Other breeding and feeding parameters are also inexpensive and easy to record. Also, there are ten years of population size and productivity data for kittiwakes in PWS that can be used for comparison.

Because kittiwakes prey on many of the same forage fish species as marbled murrelets, pigeon guillemots, and murres, they act as indicator species. However, because kittiwakes are surface feeders, a diving species such as pigeon guillemots should also be studied.

#### **PROJECT DESIGN**

#### A. Objectives

- 1. Determine relative food availability to kittiwakes by the following:
  - a. Monitoring reproductive parameters such as egg laying date, clutch size, hatching success, growth rates, fledging success, brood size at fledging, and overall productivity.
  - b. Monitoring diets and foraging parameters such as foraging trip length, foraging trip distance, foraging areas, chick provisioning rates, and species and size of prey consumed.

#### Kittiwakes as Indicators

c. Monitoring survival rates of adults.

#### B. Methods

Twenty-four kittiwake colonies in PWS and three colonies in the northern Gulf of Alaska will be monitored for productivity and brood size at fledging. Clutch size will be monitored at 10 to 12 colonies in PWS. Hatching success, chick growth rates, fledging success, and diets will be monitored at four to six colonies in PWS. All parameters will be measured at two or three colonies in PWS.

Methods for measuring parameters are described by Irons. All methods have been used successfully in one or more other studies on kittiwakes. Productivity will be determined for entire colonies in PWS and study plots at colonies outside PWS. Productivity is measured by counting the numbers of nests in June, the number of pre-fledging chicks in August, and calculating an average number of chicks per nest. Egg laying dates, clutch sizes, hatching success, chick growth rates, provisioning rates and fledging success will be determined for nests in study plots at colonies. Foraging trip length will be measured using radio-tagged birds and data collection computers to monitor their foraging trips. Foraging trip distance and foraging areas will be determined by locating foraging radio-tagged birds with boats and planes in conjunction with the marbled murrelet project.

#### C. Schedule

October - May 1995 June - August 1995 August - November 1995 September - November 1995 December 1995 - January 1996 31 January 1996 31 March 1996 Prepare for field season Field work Contract for diet analysis Data analysis Report Writing Draft Report Final Report

#### D. Technical Support

This project will require technical support for analysis of diet samples and GIS mapping.

# E. Location

Kittiwakes will be monitored throughout Prince William Sound at 24 kittiwake colonies in FY 95. In the future, this project will expand to include the oil spill zone of the northern Gulf of Alaska.

#### **PROJECT IMPLEMENTATION**

The USFWS will be the lead agency for this project. The USFWS has the technical expertise to conduct this study. Similar projects have been conducted by the USFWS on kittiwakes in PWS in the past. Successful methods have been established to collect and analyze data. The USFWS has trust responsibility for kittiwakes and all other seabirds as designated in the Migratory Bird Treaty Act of 1918.

#### COORDINATION OF INTEGRATED RESEARCH EFFORT

This is a subproject of the integrated Seabird/Forage Fish project (95163A-I) and will collaborate with other components to investigate whether food availability is limiting the recovery of injured species that prey on forage fish. There will be two major elements of coordination to ensure efficiency in this research program: coordination among the subprojects within the Seabird/Forage Fish project and coordination between the Seabird/Forage Fish project and other projects. Because of the links inherent in questions involving multiple trophic levels, the components of the Seabird/Forage Fish project are highly dependent upon each other. The Forage Fish Assessment component will provide data on fish distribution, abundance, and composition to the Kittiwakes as Indicators study. The Forage Fish Assessment/Bird component will provide data on foraging behavior in relation to fish distribution and abundance to the Kittiwake component. The Pigeon Guillemot and Kittiwake components will share information on the distribution of foraging birds and will compare their data to those of the Forage Fish Assessment/Bird component. Also, much data will be shared between the Seabird Energetics and the Kittiwake components.

Logistics will be coordinated to reduce cost and maximize data collection. The Pigeon Guillemot, Kittiwake, Puffin, and Seabird Energetics components will share field camps and logistical support where practical.

The Seabird/Forage Fish project will coordinate with several other projects in PWS to increase the overall efficiency of the *Exxon Valdez* Trustee Council work plan. All data collected by the Kittiwake subproject will be added to the data base management system that is maintained by the SEA program and to the oil spill office information management system. The Seabird/Forage Fish project program coordinator will ensure that coordination occurs in a timely, efficient manner.

## FY 95 Budget (\$K)

-

| Personnel            | 106.9 |
|----------------------|-------|
| Travel               | 6.0   |
| Contractual Services | 9.2   |
| Commodities          | 15.0  |
| Equipment            | 26.2  |
| Subtotal             | 163.3 |
| Gen. Admin.          | 16.7  |
| Total                | 180.0 |

त्राभत्त्र ह

;

· • •

Factors Affecting the Recovery of Pigeon Guillemot Populations in Prince William Sound

| Project | Number: |
|---------|---------|
|---------|---------|

95163F (formerly 95173)

EXXON VALUEZ OIL SPILL TRUSTEE COUNCIL

ADMINISTRATIVE RECORD

Research (continuation of 941)

DOI -

\$260,000

\$260,000

Unknown

**Restoration Category:** 

Proposed By:

Cost FY 95:

Cost FY 96:

Total Cost:

**Duration:** 

5 to 10 years

Geographic Area:

Injured Resource/Service: Pigeon Guillemot

## INTRODUCTION

The population of pigeon guillemots (*Cepphus columba*) in Prince William Sound (PWS) has decreased from about 15.000 in the 1970's (Isleib and Kessel 1973) to about 3,000 in 1993 (Sanger and Cody 1993). There is some evidence (Oakley and Kuletz 1993) suggesting that this population was in decline before the *Exxon Valdez* oil spill in March of 1989. An estimated 2,000 to 3,000 pigeon guillemots were killed throughout the spill zone immediately after the spill (Piatt et al. 1990). Based on censuses taken around the Naked Island complex (Naked, Peak, Storey, Smith, and Little Smith Islands), pre-spill counts (ca. 2,000 guillemots) were roughly twice as high as post-spill counts (ca. 1,000 guillemots; Oakley and Kuletz 1993). Also, relative declines in the numbers of guillemots were greater along oiled shorelines than along unoiled shorelines.

Prince William Sound

Adult guillemots delivered significantly fewer schooling fish, particularly sand lance (*Ammodytes hexapterus*), to their chicks after the spill (Oakley and Kuletz 1993). In 1994, sand lance accounted for about 1% of prey items fed to guillemot chicks at Jackpot Island and about 8% at Naked Island; by contrast, the sand lance component at Naked Island in 1979 was about 55% (Kuletz 1983). Gadids were much more prevalent in the diet of guillemot chicks on Naked Island in 1994 (ca. 30%) than they were in 1979-1981 (< 7%; Kuletz 1983). The apparent decline in the abundance of sand lance and change in relative proportions of other benthic and schooling fish in the diet of guillemot chicks might represent a key change in the PWS ecosystem that is affecting several species of marine birds and mammals that were injured by the spill.

Predation on eggs and chicks, not important previously (Oakley 1981), might have played a role in the lower reproductive success of guillemots after the spill (Oakley and Kuletz 1993). On Naked Island, nest predation was an important factor affecting the productivity of guillemots during the 1994 breeding season.

This study is a continuation of the Pigeon Guillemot Recovery Monitoring Project (94173), which began in 1994 and was funded by the Trustee Council. Also funded by the Trustee Council was an extensive survey of pigeon guillemot colonies in PWS (93034; Sanger and Cody 1993). Bird Study Number 9 (Oakley and Kuletz 1993), begun in 1989 immediately after the oil spill, compared various population and reproductive parameters of pigeon guillemots before (Oakley and Kuletz 1979; Kuletz 1981, 1983; Oakley 1981) and after the spill.

The goal of this study is to determine whether food, predation, toxicity from oil, or any combination of these is limiting the recovery of pigeon guillemot populations in PWS. The Forage Fish Assessment subproject (95163A) will provide information on the abundance, distribution, and species composition of forage fish in the study areas. In addition, specific information on the energy content and nutritional value of various forage fishes will be provided by the Seabird Energetics (95163G) and Forage Fish Composition (95163H) subprojects. The data gathered by the above components of the Seabird/Forage Fish project, in conjunction with our own studies of guillemot diet and foraging habits, will help us address the hypothesis that food is limiting recovery.

#### NEED FOR THE PROJECT

Considerable baseline data on pigeon guillemot populations and their foraging and reproductive ecology in PWS have been collected both before and after the oil spill. Continuation of these efforts is essential for monitoring any trends in the PWS populations and determining what factors are limiting their recovery. Food supply, predation, or oil toxicity might limit reproductive success. This project will attempt to evaluate the relative importance of each of these three factors.

Pre-spill studies of pigeon guillemots breeding at Naked Island suggest that sand lance are a preferred prey during chick-rearing (Kuletz 1983). Breeding pairs that specialized on sand lance tended to initiate nesting attempts earlier and produce chicks that grew faster and fledged at higher weights than breeding pairs that preyed mostly upon blennies and sculpins, at least in years when sand lance were readily available. Consequently, the overall productivity of the guillemot population was higher when sand lance were available. The post-spill decline in the prevalence of sand lance in the diet of guillemots breeding at Naked Island might be a key element in the failure of this species to recover from the oil spill. The schooling behavior of sand lance, coupled with their high lipid content relative to that of

gadids and nearshore bottom fish, might make this species a particularly high-quality forage resource for PWS pigeon guillemots. This is consistent with the observation that other seabird species (e.g., puffins, murres, kittiwakes) experience enhanced reproductive success when sand lance are available (Pearson 1968; Harris and Hislop 1978; Hunt et al. 1980; Vermeer 1979, 1980). This project, in conjunction with the Seabird Energetics subproject (95163G), will help assess the relative importance of sand lance and other forage fish resources for successful reproduction in PWS guillemots. There is a critical need for this information to understand the constraints that currently limit the recovery of seabirds and marine mammals damaged by the oil spill.

### **PROJECT DESIGN**

#### A. Objectives

- 1. Determine if availability of food is limiting reproductive success of guillemots by collecting the following kinds of data:
  - a. Measuring breeding parameters, including phenology, egg volume, chick growth rates, fledging weights, and reproductive success at colonies on Naked and Jackpot Islands.
  - b. Measuring foraging parameters, including diet and provisioning rates of chicks, duration of foraging trips, and location of foraging areas.
  - c. Obtaining independent data from the Forage Fish Assessment subproject (95163A) on the abundance of various forage fishes within the foraging areas used by guillemots during the chick-rearing period.
- 2. Determine if predation on eggs or chicks is limiting reproductive success by measuring relative rates of predation during the egg and chick stage in different habitats and at different colonies.
- 3. Determine if toxicity from petroleum hydrocarbon residues is limiting reproductive success by analyzing unhatched eggs and the carcasses of adults and chicks, and by analyzing blood samples from adults and chicks for biomarkers of stress associated with ingestion effective petroleum hydrocarbons (in conjunction with project 95025C).
- 4. Determine if adult survival and recruitment are limiting the recovery of the guillemot population in PWS by resighting individually color-marked birds.

### B. Methods

About 60 guillemot nests on Naked Island and 40 guillemot nests on Jackpot Island were located during the 1994 field season. Although not all of these were accessible to field personnel, they were monitored in some manner (e.g., for productivity and chick growth rates when possible, or at least provisioning rates if nests were inaccessible). These same two study sites will be used during the 1995 field season. We expect to find a few more accessible nests at Jackpot Island and several more at Naked Island during the next field season.

Reproductive success will be monitored using standard field techniques involving periodic nest checks. A portable, infrared-sensitive video camera system, specifically designed for inspecting dark burrows and holes, will be used to monitor those nests that cannot be checked by conventional means.

Morphometric data for determining growth rates will be acquired at regular intervals during the chick-rearing period. Provisioning rates and diets of chicks will be determined whenever possible throughout this period by observing them from strategically located blinds or from boats anchored offshore. Using VHF radio communications between observers in blinds and others in boats, attempts will be made to track guillemots to their foraging areas.

During the 1994 field season, we found conclusive evidence of predation on the eggs and chicks of guillemots on Naked Island. Strong evidence suggests that river otters (*Lutra canadensis*) were responsible for some of this predation. Other mustelids, such as mink (*Mustela vison*), might also be involved. There are conflicting reports as to whether mink are still present on Naked Island. Baited traps were used in 1994 in an unsuccessful attempt to document the presence of mink on the island. We will continue with this effort in 1995. Any evidence of predation will be collected or recorded. Also, time-lapse videography, or that triggered by infrared sensors, will be used in an attempt to document predation and identify predators, as well as to monitor activity budgets of chick-rearing guillemots.

An approved protocol will be used to collect unhatched eggs, which will be stored and shipped in sealed jars for hydrocarbon analysis.

Blood samples for biomarker analyses will be collected using standard protocols developed in collaboration with project 95025C (Bioindicators of Ecosystem Health: Guillemots and River Otters).

Estimates of adult survival will require the successful marking of birds (especially breeding adults, which are likely to return to the same nest each year) with unique color band combinations during the 1995 and future field seasons. In 1994, 80 birds were banded (19 adults and 61 chicks). Various methods of capturing adults (mist nets, noose mats, net traps

at the nest entrance, and by hand at the nest) were tried in 1994. Although almost all of these methods are quite labor-intensive, certain methods are more effective at particular phases of the breeding season. Thus, we should be able to band more adults next year if we plan our capture efforts accordingly. Because of the high degree of nest-site fidelity in pigeon guillemots, known breeding birds not sighted the following season will be assumed to be dead. Marked birds are also useful in determining sex, activity budgets, and reproductive histories of individual birds.

#### C. Schedule

| October - December 1994   | Data analysis              |
|---------------------------|----------------------------|
| December - January 1995   | Report writing             |
| 31 January 1995           | Draft report               |
| 31 March 1995             | Final report               |
| May - August 1995         | Field work/data collection |
| September - November 1995 | Data analysis              |
| December - January 1996   | Report writing             |
| 31 January 1996           | Draft report               |
| 31 March 1996             | Final report               |
|                           |                            |

#### D. Technical Support

Hydrocarbon analyses of unhatched eggs will be subcontracted to Texas A&M University.

#### E. Location

Most, if not all, of our work in 1995 will be concentrated on Naked Island and Jackpot Island. Naked Island is ideal for studying pigeon guillemots for the following reasons: 1) Naked and nearby islands (Peak, Storey, Smith, and Little Smith) support approximately one fourth of the guillemots in PWS; 2) there are many previously identified, accessible nest sites on the island; 3) there are excellent baseline data on the island's guillemot population that were obtained both before and after the oil spill, and finally; 4) Cabin Bay provides a suitable field camp site and an excellent anchorage for our boats. Jackpot Island was first used as a study site for pigeon guillemots in 1994. Its small size and numerous accessible nests make it an excellent study site. In 1994, a considerable effort was made to find other guillemot study sites in PWS, but these two islands are the only ones that met our criteria: large numbers of guillemots and accessible nest sites.

#### **PROJECT IMPLEMENTATION**

The U. S. Fish and Wildlife Service has the appropriate expertise to conduct the monitoring project outlined above. This agency employs several people with extensive experience in studying the breeding biology and feeding ecology of guillemots. The transport of field equipment from Whittier to Naked Island by barge and the hydrocarbon analyses will be subcontracted.

#### COORDINATION OF INTEGRATED RESEARCH EFFORT

This proposed study is a component or subproject of the larger Seabird/Forage Fish project (95163A-I). The Forage Fish Assessment subproject (95163A) will provide the Pigeon Guillemot Recovery component with data on fish distribution, abundance, and species composition, while the Forage Fish Assessment/Birds subproject (95163B) will provide pertinent data on the foraging behavior of guillemots in relation to the distribution and abundance of forage fish. At the guillemot study sites (Naked and Jackpot Islands), personnel from the Pigeon Guillemot Recovery subproject (95163F) will work closely with those of the Seabird Energetics subproject (95163G). Because of the difficulty in finding accessible nests, it is imperative that the Seabird Energetics component have access to most of the pigeon guillemot nest sites that were located and used during the 1994 field season. The Principal Investigators (D. Lindsey Hayes, 95163F; Dr. Dan Roby, 95163G) of these two components have agreed to share access to most of these nests. In addition, they are coordinating their efforts so that the kinds of data and measurements needed by each component are collected only once, and in the same manner. This might involve a division of labor (and possibly nest sites, or even study sites) between the two subprojects and subsequent sharing of the data, or perhaps having members from each field crew present during each nest check. Dr. Roby is also one of the Principal Investigators on the Bioindicators project (95025C), and in support of that project, we expect to help him obtain blood samples from guillemot adults and chicks during our routine nest checks.

The Puffins as Samplers subproject (95163D) and the Marbled Murrelet project (95031) might have field camps on Naked Island during the 1995 field season. The Seabird Energetics subproject (95163G) will be based either at Naked Island or in the vicinity of Jackpot Island. Any of these studies that are based at Naked Island will share transport costs. The Eleanor Island component of the Kittiwakes as Indicators subproject (95163G) will share costs for the delivery of their fuel caches. Also, combining field camps will make communications between various groups<sup>6</sup> and their respective offices easier and obviate the need for each group to purchase its own radio and antenna. Increased numbers of personnel at a given location can sometimes enhance the collection of data, such as opportunistic observations of rare events that might be pertinent to a particular study.

## FY 95 BUDGET (\$K)

| Personnel   | 151.0 |
|-------------|-------|
| Travel      | 11.0  |
| Contractual | 30.0  |
| Commodities | 15.0  |
| Equipment   | 28.3  |
| Subtotal    | 242.0 |
| Gen. Admin. | 24.7  |
| Total       | 260.0 |

#### LITERATURE CITED

- Harris, M.P., and J.R.G. Hislop. 1978. The food of young Puffins Fratercula arctica. J. Zool. Lond. 85:213-236.
- Hunt, G.L., and Z. Eppley, B. Burgeson, and R. Squibb. 1981. Reproductive ecology, food and foraging areas of seabirds nesting on the Pribilof Islands, 1975-1979. OCS Final report, Biological Studies, NOAA Environ. Res. Lab, Boulder, Colo.
- Isleib, M.E.P., and B. Kessel. 1973. Birds of the north Gulf Coast Prince William Sound region, Alaska. Biol. Pap. Univ. of Alaska 14:1-149.
- Kuletz, K.J. 1981. Feeding Ecology of the Pigeon Guillemot (*Cepphus columba*) at Naked Island, Prince William Sound, Alaska and surveys of the Naked Island complex. U.S. Fish and Wildlife Service. Special Studies, Anchorage, Alaska. 23 pp.
- Kuletz, K.J. 1983. Mechanisms and consequences of foraging behavior in a population of breeding Pigeon Guillemots. Unpublished M.S. Thesis. Univ. of California, Irvine. 79 pp.
- Oakley, K.L. 1981. Determinants of population size of Pigeon Guillemots Cepphus columba at Naked Island, Prince William Sound, Alaska. Unpublished M.S. Thesis. Univ. of Alaska, Fairbanks. 65 pp.
- Oakley, K.L., and K.J. Kuletz. 1979. Summer distribution and abundance of marine birds and mammals near Naked Island, Alaska. U.S. Fish and Wildlife Service, Special Studies, Anchorage, Alaska. 95 pp. + appendices.
- Oakley, K.L., and K.J. Kuletz. 1993. Population, Reproduction and Foraging ecology of Pigeon Guillemots at Naked Island, Prince William Sound, Alaska, Before and After

the Exxon Valdez Oil Spill. Bird Study Number 9. 65 pp.

- Pearson, T.H. 1968. The feeding biology of sea-bird species breeding on the Farne Islands, Northumberland. J. Anim. Ecol. 37:521-552.
- Piatt, J.F., C.J. Lensink, W. Butler, M. Kendziorek, and D.R. Nysewander. 1990. Immediate impact of the 'Exxon Valdez' oil spill on marine birds. Auk 107:387-397.
- Sanger, G.A., and M.B. Cody. 1993. Survey of Pigeon Guillemot Colonies in Prince William Sound, Alaska. U.S. Fish and Wildlife Service. Final Report. 58 pp.
- Vermeer, K. 1979. A provisional explanation of the reproductive failure of Tufted Puffins Lunda cirrhata on Triangle Island, British Columbia. Ibis 121:348-354.
- Vermeer, K. 1980. The importance of timing and type of prey to reproductive success of Rhinoceros Auklets (*Cerorhincha monocerata*). Ibis 122:343-354.

# Diet Composition, Reproductive Energetics, and Productivity of Seabirds Damaged by the *Exxon Valdez* Oil Spill

| Project Number:              | 95163G (formerly 95118-BAA)   | )  |  |
|------------------------------|---|--|--|
| <b>Restoration Category:</b> | Research (new)  |  |  |
| Proposed By:                 | University of Alaska Fairbanks  | niversity of Alaska Fairbanks                                      |  |
| Lead Trustee Agency:         | NOAA  |  |  |
| Cost FY 95:                  | \$140,600   | NOV 0 8 1994   |  |
| Cost FY 96:                  | \$144,100   | EXXON VALDEZ OIL SPILL<br>TRUSTEE COUNCIL<br>Administrative Record |  |
| Total Cost:                  | Unknown   |  |  |
| Duration:                    | 5 years (useful results can be obtained in 3 years, but to be effective the project should be supported a minimum of 4 years) |  |  |
| Geographic Area:             | Prince William Sound (Naked Island, Shoup Bay, Eleanor<br>Island, Jackpot Island, Icy Bay)                                    |  |  |
| Injured Resource/Service:    | Multiple resources  |  |  |

## INTRODUCTION

1 25

Three seabird species that were damaged by the *Exxon Valdez* oil spill (EVOS) are failing to recover at an acceptable rate: pigeon guillemot (*Cepphus columba*), common murre (*Uria aalge*), and marbled murrelet (*Brachyramphus marmoratus*). Damage from the spill to a fourth species of seabird, black-legged kittiwake, is equivocal, but recent reproductive failures of kittiwakes within the spill area may be due to longer term ecosystem perturbation related to the spill (D. Irons, pers. comm.). The status of pigeon guillemots and marbled murrelets in Prince William Sound (PWS) and the Northern Gulf of Alaska has been of concern for nearly a decade due to declines in numbers of adults observed on survey routes (Laing and Klosiewski 1993).

The failure of these seabirds to recover has been attributed to low reproductive success, but there is a troubling lack of information on the factors ultimately responsible for low productivity. One prevalent hypothesis is that changes in the abundance and species composition of forage fish resources within the spill area has resulted in food provisioning rates that are below the requirements of growing nestlings. Concurrent population declines in some marine mammals, particularly harbor seals, have also been blamed on food limitations.

#### Seabird Energetics

Whether these changes in forage fish availability are related to or have been exacerbated by EVOS is unknown.

Reproductive success in seabirds is largely dependent on foraging constraints experienced by breeding adults. Previous studies on the reproductive energetics of seabirds have indicated that productivity is energy-limited, particularly during brood-rearing (Roby 1991a). Also, the young of most seabird species accumulate substantial fat stores prior to fledging, an energy reserve that is crucial for post-fledging survival. Data on foraging habitats, prey availability, and diet composition are critical for understanding the effects of changes in the distribution and abundance of forage fish resources on the productivity and dynamics of seabird populations.

The composition of forage fish is particularly relevant to reproductive success because it is the primary determinant of the energy density of chick diets. Parent seabirds that transport chick meals in their stomachs (e.g., kittiwakes) or in a specialized pouch (e.g., auklets) normally transport meals that are close to the maximum load. Seabirds that transport chick meals as single prey items held in the bill (e.g., guillemots, murres, murrelets) experience additional constraints on meal size if optimal-sized prey are not readily available. Consequently, seabird parents that provision their young with fish high in lipids are able to support faster growing chicks that fledge earlier and with larger fat reserves. This is because the energy density of lipid is approximately twice that of protein and carbohydrate. Also, most of the nonlipid dry matter in fish consists of protein, and metabolism of protein as an energy source requires the energetically expensive process of excreting the resultant nitrogenous waste. While breeding adults can afford to consume prey that are low quality (i.e., low in lipid) but abundant, reproductive success is largely dependent on provisioning young with high quality food items. If prey of adequate quality to support normal nestling growth and development are not available, nestlings either starve in the nest or prolong the nestling period and fledge with low fat reserves.

Forage fish vary considerably in lipid content, lipid:protein ratio, energy density, and nutritional quality. Much of the energy content of prey consumed by seabirds is in the form of neutral lipids, especially triglycerides and wax esters, and wax esters in particular are known to be difficult to digest (Nevenzel 1970; Lee et al. 1972; Benson et al. 1972; Sargent 1976; Clarke 1984, In press). In some seabird prey, such as lanternfishes (Myctophidae), lipids may constitute as much as 50% of dry mass (A. R. Place, unpubl. data); while in other prey, such as juvenile walleye pollock (*Theragra chalcogramma*), lipids are less than 5% of dry mass (J. Wejak, unpubl. data). This means that a given mass of lanternfish has more than twice the energy content of the same mass of juvenile pollock. Published values for lipid content (% dry mass) of other forage fish are intermediate between those of lanternfish and juvenile pollock: herring (Clupeidae)- 36.7%, sand lance (Ammodytidae) - 24.4%, smelt (Osmeridae) - 15.8%, capelin (*Mallotus villosus*) - 15.3% (Montevecchi et al. 1984, Barrett et al. 1987, Massias and Becker 1990). These studies have shown that for a particular species

#### Seabird Energetics

of forage fish, lipid content can vary widely with season, sex, reproductive status, and age class. For example, sand lance can vary from 10% lipid (% dry mass) to 31.5% lipid (Hislop et al. 1991) and gravid female capelin have nearly twice the energy density of male capelin (Montevecchi and Piatt 1984). By increasing the proportion of high-lipid fish in chick diets, parents can increase the energy density of chick meals in order to compensate for the low frequency of chick feeding (Ricklefs 1984a, Ricklefs et al. 1985).

#### **NEED FOR THE PROJECT**

This study is relevant to the Seabird/Forage Fish project (95163A-I) and EVOS Restoration Work because it is designed to develop a better understanding of how shifts in the diet of seabirds breeding in PWS affect reproductive success. Unlike marine mammals, seabirds offer the possibility of directly measuring diet composition and feeding rates, and their relation to productivity. By monitoring the composition and provisioning rates of seabird nestling diets, prey preferences can be assessed. Measuring provisioning rates is crucial because even very poor quality prey may constitute an acceptable diet if it can be supplied at a high rate. Understanding the diet composition, foraging niche, and energetic constraints on seabirds breeding within the spill area will be crucial for designing management initiatives to enhance productivity in species that are failing to recover from EVOS. If forage fish that are high in lipids are an essential resource for successful reproduction, then efforts can be focused on assessing stocks of preferred forage fish and the factors that impinge on the availability of these resources within foraging distance of breeding colonies in PWS. As long as the significance of diet composition is not understood, it will be difficult to interpret shifts in the utilization of forage fishes and develop a management plan for effective recovery of damaged species.

There is a definite need for information on the relationship between diet and reproductive success for pigeon guillemots, common murres, and marbled murrelets, all seabird species that are failing to recover from EVOS at an acceptable rate. However, the latter two species pose serious problems for studies of diet composition in the spill area. For common murres it is difficult to collect quantitative data on diet composition, feeding rate, meal size, and chick growth rates without seriously impacting productivity because this species nests in dense colonies on narrow ledges where human activity can cause high losses of eggs and chicks. Also, murre chicks leave the nest site to go to sea at only c. 21 days post-hatch, when they are only 20% of adult mass. In addition, the murre colonies most damaged by the spill and slowest to recover are tocated in the Barren Islands, where few nesting ledges are accessible. Marbled murrelet nests are usually located high in mature conifers and are very difficult to locate. Most nest visits by parents provisioning young occur at night, so monitoring chick diets is highly problematic. While some limited information on chick diets may be obtained as part of on-going EVOS studies of common murres in the Barren Islands (project 95039, "Common Murre Productivity Monitoring") and marbled murrelets breeding on Naked Island

#### Seabird Energetics

(project 95031, "Reproductive Success as a Factor Affecting Recovery of Murrelets in PWS"), neither of these species are feasible study subjects for assessing the role of diet composition for seabird reproductive success in the spill area. Consequently, the Principal Investigators (PIs) in the Seabird/Forage Fish project have agreed to focus their efforts on pigeon guillemots and black-legged kittiwakes nesting in PWS.

Guillemots are the most neritic members of the seabird family Alcidae (i.e., murres, puffins, and auks), and like the other members of the family, capture prey during pursuit-dives. Pigeon guillemots are a well-suited species for monitoring forage fish availability for several reasons: (1) they are a common and widespread seabird species breeding in PWS (Sowls et al. 1978); (2) they primarily forage within 5 km of the nest site (Drent 1965); (3) unlike most seabird species, they do not breed in large, dense colonies; (4) they raise their young almost entirely on fish; (5) they prey on a wide variety of fishes, including schooling forage fish (e.g., sand lance, herring, smelt) and subtidal/nearshore bottom fish (blennies, sculpins; Drent 1965, Kuletz 1983); (6) the one- or two-chick broods are fed in the nest until the young reach adult body size. In addition, there is some evidence that many guillemot pairs breeding at Naked Island before the spill specialized on schooling forage fish, particularly sand lance, during the chick-rearing period. Reproductive success of these pairs was lower when sand lance was less available (Kuletz 1983). Guillemots carry whole fish in their bills to the nest-site to feed their young. Thus individual prey items can be identified, weighed, measured, and collected for composition analyses.

Black-legged kittiwakes also breed abundantly in the spill area and rely largely on forage fish during reproduction. Unlike guillemots, kittiwakes are efficient fliers, forage at considerable distances from the nest, and capture prey at or near the surface. Although kittiwakes are highly colonial, cliff-nesting seabirds, they construct nests and can be readily studied at the breeding colony without causing substantial egg loss and chick mortality. Several breeding colonies of black-legged kittiwakes in PWS are easily accessible so that chicks can be weighed regularly without resorting to technical climbing (D. Irons, pers. comm.). Diets fed to kittiwake chicks in PWS consist primarily of schooling forage fish (i.e., sand lance, herring, juvenile walleye pollock), but when forage fish are scarce, euphausiids may be substituted. Like guillemots, kittiwakes can raise one- or two-chick broods, and chicks remain in the nest until nearly adult size. Together with pigeon guillemots, black-legged kittiwakes are excellent bioindicators of the distribution and abundance of preferred forage fish in PWS.

The proposed research is the first focused study to investigate the effects of diet composition on reproductive energetics and productivity of piscivorous seabirds in PWS. The research will result in a fundamental advance in our understanding of the significance of prey composition for pigeon guillemot and black-legged kittiwake reproduction, as well as for other seabirds and marine mammals that breed in PWS. The research will also provide new information relevant to several additional areas of study: (1) comparative biochemical
composition and physiological condition of forage fishes, (2) factors such as age class, sex, size, and reproductive status as they influence the nutritional quality of forage fishes, (3) responses of breeding seabirds to shifts in prey availability, and (4) the energetic consequences of foraging on different prey with differing energy content. This research will be the first to (1) measure the nutritional quality of various forage fishes used by breeding seabirds in PWS, (2) use data on diet composition and provisioning rates to construct energetics models of chick growth and survival, and (3) monitor fat deposition rates of individual seabird chicks on differing dietary regimes by repeated, noninvasive analysis. In addition, the results will have broader implications for our understanding of dietary constraints on reproductive success in other piscivorous seabirds damaged by the spill (common murre, marbled murrelet) and will enhance our understanding of the adaptive significance of prey preferences in these seabirds. These results are crucial for understanding the factors constraining recovery of seabirds and marine mammals damaged by the spill.

## **PROJECT DESIGN**

## A. Objectives

The overall objective of the proposed research is to determine the energy content and nutritional value of various forage fishes used by seabirds breeding in the EVOS area, and to relate differences in prey quality and availability to reproductive success and physiological condition of breeding adults. The proposed research will emphasize pigeon guillemots and black-legged kittiwakes for practical reasons, but prey composition and quality will be evaluated for common murres, marbled murrelets, and tufted puffins as data and samples permit. Specific objectives are enumerated below:

- 1. To determine the nutritional quality of various forage fish species consumed by seabirds in the EVOS area as a function of size, sex, age class, and reproductive status, including:
  - a. lipid content
  - b. water content
  - c. ash-free lean dry matter (protein) content
  - d. energy density (kJ/g fresh mass)
  - e. lipid composition (triglyceride, wax ester, mono- and diglyceride, free fatty acid, phospholipid)
- 2. To determine dietary parameters of pigeon guillemot and black-legged kittiwake chicks in PWS, including:
  - a. provisioning rate (meal size X delivery rate)
  - b. taxonomic composition of the diet
  - c. biochemical composition of the diet

- d. energy density of the diet
- 3. To determine the relationship between diet and the growth, development, and survival of seabird nestlings. Variables measured will include:
  - a. growth rates of total body mass, lean body mass, and total body fat
  - b. rates and patterns of flight feather development
  - c. fledgling body mass and fat reserves
  - d. fledging age
- 4. To determine the contribution of specific forage fish resources to the overall productivity of seabird breeding pairs, including:
  - a. body composition (physiological condition) of parents raising chicks
  - a. gross foraging efficiency of parents
  - b. conversion efficiency of food to biomass in chicks
  - c. net production efficiency of the parent/offspring unit

### **B.** Methods

The proposed research approach utilizes a combination of sample/data collection in the field (in conjunction with other Seabird/Forage Fish subprojects in PWS) and laboratory analyses. Sample collection and field data collection will be conducted concurrently during the 1995-1998 breeding seasons at two guillemot and two kittiwake colonies in PWS. A minimum of 50 active and accessible nests of each species will be located and marked prior to hatching at each of the study colonies during the four breeding seasons. These nests will be closely-monitored until the young fledge or the nesting attempt fails.

Fresh samples of forage fishes used by guillemots will be collected for proximate analysis using three techniques: (1) temporarily placing "neckties" on guillemot chicks to prevent them from swallowing prey delivered by parents and retrieving samples from chicks, (2) temporarily placing obstructions in the entrance of guillemot nest crevices immediately after arrival of an adult with a chick meal and retrieving samples from adults, and (3) capturing adults carrying forage fish in noose traps as they approach the nest and retrieving samples from adults. Supplemental samples of guillemot forage fishes will be collected using minnow traps deployed in guillemot foraging areas and netting specimens at low tide. Kittiwakes transport chick meals in the stomach and esophagus, so chick diet samples will consist of semi-digested food. Kittiwake meal samples are normally collected when chicks regurgitate during routine weighing and measuring. Fresh specimens of forage fishes used by kittiwakes will be provided from at-sea trawls conducted as part of the Seabird/Forage Fish subproject 95163A, "Abundance and Distribution of Forage Fish and their Influence on Recovery of Injured Species." Fresh fish samples and kittiwake regurgitations will be weighed  $(\pm 0.1 \text{ g})$ in the field and immediately frozen in small, propane-powered freezers that will be maintained at each of the four study sites. Samples will be shipped frozen to my laboratory

at the University of Alaska Fairbanks, where they will be kept in an ultra-low freezer at -70°C until proximate analysis. In the lab, forage fish specimens will be reweighed ( $\pm$  0.1 mg), identified to species, aged, sexed, measured, and reproductive status (gravid, recently spawned, nonreproductive) determined. Kittiwake regurgitations will be sorted into prey classes to the extent feasible, but otherwise handled as with fresh prey samples. Forage fish specimens will be dried to constant mass in a convection oven at 60°C to determine water content. Lipid content of a subsample of dried forage fish will be determined by solvent extraction using a soxhlet apparatus and petroleum ether as the solvent system. Lean dry fish samples will then be ashed in a muffle furnace at 550°C in order to calculate ash-free lean dry mass by subtraction. A subsample of dried forage fish samples will be combusted in a bomb calorimeter to determine energy density. Energy content of chick diets will be calculated from both the energy densities determined by bomb calorimetry and the composition (water, lipid, lipid-free dry matter, and ash) of forage fish along with published energy equivalents of these fractions (Roby 1991).

The lipid composition of forage fish (percentage wax esters, triglycerides, mono- and diglycerides, free fatty acids, and phospholipids of total lipids) will be determined by extracting total lipids from a subsample of fresh-frozen forage fish using the Bligh and Dyer (1959) technique. Extracted lipids will then be separated into the various lipid classes and quantitated using TLC/FID analysis procedures on a Mark IV latroscan. This procedure will allow us to determine the percentage of total lipids in forage fish that are in the form of wax esters and other refractory (hard to digest) lipid classes (Roby et al. 1986). My laboratory is equipped with all the instrumentation required for proximate analysis of samples, including a Soxtee HT-12 soxhlet apparatus; an latroscan TLC/FID system; and a Parr automated adiabatic bomb calorimeter.

Chick provisioning rates for pigeon guillemots and black-legged kittiwakes in PWS will be determined by monitoring active nests to determine meal delivery rates throughout the 24 h period. Average meal size, taxonomic and biochemical composition of the diet, and average energy density of chick meals will be determined as part of analyses of diet samples collected from guillemot and kittiwake chicks.

Known-age chicks will be weighed and measured regularly to determine individual growth rates throughout the nestling period. Total body fat of chicks at 20 and 30 days post-hatch will be determined by noninvasive (nondestructive) measurement of total body electrical conductivity (Walsberg 1988, Roby 1991). Fat reserves of chicks will be measured in the field using total body electrical conductivity (TOBEC) fat analyzers (SA-3000 Small Animal Body Composition Analyzer from EM-SCAN, Inc., Springfield, IL) that I currently have in my lab. The TOBEC method relies on the major difference in conductivity between lipids and other body constituents to estimate total lean body mass (Pethig 1979; Van Loan and Mayclin 1987). The difference between total body mass, as determined by weighing, and lean body mass, estimated by TOBEC, provides an estimate of total body fat. A major

advantage of the technique is that measurements can be obtained rapidly and repeatedly without harm to the subject. Also, validation studies to date indicate that accuracy is high ( $r^2$  = .996) (Bracco et al. 1983, Walsberg 1988, Roby 1991b). The SA-3000 TOBEC analyzer can be used in the field and powered from a 12 volt battery, so chicks can be measured for TOBEC and returned to their nest in a matter of minutes. Body mass, primary feather development, and total body fat measurements will be used to develop a condition index for each chick at 20 and 30 days post-hatch.

The effects of diet composition on the physiological condition of breeding adults will be monitored using a combination of direct and indirect methods. Attentiveness of adults will be monitored during the incubation period. Adults will be captured on the nest early in the chick-rearing period and body composition determined nondestructively by TOBEC analysis. Frequency of chick meal delivery and meal size will be determined during the chick-rearing period as part of diet composition studies.

Data on chick age-specific body mass, wing chord, and primary feather length will be separated by year and colony for each species, and fit to Gompertz sigmoidal growth models. Growth constants (K), inflection points (I), and asymptotes (A) of fitted curves will be statistically analyzed for significant differences among years and colonies. Lipid deposition rates from TOBEC analysis will be compared using slopes of least squares linear regression models. Gross foraging efficiency of adults will be calculated from daily energy expenditure by the following equation:

#### $([M \cdot F \cdot D] + DEE) / DEE = GFE,$

where M is average chick meal mass in grams, F is average frequency of meal delivery in meals day<sup>-1</sup> parent<sup>-1</sup>, D is energy density of chick meals in kJ/gram, DEE is adult daily energy expenditure in kJ/day, and GFE is adult gross foraging efficiency in kJ consumed/kJ expended. Daily energy expenditures of pigeon guillemots, black-legged kittiwakes, and common murres have been measured previously using the doubly-labeled water technique and are available in the published literature (Birt-Friesen et al. 1990). Net production efficiency of chicks as a function of age will be calculated by regressing the change in body mass over a 24 hour period against the mass of food consumed during the period, as determined by periodic weighing. Comparison of food conversion efficiency of chicks will provide an estimate of the relative energetic efficiency of diets composed of various forage fishes. The net production efficiency of the parent/offspring unit will be calculated for each diet and each year for both species using the equation:

 $CFCE / ([DEE \cdot 2] + [M \cdot F \cdot D]) = TNPE,$ 

where CFCE is chick food conversion efficiency in grams of body mass gained per gram food ingested, TNPE is the total net production efficiency of the parent/offspring unit in grams gained by chicks per kJ of energy expended by both parents, and other variables are as described above.

8

## C. Schedule

Field work in PWS will be conducted during the 1995, 1996, 1997, and 1998 breeding seasons. Data collection during four field seasons will be necessary in order to provide minimal information on interannual variation in diet composition and reproductive success. Guillemots and kittiwakes normally lay eggs from late May to late June and raise their young during July and August. Field crews will be set up at each of the four colonies in mid-May. Active, accessible nests of the two study species will be located and marked during late May and June, prior to hatching. Marked nests will be checked daily during the hatching period to determine hatching date, and, in the case of two-chick broods, chicks will be banded soon after hatching so that individual growth rates can be monitored throughout the nestling period. Samples of chick meals and measurements of chick feeding rates will be collected throughout the nestling period. Chicks will be monitored throughout the nestling period in order to determine growth rates, fledgling mass, fledging age, and survival until fledging.

Following the field season, chick meals will be analyzed in the lab in order to determine the taxonomic and biochemical composition of guillemot and kittiwake diets and their relationship to chick growth and survival. These analyses will be completed before the next field season in order to determine the results prior to collecting additional samples from the field. A draft annual report for this subproject will be prepared in February and a final report will be submitted in March for incorporation into a synthesis Annual Report for the Seabird/Forage Fish project in June.

Following the analysis of samples collected during the 1998 field season, data collected during the three field seasons will be analyzed for relationships between diet composition and reproductive success by May 1999. The results of these analyses of diet composition and its relation to productivity and chick growth will be prepared in manuscript form and submitted by the end of FY 1999.

## D. Technical Support

Laboratory analyses of the biochemical composition and energy content of forage fishes will be conducted in the laboratory of the PI. No analyses will be subcontracted to other laboratories. No new laboratory equipment will need to be purchased for the proposed research with funds provided by the grant. A laboratory technician will be hired to help the PI and graduate research assistant with processing chick meals and diet samples, and with performing of routine laboratory analyses.

## E. Location

The proposed field work will be conducted in PWS during FY 1995, with possible expansion to adjacent parts of the oil spill area in subsequent field seasons. PWS supports accessible

breeding populations of guillemots and kittiwakes that are more than adequate for the proposed research. Field work on guillemots will be conducted at breeding colonies on Naked Island and Jackpot Island. Naked Island is surrounded by a broad shallow shelf, whereas Jackpot Island is in deep water. Consequently, the foraging habitats available within foraging distance of the two colonies are markedly different.

Approximately 500 pigeon guillemots nest along the shores of Naked Isla nd (Sanger and Cody 1993), as well as smaller numbers of marbled murrelets and tufted puffins. The Naked Island base camp would offer an ideal base for field studies on guillemots (D. Irons, pers. comm.), and Naked Island supports the highest breeding densities of guillemots in PWS (Sanger and Cody 1993). In addition, Naked Island has been the site of long term studies since the early 1980s by the U.S. Fish and Wildlife Service (USFWS) on factors affecting reproductive success of pigeon guillemots in PWS (Kuletz 1983). Jackpot Island supports about 50 breeding pairs of guillemots that are nesting at extremely high densities and in unusually accessible nests (G. Sanger, D. L. Hayes, pers. comm.). Additional guillemot nests will be located and monitored adjacent to Jackpot Island in Icy Bay. Both Naked Island and Jackpot Island were the site of intensive studies of guillemot nesting success during the 1994 field season and have been selected for continued studies (BPD 95163F) as part of the Seabirds/Forage Fish project (D. L. Hayes, pers. comm.).

Field work on kittiwakes in PWS will be conducted at two breeding colonies, one at Shoup Bay (off Valdez Arm) which supports approximately 400 breeding pairs of black-legged kittiwakes and another at Eleanor Island (adjacent to Naked Island) which supports about 550 breeding pairs. The Shoup Bay colony is the site of continuing long-term studies of kittiwake nesting ecology in PWS by the USFWS and Eleanor Island has been selected as a site for intensive study for comparison purposes (D. Irons, pers. comm.). Both colonies include large numbers of readily accessible nests.

The at-sea foraging distribution of pigeon guillemots near Naked Island and Jackpot Island has been the subject of previous study (Sanger and Cody 1993), as has the species composition of the diet (Kuletz 1983). Kittiwake foraging distribution and reproductive success has been monitored at the Shoup Bay colony for several years (D. Irons, pers. comm.). In addition, subproject 95163B will provide data on the distribution of foraging kittiwakes and guillemots in the vicinity of the four study colonies during the chick-rearing period. A field camp operated by the USFWS is available for field workers on Naked Island and at Shoup Bay and is within walking distance or short boat ride of colonies where adequate numbers of accessible guillemot and kittiwake nests are available.

## **PROJECT IMPLEMENTATION**

The proposed research will be implemented by the University of Alaska Fairbanks, closely

;

coordinated with and in cooperation with USFWS biologists with expertise on the proposed study species in the proposed study area. The PI (Daniel D. Roby) has extensive experience with studies of the reproductive energetics of high latitude seabirds and the relationship between diet composition and productivity. The PI currently has in his laboratory the analytical equipment necessary to accomplish the proposed laboratory analyses and is familiar with the relevant analytical procedures. To the PI's knowledge, the expertise and equipment necessary for the proposed research are not available within the federal and state agencies that compose the Trustees Council. The PI will be assisted by a Graduate Research Assistant (Ph.D. candidate), Field Technician, and undergraduate field assistant who will be carefully selected from the applicant pool as qualified to participate in the proposed research.

## **COORDINATION OF INTEGRATED RESEARCH EFFORT**

The research described in this proposal is a subproject within the Seabird/Forage Fish project (95163A-I) and dove-tails nicely with new and continuing research to assess factors limiting recovery of seabird populations damaged by EVOS. It is also relevant to efforts toward developing seabird models as upper trophic level sentinels of changes in the availability of forage fish, such as sand lance, juvenile pollock, herring, capelin, and smelt. The proposed research approach utilizes prey composition, reproduction rates, and energetics models to help identify and quantify the present level of forage fish availability within the PWS ecosystem. This approach is necessary because evaluation of the stocks of various forage fishes is extremely complex due to temporal and spatial variability and unpredictability in the distribution of forage fish in PWS.

Studies of foraging, reproduction, and population recovery following the EVOS are on-going for pigeon guillemots, common murres, and marbled murrelets. Black-legged kittiwakes are currently being used as indicators of ecosystem function and health within PWS. This proposal complements and enhances other proposed studies on pigeon guillemots and blacklegged kittiwakes without duplication of effort. The PI on the present proposal has been and will continue to work closely with Dr. David Irons (PI on subproject 95163E [formerly 95033] "Kittiwakes as Indicators of Forage Fish Availability) and D. Lindsey Hayes (PI on subproject 95163F [formerly 95173] "Factors Affecting Recovery of PWS Pigeon Guillemot Populations") in developing protocols for collecting field data on kittiwakes and guillemots so as to minimize project cost and maximize data acquisition. Dr. Irons and Mr. Hayes are both with the Migratory Bird Branch, USFWS. Dr. Irons has had extensive experience working in the field with both guillemots and kittiwakes nesting in PWS, and is project leader for ongoing studies of the reproductive success and status of these two species in PWS. Mr. Hayes was in charge of the field crew working on pigeon guillemots at Naked Island during the 1994 breeding season and has extensive field experience with nesting guillemots. Close coordination with Dr. Irons' and Mr. Hayes' research teams will be essential for the success of the proposed research.

Subprojects 95163E, 95163F, and the present subproject (95163G) all require information on chick feeding rates, chick meal size, and taxonomic composition of chick diets in order to meet their objectives. Collecting these data is extremely labor intensive and the cooperation of these three subprojects in collecting these data will greatly enhance sample sizes. The three subprojects also require data on chick growth rates (body mass and flight feather development), nestling survival, body composition and mass of fledglings, and fledging age. Again, cooperation and coordination between these three subprojects will greatly enhance sample sizes and the power of statistical tests and inferences. The field crews for the three subprojects will work together to insure that data collection methods and procedures are consistent. In addition, the PIs for subprojects 95163E (D. Irons) and 95163F (D. L. Hayes) have agreed to assist this subproject in collecting food items for analysis of biochemical composition of the diet and in collecting data on the body composition of adults and chicks.

Additional cooperators include Dr. Scott Hatch (PI for subproject 95163D [formerly 95019] "Distribution and Abundance of Forage Fish as Indicated by Puffin Diet Sampling"). Dr. Hatch's subproject will collect forage fish from breeding tufted puffins on Naked Island and nearby Smith Island. Considerable overlap between diets of tufted puffins, black-legged kittiwakes, and pigeon guillemots is expected, so forage fish samples collected as part of subproject 95163D will be extremely useful for determining the biochemical composition and energy density of guillemot and kittiwake diets. Kathy Kuletz (PI for project 95031, "Reproductive Success as a Factor Affecting Recovery of Murrelets in PWS") will be working on Naked Island and may collect data on diet composition of breeding marbled murrelets in the course of her studies. These data will be extremely useful for comparison with diet composition of guillemots and kittiwakes.

Subproject 95163H "Proximate Composition and Energetic Content of Selected Forage Fish Species in PWS" (PI Dr. Graham Worthy) will assess the quality of various forage fish that are major prey for seabirds and marine mammals." Dr. Worthy's study will use fish specimens collected during shipboard surveys throughout the year to provide background data for the entire Seabird/Forage Fish project, including this subproject. Comparison between the proximate composition of forage fishes collected at sea and those fed to seabird nestlings will provide a valuable means of assessing the role of prey selection for enhancing the quality of seabird diets. Sample treatment and proximate analysis procedures will be consistent between subprojects 95163G and 95163H so that the results are comparable. These two projects will be coordinated so as not to duplicate efforts to obtain data on the proximate composition of forage fish used by guillemots and kittiwakes during the breeding season.

In order to understand dietary factors responsible for poor reproductive performance of seabirds in PWS, it is essential to conduct simultaneous shipboard work (hydroacoustic surveys in conjunction with net sampling) to assess the distribution, abundance, and species composition of forage fish in seabird foraging areas. That research was recently funded by the Trustees Council (project 94163) and the continuation of this project (subproject 95163A)

1.

will be invaluable for interpretation of data on diets collected as part of the present proposal. In addition, the integrated studies that comprise the SEA Program (95320A-Y) will provide an important foundation for understanding ecosystem function in PWS as it relates to Seabird/Forage Fish interactions.

# FY 95 BUDGET (\$K)

| Personnel      | 45.7  |
|----------------|-------|
| Travel         | 4.7   |
| Contractual    | 24.6  |
| Commodities    | 17.8  |
| Equipment      | 0.0   |
| Indirect Costs | 39.2  |
| Subtotal       | 132.0 |
| Gen. Admin.    | 8.6   |
| Total          | 140.6 |

ě

, <u>,</u> , . . .

10.00

## LITERATURE CITED

- Asbirk, S. 1979. The adaptive significance of the reproductive pattern in the black guillemot, *Cepphus grylie.* Vidensk. Meddr. dansk naturh. Foren. 141:29-80. Ashmole, N. P. 1971. Seabird ecology and the marine environment. Pp. 223-286 in D. S.
- Ashmole, N. P. 1971. Seabird ecology and the marine environment. Pp. 223-286 in D. S. Farner and J. R. King (eds.), Avian Biology, Vol. 1. Academic Press, New York.
- Barrett, R. T., T. Anker-Nilssen, F. Rikardsen, K. Valde, N. Rov, and W. Vader. 1987. The tood, growth and fledging success of Norwegian puffin chicks *Fratercula arctice* in 1980-1983. Ornis Scand. 18: 73-83.

Benson, A. A., R. F. Lee, and J. C. Nevenzel. 1972. Wax esters: major marine metabolic energy sources. Pp. 175-187 in I. Ganguly and R. M. S. Smellie (eds.), Current Trends in the Biochemistry of Lipids. Biochem. Soc. Symp. No. 35. Academic Press, New York.

Bligh, E. G., and W. J. Dyer. 1959. A rapid method of total lipid extraction and purification. Can. J. Biochem. Physiol. 37: 911-917.

Bracco, E.F., M. Yang, K. Segal, S.A. Hasim, and T. B. Van Itallie. 1983. A new method for determining body composition in the live rat. Proc. Soc. Exp. Bio. Med. 174: 143-146.

Clarke, A. 1980. The biochemical composition of krill, <u>Euphausia superba</u> Dana, from South Georgia. J. exp. mar. Biol. Ecol. 43: 221-238.

Clarke, A. 1984. The lipid content and composition of some Antarctic macrozooplankton. Br. Antarct. Surv. Bull. No. 63: 57-70.

Clarke, A. in press. Seabirds. in R. G. Ackman (ed.), Marine Biogenic Lipids. Chemical Rubber Co.

Dragoo, D. E. 1991. Food habits and productivity of kittiwakes and murres at St. George Island, Alaska. Unpubl. M.S. thesis, University of Alaska, Fairbanks. 104 pp.

Drent, R. H. 1965. Breeding biology of the pigeon guillemot, Cepphus columba. Ardea 53:99-159.

Ellis, H. I. 1984. Energetics of free-ranging seabirds. Pp. 203-234 in G. C. Whittow and H. Rahn (eds.), Seabird Energetics. Plenum Press, New York.

Flint, E. N., G. L. Hunt, Jr., and M. A. Rubega. 1990. Time allocation and field metabolic rate in two sympatric kittiwake species. Acta XX Congressus Internationalis Omithologici, Supplement, pp. 426-427. (Abstract).

Hall, K. J. 1983. Physiology of the digestive tract. Pp. 31-49 in B. M. Freeman (ed.), Physiology and Biochemistry of the Domestic Fowl, Vol. 4. Academic Press, London.

Harrison, G. G. 1987. The measurement of total body electrical conductivity. Human Biol. 59: 311-317.

Harrison, G. G., and T. B. Van Italije. 1982. Estimation of body composition: a new approach based on electromagnetic principles. Am. J. Clin. Nutri. 35: 1176-1179.

Hatch, S. A., G. V. Byrd, D. B. Irons, and G. L. Hunt, Jr. In press. Status and ecology of kittiwakes (*Rissa tridactyla* and *R. brevirostris*) in the North Pacific. In The status, ecology and conservation of marine birds of the North Pacific, K. Vermeer, K. T. Briggs, K. H. Morgan, and D. Siegel-Causey (eds.). Can. Wildl. Serv. Spec. Pub., Ottawa.

Hislop, J. R. G., M. P. Harris, and J. G. M. Smith. 1991. Variation in the calorific value and total energy content of the lesser sandeel (*Ammodytes marinus*) and other fish preyed on by seabirds. J. Zool., Lond. 224: 501-517.

Hunt, G. L., Jr., B. Burgeson, and G. A. Sanger. 1981a. Feeding ecology of seabirds in the eastern Bering Sea. Pp. 629-647 in D. W. Wood and J. A. Calder (eds.), The eastern Bering Sea shelf: oceanography and resources. Vol. 1, U.S. Gov. Printing Office, Washington, D.C.

Hunt, G. L., Jr., Z. Eppley, B. Burgeson, and R. Squibb. 1981b. Reproductive ecology, foods and foraging areas of seabirds nesting on the Pribilof Islands, 1975-1979. Environ. Assess. Alaskan Contin. Shelf, Ann. Rep. Princ. Investig. NOAA Environ. Res Lab., Boulder, CO 12: 1-258.

- Klosiewski, S. P., and K. K. Laing. ms. Marine bird populations of Prince William Sound, Alaska, before and after the Excon Valdez oll spill. Bird Study No. 2. Final Report. U.S. Fish and Wildlife Service, Migratory Bird Management, Anchorage, Alaska.
- Kuletz, K. J. 1983. Mechanisms and consequences of foraging behavior in a population of breeding pigeon guillemots. M.S. Thesis, Univ. of California, Irvine. 79 pp.
- Lee, R. F., J. Hirota, J. C. Nevenzel, R. Sauerheber, A. A. Benson, and A. Lewis. 1972. Lipids in the marine environment. Calif. Mar. Res. Comm., CalCOFI Rep. 16: 95-102.
- Massias, A., and P. H. Becker. 1990. Nutritive value of food and growth in common tern Sterna hirundo chicks. Omis Scand. 21: 187-194.
- Montevecchi, W. A., and J. Platt. 1984. Composition and energy contents of mature inshore spawning capelin (*Mallotus villosus*): implications for seabird predators. Comp. Biochem. Physiol. 78A: 15-20.
- Montevecchi, W. A., R. E. Ricklefs, I. R. Kirkham, and D. Gabaldon. 1984. Growth energetics of nestling gannets (Sula bassanus). Auk 101: 334-341.
- Nevenzel, J. C. 1970. Occurrence, function and biosynthesis of wax esters in marine organisms. Lipids 5: 308-319.
- Oakley, K. 1981. Determinants of the population size and distribution of the pigeon guillemot (*Cepphus columba*) at Naked Island, Prince William Sound, Alaska. M.S. Thesis, Univ. of Alaska, Fairbanks. 65 pp.
- Oakley, K., and K. J. Kuletz. ms. Population, reproduction and foraging ecology of pigeon guillemots at Naked Island, Prince William Sound, Alaska, before and after the Excon Valdez oll spill. Bird Study Number 9. Final Report. U.S. Fish and Wildlife Service, Migratory Bird Management, Anchorage, Alaska.
- Obst, B. S., K. A. Nagy, and R. E. Ricklefs. 1987. Energy utilization in Wilson's Storm-petrel (Oceanites oceanicus). Physiol. Zool.
- Pethig, R. 1979. Dielectric and electronic properties of biological materials. Wiley, Chichester.
- Presta, E., K. R. Segal, B. Gutin, C. G. Harrison, and T. B. Van Itallie. 1983a. Comparison in man of total body electrical conductivity and lean body mass derived from body density: validation of a new body composition method. Metabolism 32: 534-537.
- Presta, E., J. Wang, G. C. Harrison, P. Bjorntorp, W. H. Harter, and T. B. Van Itallie. 1983b. Measurement of total body electrical conductivity: a new method for estimation of body composition. Am. J. Clin. Nutr. 37: 735-739.
- Prince, P. A., and C. Ricketts. 1981. Relationships between food supply and growth in albatrosses: an interspecies chick fostering experiment. Omis Scand. 12: 207-210.
- Ricklefs, R. E. 1974. Energetics of reproduction in birds. Pp. 152-292 in R. A. Paynter (ed.), Avian Energetics. Publ. Nuttall Ornithol. Club, No. 15.
- Ricklefs, R. E. 1979. Adaptation, constraint, and compromise in avian postnatal development. Biol. Rev. 54; 269-290.
- Ricklefs, R. E. 1983a. Some considerations on the reproductive energetics of pelagic seabirds. Studies in Avian Biology No. 8: 84-94.
- Ricklefs, R. E. 1983b. Avian postnatal development. Pp. 1-83 in D. S. Farner, J. R. King, and K. C. Parkes (eds.), Avian Biology, Vol. 7. Academic Press, New York.
- Ricklefs, R. E. 1984a. Meal sizes and feeding rates of Christmas Shearwaters and Phoenix Petrels on Christmas Island, Central Pacific Ocean. Omis Scand. 15: 16-22.
- Ricklefs, R. E., S. C. White, and J. Cullen. 1980a. Postnatal development of Leach's Stormpetrel. Auk 97: 768-781.

185

÷,

Ricklefs, R. E., S. C. White, and J. Cullen. 1980b. Energetics of postnatal growth in Leach's Storm-petrel. Auk 97: 566-575.

Ricklefs, R. E., C. H. Day, C. E. Huntington and J. B. Williams. 1985. Variability in feeding rate and meal size of Leach's Storm-petrel at Kent Island, New Brunswick. J. Anim. Ecol. 54: 883-898.

Ricklefs, R. E., A. R. Place, and D. J. Anderson. 1987. An experimental investigation of the influence of diet quality on growth in Leach's Storm-Petrel. Am. Nat. 130: 300-305.

- Roby, D. D. 1989. Chick feeding in the diving petrels <u>Pelecanoides georgicus</u> and <u>P. urinatrix</u> <u>exsul</u>. Antarctic Science 1: .
- Roby, D. D. 1991a. Diet and postnatal energetics in two convergent taxa of plankton-feeding seabirds. Auk 108: 131-146.
- Roby, D. D. 1991b. A comparison of two noninvasive techniques for measuring total body lipid in live birds. Auk 108: 509-518.
- Roby, D. D., and R. E. Ricklefs. 1986. Energy expenditure in adult Least Auklets and diving petrels during the chick-rearing period. Physiol. 2001. 59: 681- 678.
- Roby, D. D., A. R. Place, and R. E. Ricklefs. 1986. Assimilation and deposition of wax esters in planktivorous seabirds. J. Exp. Zool. 238: 29-41.
- Roby, D. D., K. L. Brink, and A. R. Place. 1989. Relative passage rates of lipid and aqueous digesta in the formation of stomach oils. Auk 106: 303-313.
- Sanger, G. A., and M. B. Cody. 1993. Survey of Pigeon Guillemot colonies in Prince William Sound, Alaska. Draft Final Report, Restoration Project 93034, U.S. Fish and Wildlife Service, Anchorage, AK.
- Sargent, J. R. 1976. The structure, metabolism and function of lipids in marine organisms. Pp. 149-212 in D. C. Malins and J. R. Sargent (eds.), Biochemical and Biophysical Perspectives in Marine Biology, Vol. 3. Academic Press, London.
- Shea, R. E., and R. E. Ricklefs. 1985. An experimental test of the idea that food supply limits growth in a tropical pelagic seabird. Am. Nat. 126: 116-122.
- Simons, T. R., and G. C. Whittow. 1984. Energetics of breeding Dark-rumped Petrels. Pp. 159-181 in G. C. Whittow and H. Rahn (eds.), Seabird Energetics. Plenum Press, New York.
- Sowis, A. L., S. A. Hatch, and C. J. Lensink. 1978. Catalog of Alaskan seabird colonies. U.S. Dept. Interior, Fish and Wildlife Service, FWS/OBS-78/78.
- Springer, A. M. 1992. A review: walleye pollock in the North Pacific--how much difference do they really make? Fish. Oceanogr. 1: 80-96.
- Springer, A. M., and G. V. Byrd. 1988. Seabird dependence on walleye pollock in the southeastern Bering Sea. Pp. 667-677 in International symposium on the biology and management of walleye pollock. Lowell Wakefield Fish. Symp. 7, Alaska Sea Grant Rep. 89-1.
- Van Loan, M., and P. Mayclin. 1987. A new TOBEC instrument and procedure for the assessment of body composition: use of Fourier coefficients to predict lean body mass and total body water. Am. J. Clin. Nutr. 45: 131-137.
- Walsberg, G. E. 1983. Avian ecological energetics. Pp. 161-220 in D. S. Farner and J. R. King (eds.), Avian biology, Vol. 7. Academic Press, New York.
- Walsberg, G. E. 1988. Evaluation of a nondestructive method for determining fat stores in small birds and mammals. Physiol. Zool. 61: 153-159.
- Wanless, S., and M. P. Harris. 1992. Activity budgets, diet and breeding success of kittiwakes Rissa tridactyla on the Isle of May. Bird-Study 39: 145-154.

# Proximate Composition and Energetic Context of Selected Forage Fish Species in Prince William Sound

| Project Number:              | 95163H (formerly BAA-120)  |                        |  |
|------------------------------|--|------------------------|--|
| <b>Restoration Category:</b> | Research (new)   |                        |  |
| Proposed By:                 | Physiological Ecology Research Laboratory, Marine<br>Mammal Research Program, Texas A&M University |                        |  |
| Lead Trustee Agency:         | NOAA   |                        |  |
| Cost FY 95:                  | \$43,000   |                        |  |
| Cost FY 96:                  | \$35,000   | DECEIVED               |  |
| Total Cost:                  | Unknown  | NOV 0 8 1994           |  |
| Duration:                    | 4 years  | EXXON VALDEZ QIL SPILL |  |
| Geographic Area:             | Prince William Sound   | ADMINISTRATIVE RECORD  |  |
| Injured Resource/Service:    | Multiple resources   |                        |  |

# INTRODUCTION

As a result of damage assessment studies initiated after the *T/V Exxon Valdez* struck Bligh Reef in March, 1989, it was noted that several pelagic-feeding marine mammals and seabirds found in Prince William Sound (PWS) were apparently not recovering back to predisturbance population levels. This lack of recovery may be due to a number of factors, including possible food limitations. Food limitations have been suggested to be a problem for a variety of species which are found throughout the Bering Sea and Gulf of Alaska. While cause-effect relationships are difficult to demonstrate, changes in the energetic value of prey species can be quantified and these values used in the interpretation of energy availability to the impacted species. In PWS, two marine mammal species, harbor seals and sea otters, and several seabird species (common murre, harlequin duck, marbled murrelet, and pigeon guillemot) have been impacted and are not recovering. Others, such as killer whales, are recovering but may be indirectly inhibiting the recovery of other species if food competition is a problem.

There is increasing interest in the use of energetic models to study interactions between marine mammals or seabirds and their prey species. Often these models are based upon energy transfer between predator and prey. Although these models require information on

the energy context or proximate composition of these species, few data are available. Those data which have been published have limited application due to the inherent seasonal and annual variability in the value of the prey. The goal of this proposed subproject is to assess on a seasonal and annual basis, the value of the major prey species that would be of significance to the mammalian and avian predators listed above. These data will allow for the development of models that may yield reasons for the lack of recovery of these species.

## NEED FOR THE PROJECT

This subproject will provide the background data necessary for future studies of food web dynamics and ecology of many species of fish, birds, and mammals of PWS. In any long-term study of foraging ecology, especially those investigating the recovery of impacted species, knowledge of prey species composition and energetic value is critical in the interpretation of consumption rates and therefore the impact of consumer species upon prey species stocks. Compositional analysis will also yield important information on the general quality of the environment by assessing the condition of important prey species.

# **PROJECT DESIGN**

#### A. Objectives

The objectives of this subproject are to assess the seasonal and annual changes in the proximate composition of the major forage fish species in PWS. Data on the composition and energetic value of prey species for marine mammals and seabirds are very limited. Most data that are available are for commercial species that are consumed by humans. These data are further limited, in their ecological application, because they usually only analyze the edible fillets that people consume. Another major limitation in the database relates to the lack of an appreciation of the magnitude of seasonal variability which occurs. For example, herring can vary from as little as 3% lipid to as much as 22% lipid seasonally. Knowing the energy content and composition of these species will allow us to further enhance our understanding of the energetic and physiological ecology of the major consumer species in the PWS.

## **B.** Methods

Species that should be collected are listed in Table 1. Samples should be frozen immediately after collection and be representative of the size classes which are known to be consumed by the consumer species in question.

All analytical techniques are described in detail in Worthy and Lavigne (1983) and Hislop et al. (1991). Analysis will be performed on freeze-dried, ground fish and will include

2

determinations of water content, total lipid content, total protein content, ash content, and energy density. Initially, wet mass, sex, and length of each individual specimen will be recorded. Specimens would then be combined, ground, and homogenized prior to freezedrying. Water content will be determined gravimetrically by lyophilization of ground, homogenized prey until constant mass has been obtained. This will be accomplished using a LabConco Lyophilizer over a period of 4-5 days. Once the samples are dried, they are finely ground using a Spex 8000 Mixer/mill. This ground material will be used in all subsequent analyses and will be available for other investigators to use for future studies.

Lipid content will be measured gravimetrically by Soxhlet extraction using petroleum ether as the solvent. Protein content will be assessed using a modified Kjeldhal analysis and ash content will be determined by ashing at 550°C for 2 h in an ashing oven. Ground lyophilized samples will be analyzed for energy content by means of a Parr adiabatic bomb calorimeter.

## C. Schedule

It is suggested that sampling be conducted a minimum of two seasons per year, when maximum productivity is occurring. If samples can be opportunistically obtained on a more regular basis, then a more detailed assessment of seasonal changes can be undertaken.

## D. Technical Support

Collections will be done during Seabird/Forage Fish and SEA project cruises, charter cruises, and through the purchase of fish from local fishermen. All of the required equipment and expertise for this project are on-site at Texas A&M University - Galveston. This includes all of the specialized equipment required for the composition and energetics analysis, as well as archival capabilities for samples and the computer related software for full statistical analysis of the data.

## E. Location

Collections will take place throughout PWS and surrounding waters.

### **PROJECT IMPLEMENTATION**

This proposal is being submitted by the Physiological Ecology Research Laboratory (PERL) of the Marine Mammal Research Program (MMRP) of Texas A&M University - Galveston. The PERL is already collaborating with National Marine Fisheries Service, National Marine Mammal Laboratory, on two other projects related to the ecology of killer whales and use of stable isotope tracers in PWS. All of the data obtained in the present subproject will also be incorporated into the Integrative Marine Mammal Ecosystem Program.

The PERL has 20 years of combined experience in the analysis of prey species of marine mammals for their composition and energetic value. The ultimate aim of the PERL is to develop a library of prey species samples which could be made available to researchers for future analyses, as well as to make available data on long-term changes in prey species energetic values. The PERL currently is involved in similar projects in California, Texas, Florida, and eastern Canada.

## COORDINATION OF INTEGRATED RESEARCH EFFORT

Collection of prey species will be undertaken during cruises by Seabird/Forage Fish and SEA projects. Additionally dedicated cruises may be required for the collection of certain species. Samples will be archived for potential future use by other investigators interested in this area. This subproject is an integral part of the Seabird/Forage Fish project and will provide key information to the synthesis report. Data collected will be used by the Seabird Energetics subproject (95163G) and subsequently by Puffins as Samplers (95163D), Kittiwakes as Indicators (95163C), and Pigeon Guillemot Recovery (95163F) components. To facilitate access to project data, the information collected from this subproject will be incorporated into a data base managed by the Trustee Council and by SEA.

. ....

#### FY 95 BUDGET (\$K)

| 20.5 |   |
|------|---|
| 3.0  |   |
| 0.0  |   |
| 3.5  |   |
| 1.0  |   |
| 11.9 |   |
| 39.9 |   |
| 3.1  |   |
| 43.0 |   |
|      | 20.5<br>3.0<br>0.0<br>3.5<br>1.0<br>11.9<br>39.9<br>3.1<br>43.0 |

•

Table 1. Forage fish species of significance in the PWS System that are proposed to be studied for composition and energetic value in the present study. Suggested species were determined by assessing their importance to the various seabirds and marine mammals that are found in PWS. Some species are of importance only to the larger species such as killer whales (*Orcinus orca*).

| Pacific herring  | Clupea harengus pallasi |
|------------------|-------------------------|
| Rockfish         | Sebastes sp.            |
| Cutthroat trout  | Salmo clarkii           |
| Capelin          | Mallotus villosus       |
| Rainbow smelt    | Osmerus mordax          |
| Sand lance       | Ammodytes hexapterus    |
| Eulachon         | Thaleichthys pacificus  |
| Pacific cod      | Gadus macrocephalus     |
| Walleye pollock  | Theragra chalcogramma   |
| Sablefish        | Anopoploma ftmbria      |
| Pacific sandfish | Trichodon trichodon     |
| Pink salmon      | Onchorhynchus gorbuscha |
| Sockeye salmon   | O. nerka                |
| King salmon      | O. tshawytscha          |
| Silver salmon    | O. kisutch              |
| Chum salmon      | O. iceta                |
|                  |                         |

5

, `

# Seabird/Forage Fish - Program Management and Integration

| 951631               |  |
|----------------------|--|
| Research (new)       |  |
| DOI, NOAA, ADFG      | DECEIVED   |
| \$80,700             | NOV 0 8 1994   |
| \$105,000            | EXXON VALDEZ OIL SPILL<br>TRUSTEE COUNCIL  |
| Unknown              | ABMINISTRATIVE RECORD  |
| 6 years              |  |
| Prince William Sound |  |
| Multiple resources   |  |
|                      | 95163I<br>Research (new)<br>DOI, NOAA, ADFG<br>\$80,700<br>\$105,000<br>Unknown<br>6 years<br>Prince William Sound<br>Multiple resources |

## INTRODUCTION

This component of the Seabird/Forage Fish project (95163A-I) will provide for scientific oversight, coordination, performance tracking, and integration of results. The suggested approach to program management employs elements that have been used effectively in other large, multidisciplinary programs for ecosystem assessment.

## NEED FOR THE PROJECT

The Seabird/Forage Fish project, in its initial form and likely evolution, will comprise a number of interacting components involving specialists from various agencies, universities, and private organizations. To ensure that a cooperative and efficient research effort is achieved, it is essential that a program management plan be implemented to address such issues as team organization, scientific planning, scheduling and reporting, coordination between investigators and other existing programs and projects, data management, and quality assurance. This proposal recognizes that such functions cannot be solely vested in the individual Principal Investigators, that a responsible individual or group must be identified and dedicated to each of the management tasks, and that effective program management cannot be achieved at zero cost.

## **PROJECT DESIGN**

## A. Objective

The objective of program management and integration is to ensure a coordinated and scientifically productive research effort in support of restoration goals for seabirds.

## B. Methods

The investigative team proposes to enlist one full-time individual (Program Coordinator) to implement and adaptively refine a management plan for seabird and forage fish investigations. The person recruited will possess a reasonable level of technical competence in marine ecology, fisheries, and/or avian science, as well as demonstrated skill in program organization and management. Duties of the Program Coordinator include (but are not limited to) the following: (1) coordinate activities among subprojects (methods, timing, and location of data collection, logistics, and contingency planning), (2) coordinate activities and facilitate data sharing with SEA investigations (95320), (3) facilitate communication among agencies and between this project and the oil spill restoration office (Executive Director, Chief Scientist, and staff), (4) schedule performance milestones for individual projects and assess success in meeting those milestones, (5) conduct quarterly meetings of the Principal Investigators, (6) prepare an annual synthesis report of forage fish and seabird projects and make an oral presentation at the annual science workshop, (7) provide scientific oversight and quality assurance by enlisting the services of a Technical Steering Committee (see below) and a qualified biometrician during project planning and review, and (8) explore opportunities for data management and system modelling, emphasizing cooperation with related efforts such as the Information Management System project (95089) and the SEADATA project (95320J).

The team further proposes to establish a three-member Technical Steering Committee with duties comparable to those of a project Chief Scientist. The Steering Committee will consist of individuals with expertise and professional stature in the relevant sciences (marine ecology, fisheries, avian biology, and population dynamics) who are not actively engaged in the field research program. The Technical Steering Committee will advise primarily on matters of overall scientific direction, but may also assist in defining specific research objectives and procedures.

## C. Schedule

Annual scheduling to accomplish program management tasks will be the responsibility of the Program Coordinator. A reduced funding level is proposed for FY 95, reflecting the likelihood that this position will not be filled before March during the first year of the Seabird/Forage Fish study.

## Program Management and Integration

## D. Technical Support

It is not expected that the Program Coordinator will have the skills and time to perform all of the identified tasks single-handedly. Rather, the position will come with a limited operating budget (ca. \$40K) for purposes of travel and for contracting as needed the services of the Technical Steering Committee, a biometrician, technical writer, modeler, or data management specialist.

## E. Location

-

Not applicable.

## **PROJECT IMPLEMENTATION**

The position will most likely be filled through a personal services contract, as opposed to direct hire. Selection of the Program Coordinator and members of the Technical Steering Committee will be subject to approval by the Principal Investigators participating in the project.

## COORDINATION OF INTEGRATED RESEARCH EFFORT

The central mission of this subproject is coordination of seabird and forage fish investigations, both within the parent Seabird/Forage Fish project (95163A-I) and between this project and other programs funded by the Trustee Council.

• \_\* \*\*

## FY 95 BUDGET (\$K)

| Personnel   | 1   | 0.0 |
|-------------|-----|-----|
| Travel      |     | 5.0 |
| Contractual | 6   | 0.0 |
| Commodities |     | 0.0 |
| Equipment   |     | 0.0 |
| Subtotal    | 7   | 5.0 |
| Gen. Admin. | •   | 5.7 |
| Total       | . 8 | 0.7 |

## I. EXXON VALDEZ OIL SPILL BRIEF PROJECT DESCRIPTION

| Project Title:                            | Restoration of PWS Natural Spawning Salmon Resources<br>and Services Overview: <u>An Integrated and Collaborative</u><br><u>Approach</u>  |
|---|---|
| Sub-project Numbers:                      | 95093-A; 95093-B; 95093-C   |
| Project Leader:                           | Howard Ferren, Special Projects Manager   |
| Lead Agency:                              | AK. Dept. of Fish and Game (ADF&G)  |
| Cost of Subprojects:<br>Start/Completion: | <b>FY95:</b> \$3,948.5; <b>FY96</b> \$3957.2<br>( <i>NOTE: FY cost is not additive as indicated above. Should all subprojects -A, -B and -C be funded, total cost will be reduced to</i> <u>\$2,410.9</u> due to integrations and cost savings.)<br>January, 1995 - September, 1995 |
| Project Duration:                         | 0.75 yr.  |
| Geographic Area:                          | Prince William Sound  |
| Contact Person:                           | Howard Ferren, Special Projects Manager<br>PWSAC, P.O. Box 1110, Cordova, AK 99574<br>(907) 424-7511  |

## II. Introduction

in the second second

Due to the **Exxon Valdez Oil Spill (EVOS)**, natural spawning stocks of salmon in Prince William Sound (PWS) are recognized as injured. Pink salmon in particular are identified as injured and not recovering (**EVOS** Trustee Council). As a result of these injured resources, individuals and communities of PWS have suffered lost or reduced services. Restoration funds must be used "...for the purposes of restoring, replacing, enhancing or acquiring the equivalent of natural resources injured as a result of the oil spill or the reduced or lost services provided by such resources".

The purpose of this suite of subprojects is to rehabilitate injured natural spawning salmon stocks to maintain the biodiversity of the PWS ecosystem, and restore resources and services to subsistence, commercial, recreational and other users and communities of the PWS area. This will be accomplished by integrating objectives under a collaborative agreement between professional and local resident partners, to:

| 95093-A/          | actively rehabilitate injured stocks;                     |
|-------------------|---|
| 9509 <b>3-</b> B/ | reduce harvest pressures on injured wild stocks;          |
| 95093-C/          | replace injured salmon resources with stocks important to |
|                   | subsistence users.  |

## III. Need for Project

This integrated project is needed to: <u>restore</u> injured pink salmon resources by direct rehabilitation intervention in 3 oiled streams; <u>reduce harvest pressures</u> on injured resources to allow their recovery; and, <u>replace</u> lost resources and services by rehabilitating 3 streams in unoiled areas important to subsistence users in order to provide continued services to the people and communities of Prince William Sound.

## IV. Objectives

- A. Restore natural spawning salmon resources and services in PWS to prespill conditions.
- B. Maximize fitness (both biologic and economic) of injured natural spawning stocks through application of knowledge of salmon population biology, genetics and disease.
- C. Reduce harvest of injured natural spawning stocks by more specific management of natural spawning and hatchery stocks.
- D. Develop, train and use resident expertise to establish the capability for continuing conservation and protection of PWS salmon resources.

## V. Methods

Methods include:

- resource inventory (literature search and ground surveys), and resource assessment (census, phenotypes);
- genetic and disease evaluations;
- taking injured and non-injured stock for brood; isolating and incubating eggs at PWS supplementation facilities, and returning fry to natal streams for acclimation;
- monitoring the fitness of salmon stocks and their progress toward restoration;
- identification of locations to remote release hatchery salmon and initiation of test fishing to determine wild stock presence.

These methods, particularly the research and monitoring aspects, follow in concept a model for monitoring interactions of wild and hatchery salmon recently set forth by an international panel of salmon geneticists and conservation scientists convened by NINA (Norweg. Instit. Nature Res.). They emphasize the necessity of monitoring a baseline of genetic and fitness (phenotypic) data, of understanding the extent of gene flow between stocks, and of studying the biological effect of gene flow through quantitative genetic analysis.

The proposed subprojects and methods support and in many cases depend on the integrated cooperation of projects independently proposed by other agencies and groups including 95076, 95191-A, 95320-C, 95320-B, 95320-D. A workshop is proposed to bring project 95093 (A-C) collaborators and other EVOS Trustee Council funded project leaders together to further integrate and plan activities.

## VI. Schedule for FY95

NOTE: The generalized schedule for the integrated subprojects is presented below for FY95. Specific objectives and activities are intended to occur annually and to encompass two (2) life cycles for both odd year and even year pink salmon. Specific subproject schedules are presented in 95093 (A-C) brief project descriptions. A generalized listing of the extended workplan and timeline is presented in **Figure 1**.

| Activity   | Begin | End     |
|--|-------|---------|
| Convene workshop   |       |         |
| Contact all collaborators                                | 1/95  | 1/95    |
| Convene workshop   | 2/95  | 2/95    |
| Integrate objectives/activities                          | 2/95  | 2/95    |
| Finalize workplans                                       | 2/95  | 3/95    |
| Evaluate hatchery capabilities                           |       |         |
| Analyze facilities' water temperature<br>and water flows | 1/95  | 2/95    |
| Review incubation and facility<br>floor plans            | 2/95  | 3/95    |
| Compute species/stock limitations                        | 2/95  | 3/95    |
| Report on recommendations                                | 3/95  | 4/95    |
| Investigate literature                                   |       |         |
| Research oiled streams                                   | 1/95  | 2/95    |
| Assess hatchery release criteria                         | 1/95  | 4/95    |
| Identify subsistence stocks                              | 1/95  | 2/95    |
| NEPA requirements  |       |         |
| Complete NEPA requirements                               | 2/95  | 4/95    |
| Develop technical teams for 5 sectors in PWS             |       | vi<br>a |
| Contract vessels and crews                               | 1/95  | 4/95    |
| Contract technicians                                     | 3/95  | 4/95    |
| Train field crews  | 4/95  | 5/95    |
| Inventory stock baselines                                |       |         |
| Stock surveys  | 6/95  | 10/95   |
| Census/phenotypes  | 6/95  | 10/95   |
| Collect Tissue samples                                   | 6/95  | 10/95   |
| Assess stream conditions                                 |       |         |
| Collect oiled stream gravel samples                      | 6/95  | 7/95    |
| Analyze samples  | 6/95  | 8/95    |
| Direct restoration                                       |       |         |
| Collect eggs from oiled and<br>non-oiled streams         | 7/95  | 10/95   |

| Activity  | Begin                | End        |
|---|----------------------|------------|
| Incubate embryos  | 9/95                 | 12/95      |
| CWT/otolith mark embryos  | 9/95                 | 10/95      |
| Pen rear, acclimate & release fry   | 1996                 |            |
| Recover marks/tags  | 1997                 |            |
| Evaluate & revise plan  | 1997                 |            |
| Reduce harvest pressure on injured stocks   |                      |            |
| Survey sites  | 4/95                 | 5/95       |
| Test fish sites   | 8/95                 | 9/95       |
| Identify early run broodstocks  | 6/95                 | 8/95       |
| Feasibility scale releases of current<br>hatchery production                        | 1996                 |            |
| Evaluate releases/returns   | 1997                 |            |
| Remote egg takes early run brood  | · 1997               | (odd year) |
| Incubate and release  | 1998                 |            |
| Geneflow field experiment   |                      |            |
| Establish genetic tag   | 7/95                 | 9/95       |
| (2 camps/screen males)  |                      |            |
| Sample returns  | 1997                 |            |
| Analyze gene flow   | 1997                 |            |
| Report  | 1998                 |            |
| Quantitative genetic analysis of<br>fitness traits                                  |                      |            |
| Sample gametes in field   | 7/95                 | 10/95      |
| Incubate embryos in lab and gather data   | 10/95                | 1996       |
| Analyze   | 1996                 |            |
| Report  | 1997                 |            |
| Model fitness effects of genetic<br>interactions: develop simulation<br>models for: |                      |            |
| Gene flow and drift   | 2/95                 | 11/95      |
| Single locus selection  | 7/95                 | 1996       |
| Quantitative/fitness trait  | 12/95                | 1997       |
| Population dynamics   | 1996                 | 1997       |
| Report  | 9/95                 | 10/95      |
| VIITechnical support  |                      |            |
| Technical support will include the services of                                      |                      |            |
| - PWSAC project management  | & tish culture staff |            |

- ADF&G biologists and technicians University of Alaska geneticists ADF&G pathologist -
- -
- -

۰.

permitting agencies including ADF&G, Department of Army, Corps of Engineers, Department of Natural Resources ADF&G otolith mark analysis lab

### VIII. Location

- مداخلة مسر

This project will take place in Prince William Sound. Field crew activities will take place within districts of PWS as divided into five sectors (Figure 2) including the Southeastern, Eastern, Northern-Coghill-Northwestern, Southwestern, and \_\_\_\_\_\_ Montague Districts.

#### IX. Project Implementation

PWSAC will implement the project in conjunction with the Native Village of Eyak Tribal Council, University of Alaska, School of Fisheries and Ocean Sciences, and with ADF&G as the lead agency.

## X. Coordination of Integrated Research Effort

PWSAC will be responsible for coordinating activities under this proposal including research, restoration and monitoring. Activities of the salmon restoration program will be integrated with previously funded and proposed genetic investigations, stream analyses, stock identification and monitoring studies, and otolith marking (Figure 3).

#### XI. Public Process

PWSAC is a regional association which by law (AS 16.05.380.) must include on their boards representatives of sport fishermen, municipalities, and Native organizations, in addition to commercial fishermen and processors. It is PWSAC's mission to optimally produce salmon for the benefit of all user groups.

As a mechanism to restore PWS salmon resources and services, the salmon restoration project will incorporate existing research results achieved through projects previously and currently funded by the EVOS Trustee Council process. In addition, specific stock and stream restoration options may be recommended by users and village residents within PWS. Local vessels, skippers and crews will be solicited from interested public and contracted for training and field work.

## XII. Budget

.....

#### Total budget for subprojects 95093 A-C

|                          | PWSAC       | EYAK    | UAF     | ADF&G   |
|--------------------------|-------------|---------|---------|---------|
| 100 Personnel            | \$352.4     | \$387.9 | \$553.5 | \$0.0   |
| 200 Travel               | \$68.5      | \$57.8  | \$21.6  | \$0.0   |
| 300 Contractual Services | \$30.0      | \$649.5 | \$48.0  | \$200.0 |
| Administration           | \$97.2      | \$172.6 | \$335.7 | \$4.1   |
| 400 Commodities          | \$76.0      | \$30.2  | \$120.0 | \$0.0   |
| 500 Equipment/capital    | \$118.0     | \$25.5  | \$600.0 | \$0.0   |
| BUDGET SUBTOTALS         | \$742.1     | 1,323.5 | 1,678.8 | 204.1   |
| TOTAL PROJECT BUDGE      | T \$3,948.5 | 5       |         |         |

· · · ·

# PLEASE NOTE:

This budget depicts all three subprojects as though their budgets were additive (separate and independently funded projects). If all three subprojects (-A, -B, -C) are funded simultaneously, cost savings are realized due to elimination of activities and cost duplications. Funding all three projects will reduce the total budget to \$2,410.9. Discussion is attached to each subproject budget regarding project integration cost savings.

# Figure 1: Time-line and activities (\pwsac\evos\fig95-2)

| 1995                   |   | 1997   |   | 1999   |
|------------------------|---|--|---|--|
| (odd year pink salmon) | <ul> <li>evaluate hatchery capabilities</li> <li>assess existing stream research</li> <li>contract vessels and crew</li> <li>train field crew</li> <li>conduct stream/stock surveys</li> <li>evaluate remote release sites, test fi</li> <li>collect gene, disease &amp; gravel samples</li> <li>collect &amp; transport BY95 eggs</li> <li>otolith mark embryos</li> </ul> | ish<br>ples<br>treams)<br>- transport and rear BY95 fry<br>- release BY95 fry<br>- conduct stream/stock surveys<br>- evaluate remote release sites, test f<br>- collect gene, disease & gravel sam<br>- analyze samples<br>- collect & transport BY96 eggs<br>- incubate BY96 eggs<br>- otolith mark embryos | <ul> <li>transport and rear BY96 fry</li> <li>release BY96 fry</li> <li>conduct stream/stock surveys</li> <li>collect gene, disease &amp; gravel sam</li> <li>analyze samples</li> <li>analyze gene flow</li> <li>remote release hatchery fish</li> <li>sample BY95 adults for marks</li> <li>analyze for otolith marks</li> <li>collect &amp; transport BY97 eggs</li> <li>incubate BY97 eggs</li> <li>otolith mark embryos</li> </ul> | <ul> <li>transport and rear BY96 fry</li> <li>release BY96 fry</li> <li>conduct stream/stock surveys</li> <li>collect gene &amp; disease samples</li> <li>analyze samples</li> <li>remote release hatchery fish</li> <li>sample BY96 adults for marks</li> <li>analyze for otolith marks</li> <li>collect &amp; transport BY98 eggs</li> <li>incubate BY98 eggs</li> <li>otolith mark embryos</li> </ul> |
|                        | (even year pink salmon)   |  | 1008  |  |
| 1999                   | 1990  | 2001   | 1996  |  |
|                        | <ul> <li>transport and rear BY98 fry</li> <li>release BY98 fry</li> <li>conduct stream/stock surveys</li> <li>collect gene samples</li> <li>analyze samples</li> <li>remote release hatchery fish</li> <li>sample BY96 adults for marks</li> <li>analyze for otolith marks</li> </ul>   | <ul> <li>- conduct stream/stock surveys</li> <li>- collect gene samples</li> <li>- analyze samples</li> </ul>  | <ul> <li>conduct stream/stock surveys</li> <li>collect gene samples</li> <li>analyze samples</li> <li>remote release hatchery fish</li> </ul>   | - conduct stream/stock surveys   |
|                        | 2000  | <ul> <li>remote release hatchery fish</li> <li>sample BY98 adults for marks</li> <li>analyze for otolith marks</li> </ul>  | 2002  | <ul> <li>collect gene samples</li> <li>analyze samples</li> <li>remote release hatchery fish</li> </ul>  |

٠

. ,

# Figure 2

# Prince William Sound

# Sectors for Research, Restoration and Monitoring



## Sectors

. . . . \*

- 1: Southeastern District
- 2: Eastern District
- 3: Northern-Northwestern-Coghill Districts
- 4: Southwestern-Eshamy Districts
- 5: Montague District

Hatcheries

Solomon Gulch

Cannery Creek Wally Noerenberg

Main Bay Armin F. Koernig

# Figure 3: Integration of Research, Pestoration and Monitoring

(pwsac\evos\fig95-3)

| COMPONENT               | ACTIVITY   | INTEGRATION   |
|-------------------------|--|---|
| Research                | Stream - stock identification                              | ADF&G<br>USFS<br>PWS resource users                       |
| Research                | Stream - stock surveys<br>and escapement enumeration       | PWSAC<br>ADF&G<br>Trained technicians and<br>vessel crews |
| Research                | Genetic and disease sampling                               | University of Alaska, SFOS<br>ADF&G<br>Technicians        |
| Research                | Gene analysis; gene flow simulation                        | University of Alaska, SFOS<br>ADF&G<br>NMFS: Auke Bay Lab |
| Research                | Disease analysis   | ADF&G   |
| Research                | Evaluate remote release sites<br>for hatchery fish         | PWSAC<br>ADF&G  |
| Restoration             | Egg-take from wild stock system(s)                         | PWSAC<br>ADF&G technicians<br>Vessel crews                |
| Restoration             | Incubation and rearing wild stock                          | PWSAC   |
| Restoration             | Acclimate and release wild stock                           | PWSAC<br>Vessel crews                                     |
| Restoration             | Remote release hatchery fish                               | PWSAC<br>ADF&G  |
| Research                | CWT/otolith marking  | ADF&G<br>PWSAC  |
| Research and monitoring | Adult return, enumeration and<br>CWT/otolith mark sampling | PWSAC<br>ADF&G technicians<br>Vessel crews                |
| Research and monitoring | Otolith analysis   | ADF&G   |

-

## I. EXXON VALDEZ OIL SPILL BRIEF PROJECT DESCRIPTION

| Subproject Title: | Restoration of Salmon in 3 Oil Damaged Streams   |  |  |
|-------------------|--|--|--|
| Project Number    | 95093-A  |  |  |
| Project Leader:   | Howard Ferren, Special Projects Manager  |  |  |
| Lead Agency:      | AK. Dept. of Fish and Game (ADF&G)   |  |  |
| Cost of Project   | FY95: \$1,009.6 FY96 \$1,021.0   | DECEIVED   |  |
| Start/Completion: | January, 1995 - September, 1995  |  |  |
| Project Duration: | 0.75 yr.   | NUY U 0 1994   |  |
| Geographic Area:  | Prince William Sound   | EXXON VALUEZ OIL SPILL<br>TRUSTEE COUNCIL<br>Administrative record |  |
| Contact Person:   | Howard Ferren, Special Projects Manager<br>PWSAC, P.O. Box 1110, Cordova, AK 99574<br>(907) 424-7511 |  |  |

## II. Introduction

Following the *Exxon Valdez* oil spill **(EVOS)** Alaska Department of Fish and Game (ADF&G) initiated surveys in Prince William Sound (PWS) and found 106 oiled anadromous streams<sup>1</sup>. In 1989 21 streams of the total were determined to be heavily oiled. This number declined due to directed clean up actions and natural weathering, and as recently as 1991 only 2 streams were determined to be heavily oiled. However, lightly oiled streams increased to 26. Much of the oil remained subsurface.

Pink salmon egg mortality was observed in oiled streams in 1989 and was shown to average 15%, whereas mortality in nonoiled streams was 9%.<sup>2</sup>. Egg mortality has generally increased and in 1991 there was an approximate 40% to 50% egg mortality in oiled streams and 18% mortality in nonoiled streams.<sup>2</sup> Oil related genetic damage may be the cause of this mortality which has resulted in a substantial decrease in adult pink salmon run strength. Oil damage to pink salmon may have reduced the adult population and some experts estimate that recovery will take more than a decade.<sup>2</sup> In addition, direct oiling of streams and clean-up activities such as hot water washing, substrate tilling and bio-remediation may contribute to habitat degradation.

## III. Need for Project

Damaged pink salmon stocks in PWS must be restored to maintain the biodiversity of the PWS ecosystem and restore spawning populations of pink salmon to pre-spill conditions.

This project will test the feasibility of supplementing oil damaged pink salmon stocks by increasing survival at early life stages and thereby increasing naturally occurring adult populations to optimally seed the available habitat.<sup>3</sup> Supplementation is defined as the stocking of fish into the natural habitat to increase the abundance of naturally reproducing fish populations. Use of supplementation facilities will be employed to incubate eggs (cf Draft EIS, Proposed Action, Comprehensive Restoration of Impacts on Fish, Action 3, Ch. 4, p. 124).

Targeting three ciled streams for supplementation will allow us to test supplementation as a possible tool for restoring damaged populations. In addition to testing this processimily important biological traits of damaged populations will be inventoried and assessed, as well as substrate hydrocarbons, and geneflow through subsequent generations of the population.

## IV. Objectives

- A. Test supplementation as a useful tool to restore injured pink salmon stocks in oiled streams.
  - B. Restore naturally spawning pink salmon populations in oil damaged streams to pre-spill conditions.
  - C. Maximize fitness (both biologic and economic) of injured wild stocks through application of knowledge of salmon population biology, genetics and disease.

#### V. Methods

- 1. Inventory and assessment: This component will have both literature and infield aspects. Habitat will be identified, inventoried and assessed as to candidate oiled streams. Injured pink salmon stocks will be censused and inventoried for phenotype and genotype. Samples will be taken for pathogen and parasite assessment. Facilities will be assessed for water regime requirements and possible modifications to suit feasibility scale supplementation.
- 2. Implementation: Implementation will have several phases including stream survey, substrate sampling, brood stock collection and sampling, eggtake, egg transport to supplementation facility, incubation, thermal marking, return of fry to natal stream for net pen rearing and acclimation. All necessary permitting including hatchery permit alterations (PAR), fry transport permits (FTP), Alaska Coastal Consistency Review, DNR Tideland's lease and bonding, Army Corps anchoring permit, and U.S. Coast Guard anchoring permit must be obtained. The project will be reviewed after one return cycle of both odd and even year pink salmon and a decision made to either continue or discontinue the feasibility project, or go to larger scale supplementation.
- 3. Evaluation: Supplementation will be evaluated as a tool for restoring pink salmon stocks by determining and comparing natural versus supplementation egg to fry survivals, acclimation success by adult homing, and adult survivals for seeding the habitat. Stocks selected for subsistence restoration (95093-C) will provide the control experiments needed for the oiled stream supplementation

feasibility subproject and genetic research. Integral with the supplementation process will be:

a. <u>Straving/gene flow field experiment: (SFOS Division of Fisheries)</u>

This research is modelled on earlier work on pink salmon at Auke Creek in Juneau by A.J. Gharrett and colleagues. Straying may be estimated by observing physically marked or tagged salmon; however, straying is only one component of gene flow--strays may well not breed successfully to contribute genetically. Our proposed protocol is to screen male returning salmon at a weir, allowing about 20%, those bearing a relatively rare presumably neutral gene, to spawn naturally. This procedure genetically tags the stock; applied with different marker genes to two stocks in the same region, a precise estimate of actual gene flow can be obtained by simple monitoring of the stocks over several generations. Integrates with Project Proposal 95076 by Wertheimer, et al.

<u>b.</u> Fitness phenotype laboratory experiment: quantitative genetic analysis of life history and fitness traits. (SFOS Division of Fisheries)
 This research is developed from earlier work on pink salmon at Auke Creek and at Gastineau Hatchery by W.W. Smoker, P.A. Crandell, and colleagues. Gametes sampled from known parents in stocks under restoration will be taken to the incubation laboratory at Juneau and observed under a standard quantitative genetic experimental design. Analysis of observations of fitness-related developmental traits (rates of development, salinity tolerance, etc.) and developmental stability (fluctuating asymmetry of meristic and morphologic traits) will provide estimates of genetic parameters, and from observations of hybrid families, direct estimates of the fitness effects of gene introgression.

c. Analysis of fitness effects on natural spawning stocks of interactions with cultured fish based on observed PWS data. (SFOS Division of Fisheries) Recent biometrical simulations of hypothetical salmon production systems, modelled on PWS pink salmon, by AJ Gharrett have demonstrated a relationship between ecological productivity (carrying capacity) and the overall fitness benefit of homing or straying. These models will provide a basis for analyzing with biometrical rigor the straying, gene flow, population genetic structure, and quantitative fitness variation data collected by other components of this integrated project.

Requisite to a thorough evaluation of the supplementation process, fish incubated at facilities must be marked for later identification. Therefore, additional methods employed in this subproject must include:

<u>a.</u> <u>Coded micro wire tagging</u>: Refer to Project Proposal 95137, 95320: Stock ID and Monitoring Studies.

b. Thermal manipulation of otolith microstructure Contained in Project Proposal 95320C, Otolith thermal mass marking.

3

4. Logistics: Logistical support will be provided by the <u>Native Village of Eyak Tribal</u> <u>Council</u> and include locally owned vessels with local resident crews and technical teams. Inventories, sampling, egg takes, pen rearing acclimation, and other activities will involve the logistical support services. One vessel and team will be required for habitat assessment, salmon stock inventory, fish sampling and eggtake. Three vessels and crews will be required during fry pen rearing and acclimation. A detailed cooperative agreement established between PWSAC, Native Village of Eyak Tribal Council, and UAF-SFOC establishes the collaborative responsibilities.

#### VI. Schedule for FY-95

**NOTE:** The schedule is presented for FY95. Specific objectives and activities are intended to occur annually to encompass two (2) life cycles for both odd year and even year pink salmon.

| Activity   | Begin   | End   |
|--|---|-------|
| Evaluate hatchery capabilities   |   |       |
| Analyze facilities' water temperature<br>and water flows   | 1/95  | 2/95  |
| Review incubation and facility floor plans   | 2/95  | 3/95  |
| Compute species/stock limitations  | 2/95  | 3/95  |
| Report on recommendations  | 3/95  | 4/95  |
| Literature search  |   |       |
| Review literature  | 1/95  | 2/95  |
| Identify injured stocks for  | 2/95  | 2/95  |
| supplementation activities   |   |       |
| NEPA compliance  |   |       |
| Complete NEPA requirements   | 2/95  | 4/95  |
| Develop and deploy logistical support  |   |       |
| Contract vessels and crews   | 5/95  | 5/95  |
| Contract technicians   | 5/95  | 6/95  |
| Train field crews  | 5/95  | 6/95  |
| elop and deploy logistical supportContract vessels and crews5/95Contract technicians5/95Contract technicians5/95Train field crews5/95Stock surveys7/95Consul/abonet/map7/95Consul/abonet/map7/95 |   |       |
| Stock surveys  | 7/95  | 10/95 |
| Census/phenotypes  | 7/95  | 10/95 |
| Take fish samples  | 7/95  | 10/95 |
| Analyze for pathogens/parasites  | 8/95  | 9/95  |
| Assess stream conditions   | Analyze for pathogens/parasites8/959/95sess stream conditions |       |
| Collect oiled stream gravel samples  | 6/95  | 7/95  |
| Analyze samples  | 6/95  | 8/95  |

| Activity  | E  | Begin | End   |
|---|--|-------|-------|
| Direct restoration  |  |       |       |
| Collect eggs from oiled streams   |  | 8/95  | 9/95  |
| Incubate embryos  |  | 9/95  | 12/95 |
| CWT/otolith mark embryos  |  | 9/95  | 10/95 |
| Pen rear, acclimate & release fry   |  | 1996  |       |
| Recover marks/tags  |  | 1997  |       |
| Evaluate & revise plan  | ~  | 1997  |       |
| Geneflow field experiment   |  |       |       |
| Establish genetic tag   | and a to a construct of approximation of the second s | 7/95  |       |
| Sample returns  |  | 1997  |       |
| Analyze gene flow   |  | 1997  |       |
| Report  | ст.<br>  | 1998  |       |
| Quantitative genetic analysis of<br>fitness traits                                  |  |       |       |
| Sample gametes in field   |  | 7/95  | 10/95 |
| Incubate embryos in lab and   |  | 10/95 | 10/00 |
| gather data   |  | 10/00 | 1300  |
| Analyze   |  | 1996  |       |
| Report  |  | 1997  |       |
| Model fitness effects of genetic<br>interactions: develop simulation<br>models for: |  | ×     |       |
| Gene flow and drift   |  | 2/95  | 11/95 |
| Single locus selection  |  | 7/95  | 1996  |
| Quantitative/fitness trait  |  | 12/95 | 1997  |
| Population dynamics   |  | 1996  | 1997  |
| Report  |  | 9/95  | 10/95 |

## VII. Technical support

-

. •

Technical support will include the services of:

- PWSAC planning, project management and fish culture staff -
  - ADF&G biologists and technicians University of Alaska geneticists ADF&G pathologist
- \_
- -
- permitting agencies including ADF&G, Department of Army, Corps of Engineers, Department of Natural Resources ADF&G otolith mark analysis lab -

-

#### VIII. Location

This project will take place in Prince William Sound. Specific streams in the oiled area, particularly the Southwestern District, will be selected as sites for supplementation.

#### IX. Project Implementation

PWSAC will implement the project in conjunctics with the Native Village of Eyak Tribal Council, University of Alaska, School of Fisheries and Ocean Sciences, and with ADF&G as the lead agency.

## X. Coordination of Integrated Research Effort

PWSAC will be responsible for coordinating activities under this proposal including research, restoration and monitoring. Activities of the oiled injured stock restoration subproject will be integrated with previously funded and proposed genetic investigations, stream analyses, stock identification and monitoring studies, and otolith marking.

#### XI. Public Process

PWSAC is a regional association having representatives from various user groups, communities and businesses seated as the Board of Directors. The Board has authorized this subproject and suite of salmon projects under the title of <u>Restoration of PWS Natural Spawning Stock Salmon Resources and Services</u> <u>Overview: An Integrated and Collaborative Approach</u>. The project has had wide exposure and endorsement throughout PWS. In addition, **NEPA** requirements will be met prior to stream supplementation activities.

#### XII. Personnel Qualifications

#### **PWSAC**

**B. Roys** President, CEO B.S. Wildlife Management, University of Massachusetts Fisheries biology, fisheries management, organizational management.

## H.J. Ferren

Special Project Manager, Planner M.S. Biological Oceanography, University of Alaska Corporate strategic and tactical planning, regional salmon planning, team facilitation and project management.

#### Eric Prestegard

Fisheries Manager A.A. Fisheries Fish culture, fisheries research, quality control, fisheries management.

# C. Kerns

· . · · · ·

Principal Fish Culturist

M.S. Fisheries Biology, Michigan State University

Chairman Alaska Fisheries Council (1979-83); President American Fisheries Society (1983-84); Certified Fisheries Scientist; Former Associate Professor, University of Alaska; Management in fish nutrition research.

Native Village of Eyak Tribal Council

## B. Henrichs

President Native; fisherman; vessel coordination and logistics.

#### D. Daisy

B.S. Fisheries, University of Massachusetts Fisheries Rehabilitation Program Manager (ADF&G); Consultant in fisheries development and aquaculture.

#### University of Alaska, SFOS

#### W.W. Smoker

Professor of Fisheries, SFOS. PhD Fisheries, Oregon State Univ. Research in salmon ocean ranching, quantitative genetics of Pacific salmon.

## A.J. Gharrett

Professor of Genetics, SFOS PhD Genetics, Oregon State Univ Research on molecular genetics, population genetics of Pacific salmon. Recognized expert on population genetics of Pacific salmon, Genetic Stock Identification, genetic tagging

#### Patricia A. Crandell

Postdoctoral Fellow and Research Associate, SFOS PhD Aquaculture Genetics, Biometrics Univ. of Calif Davis Research on quantitative genetics of pink salmon, ploidy manipulation in Pacific salmon Expertise in experimental design and statistical analysis.

#### Andrew Gray

Research Associate, SFOS MS Genetics, Washington State University Molecular genetics techniques, Electrophoretic analysis of allozymes, DNA analysis
#### XIII. Budget

. . . . .

٦f.a

| Subproject 95093-A       |                 |         |         |        |  |
|--------------------------|-----------------|---------|---------|--------|--|
|                          | PWSAC           | EYAK    | UAF     | ADF&G  |  |
| 100 Personnel            | \$80.5          | \$129.3 | \$184.5 | \$0.0  |  |
| 200 Travel               | \$ <b>1</b> 9.1 | \$12.6  | \$7.2   | \$0.0  |  |
| 300 Contractual Services | \$0.0           | \$61.5  | \$16.0  | \$75.0 |  |
| Administration           | \$16.0          | \$32.4  | \$111.9 | \$0.8  |  |
| 400 Commodities          | \$7.0           | \$4.3   | \$40.0  | \$0.0  |  |
| 500 Equipment/capital    | \$0.0           | \$8.5   | \$200.0 | \$0.0  |  |
|                          |                 |         |         |        |  |
| PROJECT BUDGETS          | \$122.5         | \$248.6 | \$559.6 | \$78.8 |  |
|                          |                 |         |         |        |  |
| TOTAL PROJECT BUDGE      | =1 \$1,009.6    | ł       |         | ~ ~    |  |

• • •

**NOTE:** If Subproject-C is funded, then cost of Subproject-A is reduced to \$280,750 by elimination of activities and cost duplications. Conversely, if A if funded, then costs of Subproject-C are reduced to similar amount. Total cost if both A and C are funded is \$1,290,229. Funded separately, the projects will cost in excess of \$2,000,000.

#### References

- 1. Alaska Department of Fish and Game, *Exxon Valdez* Oil Spill Response Operations Report Habitat Division 1989-1992. June 1992.
- 2. Draft *Exxon Valdez* Oil Spill Restoration Plan. *Exxon Valdez* Oil Spill Trustee Council. 1993.
- 3. The Use of Supplementation to Aid in Natural Stock Restoration. Cuenco, M., Backman, T., and Mundy, P. Columbia River Inter-Tribal Fish Commission.

#### EXXON VALDEZ OIL SPILL BRIEF PROJECT DESCRIPTION

| Project Title:    | Diversion of Fishing Effort From Oil Damaged Salmon<br>Stocks   |
|-------------------|---|
| Project Number:   | 95093-B   |
| Project Leader:   | Howard Ferren, Special Projects Manager   |
| Lead Agency:      | AK. Dept. of Fish and Game (ADF&A) NOV 0 8 1994   |
| Cost of Project:  | FY95: \$1,937.9 FY96 \$1,712.5 EXXON VALUEZ OIL SPILL<br>(Note: if funded with Subprojects -A or -B, cosput, the reconnection<br>\$1,120.6) |
| Start/Completion: | January, 1995 - September, 1995   |
| Project Duration: | 0.75 yr.  |
| Geographic Area:  | Prince William Sound  |
| Contact Person:   | Howard Ferren, Special Projects Manager<br>PWSAC, P.O. Box 1110, Cordova, AK 99574<br>(907) 424-7511  |

#### II. Introduction

I.

Significant pink salmon egg mortality is attributed to oiling of anadromous streams resulting from the *Exxon Valdez* oil spill (**EVOS**). Mortality has persisted through subsequent generations contributing to a reduction in adult pink salmon returns limiting both the escapement of naturally spawning populations, and services to users and communities deriving an income from the resource.

Activities directed at restoring injured pink salmon to pre-spill conditions may include habitat protection and improvement, hatchery rearing, net-pen rearing and relocation of hatchery runs<sup>1</sup>. Relocation of hatchery runs can take the form of releasing fish in new locations or replacing hatchery fish with a stock of different run timing. These changes to current hatchery stocks and releases can provide alternate return locations or return timing. This in turn can reduce harvest pressures on injured stocks which might presently be caught in fisheries targeting predominantly hatchery fish.

#### III. Need for Project

Diversion of fishing efforts from oil damaged salmon stocks is an important step to reduce pressures on these fish while providing greater opportunity to meet spawning escapement needs. For example, hatchery salmon could be released in the Eastern, Southeastern and/or Montague Districts, thereby distributing the commercial fleet and reducing harvest pressures on injured stocks in the Eshamy, Northwestern and Southwestern Districts. Also, hatchery stocks could be replaced with stocks which have adult return run time different from that of injured or depleted wild stocks which may be currently harvested in fisheries targeting returning hatchery salmon. By culturing temporally isolated salmon stocks, fisheries can be managed without placing additional pressure on injured stocks. Consideration must be given to species in addition to pink salmon if those species provide the temporal and spatial isolation necessary to reduce pressures on injured pink stocks.

Without taking steps to reduce these harvest pressures, and where possible the supplementation of the injured stocks, it may take many generations before restoration of stocks to pre-spill conditions can be achieved. As a result of no action, injured stocks will continue to be subject to pressures which may prevent their full contribution to the biodiversity and economy of the PWS ecosystem.

#### IV. Objectives

- A. Restore naturally spawning salmon resources and services in PWS to prespill conditions.
- B. Maximize fitness (both biologic and economic) of injured salmon stocks through application of knowledge of salmon population biology, genetics and disease.
- C. Reduce harvest of injured naturally spawning stocks by more specific management of wild and hatchery stocks. Specific objectives for FY95 include: to remote release 50 million pink salmon fry in increments of 25 million at two locations; and, identify an early run timing stock of salmon which could replace current hatchery stock.

#### V. Methods

- 1. **Inventory and assessment:** This component will have both literature review and in-field aspects. Approaches to remote releasing hatchery salmon, and replacing hatchery salmon with a stock of different run timing require:
  - a. hatchery stock inventory (genetic and disease history);
  - b. facility assessment (water regime characteristics and capabilities);
  - c. remote release location assessment (inventory of possible locations); many potential release areas have already been identified in the Regional Comprehensive Salmon Plan, Phase 3;
  - d. naturally spawning salmon stock census by ground surveys in five districts of PWS to contribute to stock baseline information including species, stocks and stock size; identification of genotypes and frequencies from selected stocks, and phenotypes; sampling for parasites and pathogens from selected stocks; assessment of brood potentials to replace hatchery stocks;
- 2. Implementation: Implementation will have several phases.
  - a. Remote releasing hatchery fish requires transportation of outmigrant fry to remote pens for rearing and acclimation. After two weeks of rearing, fry are released to the marine waters. Vessels and crews must be present on-site during the rearing phase. All necessary permitting including hatchery permit alterations (PAR), fry transport permits (FTP), Alaska Coastal Consistency Review, DNR Tideland's lease and bonding, Army Corps anchoring permit, and U.S. Coast Guard anchoring permit must be obtained.

b.

Replacing current hatchery brood stock with another stock of different run timing requires PAR and FTP permitting, along with brood stock collection and introduction to the hatchery. FY95 funding will be directed at stock identification, permitting and initial brood sampling if feasible.

**3. Evaluation:** Critical to the success of either remote release hatchery fish or developing a new run timing stock is the evaluation program. Elements of the evaluation program include:

- a. test fishing to determine whether natural stocks migrate through the proposed fishing area surrounding a remote release location, and the interception rate;
- b. CWT/otolith marking fish to evaluate return run strength, and straying; <u>Coded micro wire tagging</u>: Refer to Project Proposal 95137, 95320: Stock ID and Monitoring Studies. <u>Thermal manipulation of otolith</u> <u>microstructure</u> Contained in Project Proposal 95320C, Otolith thermal mass marking.
- c. genetic monitoring to determine whether geneflow occurs between remote released fish and natural spawning populations in the area of the remote release.
- d. analysis of harvest stock composition to determine at what level injured stocks are being harvested both pre and post hatchery releases.
- 4. Logistics: Logistical support will be provided by the <u>Native Village of Eyak Tribal</u> <u>Council</u> and include locally owned vessels with local resident crews and technical teams. Inventories, census, fish sampling, eggtakes, pen rearing acclimation, and other activities will involve the logistical support services.

One vessel and team will be required for inventory, assessment and sampling in each of five sectors as described in the overview proposal. Historic observations indicate that early returning salmon stocks spawn in the Eastern and Southeastern Districts. Therefore, two vessels and technical teams are to be deployed to those sectors from June 15 through July 31. Beginning August 1, five vessels and crews are to be deployed, one to each sector of PWS during the mid and late salmon return, and remain in the field until September 25. The project leader and field technicians trained and assigned to each vessel and sector will survey, sample, monitor, compile data and report as required. Additional assignments may include, based on restoration requirements, taking eggs, managing net pens, rearing fry for acclimation, or other restoration activities.

A detailed cooperative agreement established between PWSAC, Native Village of Eyak Tribal Council, and UAF-SFOS establishes the collaborative responsibilities.

#### VI. Schedule for FY95

| Activity   | Begin | End  |
|--|-------|------|
| Evaluate hatchery capabilities<br>Analyze water temp. and flow | 1/95  | 2/95 |

| Activity                                      | Begin         | End   |
|---|---------------|-------|
| Review incubation and facility<br>floor plans | 2/95          | 3/95  |
| Compute species/stock limitations             | 2/95          | 3/95  |
| Report on recommendations                     | <b>3/9</b> 5  | 4/95  |
| Literature search                             | £             |       |
| Review literature                             | - 1/95        | 2/95  |
| Identify remote release sites and             | 2/95          | 2/95  |
| possible early run salmon stocks              | 3.4 4 × 51 3. |       |
| NEPA compliance                               | • .           | 1     |
| Complete NEPA requirements as                 | 2/95          | 4/95  |
| required                                      |               |       |
| Develop and deploy logistical support         |               |       |
| Contract vessels and crews                    | 5/95          | 5/95  |
| Contract technicians                          | 5/95          | 6/95  |
| Train field crews                             | 5/95          | 6/95  |
| Deploy vessels                                | 6/95          | 10/95 |
| Inventory and assessment                      |               |       |
| Stock/stream surveys                          | 6/95          | 10/95 |
| Census/phenotypes                             | 6/95          | 10/95 |
| Take fish samples/genotypes                   | 6/95          | 10/95 |
| Analyze for pathogens/parasites               | 6/95          | 10/95 |
| Remote release hatchery fish                  |               |       |
| Permitting as required                        | 2/95          | 5/95  |
| Deploy net pens                               | 5/95          | 5/95  |
| Transport fry                                 | 5/95          | 5/95  |
| Pen rear, acclimate & release fry             | 5/95          | 5/95  |
| Recover marks/tags                            | 1996          |       |
| Evaluate & revise plan                        | 1996          |       |
| Evaluate remote terminal harvest area         |               |       |
| Test fish area                                | 8/95          | 9/95  |
| Evaluate migrating stock<br>interception rate | 9/95          | 10/95 |
| Identify early run time brood stock           |               |       |
| Review phenotype inventory                    | 6/95          | 7/95  |
| Assess stock population                       | 7/95          | 8/95  |
| Permitting as required                        | 6/95          | 9/95  |
| Take eggs to initiate hatchery                | 7/95          | 9/95  |
| brood replacement                             |               |       |
| Report  | 9/95          | 10/95 |

#### VII. Technical support

Technical support will include the services of:

- PWSAC planning, project management and fish culture staff
- ADF&G biologists and technicians
- University of Alaska geneticists
- ADF&G pathologist
- permitting agencies including ADF&G, Department of Army, Corps
  - of Engineers, Department of Natural Besources
- ADF&G otolith mark analysis lab

#### VIII. Location

This project will take place in Prince William Sound. Specific locations for remote releasing hatchery salmon are yet to be determined. Stock inventories will take place throughout 5 sectors delineating PWS for this subproject.

#### IX. Project Implementation

PWSAC will implement the project in conjunction with the Native Village of Eyak Tribal Council, University of Alaska, School of Fisheries and Ocean Sciences, and with ADF&G as the lead agency.

#### X. Coordination of Integrated Research Effort

PWSAC will be responsible for coordinating activities under this proposal including research, restoration and monitoring. Activities of the oiled injured stock restoration subproject will be integrated with previously funded and proposed genetic investigations, stream analyses, stock identification and monitoring studies, and otolith marking.

#### XI. Public Process

PWSAC is a regional association which by law (AS 16.05.380.) must include on their boards representatives of sport fishermen, municipalities, and Native organizations, in addition to commercial fishermen and processors. It is PWSAC's mission to optimally produce salmon for the benefit of all user groups.

As a mechanism to restore PWS salmon resources and services, the PWSAC salmon restoration project will incorporate existing research results achieved through projects previously and currently funded by the EVOS Trustee Council process. In addition, NEPA and agency permitting processes are open to public review. Further, remote release projects will be reviewed by the PWS/Copper River Regional Planning Team which conducts business in a public forum for open discussion at the planning phase of project definition.

#### XII. Personnel Qualifications

#### **PWSAC**

<u>.</u>.

#### **B. Roys**

President, CEO B.S. Wildlife Management, University of Massachusetts Fisheries biology, fisheries management, organizational management.

#### H.J. Ferren

Special Project Manager, Planner Manager

#### Eric Prestegard

Fisheries Manager A.A. Fisheries Fish culture, fisheries research, quality control, fisheries management.

#### C. Kerns

Principal Fish Culturist M.S. Fisheries Biology, Michigan State University Chairman Alaska Fisheries Council (1979-83); President American Fisheries Society (1983-84); Certified Fisheries Scientist; Former Associate Professor, University of Alaska; Management in fish nutrition research.

Native Village of Eyak Tribal Council

#### **B. Henrichs**

President Native; fisherman; vessel coordination and logistics.

#### D. Daisy

B.S. Fisheries, University of Massachusetts Fisheries Rehabilitation Program Manager (ADF&G); Consultant in fisheries development and aquaculture.

University of Alaska, SFOS

#### W.W. Smoker

Professor of Fisheries, SFOS. PhD Fisheries, Oregon State Univ. Research in salmon ocean ranching, quantitative genetics of Pacific salmon.

#### A.J. Gharrett

Professor of Genetics, SFOS PhD Genetics, Oregon State Univ Research on molecular genetics, population genetics of Pacific salmon. Recognized expert on population genetics of Pacific salmon, Genetic Stock Identification, genetic tagging.

#### Patricia A. Crandell

Postdoctoral Fellow and Research Associate, SFOS PhD Aquaculture Genetics, Biometrics Univ. of Calif Davis Research on quantitative genetics of pink salmon, ploidy manipulation in Pacific salmon Expertise in experimental design and statistical analysis.

#### Andrew Gray

Research Associate, SFOS

MS Genetics, Washington State University

Molecular genetics techniques, Electrophoretic analysis of allozymes, DNA analysis

÷

#### XIII. Budget

| Subproject 95093-B       |             |         |                  |        |
|--------------------------|-------------|---------|------------------|--------|
|                          | PWSAC       | EYAK    | UAF              | ADF&G  |
|                          |             |         |                  |        |
| 100 Personnel            | \$194.1     | \$129.3 | \$184.5          | \$0.0  |
| 200 Travel               | \$30.3      | \$32.6  | \$7.2            | \$0.0  |
| 300 Contractual Services | \$30.0      | \$526.5 | \$16.0           | \$50.0 |
| Administration           | \$65.2      | \$107.8 | \$11 <b>1</b> .9 | \$2.5  |
| 400 Commodities          | \$62.0      | \$21.6  | \$40.0           | \$0.0  |
| 500 Equipment/capital    | \$118.0     | \$8.5   | \$200.0          | \$0.0  |
| PROJECT BUDGETS          | \$499.6     | \$826.3 | \$559 <b>.6</b>  | \$52.5 |
| TOTAL PROJECT BUDGE      | Г \$1,938.0 | )       |                  |        |

**NOTE:** If Subprojects-A or -C are funded, then the total of Subproject-B will reduce to \$1,120,636 by elimination of activities and cost duplications. This presents a saving of more than \$800,000.

#### References

1. Final Environmental Impact Statement for the *Exxon Valdez* Oil Spill Restoration Plan. *Exxon Valdez* Oil Spill Trustee Council. 1994.

#### EXXON VALDEZ OIL SPILL BRIEF PROJECT DESCRIPTION

| Project Title:    | Restoration of 3 Salmon Stocks Important to Subsistence   |
|-------------------|---|
| Project Number:   | 95093-C   |
| Project Leader:   | Howard Ferren, Special Projects Manager   |
| Lead Agency:      | AK. Dept. of Fish and Game (ADF&G) NOV 0 8 1994   |
| Cost of Project:  | FY95: \$1,009.6 FY96 \$1,021.0 EXXON VALDEZ OIL SPILL<br>(Note: if funded with Subproject-A, cost JAUSTEE COUNCIL<br>\$280.7) |
| Start/Completion: | January, 1995 - September, 1995   |
| Project Duration: | 0.75 yr.  |
| Geographic Area:  | Prince William Sound  |
| Contact Person:   | Howard Ferren, Special Projects Manager<br>PWSAC, P.O. Box 1110, Cordova, AK 99574<br>(907) 424-7511                          |
| •• • •            |   |

#### II. Introduction

A Sec.

Following the *Exxon Valdez* oil spill (EVOS) Alaska Department of Fish and Game (ADF&G) initiated surveys in Prince William Sound (PWS) and found 106 oiled anadromous streams<sup>1</sup>. The EVOS Trustee Council has concluded that pink salmon resources are damaged and non recovering. In addition to salmon resources, other subsistence resources were affected by the spill including many marine invertebrates, birds, and marine mammals. Per capita subsistence harvevst ranged from nearly 200 pounds to over 600 pounds per year<sup>2</sup> pre spill and were reduced 4% to 77% immediately following the spill. Harvest levels in some villages including Chenega Bay and Tatitlek continue at low levels. Not only has subsistence harvesting been disrupted, but traditional cultural patterns of social interaction surrounding the harvesting of local resources have been disrupted<sup>2</sup>.

#### III. Need for Project

Injured and lost resources important to subsistence harvesters must be restored or replaced to provide both the resource base of the community and to re-instill traditional cultural patterns surrounding subsistence harvest and resource use. This project is designed to seek out identifiable depleted salmon stocks important to subsistence users and to restore those stocks through supplementation procedures outlined in subproject 95093-A.

In addition to the primary purpose of replacing and supplementing subsistence resources, the subproject will provide experimentation controls for the geneflow and quantitative genetic analysis components of 95093-A.

#### IV. Objectives

- A. Restore wild stock salmon resources and services in PWS to pre-spill conditions.
- B. Maximize fitness (both biologic and economic) of injured wild stocks through application of knowledge of salmon population biology, genetics and disease.
- C. Restore salmon stocks in three streams important to subsistence users to replace injured or lost resources and services.
- Provide experimental control groups for subproject 95093-A 
  supplements stocks in oil impacted streams.
  - V. Methods
  - 1. Inventory and assessment: This component will have both literature and infield aspects. Residents of PWS native communities Tatitlek and Chenega, and native residents in Cordova and Valdez, as well as natural resource and anthropological expertise at Chugach Corporation will be contacted for guidance on target streams/stocks. Literature will be reviewed and in-field observations conducted at potential streams. Salmon stocks will be censused and inventoried for phenotype and genotype. Samples will be taken for pathogen and parasite assessment. Facilities will be assessed for water regime and possible modifications to suit supplementation requirements.
  - 2. Implementation: Implementation will have several phases including stream survey, substrate sampling, brood stock collection and sampling, eggtake, egg transport to supplementation facility, incubation, thermal marking, return of fry to natal stream for net pen rearing and acclimation. All necessary permitting including hatchery permit alterations (PAR), fry transport permits (FTP), Alaska Coastal Consistency Review, DNR Tideland's lease and bonding, Army Corps anchoring permit, and U.S. Coast Guard anchoring permit must be obtained.
  - **3. Evaluation:** Supplementation will be evaluated as a tool for restoring and/or replacing lost or damaged subsistence resources. This can be achieved by evaluating supplementation egg to fry survivals, acclimation success by adult homing, adult survivals for seeding the habitat, and pattern changes in subsistence use of the resource.

Stocks selected for subsistence restoration will also provide the control experiments required to evaluate supplementation within oil impacted streams (subproject **95093-A**). The experimental control process is to include:

4

- a. <u>Straying/gene flow field experiment: (SFOS Division of Fisheries)</u>
  - This research is modelled on earlier work on pink salmon at Auke Creek in Juneau by A.J. Gharrett and colleagues. Straying may be estimated by observing physically marked or tagged salmon; however, straying is only one component of gene flow--strays may well not breed successfully to contribute genetically. Our proposed protocol is to screen male returning salmon at a weir, allowing about 20%, those bearing a relatively rare presumably neutral gene, to spawn naturally. This procedure genetically

tags the stock; applied with different marker genes to two stocks in the same region, a precise estimate of actual gene flow can be obtained by simple monitoring of the stocks over several generations. Integrates with Project Proposal 95076 by Wertheimer, et al.

<u>b.</u> Fitness phenotype laboratory experiment: quantitative genetic analysis of life history and fitness traits. (SFOS Division of Fisheries)
 This research is developed from earlier work on pinkl salmon at Auke Creek and at Gastineau Hatchery by W.W. Smoker, P.A. Crandell, and colleagues. Gametes sampled from known parents in stocks under restoration will be taken to the section laboratory at Juneau and observed under a standard quantitative genetic experimental design. Analysis of observations of fitness-related developmental traits (rates of development, salinity tolerance, etc.) and developmental stability (fluctuating asymmetry of meristic and morphologic traits) will provide estimates of genetic parameters, and from observations of hybrid families, direct estimates of the fitness effects of gene introgression.

Car In

میں <sup>م</sup>ی<mark>ہ</mark>۔

c. Analysis of fitness effects on natural spawning stocks of interactions with cultured fish based on observed PWS data. (SFOS Division of Fisheries) Recent biometrical simulations of hypothetical salmon production systems, modelled on PWS pink salmon, by AJ Gharrett have demonstrated a relationship between ecological productivity (carrying capacity) and the overall fitness benefit of homing or straying. These models will provide a basis for analyzing with biometrical rigor the straying, gene flow, population genetic structure, and quantitative fitness variation data collected by other components of this integrated project.

Requisite to a thorough evaluation of the supplementation process, fish incubated at facilities must be marked for later identification. Therefore, additional methods employed in this subproject must include:

<u>a.</u> <u>Coded micro wire tagging</u>: Refer to Project Proposal 95137, 95320: Stock ID and Monitoring Studies.

b. Thermal manipulation of otolith microstructure Contained in Project Proposal 95320C, Otolith thermal mass marking.

4. Logistics: Logistical support will be provided by the <u>Native Village of Eyak Tribal</u> <u>Council</u> and include locally owned vessels with local resident crews and technical teams. Inventories, sampling, egg takes, pen rearing acclimation, and other activities will involve the logistical support services.

One vessel and team will be required for habitat assessment, salmon stock inventory, fish sampling and eggtake. Three vessels and crews will be required during fry pen rearing and acclimation. A detailed cooperative agreement established between PWSAC, Native Village of Eyak Tribal Council, and UAF-SFOS establishes the collaborative responsibilities.

3

### VI. Schedule for FY95

· .

.

| NOTE: | The schedule is presented for FY95. Specific objectives and activities are |
|-------|--|
|       | intended to occur annually to encompass two (2) life cycles for both odd   |
|       | year and even year pink salmon.  |

| Activity  | Begin  | End   |
|---|--------|-------|
| Evaluate hatchery capabilities                            |        |       |
| Analyze facilities' water temperature                     | 1/95   | 2/95  |
| and water flows   | 19. ž. |       |
| Review incubation and facility<br>floor plans             | 2/95   | 3/95  |
| Compute species/stock limitations                         | 2/95   | 3/95  |
| Report on recommendations                                 | 3/95   | 4/95  |
| Literature and subsistence user review                    |        |       |
| Review literature   | 1/95   | 2/95  |
| Obtain guidence from subsistence users                    | 1/95   | 3/95  |
| Identify injured stocks for<br>supplementation activities | 2/95   | 3/95  |
| NEPA compliance   |        |       |
| Complete NEPA requirements                                | 2/95   | 4/95  |
| Develop and deploy logistical support                     |        |       |
| Contract vessels and crews                                | 5/95   | 5/95  |
| Contract technicians                                      | 5/95   | 6/95  |
| Train field crews   | 5/95   | 6/95  |
| Inventory and assessment                                  |        |       |
| Stock surveys   | 7/95   | 10/95 |
| Census/phenotypes   | 7/95   | 10/95 |
| Take fish samples   | 7/95   | 10/95 |
| Analyze for pathogens/parasites                           | 8/95   | 9/95  |
| Assess stream conditions                                  |        | •     |
| Collect stream gravel samples                             | 6/95   | 7/95  |
| Analyze samples   | 6/95   | 8/95  |
| Direct restoration  |        |       |
| Collect eggs from streams                                 | 8/95   | 9/95  |
| Incubate embryos  | 9/95   | 12/95 |
| CWT/otolith mark embryos                                  | 9/95   | 10/95 |
| Pen rear, acclimate & release fry                         | 1996   |       |
| Recover marks/tags  | 1997   |       |
| Evaluate & revise plan                                    | 1997   |       |

| Activity                                | ٠        | Begin   | End   |
|---|----------|---------|-------|
| Geneflow field experiment               |          |         |       |
| Establish genetic tag                   |          | 7/95    | 9/95  |
| Sample returns                          |          | ·• 1997 |       |
| Analyze gene flow                       |          | 1997    |       |
| Report                                  |          | 1998    |       |
| Quantitative genetic analysis of        |          |         | e*    |
| fitness traits                          | •        |         |       |
| Sample gametes in field                 | 2        | 7/95    | 10/95 |
| Incubate embryos in lab and gather data | annan a' | - 10/95 | 1996  |
| Analyze                                 |          | 1996    |       |
| Report                                  |          | 1997    |       |
| Model fitness effects of genetic        |          |         |       |
| interactions; develop simulation        |          |         |       |
| models for:                             |          |         |       |
| Gene flow and drift                     |          | 2/95    | 11/95 |
| Single locus selection                  |          | 7/95    | 1996  |
| Quantitative/fitness trait              |          | 12/95   | 1997  |
| population dynamics                     |          | 1996    | 1997  |
| Report                                  |          | 9/95    | 10/95 |

#### VII. Technical support

....

Technical support will include the services of:

- PWSAC planning, project management and fish culture staff
- ADF&G biologists and technicians
- University of Alaska geneticists
- ADF&G pathologist
- permitting agencies including ADF&G, Department of Army, Corps of Engineers, Department of Natural Resources
- ADF&G otolith mark analysis lab

\*

#### VIII. Location

This project will take place in Prince William Sound. Specific streams identified or supported by subsistence users will be selected as sites for supplementation.

#### IX. Project Implementation

PWSAC will implement the project in conjunction with the Native Village of Eyak Tribal Council, University of Alaska, School of Fisheries and Ocean Sciences, and with ADF&G as the lead agency.

#### X. Coordination of Integrated Research Effort

PWSAC will be responsible for coordinating activities under this proposal including research, restoration and monitoring. Activities of the subsistence restoration subproject will be integrated with previously funded and proposed genetic investigations, stream analyses, stock identification and monitoring studies, and otolith marking.

#### XI. Public Process

PWSAC is a regional association having representatives from various usergroups, communities and businesses seated as the Board of Directors. The Board has authorized this subproject and suite of salmon projects under the title of <u>Restoration of PWS Natural Spawning Stock Salmon Resources and Services</u> <u>Overview: An Integrated and Collaborative Approach</u>. The project has had wide exposure and endorsement throughout PWS. In addition, **NEPA** requirements will be met prior to stream supplementation activities.

#### XII. Personnel Qualifications

#### **PWSAC**

#### B. Roys

President, CEO B.S. Wildlife Management, University of Massachusetts Fisheries biology, fisheries management, organizational management.

#### H.J. Ferren

Special Project Manager, Planner M.S. Biological Oceanography, University of Alaska Corporate strategic and tactical planning, regional salmon planning, team facilitation and project management.

#### **Eric Prestegard**

Fisheries Manager A.A. Fisheries Fish culture, fisheries research, quality control, fisheries management.

#### C. Kerns

Principal Fish Culturist M.S. Fisheries Biology, Michigan State University Chairman Alaska Fisheries Council (1979-83); President American Fisheries Society (1983-84); Certified Fisheries Scientist; Former Associate Professor, University of Alaska; Management in fish nutrition research.

#### Native Village of Eyak Tribal Council

#### **B. Henrichs**

President Native; fisherman; vessel coordination and logistics.

#### D. Daisy

B.S. Fisheries, University of Massachusetts Fisheries Rehabilitation Program Manager (ADF&G); Consultant in fisheries development and aquaculture.

#### University of Alaska, SFOS

#### W.W. Smoker

Professor of Fisheries, SFOS. PhD Fisheries, Oregon State Univ. Research in salmon ocean ranching, quantitative genetics of Pacific salmon.

#### A.J. Gharrett

Professor of Genetics, SFOS PhD Genetics, Oregon State Univ Research on molecular genetics, population genetics of Pacific salmon. Recognized expert on population genetics of Pacific salmon, Genetic Stock Identification, genetic tagging

#### Patricia A. Crandell

Postdoctoral Fellow and Research Associate, SFOS PhD Aquaculture Genetics, Biometrics Univ. of Calif Davis Research on quantitative genetics of pink salmon, ploidy manipulation in Pacific salmon Expertise in experimental design and statistical analysis.

#### Andrew Gray

Research Associate, SFOS MS Genetics, Washington State University Molecular genetics techniques, Electrophoretic analysis of allozymes, DNA analysis

#### XIII. Budget

. . . .

| TOTAL PROJECT BUDGET     | Г \$1,009.6  | *        | -       | -                |   |
|--------------------------|--------------|----------|---------|------------------|---|
| PROJECT BUDGETS          | \$122.6      | \$248.6  | \$559.6 | ∽≕ <b>\$78:8</b> |   |
| 500 Equipment/capital    | <b>\$0.0</b> | \$8,5    | \$200.0 | \$0.0            | - |
| 400 Commodities          | \$7.0        | \$4.3    | \$40.0  | \$0.0            |   |
| Administration           | \$16.0       | \$32.4 - | \$111.9 | \$3.8 - •        |   |
| 300 Contractual Services | \$0.0        | \$61.5   | \$16.0  | \$75.0           |   |
| 200 Travel               | \$19.1       | \$12.6   | \$7.2   | \$0.0            |   |
| 100 Personnel            | \$80.5       | \$129.3  | \$184.5 | \$0.0            |   |
|                          | PWSAC        | EYAK     | UAF     | ADF&G            |   |
| Subproject 95093-C       |              |          |         |                  |   |

**NOTE:** If Subproject-A is funded, then cost of Subproject-C is reduced to \$280,750 by elimination of activities and cost duplications. Conversely, if C is funded, then costs of Subproject-A are reduced to a similar amount. Total cost if both A and C are funded is \$1,290,229. Funded separately, the projects will cost in excess of \$2,000,000.

#### References

- 1. Alaska Department of Fish and Game, *Exxon Valdez* Oil Spill Response Operations Report Habitat Division 1989-1992. June 1992.
- 2. Draft *Exxon Valdez* Oil Spill Restoration Plan. *Exxon Valdez* Oil Spill Trustee Council. 1993.

8

Page

## Exxon Valdez il Spill Trustee Cour

**Report to the Public Advisory Group** 

## Public Comments on the Draft Fiscal Year 1995 Work Plan



This report presents comments received on the Draft Fiscal Year 1995 Work Plan including letters, phone calls, and comments given at the September 28 public hearing. The comment period began when the Draft Fiscal Year 1995 Work Plan was published in August. Comments were to be postmarked by October 3rd 1994, though this report includes all comments received through October 11th (a few were late). This report does not include letters that address other parts of the restoration program: habitat protection, the EIS for the improvements to the Institute of Marine Science at Seward, or the EIS for the Draft Restoration Plan.

The transcript of the September 28th public meeting is not yet available. However, notes of the comments given at that meeting are incorporated in this Summary of Public Comments.

### Table of Contents

| Summary of Public Comments   |
|--|
| 95013 & 95014; Killer Whale Projects submitted by the North Gulf Oceanic Society 1   |
| 95093 & 95024; Pink Salmon Restoration submitted by PWS Aquaculture Corporation      |
| and the Native Village of Eyak 2   |
| 95131: Clam Restoration submitted by the Nanwalek and Port Graham Village Councils 2 |
| 95115: Sound Waste Management Plan submitted by the Prince William Sound Economic    |
| Development Council  |
| Other Projects   |
| Letters Disputing Project Critiques  |
| Other Issue: Competition in the Work Plan  |
|  |
| List of Respondents (letters only, not verbal comments) 5                            |
| Letters Received   |
|  |
|  |
|  |
| NOV 0 8 1994   |
| EXXON VALUEZ OIL SPILL<br>TRUSTEE COUNCIL<br>ADMINISTRATIVE RECORD                   |

## **Summary of Public Comments**

#### 95013 & 95014; Killer Whale Projects submitted by the North Gulf Oceanic Society.

95013: Killer Whale Monitoring in Prince William Sound

95014: Predation by Killer Whales in PWS: Feeding Behavior and Distribution of Predators and Prey.

Twenty-seven written comments including 14 postcards supported these projects as submitted by the North Gulf Oceanic Society. Comments came from many regions of Alaska, mainland US, and one from Canada. Most comments attested to the worthiness of the projects, and many attested to the qualifications of the North Gulf Oceanic Society and Craig Matkin, the principal investigator. These included letters from:

Scientific Program Director of the Marine Mammal Commission Lecturer at University of California, Santa Cruz Woods Hole Oceanographic Institution Vancouver Aquarium (Vancouver, British Columbia) An Ecologist with the US Fish &Wildlife Service

Many comments, including some of those listed above, contrasted the proposals with two very similar proposals submitted by NOAA. These comments concluded that the North Gulf Oceanic Society proposals were superior to NOAA's. No comments were received that recommended NOAA's proposals, either in general or over the North Gulf Oceanic Society's submission.

Craig Matkin also wrote a letter contrasting the two sets of proposals. Finally, one letter recommended expanding the proposed monitoring to all killer whales in Prince William Sound, not just the AB pod.

Summary of Public Comments on the Draft 1995 Work Plan

- 1 -

10/11/94

# 95093 & 95024; Pink Salmon Restoration submitted by PWS Aquaculture Corporation and the Native Village of Eyak.

95093: Restoration of Pink Salmon Resources and Services (PWS Aquaculture Corporation)

95024: Enhancement of Wild Pink Salmon Stocks (Native Village of Eyak)

Eleven letters and seven people at the public meeting endorsed these projects. Respondents supported the projects because of their importance in restoring wild pink salmon stocks. Many respondents mentioned the qualification of the three teams working together: PWSAC, the Native Village of Eyak, and the University of Alaska. Some comments stressed how these projects involve the people most affected by the spill in restoration. Finally, some also addressed the perceived legal issue, and disputed that an EIS is necessary. Organizations endorsing the project include:

Prince William Sound Aquaculture Corporation The Native Village of Eyak Cordova District Fishermen United Cordova Sporting Club Beauty Seafoods, Inc. Pacific Processors, Inc. Silver Lining Seafoods

95131: Clam Restoration submitted by the Nanwalek and Port Graham Village Councils. One letter and six individuals at the public meeting endorsed project 95131. These individuals endorsed the project to help injured clam populations and subsistence. They attested that the technique is available and the project important. Supporters include representatives of the following organizations:

Chugachmuit Qutekcak Native Tribe of Seward Shellfish Hatchery (in Seward)

**95115:** Sound Waste Management Plan submitted by the Prince William Sound Economic Development Council. Five letters and one individual at the public meeting endorsed project 95115. A typical endorsement cited the need to "mitigate the amount of oil and other waste effluent...entering the waters of Prince William Sound." Organizational endorsements were received from:

Resolution from the Cordova City Council Resolution from the Valdez City Council Resolution from the Whittier City Council Chugach Alaska Corporation Chugachmuit

Summary of Public Comments on the Draft 1995 Work Plan - 2 -

**SEA Plan:** Prince William Sound Systems Investigations. Five individuals including one representing Cordova District Fishermen United endorsed continuing funding for the SEA Plan which includes a variety of projects. They cited the importance of the continuing research for pink salmon and herring in Prince William Sound.

Other Projects. Many other projects received one or two comments in a letter or at the meeting. They are listed below.

- 95027: Kodiak Shoreline Assessment. Endorsed by the Mayor of Kodiak Borough at the public meeting who said it was needed and was one of the only projects that affected Kodiak issues. Also, Angeline Campfield, President of Ouzinkie Tribal Council, called the restoration office to affirm her support for the project. She said the project was important because many people in Ouzinkie are still afraid to eat-subsistence foods because of the possibility of oil contamination.
- 95124A, 95134: Tatitlek and Chenega Bay Mariculture Development. One individual endorsed these at the public meeting.
- 95139D: Salmon Instream Habitat and Stock Restoration Pink Creek and Horse Marine Barrier Bypass Development. Endorsed by the Mayor of Kodiak Borough.
- 95163: Forage Fish Investigations. Endorsed by one individual at the meeting.
- 95290: NOAA Hydrocarbon Data Analysis. Endorsed by one individual at the meeting.
- One individual submitted a letter that addressed most of the work plan projects: endorsing some, opposing others. This letter is difficult to summarize (letter 47).
- Seabird restoration projects. Support from the Pacific Seabird Group (letter 46).
- One person supported a new idea not in the work plan to revitalize the Cordova-area crab and clam industries by deporting all but 300 sea otters from the Cordova area to central and southern Prince William Sound, and then to restock clam and crab populations around Cordova (letter 48).

Letters Disputing Project Critiques. The Draft Work Plan Summary contained notes that explained criticisms of a project, or reasons why a project was not rated into Category #1. Some proposers wrote letters disputing those critiques.

- 95002: Leave no Trace Education Program; and 95077: Recreation Impacts to PWS: Human Impacts as Factor Constraining Long Term Ecosystem Recovery. The National Outdoor Leadership School disputed the claim that there is a lack of a strong rationale of the need to investigate human impacts, and that there is no evidence that recreation is having a significant impact on recovery. One element of the dispute was that wilderness is listed as a resource and that recreation is certainly affecting wilderness areas and qualities (letter 49).
- 95038: Symposium on Seabird Restoration. Critique cited lack of publication of results, and suggested that symposium be held as part of the regular Pacific Seabird Group annual meeting. Proposer provided methods of publishing results and cited reasons why restoration would be aided by a symposium in Alaska rather than as part of the annual Group meeting (letter 46).

Summary of Public Comments on the Draft 1995 Work Plan 10/11/94

- 95042: Five-year Plan to Remove Predators from Seabird Colonies. Proposer disputes claim that this project is any more agency management than projects which overlap agency monitoring efforts such as projects 95159, 95013, 95052, and 95064. Also objects to limiting seabird restoration to area "the Trustee council has identified as the spill area." Finally, proposes that other injured seabirds be added to the list of injured resources and be the subject of restoration (letter 46).
- 95079: Pink Salmon Restoration Through Small-scale Hatcheries. Disputed legal concern because this project is similar to 95024 and 95069 which were rated as Category 2 and appear to be receiving active consideration (letter 50).
- 95086A: Coastal Habitat Intertidal Monitoring and Experimental Design Verification. Proposer addresses a alleged misconception concerning the design verification (letter 51).
- 95029 and 95030: Bald Eagle Population and Productivity Survey. Writer disputes scientific review that productivity is the better way to assess the recovery status and health of the population. Thus, would reverse the priority given by the scientific review and would fund population survey before a productivity survey (letter 53).

Other Issue: Competition in the Work Plan. Letter 54 raised the issue of competition in the work plan process. LGL, Alaska Research Associates, Inc., expressed dismay about how private industry is excluded from the process. They believe they were told that "Invitation to Submit Restoration Projects" sought "ideas" and that the work plan would identify two tracks: one for agency implementation, one for competitive implementation. Instead, the work plan appears to be a package of projects that will be funded without competition.

They also claim that it is very difficult, if not impossible, for private industry to fairly compete for work because agencies have all the data and information, little of which is available in the form of published, peer-reviewed reports. They also recommend that the monitoring program be re-cast into an issue-based synthesis, integration, and assessment program that could be efficiently conducted by private industry.

Finally, they write that the private sector has the demonstrated ability to complete much of projects 95191b, 95255, and 95165 which should be competitively contracted. They strongly recommend that Trustee Council funds not be used to build a molecular genetics program in government agencies when equipment and personnel are already available in the private sector and universities.

- 4 -

2

## List of Respondent

The letter number refers to the list of letters that follows this list. The list contains respondents who responded by letter only. The transcript of the September 28th public meeting is not yet available, but notes on the verbal comments are incorporated in the Summary of Public comments.

| Primary Topic | Name  | <b>Location</b>    | <u>Letter No.</u> |
|---------------|---|--------------------|-------------------|
| 95013 & 95014 | John D, Lyle                                  | Fairbanks, AK      | 1                 |
|               | Robert Hofman                                 | Washington, DC     | 2                 |
|               | Marine Mammal Commission                      | ۲۵۳                |                   |
| • *           | Paul McCollum<br>Broadcast Services of Alaska | Homer, AK          | 3                 |
|               | Robert H. Widman, Ed.D.                       | Santa Cruz, CA     | . 4               |
|               | Tex Edwards                                   | Fritz Creek AK     | 5                 |
|               | Michael I Moore                               | Woods Hole MA      | 5                 |
|               | Woods Hole Oceanographic Institution          | 110003 11010, 1111 | Ŭ                 |
|               | Judy Lietzau                                  | Cordova AK         | 7                 |
|               | William Dunne                                 | Fritz Creek AK     | 8                 |
|               | John K.B. Ford. Ph D                          | Canada             | 9                 |
|               | Vancouver Aquarium                            | Culluou            |                   |
|               | Bonnie S. Schwahn                             | Valdez, AK         | 10                |
|               | PWS Conservation Alliance                     | ·,                 | 10                |
|               | Dan Strickland                                | Palmer, AK         | 11                |
|               | Gary Williams                                 | Whittier, AK       | 12                |
|               | Michael Feraudo                               | Homer, AK          | 13                |
|               | Lisa Whip                                     | Homer, AK          | 14                |
|               | Jan Straley                                   | Sitka, AK          | 15                |
|               | Lisa Whip                                     | Homer, AK          | 16                |
|               | Dan McGanhey                                  | Whittier, AK       | 17                |
|               | Kirsten England                               | Gustavus, AK       | 18                |
| ···· ,        | Liz Senear                                    | Cordova, AK        | 19                |
|               | Nancy Lord                                    | Homer, AK          | 20                |
|               | Pete & Marilynn Heddel<br>Honey Charters      | Whittier, AK       | 21                |
|               | Ed Berg<br>Kenai National Wildlife Refuge     | Soldotna, AK       | 22                |
|               | Rick & Sonia Corazza                          | Homer, AK          | 23                |
|               | Eric Knudtsen                                 | Homer, AK          | 24                |
|               | Barbara Seaman                                | Homer, AK          | 25                |
|               | Bob Childers                                  | Anchorage, AK      | 26                |
| 95013, 95014  | Craig O. Matkin                               | Homer, AK          | 27                |
| ,-            | North Gulf Oceanic Society                    | ,                  |                   |
| 95093 & 95024 | Ken Roemhildt                                 | Cordova, AK        | 28                |
|               | North Pacific Processors, Inc.                | -                  |                   |
|               | Bud Perrine                                   | Cordova, AK        | 29                |

10/11/94

| Primary Topic | Name 6                               | <u>Jation</u>          | Letter No. |
|---------------|--------------------------------------|------------------------|------------|
|               | William Gilbert                      | Cadova, AK             | 30         |
|               | Silver Lining Seafoods               |                        |            |
|               | Ed Zeine                             | Cordova, AK            | 31         |
|               | Cordova Sporting Club                |                        |            |
|               | Emil "Beaver" Nelson                 | Homer, AK              | 32         |
|               | Stuart L. Deal                       | Anchorage, AK          | 33         |
|               | Hap Symmonds                         | Cordova, AK            | 34         |
|               | Ocean Beauty Seafoods, Inc.          |                        |            |
|               | Katherine G. Halgren                 | Seattle, WA            | 35         |
|               | Kenneth Adams                        | Cordova, AK            | 36         |
|               | Gerald McCune                        | Cordova, AK            | 37         |
|               | Cordova District Fishermen United    |                        |            |
|               | Bob Roys                             | Cordova, AK            | 38         |
|               | PWS Aquaculture Corporation          |                        |            |
|               | Scott Janke                          | Cordova, AK            | 39         |
|               | City of Cordova                      |                        |            |
| 95131         | Jeff Hetrick                         | Moose Pass, AK         | 40         |
| 95115         | Michael E. Brown                     | Anchorage, AK          | 41         |
|               | Chugach Alaska Corporation           |                        |            |
|               | Margy Johnson, Mayor                 | Cordova, AK            | 42         |
|               | City of Cordova                      |                        |            |
|               | Jeanne Donald                        | Valdez, AK             | 43         |
|               | City of Valdez                       |                        |            |
|               | Ben Butler                           | Valdez, AK             | 44         |
|               | City of Valdez                       |                        |            |
|               | Paul G. Jackson                      | Anchorage, AK          | 45         |
|               | Chugachmuit                          |                        |            |
| 95038 et al   | Craig Harrison                       | Virginia               | 46         |
|               | Pacific Seabird Group                |                        |            |
| Most projects | Kendra Zamzow                        | Cordova, AK            | 47         |
| New idea      | David Werner                         | Cordova, AK            | 48         |
| 95002 & 95077 | Don Ford                             | Palmer, AK             | 49         |
|               | National Outdoor Leadership School   |                        |            |
| 95079         | Jack M. Van Hyning                   | Fairbanks, AK          | 50         |
|               | NERKA, Incorporated                  |                        |            |
| 95086A        | Mike Stekoll                         | Juneau, AK             | 51         |
|               | University of Alaska                 |                        |            |
| 95114         | Tom Kline                            | Fairbanks, AK          | 52         |
|               | PWS Science Center                   |                        |            |
| 95029 & 95030 | Timothy Bowman                       | Anchorage, AK          | 53         |
| Competition   | William J. Wilson                    | Anchorage, AK          | 54         |
|               | LGL Alaska Research Associates, Inc. | <b>X 1 1 1 1 1 1 1</b> |            |
| General Pink  | Robert Chemer                        | Ninilchik, AK          | 55         |
| Salmon        |                                      |                        |            |

6

gaaaaaa koooggaaaaa

~ ~

Mr. Jim Ayers, Director EVOS Trustee Council 22 September, 1994 \_645 G Street, Suite 402, nchorage, AK 99501

Dear Mr. Ayers,

Prease accept and share with other EVOS Trustees these comments on two issues: 1) support of Alaskan-based marine biology research and 2) closer scrutiny of the proposed IMS Infrastructure Improvement in Seward. I feel very strongly about both topics and hope you'll be receptive to considering my arguments.

I urge the Trustees to support Alaskan-based research such as that conducted by the North Gulf Oceanic Society (NGOS), specifically killer whale study proposals #95013 and #95014. Expertise of NGOS, in my-opinion, is superior to that of federal agencies (NMML/NMFS). Costs of local research are lower than there associated with Outside agencies. Please be aware that fishermen, villagers, hatchery personnel, lodge owners and merchants living and working in the Sound know and trust\_NGOS from years of personal and professional contacts. I cannot stress strongly enough how important a history of trust is in contributing to consistent, quality research, year after year.

Killer whale whale research done by the North Gulf Oceanic Society has a long history, predating the oil spill. Their baseline data are extensive. I know these individuals. I can personally and professionally attest to their long term connection and committment to Prince William Sound. Their work is not just a contract job, it's their life. They care deeply about the Sound, spending much of the year there. They live in Alaska. And they do excellent work. To give contracts to competing Outside government agencies seems to me to be inappropriate. Please seriously consider funding their work as well as work by other Alaskan research groups. This seems the right thing to do.

Regarding the second issue, that of the Alaska SeaLife Center in Seward, I think existing IMS facilities in Kasitsna Bay should be improved if needed, rather than \$37.5 million of EVOS funds poured into a \$47.5 million venture. My personal opinion: monies should be prioritized highest in the area of critical habitat buyback, such as Chenega Native Corporation lands in the SW Sopund which are currently being surveyed for possible logging and/or buyback potential. I hope the Trustees are being appraised of this situation.

While I agree that public education is vital, I fear yet another marineworld park attempting to duplicate that which already exists in the natural environment, an environment which would be wise to permanently protect via buyback purchases. Additionally, the University of Alaska owns appx. 1,000 acres of critical habitat in Jack Bay near Valdez, inc. lands around three creeks. One, Gregorioff Creek, is the area's most prolific pink salmon spawning stream. I'd advise you to seriously consider that area as well as the Chenega lands, all of which may be logged, subdivided or otherwise developed in the future.

Generally speaking, I question EVOS funds--especially those slated for restoration--being used to construct additional facilities when world-class facilities already exist in Kasitsna Bay, and when little critical habitat has been purchased to date.

I appreciate the time you spent reading my letter. I sincerely hope you'll consider those points raised in this letter, as they are so important to me and to many others. Thank you very much.

Sincerely,

Alla-

John D. Lyle

Box 83715 Fairbanks, Alaska 99708

MARINE MAMMAL COMMISSION REAL Part 1825 CONNECTICUT AVENUE, N.W. #512 WASHINGTON, DC 20009

ST 111 1994

Alessa .

EXRU

16 September 1994

Mr. James R. Ayers Director EVOS Trustee Council 645 G Street, Suite 402 Anchorage, AK 99501

Dear Mr. Ayers:

I understand that Mr. Craig O. Matkin, of the North Gulf Oceanic Society, has submitted two proposals to the EVOS Trustee Council for FY 95 funding consideration. One proposal is to continue monitoring of killer whales in Prince William Sound, Alaska. The second is to continue field studies to document any changes in the diet of Prince William Sound killer whales since the Exxon Valdez oil spill and to estimate killer whale predation rates on harbor seals, salmon, and other species in Prince William Sound.

The Marine Mammal Commission contracted with Mr. Matkin in 1991 to prepare a report summarizing available information concerning the biology and management of killer whales in Alaska. A copy of the completed report is enclosed.

The report clearly illustrates Mr. Matkin's breadth of knowledge concerning killer whales and killer whale management problems in Alaska. I suspect that he may be uniquely qualified to do the research he has proposed.

This example of Mr. Matkin's work may help you to evaluate his proposals.

Sincerely,

www

Robert J. Hofman, Ph.D. Scientific Program Director

Enclosure

cc: Mr. Steven Pennoyer

September 22, 1994

Jim Ayers, Director EVOS Trustee Council 645 G Street, Suite 402 Anchorage, AK 99501

Dear Mr. Ayers

I am writing to voice my support for funding the North Gulf Oceanic Society Killer Whale projects #95013 (Killer Whale Monitoring in Prince William Sound) and 94014 (Predation by Killer Whales in Prince William Sound).

This summer I was fortunate to have spent some time with Craig Matkin and some visiting Canadian Killer Whale researchers out near the NGOS whale camp in Prince William Sound. I work with Broadcast Services of Alaska a wildlife filming company and we were out there filming killer whales. The NGOS people were very helpful and gave us some very much appreciated advice and assistance.

Mr. Matkin is a long time Alaskan researcher and fisherman and has spent over 14 years researching the Killer Whales of Prince William Sound. While some may think that National Marine Fisheries Service would be best suited for this task (I used to work for them), in this case however you have a private Alaskan research group that has a very specialized expertise that is in a much better position to conduct the best research.

Please support these projects as they have a broader scope than the NMFS projects and cost much less.

Sincerely

Paul A. McCollum Business Manager Broadcast Services of Alaska

## KILLER WHALE (ORCINUS ORCA) BIOLOGY AND MANAGEMENT IN ALASKA

by

ź

Craig O. Matkin and Eva L. Saulitis North Gulf Oceanic Society P.O. Box 15244 Homer, Alaska 99603

Contract Number T75135023

Marine Mammal Commission 1825 Connecticut Avenue, N.W. Washington, D.C. 20009

1994

9-23-94



EXECUTIVALUEZ OIL SPILE

TRUSTEE CONSOL

JIM AYERS, DIRECTOR EVOS TRUSTEE COUNCIL 645 G STREET, SUITE 402 ANCHORAGE, ALASKA

Dear Mr. Ayres,

I have been a commercial fisherman in Prince William Sound since 1965. I have skippered my own seine boat since 1978. I feel very strongly about the damage that EXXON did to the PWS ecosystem. In the winter months I teach at the University of California Santa Cruz.

I am writing in support of your funding proposal 95013 <u>Killer Whale Monitoring in Prince</u> <u>William Sound</u>. Also Project 94014 is also worthy of your support also. I am familiar with past Killer Whale studies made by Mr. Matkin and his work is highly respected in the scientific community. His research group has already made significant contributions toward the understanding of how the resident and transient Killer Whale populations fit into the total PWS ecosystem and with continued funding he will be able to continue and expand those contributions. Mr. Matkin is an Alaskan resident and one of the most conscientious and thorough researchers that I know.

I understand that his proposals are in competition with the National Marine Mammal Laboratory proposals. I know for a fact that his proposal will cost less than the NMML proposal and his study will document <u>all</u> killer whales that use the sound and not just AB pod.

If I can offer any further information concerning Mr. Matkin and his work please do not hesitate to contact me.

Yours truly.

Robert H. Widmann Ed.D., Lecturer University of California Santa Cruz

TEX EDWARDS Po Box 15014 FRITZ CREEK, AK, 9960 235-7334; FAX-7025 JIM AVERS المراجع المراجع المراجع المراجع EVOS TRUSTEE COUNCIL TO THE COUNCIL;

I AM WRITING IN SUPPORT OF PROPOSATIS 95013 AND 94014: KILLER WHALE MONITORING IN PWS AND PREDATION BY KILLER WHALES IN PWS.

AS A LONG TIME ALASKAN I HAVE WORKED IN PUS SINCE '79: GYEARS ON THE VALDEZ PILOT BOATS AND THE LAST & YEARS SERVING AS MASTER OF THE "GLACHER QUEEN II" ( A TOUR BOAT TRAVELING BETWEEN VALDEZ AND WHITTIER)

THE NORTH QUIF OLEANIC SOCIETY HAS WORKED IN PWS FOR MORE THAN 14 YEARS: PRIOR TO, DURING, AND AFFER THE SPILL YEARS. THEY HAVE DEFINED THE ORCA POPULATION IN PWS; AND NAVE DEVELOPED EXCELLENT LINES OF COMMUNICATION WITH OTHER USER GROUPS - PROVIDING VALUABLE INFORMATION TO THE FUBLIC,

2 NGOS LS THE CLEAR CHOICE TO CONTINUE MONITORING AND STUDY PREDATION. PHANIC YOU FOR YOUR THOUGHT FUL CONSIDER ATTON OF THESE PROADSALS \_\_\_\_SINCEREY, 5 31 ------TEX EDWARDS 27 SEP 94 N



Jim Ayers, Director EVOS Trustee Council 645 G. Street Suite 402 Anchorage, Alaska, 99501

9 26 94

Dear Mr. Ayers,

I write in support of Project 95013 "Killer Whale Monitoring" and 95014 "Killer Whale Predation" submitted to you by the North Gulf Oceanic Society. I have collaborated with Craig Matkin of that Society over the past 12 months. Our collaboration to date has included project design, permit application, and supply of extremely valuable biopsy samples. At all stages of our interaction I have found the organization to be professional, and deliver promised material in a timely manner. I am extremely excited about our ongoing collaboration, as Craig has given us the opportunity to study a critical part of the marine food web and its relationship to chemical He has been substantially more cooperative and exposure. forthcoming in this manner than many of the contacts I have attempted to make in the federal agency arena. His are worthwhile projects and NGOS is capable of completing the work. They have experience with biopsy sample techniques and they deliver what they promise.

If I can be of any further help in your consideration of their proposals please contact me,

Sincerely yours,

Michael SM

Michael J. Moore

Michael J. Moore Vet. M.B., Ph.D. Biology Department, Woods Hole Oceanographic Institution 508 457 2000 x 3228 (phone), 508 457 2169 (fax), mmoore@whoi.edu (email)

der - pain Aupt. 28, 1994

Jim ayers, Director EVOS Trustee Council 645 & St., Ste. #402 Unchorage at 99501

Dear mr. ayers,

· • • •

I would like to express my support for funding north Duy Oceanic Docietyé proposal for Killer Whale research, Project 94014, in PWS.

Mr. Matkin has spent years studying both transient & resident orca yods and is highly skilled in his field. To have a person of his expertise conduct this study is not only more cast effective than the Marine Mammal Labé proposal, but will probably result in a longer accurate study.

Thank you

Mety Retain

JUDY LIETZAU PO BOX 2195 CORDOVA AK 99574

EXXON VALUES ON SPILL Dear Trustee Council Plesse support proposal 95013 Killer Whale Monstoring in Prince William Sound. This research would be conducted by Alaskan scientists who have studied the beller whales of PWS for over 14 years. It has a broader scale than the NMML proposal which would only look at AB pod and it will cost \$ 28,000 less than the NMML project. I would also like to re-enforce my strong desire (and most of the residents and users of the spill impacted areas) that the majority of settlement monees be used to agrive habitat in order to protect the mavine environment of pus and other spill impacted areas. Infure generations of vesidents and inerg of the area will benifit most from habitat protection. Sweevely وروي ومسر والمرور والمرور والمرور والمرور و Will Drum William Dunne  $\geq$ 80 Box 15043 Fritz arech AK 99603

Canada's Pacific National Aquarium, in Stanley Park, is a self-supporting, non-profit association dedicated to effecting the conservation of aquatic life through display and interpretation, education, research and direct action.

Aquarium en and the case and a

OCT 0 3 1994

EXXOR VALUES OIL SPILL

TRUSTEE COURDE

September 26, 1994

Vancouver 6

Mr. Jim Ayers Director EVOS Trustee Council 645 G Street, Suite 402 Anchorage, AK 99501

#### Dear Mr. Ayers,

I am writing regarding two project proposals concerning killer whales in Prince William Sound that have been submitted by the North Gulf Oceanic Society for consideration by the Trustee Council. These proposals are Project 95013 (Killer whale monitoring in PWS) and Project 94014 (Predation by killer whales in PWS).

In my opinion, these two proposed projects are of high merit and worthy of support. I am familiar with the nature of the research proposed, having undertaken similar field studies in British Columbia over the past 15 years, and am also familiar with the excellent work on killer whales that has been conducted by Craig Matkin and his group since the early 1980s. The two projects will help to identify trends in the population status of PWS killer whales, as well as provide important information on the feeding ecology of these animals.

I believe that the NGOS team is uniquely qualified to undertake these studies. They have an excellent track record of completing previous field research in the area, despite the rather challenging logistical problems that often arise in this remote region. The products of their research consistently rank among the best in field. Also, they have always been very free in sharing their data and ideas with others in the killer whale research community, which has helped to promote the understanding of the species and its conservation generally.

Thank you for allowing me to pass on my recommendations of these project proposals.

Yours sincerely,

John K.B. Ford, Ph.D. Marine Mammal Scientist

and

Adjunct Professor, Department of Zoology and Fisheries Centre, University of British Columbia





## Prince William Sound Conservation Alliance

P.O. Box 1697 Valdez, AK 99686 (907) 835-2799 Fax (907) 835-5395

P.O. Box 1185 Cordova, AK 99686 Phone & Fax (907) 424-7466

GCT 0 3 1994

TERRENCE EN BREE

EXCH INDE BE

### **Board of Directors**

Marnie Graham President Valdez

**Tony Milionta** Vice President Anchorage

**Beth Trowbridge** Treasurer Cordova

> Karl Becker Cordova

Terry Hermach Valdez

Duane Goodman Valdez

#### Office Manager

Bonnie S. Schwahn Valdez

September 28, 1994

Jim Ayers, Director **EVOS** Trustee Council 645 G Street, Suite 402 Anchorage, AK 99501

Dear Jim.

The Prince William Sound Conservation Alliance would like to support Killer Whale research proposals submitted by private research groups. Specifically we would like to support proposal 95013, Killer Whale Monitoring in Prince William Sound. The Alaskans who will be conducting research under this proposal are professional scientists who have studied Killer Whales of Prince William Sound for over 14 years! This proposal will document all Killer Whales that use the Sound, not just one pod (which is what the National Marine Mammal Laboratory proposes limiting their study to).

We would also like to support Project 94014, Predation by Killer Whales in Prince William Sound which is a more comprehensive study of the role of Killer Whales in the ecosystem proposed by the North Gulf Oceanic Society in conjunction with the Prince William Sound Science Center.

Thank you for your consideration of these valuable proposals.

Sincerely,

Am A. Add

Bonnie S. Schwahn Office Manager

Jim Ayers, Director EVOS Trustee Council 645 G Street, Suite 402 Anchorage, Alaska 99501

September 29, 1994

Dear Mr. Ayers,

I would like to voice my support for two research proposals which are before you now. I refer to Proposals 95013 - Killer Whale Monitoring in Prince William Sound, and 94014 - Predation by Killer Whales in Prince William Sound.

I was previously employed by the Prince William Sound Regional Citizens' Advisory Council as their environmental monitoring coordinator. It was my job to evaluate a multitude of research proposals and monitoring schemes. In my work with RCAC, as well as from my own personal experience in the Sound (I lived and fished in the Sound for 12 years), I can recommend the North Gulf Oceanic Society and Craig Matkin unreservedly. They have proven themselves scientists of the highest quality and have added a wealth of information to killer whale knowledge. The Prince William Sound Science Center also has top caliber scientists and are initiating some good solid research in the Sound.

I would ask that you support these two proposals. Proposal 95013 has a broader scope than the competing National Marine Mammal Laboratory proposal, and the latter is more expensive. A cooperative venture between the North Gulf Oceanic Society and the PWS Science Center would undoubtedly be productive and would lend support to two very good organizations. Thank you for your consideration.

Sincerely,

Dan Strickland Box 9304-D Palmer, Alaska 99645 (907) 745-1260

cc: Matkin/PWS Science Center


OCTOBER 2, 1994

Mr. Jim Ayers, Director EVOS Trustees Council 645 G Street, Suite 402 Anchorage, Alaska 99501

Subject: Proposals 95013 and 95013, Killer Whale Monitoring in Prince William Sound

Dear Mr Ayers :

I am writing to voice my support for the proposals referenced above and submitted by the North Gulf Oceanic Society.

I believe the North Gulf Oceanic Society is uniquely qualified to conduct the studies contemplated by these proposals because of the many years they have spent studying killer whales in Prince William Sound. In addition, their proposal offers to do more for less money that the competing proposal by the National Marine Fisheries Service.

I am also persuaded that research conducted by a private sector organization with a fine reputation should be supported.

Sincerely yours, illai-

Gary Williams Box 608 Whittier, Alaska 99693

PLEASE SUPPORT PROPOSALS # 95013 F 0 AOIA. IT WOULD KE NICE TO HAVE QUALIFIED LOCAL PEOPLE WORKING LOCALLY. WE COULD EVEN SAVE MOREY OR THE TOERS THANK - YOU MICHAEL FERLUDO 53160 Maile Conver inor the cours

13

I EAR JULY AYERS,

Whip 40000 BIRCH PK Dr. THE POSTBOX COLLECTION Home, Auggioo3 OCT 0 1 1994 Deven In Ayus, FXXON VALDEZ OIL SPILL TRUSTEE (4) BOLL Alcase support Jim Ages Project 94014 EVOS Trustee (onc.) Predetion by Killer Whiles in Prince 645 E Street Suite 402 William Sound. Funlijen, Ancheze, Ak 99501 Claude Monet (1840-1926) WATER LILIES, c 1915-17 (detail) sincerely, O Musée Marmortan, Paris LISA WW

20 Sept 91, Mr. Aypes, I would like to culturage you to support the population for Killer whenter monitoring in Minel Witham Sour of the Sthe Killer what perdation Study submitted by the Work Chef Creanic Salety. Independent Alaskan researchers need your support. It's a humpback what orsearche in southeastern Alarka I find living new the space, I Andy year send justice an instight into behaving that attuis de not see when they "Visit" for rescand pupers a few weeks or month each year fin your has a long-term research project inyoung that will divertail particility with your goals the proposals sets that by NOOS are also proten in siter and more lost effective thran the "outsich" proposels. Thank queter allowing independent researchers to submit funk queter allowing independent researchers to submit Jan Sterling SITKA 15

Dear Jim Ayers Please support proposel 95013 Kille- unde Mondor i J in Prince William Sound. The Alashan researches have studied The wholes in Prince William Source for over 14 years The research proposal has a Drock scope and is cost efficient Manufon Sincerely, LISA (Unip HOMER 10

10/1 ' Dear Mr. Ayers I would like to support the North Gult Oceanic Scrietys proposal 95013 Kitter Whate And William Sound. The Societys Monitoring Jot continuous work in 14 years The sound and the comphrehenisive study Killer all whales in the Sound and Stheir ability to To it a lower cost than the National Marine Mammal Laboratory make them the bask J. this Doma Work choice for WHITTIER

GUSTAVUS, AK 9/26/94

7

S

y service in the service

Tear Mr. Ayers, I am writing to 25k that you support proposals 95013 Killer Whale Monitoring in Prince William Sound and 94014 Predation by Killer Whales in Prince William Sound. The North Culf Oceanic Society is a group of professional, well-respicted scientists who have been conducting research in PWS since the early eighties No one else knows the Sound better phas a better sense of the rescurces of the whales. Their proposals are broader in scope, less expensive and certain to be of greater use than projects picposed by other agencies. Since My, Super Alastic Gustavus Dear The Ayers

I urge the EVOS Trustus bunch to support Proposal 95013, Killer whale Ministering in Prince william Jund I feel it is implicitent research and I fovor this proposal over the NTITL proposal since it will be browneted by total swintists who have been studying killer whales in FWS for mony years, and who I feel are the most knowledgeable and quelified to be doing this work.

I also support proprial 94014, Predation by Killer where is Prince withour Sound

> Thankyou) Liz Senkar Cordova, AK.

-Sept 25-1

Stranger and the

. . .

P.O. Box 558 Homer, Alaska 99603 9/29/24 Dear Jon and Trickees: I'd like to know my suggest to two killer whate Aleced proposals -#95013 and #94014. I know the marpholiat rescuch streatists moded and Hink highly of their experience and past wate. I especially applaud He consister of proposal Hayong since Here are so many open questions about the relationdings between Declatas when pres (molecoli, Sia Liones) In the Sound Find Gill of Marka Sircens, Thency Lord

Nancy Lord

- 相称的复数 - 网络马克拉马克马克

9-23.94

Jim: WE Support NORTH BULF OCEANIC, SOCIETY'S Proposal 95013 KILLER WHALE MONITORING in ARIACE WILLIAM SOUND . Thing HAVE OVER 14 years of Storoying ALL. The OREN'S In The Sound, ME ALSO Support Their PROSECT QUOIN PREDATION BY HILLER Shakes In PRIME WILLIAM Sound. N.G. D.S. Exidence in The Second Arris The Pacontos Those more compiled photes Them FAR AHENO of HAY OTHER Breces INTERACTES IN The SOMASS WANTERS. We wage Front N.G.O.S. Ampasone 95013 Ans Presect 94014 Be given Kothy CENSIADERTICK. Thank you. Pater mailigne HE SORL Hours CHANTERS

WHITTIER

Dear Jim Fryers, I am writing to support puoposale 75/03 and 94014 for studying Killer whalos in Reince William Sound. Here studies would be conducted by Alorka scientists with mony glass of whole negleast experiorce in the Sound. The shudies would provide good baseline data about one of Hicky predators in this ecosystem. Such in formation could be very helpful for future monogerment of morine monomals in He sand. Home yriving. Sincerely ous. Ed Borg, Ecologist, toriai Wat. Wildlike Refuge, USFWS

22

e e de la

To Trustee Concel, 1/2-/94 We strongly Urge you to fund Proposal 95013 Killer Whale monitoring in Prince William Sand. We have been helping spot whales for years and reporting to Craig Matkin. Craigis proposal will document all the killer whales in the sand and he is a professional who does cost effective Studies. We believe it would be a travesty of justice to allow unit than trang Matkin to do this study. Thank you, Rich & Sonja Coraza HOMER 23

Dear Surs: 1/25/94 I've read the proposals for Killer whale research submited to the Exton Uddez OI. Spill Trustees for rest your I believe that our hest interests would be served by support proposal 95013 because The resconduces have much a firmation and experience from previous. Why change researchers and loose the invaluable contrinuity ind my researchers and wor of This project? Sinarely Eine Knudton -0 24

Dear AW. Avers September 25,1994 I write to encourage the EDOS Trustee Council to approve 2 proposals involving whate research by the North Guifo again. Society Proposals 95013 and 94014 will both be conducted by scientists with long experience in the study greas and with the pads who use those areas. They are Atackans and work with private research groups already Ganular with Prince William Sound. There is no question in my mind that experienced private research scientists can be more better and for less than either the National Manne Manniel Laboratory or the Varkanol Manne Fisheries Service. We need a bread (comprehensive) study done, as the North Gut Oceanic Society proposes, and it is obvious that they will do a beller jet for a balker price. Thanks for this opportunity, and best wishes to the Thiske council in these toxon decisions! Sincorchy, BalbaraSearman (235-2986) 25

HOMER

1.11

Deer Jim -While I generally believe most remaining resources should be spent on lend, project proposals 95013 014 are particularly Valuable & Dicas are an propulations we have long Ame-sories date that will help understand the Signifigance of post-spil date, Also, as top Predotors is long life spens - these populations may supply important date on contominants & their Pate in the consisten fand lipid lands in the future " Bob Childers Pe Box 203203 Anchorsie AK 99520 26



NC TH GULF OCEAN. SOCIETY

P.O. BOX 15244 HOMER, ALASKA 99603 (907) 235-6590

SEP 1.0 1994

Jim Ayers, Director EVOS Trustee Council 645 G. Street Suite 402 Anchorage, Alaska 99501

September 29, 1994

電話 (語) 日

Dear Mr Ayers,

Our group (NGOS) has submitted two proposals to the Trustee Council for consideration. We hope you will support them. These are Project 95013 Killer Whale Monitoring in Prince William Sound and Project 94014 Predation by Killer Whales in Prince William Sound: Feeding Behavior and Distribution of Predators and Prey. The two projects are complimentary and are both based on years of prior data collection.

First, I compare our killer whale monitoring project with a competitive project (Project 95092) submitted by the National Marine Mammal Laboratory (NMML).

Killer Whale Monitoring (NGOS) Project 95013

Total Cost = \$109.4K (FY95 and FY96)

Monitors AB pod, other major resident pods, and AT transient group

Examines changes in AB pod in comparison with other resident pods

Provides computerized readout of each individual whale in each frame of exposed film (supplied with final report)

Final whale identifications by same biologist for past ten years. Accuracy has been demonstrated by rigorous cross checking by NMFS

Continuation of long-term population studies started prior to the EVOS Recovery Monitoring of Killer Whales (NMML) Project 95092

Total Cost = \$137.2K (FY95 and FY96)

Monitors only AB pod

Examines only AB pod

Provides no computerized database.

Identification preformed by less experienced, untested personnel.

Replaces NGOS project that existed prior to the EVOS



## NORTH PACIFIC PROCESSORS, INC.

HOME OFFICE: 2300 EASTLAKE AVE EAST - SEATTLE WASHINGTON 98102 - (206) 726-0000 PO BOX 31170 - SEATTLE WASHINGTON 99103-1179 BPROCESSING PLANT BOX 1040 - GOADOVA ALASKA 90574 - (907) 424-7111

3 October 1994

Exxon Valdez Oil Spill Trustee Council fax 276-7178

Attn:: Draft Fiscal Year 1995 Work Plan

North Pacific Processors, Inc. supports both project <u>95024</u> and <u>95093</u> and supports raising <u>95093</u> to category 1 as soon as possible.

Prince William Sound has been suffering from reduced wild stock returns as a result of the spill and now is the time to rebuild these runs.

Thank you in advance.

Ken Roa hildt, Supt.

Ken Roemhildt Superintendent, North Pacific Processors, Inc.

Processors of Quality Alaska Seafoods

AN ATTAL UNANG CHIGT BE DA ING

Our monitoring program is cost effective and will provide a more detailed picture of the killer whale population. It is part of a pre- EVOS research program and will be analyzed with the benefit of uninterupted annual data from the past 11 years.

When Project 95013 and 95014 (Predation by Killer Whales) are coupled, the projects become an in depth examination of the killer whales' role in the Prince William Sound ecosystem. Project 95014 will provide hard data as well as models and projections that address such questions as how many whales eat how-much of what prey and what is the impact this might have on the system. This is a strong first step in linking the chain of effects that may be responsible for some of the changes we have seen since the EVOS. In addition, the combination of the two projects will result in substantial cost savings (An FY95 savings of about 23K).

The long-term data base that exists on killer whale numbers, distribution, and feeding habits in Prince William Sound places us in a unique position. By incorporating the latest acoustic and genetic techniques, we can begin to construct an ecological profile for a difficult to study top marine predator.

Please support Projects 95013 and 95014. They are cost effective projects that will return a large amount of information for the dollars spent in study of a species and system damaged by the spill. Thank you for providing the opportunity for a non-agency group to submit research proposals to the Trustee Council.

Craig O. Matkin, Director

しょ



## To The EVOS Trustees Council EXYON VALDEZ OIL SPILL TRUSTEE COUNCIL

I am writing to support the integrated proposals, numbers 95093 and 95024, which address the restoration of Prince William Sound natural salmon stocks.

I have been an active member of the SEA Committee from its start, and have contributed a great number of hours working on and listening to proposals from all corners. Last fall, I attended the workshop held in Cordova, which addressed the scientific aspects of ecologic and economic restoration in Prince William Sound. As a member of the Prince William Sound Aquaculture (PWSAC) executive board, I have hoped that PWSAC could also contribute to a solid program for restoring the Sound after the 1989 oil spill.

The teamwork of PWSAC, the Native Village of Eyak Tribal Council, and the University of Alaska, as proposed in 95093 and 95024, could play a major role in successfully restoring the Sound's damaged fish stocks. Each player can contribute from its area of expertise: native Alaskans have the manpower and marine vessels, the University possesses the scientific experience, and PWSAC commands the skill for raising fish.

If just a few streams in the Sound could match the success PWSAC has had with its releases of coho salmon in Cordova and Whittier, all user groups of this area would benefit. PWSAC can use its expertise in nurturing fish stocks in combination with the talents of the other two groups to reestablish marine life that left Prince William Sound after the oil spill of 1989.

It's time for a project in the Sound that produces tangible, measurable results, one directed by a team committed to the area's ecological and economic health. We have had enough of the deadlocks caused by uninvolved parties who try to take control of our area's projects for their own economic benefit. Sport fishermen, subsistence fishers, native communities and commercial fishermen alike are tired of arguing and want to see some immediate, constructive action in Prince William Sound.

I am aware of the legal issues that surrounded PWSAC's proposal in fiscal 1994. However, if you want to convince me that this year's proposal 95093 falls into the same category, I suggest coming to Cordova with a ton of paper, a barrel of ink, and your lunch. I believe this proposal is critical for progress in restoring wild salmon stocks in Prince William Sound.

Sincerely.

Bud Perrine

Silver Lining Seafoods Cordova Plant 545 Railroad Ave. P.O. Box 260 Cordova, Alaska 99574

Ph: (907) 424-5390

.

Fax: (907) 424-5395

30

بالمريان فقتم المراجع فستم

September 29, 1994

I William S. Gilbert as Plant Manager of Silver Lining Seafoods Cordova a division of Norquest Seafoods fully endorse and support the Prince William Sound natural Wild Stock restoration projects as outlined in the proposals #95093 and #95024.

These proposals when interegated and developed will assess and go a long way to rehabilitate the natural wild stocks in Prince William Sound which have suffered due to the EVOS. This is very important to the viability of the Prince William Sound region and will provide long term benefit to all the people and communities of Prince William Sound.

Sincerely,

William S. Gilbert Plant Manager Silver Lining Cordova

September 30, 1994

Exxon Valdez Oil Spill Trustee Council 645 G Street Anchorage, AK 99501

Re: Draft Fiscal Year 1995 Work Plan

Members of the EVOS Trustee Council:

I am writing in support of funding Proposal #95093 and #95024 concerning Prince William Sound (PWS) Natural Stock Salmon Resources and Enhancement of Wild Pink Salmon Stocks.

Prince William Sound Aquaculture Corporation has proposed restoration of salmon resources through a program of professional agency and local resident collaboration, integration of research, restoration and monitoring objectives. The integrated proposal involves a collaboration with University of Alaska Fairbanks School of Fisheries and Ocean Sciences, the Native Village of Eyak, and others.

It is time to begin active restoration of the salmon resources of the oil impacted areas which will provide knowledge and a sustainable resource for all the people and communities of PWS.

The Prince William Sound Aquaculture Corporation has the expertise in hatchery rearing and salmon management to successfully complete the proposed program. Please reclassify this project from Category 4 to Category 1 and vote to approve the program for funding.

Sincerely,

El Jeine

Ed Zeine Chairman, Cordova Sporting Club

October 1, 1994

TO: Members of Exxon Valdez Oil Spill Trustee Council

ATTN: Draft Fiscal Year 1995 Work Plan

VIA FAX: 276-7178

1 am writing in support of EVOS Trustee Council funding for: PROPOSAL # 95093, Restoration of PWS Natural Stock Salmon Resources and Services and PROPOSAL # 95024, Enhancement of Wild Pink Salmon Stocks.

The Trustee Council has been supportive towards research funding for study of the PWS ecosystem and habitat protection and acquisition. So far there has been no funding for actual restoration of stocks damaged by the oil spill. Isn't funding such activities an Important function of the Trustee Council? Proposal # 95093 is presently classed as Category 4 due to "legal issues" regarding the proposed use of settlement funds to support activities related to hatcherles. The important thing is to get restoration programs on line. Letting anti-hatchery sentiment derail # 95093 from Category 1 to Category 4 classification is foolish. We should be using all the tools available to us in restoration efforts. There is a lot of expertise available in the PWSAC hatchery system which should be taken advantage of. Reclassifing # 95093 to Category 1 status would the correct move to make.

Sincerely, Envir Marin

Emil "Beaver" Nelson F/V NUKA POINT Box 130, Homer, AK 99603

14 # H.1/1 OCT 03 94 14:26 pluge W 2 16 - 11 18 Exxon Valdey Dil Spill == =-= 10/3/94 Trustee Conneil 645 G Street Anchorage Ak 99574 Re: Draft Fiscal year 1995 Wal Plan Hembers of the EVOS Truster Council This letter is to state my support and to enlist yours for the Proposal number 95093, Restoration of PWS natural Stock Salmon Resources and Services and Proposal humber 95024 in the Draft 1995 toble Alan These proposals are the best live seen. They address what are along the wont of the observable consequences of the oil spill. They use the best available means to directly repair the damages. They can add substantially to the body of knowledge of impacts of oil spills on ecosystems, and of our particul ability to reverse theme To me however, most import is that they are the best medicine for the effected fishing industry of PWS, and its dependant com-Jullest support Thank you 33 Sincerely Strant 2 Decl



### Ocean Beauty Seafoods, Inc.

ST. ELIAS DIVISION P.O. BOX 548 • CORDOVA, ALASKA 99574 • (907) 424-7171 • FAX (907) 424-5514 P.O. BOX 70739 • SEATTLE, WASHINGTON 98107 • (206) 265-6600 • FAX (206) 261-0820

September 30, 1994

Exxon Valdez Oil Spill Trustee Council 645 G Street Anchorage, AK 99501

Re: Draft Fiscal Year 1995 Work Plan

Members of the EVOS Trustee Council:

I am writing in support of EVOS Trustee Council funding for Proposal Number 95093, Restoration of PWS Natural Stock Salmon Resources and Services, and Proposal Number 95024, in the Draft 1995 Work Plan.

Prince William Sound salmon fisheries are distressed. During the ten years prior to 1989, the average annual return of all salmon to the PWS management region was 22 million fish. Total natural and hatchery salmon returns dwindled to 10.5 million in 1992 and 7.0 million in 1993, then rebounded in 1994, in response to ecosystem changes that are now being investigated. The damaged salmon resources and the lost services provided by those resources have heavily impacted all user groups.

While the extent of short- and long-term damage to the Prince William Sound region depends on these natural salmon resources.

Please help the resources and the people of Prince William Sound recover. Thank you.

Sincerely,

OCEAN BEAUTY SEAFOODS- ST ELIAS DIVISION

Hap Symmonds

Hap Symmonds Plant Manager

Katherine G Halgren 167 NW 73rd street Seattle, WA. 98117-485Ø October 3, 1994

Exxon Valdez Oil Spill Trustee Council 645 G Street Anchorage, AK. 99501

RE: Comments Draft 1995 Work Plan

Members of the EVOS Trustee Council:

I applaud your approval September 1993 of Project 94320 for planning an Ecosystem Study in Prince William Sound. I hope you will continue your support by approving Proposal 95093, Restoration of PWS Natural Stock Salmon Resources and Services; and Proposal 95024, Enhancement of Wild Pink Salmon Stocks, in the Draft 1995 Work Plan.

Both wild and hatchery stocks have been recognized by the EVOS Trustee Council as injured and not recovering, and have been supportive through their funding of research towards understanding oil spill impacts to the resources, and the entire PWS/Gulf of Alaska ecosystem. I hope you will continue with significant restorative actions to aid the recovery process of the Sound's salmon.

The distressed fisheries have had an impact that reaches much further than one would imagine. The effects are felt by the fishermen, Commercial as well as Sport, Subsistence, and Personal Use. The communities, from the people who process the fish; to the suppliers of services, gear, and groceries; to the citizens whose cities have lost seafood processing companies due to bankruptcy; residents due to lack of employment opportunities; and revenues due to the dramatic drop in raw fish tax.

One hope the people have is that salmon enhancement will be able to restore and replace the lost resources. The proposed restoration program will provide not only knowledge and teams of developed local expertise in salmon restoration and conservation, but will also provide for a sustainable service for the people and communities of FWS. The program involves a collaboration with U of A Fairbanks School of Fisheries and Ocean Sciences, local residents, and the Native Village of Eyak, through their integrated proposal.

Page 2 K. Halgren EVOS Trustee Council Comments Draft 1995 Work Plan

Please continue to support any proposed research to help better understand the salmon and the ecosystem of Prince William Sound, such as mass marking all hatchery salmon.

The most cost effective way to address residual oil is to leave it on the beaches. I believe its removal to encompasses more than Subsistence and Recreation Resources. I believe residual oil effects the birds both migrating and local, the terrestrial mammals, and marine life whenever there is a wind and tide similar to the one that originally put the oil on the beach. I would like the trustees to encourage future proposals that would remove or reduce residual oil when the technology becomes available.

Thank You

Katherine G Halgvin

Katherine 6 Halgren

#### SEP 30 '94 09:22 PWSAC

9-30-94 JOX 1855 CORDONA AK. 99574 FAX X 276-7178 TO: EXXON VALDEZ TRUSTEE COUNCIL MEMOERS: I URCE YOUR SUPPORT FOR PRINCE WM. SOUND PIUK SALMON PROPOSALS AT 95093 AND 95024. THE EV.O.S. HAD AN INDISPUTADLE NECATIVE EFFECT UPON P.W.S. PINK SALMON. I AM GRATEFUL TO THE TRUSTEE COUNCIL FOR SUPPORTING THE RESEARCH COMPRISING THE S.E.A. PROJECT. HOWEVER, THESE PROPOSED PROJECTS 60 BEYOND THE SCOPE OF THE SEA AND WOULD ATTEMPT TO ACTUALLY AID THE RESTORATION OF JAMAGED STOCKS PLEASE BE AWARE THAT FUNDING FOR THESE PROJECTS WILL NOT DE USED BY THE HATCHERY TO CONDUCT NORMAL OPERATIONS. THE FOCUS IS CLEARLY UPON RESTORATION OF STOCKS FROM NATURAL STRUGAMS. THESE ANE WHOLLY DEFENSIBLE AND NEEDED ADDITIONAL PROJECTS TO AID THE RECOVERY OF THE DAMAGEN P.W.S. ECOSYSTEM SINCERELY Kenneth Odams

#### RESOLUTION

WHEREAS, stocks of salmon in Prince William Sound are recognized as having been injured by the Exxon Valdez oil spill, and are designated by the Exxon Valdez Oil Spill (EVOS) Trustee Council as "not recovering"; and,

WHEREAS, the fishermen and communities in Prince William Sound have been seriously impacted by the damaged natural salmon resources; and, WHEREAS, Cordova District Fishermen United (CDFU), the regional fishermen's organization, has encouraged regional organizations and expertise to develop programs to restore and monitor damaged natural salmon stocks; and,

WHEREAS, Prince William Sound Aquaculture Corporation, the Native Village of Eyak Tribal Council and the University of Alaska Fairbanks, School of Fisheries and Ocean Sciences have submitted collaborative proposals to the EVOS Trustee Council to restore natural salmon stocks in Prince William Sound through research and restoration activities using local residents, vessels and facilities; and

WHEREAS, the proposed restoration objectives are consistent with the Draft EVOS Restoration Plan and the Draft Environmental Impact Statement for the EVOS Restoration Plan; THEREFORE,

BE IT RESOLVED that the Board of Directors of the Cordova District Fishermen United support the following collaborative proposals, and request the EVOS Trustee Council to fund the research, restoration and monitoring activities as proposed therein:

PROPOSAL #95093: RESTORATION OF PWS NATURAL STOCK SALMON **RESOURCES AND SERVICES: AN INTEGRATED APPROACH. Prince William** Sound Aquaculture Corp.

PROPOSAL #95024: ENHANCEMENT OF WILD PINK SALMON STOCKS. Native Village of Eyak Tribal Council.

Duald McCline 9-28-94 Prisident Cosdova District Fishermen United Signature Date

September 30, 1994

and the second second

Exxon Valdez Oil Spill Trustee Council 645 G Street Anchorage, AK 99501

Re: Draft Fiscal Year 1995 Work Plan

Members of the EVOS Trustee Council:



The Board of Directors of the Prince William Sound Aquaculture Corporation unanimously approved the attached Resolution 94-3 GB at its fall meeting September 18, 1994. The resolution expresses the support of the members of the Board for the restoration of natural salmon resources in Prince William Sound through a program of professional agency and local resident collaboration.

Following the Exxon Valdez oil spill, salmon stocks in Prince William Sound have been recognized by the EVOS Trustee Council as injured and not recovering. The Trustee Council has been supportive through their funding of research towards understanding oil spill impacts to the resources, and the entire PWS-Gulf of Alaska ecosystem.

It is now time to take significant restorative actions to aid the recovery process of the Sound's salmon resources. The collaborative proposals supported by the attached resolution outline a multidisciplinary program for investigating salmon resources, enumerating stocks, and assessing stock condition and genetic identity. The program intends to take restorative action using methods among those described in the EVOS Restoration Plan Draft Environmental Impact Statement: hatchery rearing of wild stock eggs, netpen rearing of wild stocks, and relocation of hatchery runs.

We ask for your support of this collaborative program involving the University of Alaska Fairbanks School of Fisheries and Ocean Sciences, the Native Village of Eyak and local residents, in cooperation with PWSAC.

Best regards,

Bob Roys Interim President

(Hong)

Corporate Office • Post Office Box 1110 • Cordova, Alaska 99574-1110 phone: 907/424-7511 \* fax: 907/424-7514 38



#### **RESOLUTION 94-3 GB**

#### **1994 REVISED EVOS PROPOSAL**

WHEREAS, stocks of salmon in Prince William Sound are recognized as injured by the *Exxon Valdez* oil spill in addition to the many stocks in PWS which are depressed and not recovering; and,

WHEREAS, Eyak Tribal Council, University of Alaska, and PWSAC propose to the *EVOS* Trustee Council to restore salmon stocks in PWS through research and restoration activities using local resource users, vessels and facilities through an integrated and coordinated collaboration program; and

WHEREAS, the proposed restoration objectives and strategies are consistent with the <u>Draft EVOS Restoration Plan</u> and <u>Draft Environmental Impact Statement for the</u> *Exxon Valdez* Oil Spill Restoration Plan; therefore,

**BE IT RESOLVED**: that the PWSAC Board of Directors supports the PWSAC salmon stock restoration proposal before the EVOS Trustee Council and encourages active public support for Trustee Council funding the research and restoration activities as proposed.

#### CERTIFICATION

I HEREBY CERTIFY, that I am the duly elected, qualified and acting Secretary of the Prince William Sound Aquaculture Corporation, an Alaska corporation; that the foregoing is a full, true and correct copy of a resolution duly and legally adopted at a regular meeting of the Board of Directors on  $\Delta c \rho t = 18$ , 1974 at which a quorum was present, and that such resolution is now in full force and effect and duly recorded in the minutes of said Board of Directors.

IN WITNESS WHEREOF, I have hereunto subscribed my name and affixed the seal of the Corporation this? day of <u>kept</u>, 1994.

Eduard Juine Secretary

Corporate Office • Post Office Box 1110 • Cordova, Alaska 99574-1110 phone: 907/424-7511 \* fax: 907/424-7514 UUI-U1-34-PK1 10+41



. October 5, 1994

Exxon Valdez Oil Spill Trustee Council 645 G. Street Anchorage, Alaska 99501

Attn: Draft Fiscal Year 1995 Work Plan FAX: 276 7178

Re: Draft Fiscal Year 1995 Work Plan

Members of the EVOS Trustee Council:

Attached please find the City of Cordova's Resolution 10-94-55 which was approved by the City Council at their regular meeting held October 5, 1994. The Resolution supports the Proposal #95093, Restoration of PWS Natural Stock Salmon Resources and Services, and Proposal #95024, in the Draft 1995 Work Plan.

Prince William Sound salmon fisheries are distressed. During the ten years prior to 1989, the average annual return of all salmon to the PWS management region was 22 million fish. Total natural and hatchery salmon returns dwindled to 10.5 million in 1992 and 7 million in 1993, then rebounded in 1994, in response to ecosystem changes that are now being investigated. The damaged salmon resources and the lost services provided by those resources have heavily impacted all user groups.

While the extend of short- and long-term damage to the PWS ecosystem is still being assessed, it is more important than ever to the people of the Sound that these lost resources and services be restored and replaced through funding and implementation of these integrated proposals. The economic viability of the entire Prince William Sound region depends on these natural salmon resources. Please help the resources and the people of Prince William Sound recover. Thank you.

Sincerely,

Scott Janke City Manager

Enclosure

602 Dolland Areas

#### CITY OF CORDOVA, ALASKA

#### RESOLUTION 10-94-55

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF CORDOVA, ALASKA SUPPORTING THE PRINCE WILLIAM SOUND AQUACULTURE CORPORATION (PWSAC) PROPOSAL #95093 AND THE NATIVE VILLAGE OF EYAK PROPOSAL #95024 BEFORE THE EVOS TRUSTEE COUNCIL

WHEREAS, stocks of salmon in Prince William Sound (PWS) are recognized as injured by the Exxon Valdez oil spill in addition to the many stocks in PWS which are depressed and not recovering; and

WHEREAS, the Native Village of Eyak, University of Alaska, and PWSAC propose to the EVOS Trustee Council to restore salmon stocks in PWS through research and restoration activities using local resource users, vessels and facilities through an integrated and coordinated collaboration program; and

WHEREAS, the proposed restoration objectives and strategies are consistent with the Draft EVOS Restoration Plan and Draft Environmental Impact Statement for the Exxon Valdez Oil Spill Restoration Plan;

NOW, THEREFORE, BE IT RESOLVED that the City Council of the City of Cordova, Alaska, supports the PWS salmon stock restoration proposals #95093 and #95024 before the EVOS Trustee Council and request proposal #95093 be raised from Category 4 to Category 1 and encourages active public support for Trustee Council funding the research and restoration activities as proposed.

PASSED AND APPROVED THIS 5th DAY OF OCTOBER, 1994.

ohnson

Exxon Valdez Oil Spill Trustee Council Restoration Office 645 G Street Anchorage, Alaska 99501

September 26, 1994

المرتب المرتب المستحان

Dear EVOS Trustees:

I would like to support the Nanwalek/Port Graham/ Tatilek Clam Restoration Project (95131). The clam resources in the Prince William Sound and lower Cook Inlet are scarce. This project should help restore those populations and help enhance this subsistance resource.

Sincerely,

1. 1A

Jeff Hetrick P.O. Box 7 Moose Pass, Alaska 99631



007 0 ± 1994

September 28, 1994

James Ayers EVOS Trustee Council Restoration Office 645 G Street, Suite 401 Anchorage, Alaska 99501

Dear Mr. Ayers,

#### Prince William Sound Waste Management Plan

The Chugach Alaska Corporation, as one of the largest land owners in the Prince William Sound Area fully supports the PWS Economic Development Council's proposal to the EVOS Trustee Council for suitable funds to develop a Prince William Sound Waste Management Plan.

We have read the Economic Development Council's submission to you and are in full support of the contents, however the timing of the project should be compressed. Our own studies of the situation in PWS indicate that time is of the essence in the production of a plan and in the introduction of new facilities. Cordova's land fill is reaching a critical state and other communities are not far behind.

You support for this project will be most appreciated.

Yours,

Michael E Brown President.

- 1 - F

×.

÷

P. 02

SEP-23-84 FRI 07:44

#### CITY OF CORDOVA

#### RESOLUTION 09-94-49

ې دهنانسو او د

#### A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF CORDOVA, ALASKA, SUPPORTING THE PRINCE WILLIAM SOUND ECONOMIC DEVELOPMENT COUNCIL SOLID WASTS PROPOSAL

WHEREAS, there exists a need to improve waste containment systems to mitigate the amount of oil and other waste effluent from entering port facilities and the adjoining waters of Prince William Sound; and

WHEREAS, existing landfills in Prince William Sound have limited life spans that necessitate the development of a comprehensive, regional plan; and

WHEREAS, a proposal was developed by the Prince William Sound Economic Development Council, working with the communities of Prince William Sound, the Alaska Department of Environmental Conservation, and other organizations to develop a three phase approach to resolving the waste stream problem in this region; and

WHEREAS, this project will reduce the impacts of solid waste to the communities of Prince William Sound from past impacts, providing restoration through a reduction in future pollution; and

WHEREAS, this proposal was presented to the Exxon Valdez Oil Spill Trustee Council and given a top priority ranking as a project for Fiscal Year 1995; and

NOW, THEREFORE, BE IT RESOLVED, by the City Council of the City of Cordova, Alaska, that the City of Cordova hereby supports the Prince William Sound Economic Development Council's proposal to systematically find, evaluate and pursue solutions to the region's solid and oily waste problems.

PASSED AND APPROVED THIS \_\_\_\_\_ DAY OF SEPTEMBER, 1994.

/s/ Mayor Margy Johnson Mayor Margy K. Johnson

/s/ Lynda Plant City Clerk Lynda Plant

Maria and

#### CITY OF VALDEZ, ALASKA

#### **RESOLUTION NO. 94-76**

#### A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF VALDEZ, ALASKA, SUPPORTING THE PRINCE WILLIAM SOUND ECONOMIC DEVELOPMENT COUNCIL SOLID WASTE-PROPOSAL

WHEREAS, there exists a need to improve waste containment systems to mitigate the amount of oil and other waste effluent from entering port facilities and the adjoining waters of Prince William Sound; and

WHEREAS, existing landfills in Prince William Sound have limited life spans that necessitate the development of a comprehensive, regional plan; and

WHEREAS, a proposal was developed by the Prince William Sound Economic Development Council, working with the communities of Prince William Sound, the Alaska Department of Environmental Conservation, and other organizations to develop a three phase comprehensive approach to resolving the waste stream problem in this region; and

WHEREAS, this project will reduce the impact of solid waste to the communities of Prince William Sound from past impacts, providing restoration through a reduction in future pollution; and

WHEREAS, this proposal was presented to the Exxon Valdez Oil Spill Trustee Council and given a top priority ranking as a project for Fiscal Year 1995;

NOW, THEREFORE, BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF VALDEZ, ALASKA, that the Valdez City Council hereby supports the Prince William Sound Economic Development Council's proposal to systematically find, evaluate and pursue solutions to the region's solid and oily waste problems.

PASSED AND APPROVED BY THE CITY COUNCIL OF THE CITY OF VALDEZ, ALASKA, this 15th day of August, 1994.



CITY OF VALDEZ, ALASKA

John L. Harris



JUL UUJ 2441

10.00 HOIVE

OFFICE OF THE CITY CLERK August 18, 1994

Mr. James Ayres, Executive Director Exxon Valdez Oil Spill Trustee Council 645 G Street, Suite 401 Anchorage, Alaska 99501-3451

Dear Mr. Ayres:

سمت حديثية والجار بالعامية والجزار المرووب

and the second secon

At the regular meeting of August 15, 1994, the Valdez City Council passed by unanimous vote of those present Resolution #94-76 supporting the Prince William Sound Economic Development Council's proposal to systematically find, evaluate and pursue solutions to the region's solid and oily waste problems. A copy of that resolution is attached for your information.

Yours truly,

Jeanne Donald

Jeanne Donald, CMC/AAE City Clerk

Attachment

cc: Paul Roetman, Prince William Sound Economic Development Council

# CITY OF WHITTIER, ALASKATET TO SERVICE AND ALASKATET AND ALASKATET ALASKATET AND ALASKATET ALASKATET AND ALASKATET AND ALASKATET ALASKATET AND ALASKATET AND ALASKATET ALASKATET AND ALASKATET ALASKATET AND ALASKATET AND ALASKATET ALASKAT

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF WHITTIER, ALASKA, SUFFORTING THE PRINCE WILLIAM SOUND ECONOMIC DEVELOPMENT COUNCIL SOLID WASTE PROPOSAL.

WHEREAS, there exists a need to improve waste containment systems to mitigate the amount of oil and other waste effluent from entering port facilities and the adjoining waters of Prince William Sound; and

WHEREAS, existing landfills in Prince William Sound have limited life spans that necessitate the development of a comprehensive, regional plan; and

WHEREAS, a proposal was developed by the Prince William Sound Economic Development Council, working with the communities of Prince William Sound, the Alaska Department of Environmental Conservation, and other organizations to develop a three phase comprehensive approach to resolving the waste stream problem in this region; and

WHEREAS, this project will reduce the impact of solid waste to the communities of Prince William Sound from past impacts, providing restoration through a reduction in future pollution; and

WHEREAS, this proposal was presented to the Exxon Valdez Oil Spill Trustee Council and given a top priority ranking as a project for Fiscal Year 1995;

NOW, THEREFORE the Whittier City Council Resolves:

THAT, the Whittier City Council hereby supports the Prince William Sound Economic Development Council's proposal to systematically find, evaluate and pursue solutions to the region's solid and oily waste problems.

PASSED AND APPROVED by a duly constituted quorum of the Whittier City Council this <u>3rd</u> day of <u>October</u>, 1994.

ATTEST:

1

Ŋ

h

್ಷೇತ್ರ ವ್ಯಾಪಿಸಿದ ಎಂದಿ

Debra Burnham, City

AYES: NOES: 0 ABSENT: 0 ABSTAIN: 0

Post-it - brand fax transmittel memo 7671 = of pages > an

October 7, 1994

Cherisga B

Mr. James Ayers, Executive Director EVOS Restoration Office 645 G Street, Suite 401 Anchorage, Alaska 99501-3451

gachmiut

Dear Mr. Ayers:

This letter is to endorse the Prince William Sound Economic Development Council's proposal on Solid Waste Management. I would encourage that it be given serious consideration for funding.

Management of solid waste is a major problem in Prince William Sound, one which may prove to be as serious a threat, in the long run, to the health and well being of the Sound as are major oil spills. The problem is complex and difficult to solve and delaying it to another day will only complicate matters further. I am currently working with the villages of Tatitlek and Chenega Bay on this issue. However, all the communities and residents of the PWS area need to work collectively on the problem. I believe the PWSEDC proposal provides the means to do this. If funded I and the villages I mentioned will look forward to working cooperatively on this important project.

Please feel free to contact me if you have questions.

Sinea

Paul G. Jackson Environmental Specialist





DEDICATED TO THE STUDY AND CONSERVATION OF PACIFIC SEABIRDS AND THEIR ENVIRONMENT

Cruig S. Harrison Vice Chair for Conservation 4001 North 9th Street #1801 Arlington, Virginia 22203

October 5, 1994

Molly McCammon Exxon Valdez Oil Spill Trustee Council 645 G Street, Suite 401 Anchorage, Alaska 99501-3451

#### Re: Comments on Draft 1995 Work Plan

Dear Ms. McCammon:

This letter contains the Pacific Seabird Group's (PSG) comments on the draft 1995 Work Plan (August 1994). PSG is an international organization that was founded in 1972 to promote knowledge, study and conservation of Pacific seabirds. PSG draws its members from the entire Pacific Basin, and includes biologists who have research interests in Pacific seabirds, state and federal officials who manage seabird populations and refuges, and individuals with interests in marine conservation. PSG has hosted symposia on the biology and management of virtually every seabird species affected by the <u>Exxon Valdez</u> oil spill, and has sponsored symposia on the effects of the spill on seabirds.

I. Project 95038 (Symposium on Seabird Restoration)

We acknowledge our conflict of interest in viewing this symposium as PSG's highest priority in the 1995 Work Plan. Our proposed symposium is <u>NOT</u> designed to be a "low maintenance" meeting at which authors talk at one another, each reading to others a paper that may or may not be useful to seabird restoration. We envision a highly interactive meeting involving plenary sessions and sub-groups. We hope that the attendees will either reach consensus or form majority and minority views on the important issues and strategies for Alaskan seabird restoration. This symposium would allow North American biologists to discuss and debate seabird restoration and strategies in a focused environment for the first time. It will sponsor scientists from U.K., New Zealand, Australia, Africa, Canada and Latin America who can provide North Americans with their experiences with seabird restoration.

PSG responds here to questions that have been raised regarding this proposal.

Could the symposium be held in conjunction with an annual PSG meeting? We believe that the symposium should be held in Alaska to attract local participants and interested observers who might ordinarily not attend a PSG meeting. PSG usually schedules its annual meeting between mid-January and mid-February. During the past 22 years, PSG's Executive Council has considered meeting in Alaska on several occasions. The Executive Council has always rejected that option because it believes that a winter meeting in Alaska would be poorly-attended. More recently, an Alaska meeting would interfere with our work on the conservation of marbled murrelets in the Pacific Northwest and our conservation initiatives in Baja California. We designed the proposal assuming that the symposium would be held in Alaska and to insure that participants could devote their full attention to this single issue. We will consider holding the symposium a few days before an annual PSG meeting if the Trustee Council prefers that PSG hold the symposium outside Alaska.

2. <u>Can this be done cheaper?</u>

<u>Travel.</u> Our estimate includes air fare, lodging and food for 25 scientists to participate in a 3-day symposium in Alaska discussing seabird restoration. Depending on actual rather than estimated expenses for travel (e.g., air fares are higher or lower than assumed), the number of sponsored scientists will vary. We assume that three of the scientists live in Anchorage, for whom no air fares will be needed.

| Symposium (costs in \$1,000):                              |              |
|--|--------------|
| Room and board (25 X \$470) \$                             | 11.8         |
| Beyond North America air fares (8 X \$1,000)               | \$8.0        |
| West coast air fares (inc. Juneau, w.Canada) (8 X \$500)   | \$4.0        |
| East coast air fares (inc. eastern Canada) (6 X \$800)     | \$4.8        |
| Sub total \$   | 28.6         |
| P.I. Travel to Anchorage (one trip in FY96): $\frac{1}{2}$ |              |
| Air fare (2 X \$500)                                       | \$1.0        |
| Per diem (2 X \$200)                                       | <u>\$0.4</u> |
| Sub total  | \$1.4        |
| Total \$   | 30.0         |

 $<sup>\</sup>frac{1}{1}$  The time and travel expense for these meetings is a requirement of the Trustee Council and not truly part of our proposal.

<u>Contract Staff.</u> This work will be conducted entirely by subcontractors because PSG has no employees. We envision subcontracts with at least two and possibly three highly qualified seabird biologists who will organize and run the symposium, conduct research and literature reviews, prepare discussion points, issue papers, conduct international conference calls and produce a final report. PSG might also hire a facilitator for the symposium. This assumes \$35 K in contract expenses during FY95 and \$9 K in contract expenses in FY96 to write a final report. At contract rates used by biological consultants to EVOS, this works out to less than 0.5 man-years, and assumes that sub-contractors will provide their own office space, equipment, and other overhead. We believe our proposal is parsimonious compared to most agency proposals.

3. Why not publish the proceedings? The proposal includes the preparation of a final report and left publication issues open. PSG has a distinguished record of professional publication,<sup>2/</sup> and we believe that this material would be appropriate for <u>Biological Conservation</u>, <u>Restoration Ecology</u>, PSG's own technical publication series, or other outlets. We believe that publication of the proceedings will require additional staff work to motivate authors to produce in a timely manner, direct the writing of papers to synthesize the material, provide honoraria and cover direct publication costs. We can negotiate with the Trustee Council regarding additional costs to publish the symposium.

#### II. Project 95041 (Introduced Predator Removal: Follow-up)

We strongly support a follow-up of FWS' efforts to remove introduced predators from Chernabura and Simeonof Islands during 1994. As we have stated repeatedly, the best means to restore Alaska's seabird populations would be to remove rats, foxes and other alien creatures from colonies and former colonies. The Canadian Wildlife Service has adopted this approach with regard to using oil spill restoration funds in British Columbia.

PSG is concerned that the Trustee Council has not extended this project for 1995 and beyond to include other islands. PSG reiterates its strong objection to limiting seabird restoration to the geographic area that the Trustee Council has identified as the spill area. We believe that far more effort and funds should be directed toward compensatory restoration of seabirds in areas that may be far from the spill area.

<sup>2/</sup> Attachment 1 indicates that PSG has published 10 symposia in some of the most distinguished ornithological publicationss, and others are in planning stages.

#### III. Injured Seabirds

PSG expresses once again its objections to the Trustee Council's simplistic list of injured seabirds in the Summary of the 1995 Work Plan (Table 1). The overall goal of the draft Restoration Plan (we have not yet seen the final) is to restore all injured resources and services.<sup>3</sup>/ We agree with the assessment of the Trustee Council that common murres, harlequin ducks, marbled murrelets and pigeon guillemots do not seem to be recovering and need restoration efforts.

We strongly believe, however, that the Trustee Council should also restore other bird species. We suggested with respect to the draft Restoration Plan that the Trustee Council add the categories "other seabirds" and "other sea ducks" to its list of "recovery unknown" resources. $\frac{4}{}$  The draft Restoration Plan acknowledges that the current population status is "unknown" for the following seabirds that were collected dead in 1989: yellow-billed, Pacific, red-throated loon; red-necked and horned grebe; northern fulmar; sooty and short-tailed shearwater; double-crested, pelagic and red-faced cormorant; herring and mew gull; Arctic and Aleutian tern; Kittlitz's and ancient murrelet; Cassin's, least, parakeet and rhinoceros auklet; and horned and tufted puffin. $\frac{5}{}$  The decline after the oil spill "varies by species" and cormorant, Arctic tern and tufted puffin clearly declined.<sup>6/</sup> The draft Restoration Plan also acknowledges that the current population status is "unknown" for the following species of sea ducks that were collected dead in 1989: Steller's, king and common eider; white-winged, surf and black scoter; oldsquaw; bufflehead; common and Barrow's goldeneye; and common and red-breasted merganser.<sup>2</sup>/ Moreover, the Trustee Council entirely ignores 31 species of shorebirds, nine of which nest in and seven of which winter in the spill area.

We raised this issue repeatedly in our earlier comments and the DEIS (Table 1-1) concedes these injuries.<sup> $\underline{B}$ /</sup> The final EIS

- $\frac{5}{}$  Draft Restoration Plan, Appendix B, p. B-41.
- 5/ Appendix B, p. B-41.
- $\frac{2}{}$  Appendix B, p. B-42.

B/ Letter to EVOS Trustee Council from PSG (August 6, 1993); PSG Comments of Draft 1994 Work Plan (January 21, 1994); PSG Comments on Draft Restoration Plan and Draft EIS (July 29, 1994).

<sup>&</sup>lt;u>3/</u> Draft Restoration Plan, p. 25.

<sup>4/</sup> Restoration Plan, p. 30.
states that this issue will be addressed in the Restoration Plan.<sup>2/</sup> According to the federal estimates published in 56 Federal Register 14687 (April 11, 1991), these "other" seabirds and "other sea ducks" totalled 14,000 dead birds. The Trustee Council estimates that "in general, the number of dead birds recovered probably represents only 10-15% of the total numbers of individuals killed."<sup>10/</sup> Simple mathematics indicates these losses were 90,000 to 140,000 birds, which the 1995 Work Plan continues to ignore.

As a reference point for this magnitude of injury to seabirds, the federal government recently settled the <u>Apex</u> <u>Houston</u> case in central California concerning a spill that may have damaged about 4,200 seabirds (the actual number being an unknown multiple of 4,200). The insurance company paid about \$6 million to settle this claim. If Alaska seabirds are worth as much as California seabirds, the Trustee Council should spend at least \$18 million of the trust funds to restore "other seabirds" and "other sea ducks."

IV. Agencies Should Not Be Funded for Work that they Normally Conduct

We agree with the Trustee Council's proposed Restoration Policy No. 9, which prohibits Government agencies from receiving restoration funds for work that they normally conduct. Apparently, Department of the Interior solicitors invoked this policy to assign one of PSG's proposals, Project No. 95042 (Fiveyear Plan to Remove Predators from Seabird Colonies), to category 4 because this work "is part of normal agency responsibility."<sup>11/</sup> PSG has identified numerous federal and state proposed projects in the 1995 Work Plan that are part of normal agency responsibility.

FWS' Project 95159 (Survey of Marine Seabirds and Sea Otters) proposes to spend \$427,000 on activities that have been part of FWS' normal agency responsibilities since the agency began. We reach the same conclusion with regard to ADNR's Project 95007A (Monitoring Archeological Sites for Looting); the North Gulf Oceanic Society's Project 95013 (Killer Whale Monitoring); NOAA's Project 95092 (Recovery Monitoring of Killer Whales); NOAA's Project 95052 (Distribution, Abundance and Dispersal of Forage Fish); and ADF&G's Project No. 95064 (Monitoring Harbor Seals). PSG fails to see how these projects are any less "normal agency responsibility" than creating a plan

 $\frac{9}{}$  FEIS, chapter 5 p. 55.

× . . .

- 10/ Draft Restoration Plan, p. B-16.
- 11/ Draft FY 95 Work Plan Summary, A-16.

to remove predators from seabird colonies, which would help implement the most effective means known to restore seabird populations.

We noted in our comments on the draft Restoration plan that monitoring is an area where the Trustee Council must make special efforts to guard against violating Policy No. 9. The Migratory Bird Treaty Act, Marine Mammal Protection Act, Magnuson Fishery Conservation and Management Act and other authorities assign legal responsibility to survey and monitor seabirds, marine mammals and fish to federal and state agencies. We can identify projects along these lines that have been conducted by federal and state agencies in PWS in the past. These projects should not be funded by the Trustee Council unless it has decided not to adopt Restoration Policy No. 9.

#### V. Work on Damaged Seabirds that Are Not Recovering

PSG generally supports projects that focus on birds that apparently are not recovering, including common murres (Projects 95021 and 95039), harlequin ducks (Projects 95005 and 95427), marbled murrelets (Project 95031), pigeon guillemots (Projects 95025C and 94173) and bald eagles (Projects 95029 and 95030).

Because bird populations may be depressed due to disruptions in food supplies, we support studies of the influence of forage fish and other prey on injured species (Projects 95019, 95023, 95025A, 95025F, 95033, 95118-BAA). We are especially pleased that the Trustee Council is finally focusing on sea ducks.

We agree with the comments in the draft work plan that many of the projects are similar, and should be coordinated and perhaps consolidated to insure the most effective use of the trust fund.

PSG thanks the Trustee Council for this opportunity to lend its expertise and views on these important issues.

Sincerely, Craig S. Ham

Enclosure

# A brief chronology of the Pacific Seabird Group

|                 |                   |  | Executive Council  |
|-----------------|-------------------|--|--------------------|
| Annual meeting  |                   | Symposis   | Chain              |
| 1973-74         | Bolinas, CA       | Organizational meeting   |                    |
| 1974-75         | Scattle, WA       | Biology of the Alcids  | J. Michael Scott   |
| 1975-76         | Monterey, CA      | Seabird Conservation on the California Coast   | J. Michael Soon    |
| 1976-77         | Monterey, CA      | Shorebirds in the Marine Environment*  | George Divoky      |
| 1977-78         | Victoria, BC      | Black-legged Kirriwake Reproduction  | David Manuwal      |
| 1978-79         | Monterey, CA      | Food Availability and Reproductive Success<br>Investigator Bias in Assessing Scabird Nesting Success | Dan Anderson       |
| 1979-80         | Monterey, CA      |  | Ralph Schreiber    |
| 1980-81         | Tucson, AZ        |  | Ralph Schreiber    |
| 198182          | Scanle, WA        | Peeding Ecology of Masine Waterfowl and Pelagic Birds*<br>Scabird–Commercial Fisheries Interactions* | Kees Vermeer       |
| 1982-83         | Honolulu, HI      | Tropical Scabirds*<br>Human Discurbance at Scabird Colonics  | Harry Ohlendorf    |
| 1983-84         | Monterey, CA      |  | Craig Harrison     |
| 1984-85         | Long Beach, CA    | Biology of Terra   | Judith Hand        |
| 198 <b>5-86</b> | San Francisco, CA | Biology of Gulls*<br>Bird Use of Man-Made vs. Natural Wetlands*                                      | Dan Anderson       |
| 1986-87         | La Paz, Mexico    | Biology of Scabirds in the Gulf of California  | Lora Leschner      |
| 1987-88         | Monterey, CA      | Alcide at Sea*<br>Marbled Murrelet Management*   | Ken Briggs         |
| 1988-89         | Washington, DC    | Wading-Bird Reproduction in 1988   | Scorr Hatch        |
| 1989-90         | Victoria, BC      | Status, Ecology, and Conservation of Marine Birds<br>of the North Pacific*                           | Michael Fry        |
| 1990-91         | Monterey, CA      |  | Doug Siegel-Causey |
| 1991-92         | Charleston, OR    |  | Malcolm Coulter    |
| 1992-93         | Seartle, WA       | Extron Valdez  | Palmer Sekora      |
|                 | ·                 | Marbled Murrelets*   |                    |

\* Published symposium

3 October 1994

### GCT 05 1994

#### To the Trustees Council:

## ARON VALDER OIL STIT

I am writing to you with comments on projects described in the "Draft Fiscal Year 1995 Work Plan". I have read both the "Summary" and the project descriptions in "Supplement Volume I". "Supplement Volume II" was unavailable.

I am strongly in support of habitat acquisition and real restoration projects, that is, projects which physically work to restore species or habitat. Research and monitoring projects, while important because they help us understand the environment that controls species fluctuations, are of lesser importance. Listed below, by category, are projects I support, do not support, and am neutral on.

#### <u>Research</u>

Although I would rather see funding go to habitat protection and real restoration, I realize that many people want to find out what is limiting the recovery of species. I have listed below projects I support with that idea in mind.

#### Prince William Sound Systems Investigations

I support nearly all of these projects, including: 95320A, 95320E, 95320G, 95320H, 95320J, 95320M, 95320N, 95320Q, 95320S, 95320T, 95320U, and 95018.

I do not support:

95320Y Variation in local predation...
95065 PWSAC Pink Salmon Fry Mortality
95320K PWSAC Experimental Fry Release
The above three projects should be funded by PWSAC.

#### Marine Mammal Ecosystem Studies

Support:

95001 (Condition and Health of Harbor Seals) and 95117 (Harbor Seal Lipids) should be combined.

95014 (Killer Whale Feeding Behaviour) and 95073 (Impact of Killer Whales on Seals) should be combined.

95064 Monitoring, Habitat Use, Trophic Interactions of Harbor Seals

95320V Herring Predation by Humpbacks

#### Isotope Studies

Support:

95320I(1 and 2) Isotope tracers for fish, marine mammals, and birds

95114 Eelgrass Community structure

953201 (3) Purchase of Radio Mass Spectrometer

Do not Support:

- 95023 Food Web Relationships of Pelagic Species Precluded by 953201 (1) and 95118-BAA
- 95121 Stable Isotope Ratios... Precluded by 953291(2)

#### Forage Fish Projects

Support:

95120-BAA Composition and Energetic Content...

95163 Abundance and distribution...

95057 Movement of Larval and Juvenile fish...

Concerning Bird/Forage Fish Projects,

Project 95118-BAA seems to cover the most ground for the least cost, looking at pigeon guillemots, puffins, and kittiwakes, thus precluding projects 95019, 95033, and 95173. What 95118-BAA does not look at is radio tags. Could the radio tagging part of 95031, 95033, and 95173 be combined into one project?

The only good murre project appears to be 95021. I support this project because of the unique use of diving-time-depth measurements in researching forage fish for diving birds.

General Restoration

Stock Separation Projects

I realize that these projects could help restoration of injured species by ensuring that commercial and sport fishermen target only on uninjured stocks, however, in general, I do not support the financing of stock separation projects. Since the goal of stock separation is improved fisheries management, it would seem that they would fall under normal ADFG duties.

The stock separation projects are: 95255, 95137, 95051, 95320D, 95320B, 95320C, 95050, and 95165.

Fish and Shellfish Enhancement Projects

I strongly support the following projects:

- 95259 Restoration of Coghill Lake Reds
- 95139D Salmon Instream Habitat Restoration
- 95024 Enhancement of Wild Pink Salmon
- 95139A Spawning Channel--Port Dick Creek
- 95043A Cordova Cutthroat Trout Habitat
- 95043B Carry Forward: Cutthroat and Dolly Varden Rehabilitation
- 95105 Kenai River Ecosystem Pilot Study This project, although it does not physically restore any species, works with that goal directly in mind.
- 95134 Chenega Bay Mariculture I support this as replacing a resource. Seems to be a reasonable cost.

I do not support the following:

- 95079 Pink Salmon Restoration through Small-Scale Hatcheries While this does attempt direct restoration, I believe it is very important to concentrate on restoring wild stock and re-creating natural runs.
- 95125 Tatitlek Sockeye Salmon Release It is important to concentrate on rebuilding the natural stocks in the streams around Tatitlek. While I was not able to evaluate the full proposal (described in Supplement Volume II, which was unavailable), it appears to me that this project would not use broodstock from streams around Tatitlek.
- 95127 Tatitlek Coho Release Do not support for reasons listed above.
- 95017 Port Graham Coho Restoration This project, which basically expands a hatchery water supply, seems to have a very high cost per fish. Also, it does not work to establish natural runs in wild streams. This project should be pursued through Small Business Admin., etc.

I remain neutral on the following:

- 95131 Clam Restoration While I support the idea, it seems to have a very high cost. Can this cost be reduced? Can the project be partially funded through other agencies?
- 95272 Chenega Chinook Release Support the idea of creating natural runs in the Chenega area, but wonder why they are using broodstock from the hatchery at Esther instead of cultivating stock from streams around Chenega.
- 95069 Restoration of Salmon Stocks... I support the idea, but believe project 95024 is more realistic and will accomplish more for a smaller cost. I believe project 95024 addresses many needs, including building up remnant salmon stocks in natural streams, using local knowledge and local labor, and following through with the project for a reasonable time (10 years) to make sure the goals are accomplished. Project 95069 addresses some of these issues, but I believe much of the work will go to biologists from outside the Prince William Sound area; also, the proposed bud-

get is quite high compared to 95024, and 95069 proposes to only follow the project for 2 years, which is not long enough to really establish the runs. Also, I like seeing actual subsistence users (the Eyak Corporation) involved in re-establishing the subsistence runs.

- 95093 PWSAC: Restoration of Pink Salmon Resources... I think some of PWSAC's resources could be used for restoration of wild stocks. However, I think they would be more cost-effectively used if under the context of project 95024.
- 95124 Tatitlek Mariculture I support this project as creating a resource. Can the cost be brought down somewhat?

- 95006 Paint River Pink Salmon Development While this does create a resource, this project was proposed before the EVOS and has been quite controversial. Since the Paint River itself was not damaged, the Trustees may want to stay away from this controversy.
- 95112 Rockfish Restoration Does not restore a resource, just studies it. Part of ADFG normal duties.

#### Subsistence Projects

1. A. A.

#### I support the following:

95279 Subsistence Food Safety Testing Since the food supply was safe before EVOS, this project should be funded by the Trustees. This project seems to be more cost effective than 95132.

I do not support:

- 95138 Elder/Youth Conference
- 95128 Teaching Subsistence
- 95136 Skin Sewing

95140 Subsistence Skills program

The above are all projects that could and should be passed from person to person, not through classes and conferences.

95132 Port Graham and Nanwalek Subsistence Baseline Project 95279 seems to accomplish this for a much lower cost.

95133 English Bay River Red... I support the concept. However, I have spoken with someone involved with this project, and it appears that the people of English Bay are not willing to work to make this project successful.

- 95123 Tatitlek Community Store
- 95129 Tatitlek Fish and Game Smoker
- 95130 Mental Health Center

95135 Subsistence Harvest Support

The above four projects should be pursued through different agencies.

#### I remain neutral on the following:

95244 Seals and Sea Otter Cooperative Subsistence Harvest I seriously doubt that the number of seals and sea otters harvested has really affected the population. Also, seems like a count could be accomplished as part of USFWS duties.

#### **Recreation Projects**

I do not support any of the recreation projects. These projects include: 95002, 95016, 95053, 95080, 95082, 95084, and 95085. While some recreation may have been curtailed by the EVOS, increased recreation opportunities will best be accomplished through restoration projects. Also, it seems to me that spending money to bring more people into Prince William Sound will only increase the amount of time it will take for the Sound to be restored. As the Sound is restored, recreation will follow naturally.

#### Archaeological Resource

I support project 95007B (Archaeological Site Restoration) since the site was physically damaged by spill workers.

#### Protecting Resources by Reducing Marine Pollution

I support both projects under this category (Project 95115 Sound Waste Management and Project 95417 Waste Oil Disposal Facilities). Ensuring that more oily waste does not enter into the Sound will directly help recovery.

#### Other General Restoration Projects

I support the following:

95041 Introduced Predator Removal

95038 Symposium on Seabird Restoration Predator removal seems to be the only project that directly helps to restore bird populations. I support the Symposium as a means to come up with more bird restoration ideas.

95266 PWS Shoreline Assessment... Support, but cost seems quite high. Can it be brought down?

I do not support:

- 95042 Five year plan for predator removal Would like to see 95041 assessed and go through with 95038 before implementing 95042.
- 95141 Afognak Island State Park Interim Support Normal agency duties.
- 95116 Restoration of Intertidal Oiled Mussel Beds... Agree with Trustees that this should be submitted as RFP.

#### Remain neutral on:

95052 Community Involvement... Support the idea of bringing local people together with researchers, however, the cost seems high. Is there a way to accomplish this goal without creating another layer of bureaucracy?

#### 95003 Area E Permit Buyback

This could definitely aid in restoring natural resources by removing the pressure of 25% of the commercial fishing fleet. While I support the concept, it is expen-

#### Habitat Protection

I support the following projects:

95126 Habitat Protection and Acquisition Support

- 95505B Data Analysis for Stream Habitat
- 95058 Restoration Assistance to Private Landowners
- 95139C Montague Riparian Rehabilitation
- 95110-CLO Closeout: habitat protection and acquisition

I do not support the following:

95060 Spruce Bark Beetle Infestation Impacts... I agree with the Trustees that this project should be funded by ADFG as part of normal agency responsibilities.

#### Monitoring

Have not had time to look through the monitoring projects.

#### **Restoration Reserve**

I am strongly in support of the Restoration Reserve (Project 95424).

I thank the Trustees Council for encouraging input and for making the draft work plan and project descriptions available to the public.

Sincerely,

lendra tan you

Kendra Zamzow Box 2514 Cordova, AK 99574

| Post-diff brend<br>Fax Transmittal Me           | emo 7672  | From Days   | Todays Dato<br>10-3-94             | ime                        |
|---|---|---|------------------------------------|----------------------------|
| Location  |   | Location  | Dopt. Charge                       |                            |
| Fax # 586 - 7840<br>Comments                    | lelentions #  | Fax#H24-3865<br>Original   Du:<br>Disposition   Du: | 3 Telephonu # 42<br>stray Autorn [ | 24-5567<br>]Callfor pickup |
|   | n an an an Arran an A |   |                                    |                            |
| ا به او به می میکند. بر بینه ۱۹۰۰ میلونیو این ا | n na sense a la construcción de la serie de la seri | an a            | ·····,                             |                            |
|   |   | н <b>а</b> н  | OCT.                               | 3, 1994                    |

OIL SPILL TRUSTEE COUNCIL GENTLEMEN, IN THE 19305-1941 SEA OTTERS WERE A RARE SIGHT IN P.W.S. THEIR POPULATION ESTAMATED AT ABOUT 12 PAIRS! DURING THE 1920'S THRU THE 1950'S LORDON, WAS HNOW AS THE RAZOR CLAM CAPITOL OF THE WORLD, THERE WAS ABOUT A DOZEN CLAM CANNERI LOCALLY, MANY FAMILY OWNED. CRABING WAS ALS A LARGE PART OF CORDOVAS ECONOMY. MILLION OF POUMPS OF CRAB AND CLAMS WERE HARVESTED ANNUALLY AND SHIPPED OUT OF THE TERRITORY. BY THE LATE 1950'S SEA OTTERS WERE ON THE REBOUND BUT STILL SELPOXA SEEN BY CORDOVANS. BY THE EARLY 1960'S SEA OTTER STARTED , APPEARING AROUND CORDOVA. IN 1964 CORDOVAS CLAM BEDS WERE DEVASTATED BY THE 64 EARTH QUANE. 50% TO 70% OF THESE I'M AR THRIAN I'P

THE UPLIFT. I CAUSE THE SEA TIER WAS PRO-TECTED THERE WAS NO STOPPING ITS INTRUSION ONTO THE CORDOVA NUO FLATS AND IMANEADIF AREAS. THEIR POPULATIONS INCREASED DRAMATICA WRECHING HAVOC ON THE REMAINING CLAM BED COMMERCIAL CLAMING WAS STOPPED. AS THE OTTERS MAIN FOOD SOURCE DWINDLED THEY TORNE TO FEEDING ON CIGATS, ETC. SOON COMMERCIAL CRABING WAS STOPPED. TODAY, <u>30 YEARS</u> LATER, CRABING IS STILL CLOSED. THE CLAM BEDS ARE ALL BUT GONE AND THE LOCAL SEA STIER POPULATION HAS SOARED TO AN ESTIMATED 4000 STRONG, CORDONANS LIFE STYLE HAS CHANGED FOREVER. NO LONGER ARE CLAMS AND CRAB MEAT PART OF OUR EVERY DAY DIET, WE HAVE ALSO LOST MILLIONS OF DOLLARS ANNUALLY FROM THIS ONCE VIABLE AND SUSTAINABLE SOURCE.

THEREFORE, WE WOULD LINE TO MAKE A PROPOSAL TO REVERSE THIS TRAGE TREND. <u>PART</u> I: WITH THE LOSS OF THOUSANDS OF SEA OTTER DUE TO THE OIL SPILL, WE PROPOSE TRANSFERRING ALL TOUT ABOUT 300 SEA OTTERS FROM THE CORDOUA AREA TO THE CENTRAL AND SOUTHERN PORTIONS OF P.W.S.

PART II: RESTOCHING OUR RAZOR CLOM BEDS WITH STOCH FIZOM, SAY, TURNAGAIN ARM BEDS, AND RESTOCHING DUNGENESS CRAB, FROM, SAY, CAPE YANATAGA AREAS.

THANN YOU FOR CONSIDERATION OF THE PROPOSAL.

SINCERLY.

CORDOVAN OLD TIMERS





(907) 745-4047

Don Ford Alaska Branch Director

EVOS Trustee Council 645 G Street Anchorage, Alaska 99501 October 1, 1994

Re: Fiscal Year 1995 Work Plan

Thank you for the opportunity to comment on the Fiscal Year 1995 E∀OS Work Plan. Our concerns specifically relate to the Trustee Council's interpretation of the "Leave No Trace" education project #95002 and the "Recreation Impacts in Prince William Sound" research project #95077. Both of the proposed projects are designed to benefit Prince William Sound injured resources not the associated services.

In the comprehensive, balanced, ecosystem approach endorsed by the Trustees, the potential adverse affect of human impact can not be dismissed. Table 1 of the Draft 95 Work Plan Summary identifies wilderness areas as a resource for which scientific research has demonstrated a population level injury or a continuing sublethal effect as a result of the spill. Changes in the traditional recreation patterns and locations caused by the spill mean that formerly pristine or infrequently used areas are now receiving heavier use. Additionally, with increase notoriety as a result of the spill, more people are coming to the Sound. The effect of this increased and concentrated recreational use on Prince William Sound's Wilderness Study Area can be mitigated through education using common themes and valid research.

Secondly, while proposals for the acquisition of specific parcels of land are not the subject of this draft work plan, we continue to support habitat protection and acquisition as a vital restoration tool.

In particular, NOLS is concerned that the area in the Southwest part of Prince William Sound not be overlooked when making acquisitions. The area was the hardest hit of all the impact area, and has tremendous value for wilderness based tourism and damaged resources. We encourage the Trustees to acquire either title and surface/subsurface rights, or surface/subsurface rights with stipulations protecting from further development, of private lands in the following areas:

Dangerous Passage East side of Knight Island Bainbridge/Evans/LaTouche Islands

South end of Knight Island Chenega Island



.

•

We appreciate your efforts in soliciting public input and look forward to the completion of the Final Restoration Plan.

Sincerely, -Dor

Don Ford Director, NOLS Alaska

.



SEP 28 1994

### \* NERKA, Incorporated

PO Box 80165 Fairbanks, Alaska 99708 (907) 479-2476 September 26, 1994

*Exxon Valdez* 011 Spill Trustee Council 645 G Street Anchorage, Alaska 9950.1

REGARDING: Draft Fiscal Year 1995 Work Plan

I have received the "Draft Fiscal Year 1995 Work Plan Summary" and would like to comment on our project No. 95079, "Pink Salmon Restoration through Small-Scale Hatcheries", which was rated in Category 4.

We are not aware of the legal ramifications of using a non-profit hatchery for aiding in salmon restoration, but presumably one aspect of an EIS would be to determine the impact of the hatchery on wild stocks. That is just the issue we plan on addressing, and propose an environmentally and genetically compatible system to enhance and increase the local pink salmon runs. Our project appears very similar to Numbers 95024 and 95069, which rate a Category 2. These projects emphasize incubation boxes, while we propose a small hatchery which would also simulate natural production and, in addition, incorporates a major research component to gain an understanding of hatchery-wild fish interaction. We use the term "hatchery" in a general sense, and might find it advantageous. with agency approval, to begin with incubation boxes building the wild stocks sufficient to justify a hatchery operation. All three projects appear very compatible from my review of the summary information, and all would contribute to restoration of wild pink salmon stocks in Prince William Sound

Although the large hatcheries had good returns in 1994, from preliminary information the wild escapement was still poor. As of late August, we counted only 600 fish in the Perry Island South Bay streams -- extremely low for the even-year cycle, pointing up a continuing problem with our wild stocks and the need for additional research and restoration

Jan an la Higren



Juneau Center ,hool of Fisheries and Ocea. ,ciences

University of Alaska Fairbanks 11120 Glacier Highway Juneau, Alaska 99801

(907) 465-6441 Office (907) 465-6447 FAX

SEP 3.0 1994

September 28, 1994

To: EVOS Trustee Council

Fr: Michael S. Stekoll, Juneau Center School of Fisheries and Ocean Sciences, University of Alaska, Juneau, AK Mychaul Allace Lawrence Deysher, Coastal Resources Associates, Inc., Vista, CA

Re: Proposed Project 95086A Coastal Habitat Intertidal Monitoring and Experimental Design Verification.

We are concerned that there is a misunderstanding of the purposes of the proposed experimental design verification as part of the above proposal. We have drafted a rationale for this aspect of the project and present it below.

Rationale for Experimental Design Verification of the Coastal Habitat Intertidal Monitoring Project

The optimal design for environmental impact monitoring requires that samples be taken at impacted and reference stations both before and after a disturbance event (Green, 1979; Stewart-Oaten et al, 1986). This process is a BACIP (Before-After, Control-Impact Pairs) design. It is very difficult, if not impossible, to obtain data for the "before" period at impact sites in unpredictable events such as an oil spill in Prince William Sound. Very few of the studies on the effects of the EVOS have been able to use this design due to the lack of pre-spill data. Therefore, the study design for the intertidal and subtidal injury assessments utilized sampling at pairs of oiled and reference sites for the after period to infer injury to biological resources. This process is an ACIP (After Control-Impact Pairs) design (Dean et al., 1993). Correct interpretation of the results produced from this design is based on the assumption that oiled and reference sites would not have differed if the oiled spill had not occurred.

The damage assessment studies for both intertidal and subtidal habitats have found consistent differences between oiled and control sites that have now persisted for 5 years. The percent cover of *Fucus* in the mid to upper intertidal of Prince William Sound, for example, has been consistently higher at control sites than at oiled sites. In subtidal habitats, *Musculus* density on eelgrass has been consistently higher at oiled sites. Without pre-spill data, it is difficult to establish whether these differences represent long term impacts of the spill, or whether they represent inherent differences among sites. For example, in the case of *Musculus* density, these types of inherent differences could

be due to subtle differences in the predominant wind and current conditions within the Sound that were responsible for bringing oil to the oiled and not to the control sites. These same wind and current conditions may also be responsible for bringing higher concentrations of *Musculus* larvae to the same beaches.

The assumption of this ACIP design that the oiled and control sites were the same before the spill has been criticized in peer reviews of publications we have written on the injury assessment data and has been recognized as a potential problem in defining damage and recovery in the "Invitation to Submit Restoration Proposals." There are sessentially two ways to address this issue. First, long-term monitoring of resources sould be conducted to determine if the resources at oiled and reference sites "converge" in the future. This approach suffers from the fact that convergence may take a long time, or may never occur if some alternate stable state has been achieved after the spill. State and Federal agencies, however, are faced with the decision to expend resources to restore these injured populations. These restoration resources could be best utilized if we had an immediate and conclusive answer to the question of damage assessed by the ACIP study design. An answer to this question could be obtained with an independent test of the process by which the control sites were matched with the controls. This independent test would demonstrate whether there were any inherent biases in the pairing process and whether the population differences we are still seeing are due to damage by the oil spill.

The site verification aspect of the proposal is a critical part of the entire Coastal Habitat project. Without this verification, results and conclusions from the data collected by the damage assessment of the nearshore must always be qualified by the prospect that oiled and control sites are inherently different.



Fairbanks, Alaska 99775-1080

9 September 1994

To: Eric Myers Alaska Dept. Fish and Game EVOS Trustee Council 645 G Street, Suite 401 Anchorage, AK 99501-3451



EXXON VALUE ON SPILL TRUSTEE COULT

From: Tom Kline PWS Science Center c/o IMS-SFOS Univ. Alaska Fairbanks, AK 99775 tel 907-474-5675 fax 907-474-7204

Re: FY95 proposed project 95114 "Eelgrass community structure restoration assessment using stable isotope tracers"

Per our telephone conversation, I am sending the following information. In the Draft FY 1995 Work Plan, project 95114 is categorized in Appendix B on page B-16 as an intertidal project. It should instead be categorized as a subtidal project on page B-30. Additionally, project 95114 should be listed as a project using stable isotopes as the primary methodology on page 19 (chapter 2). This project as stated in the proposal is designed to piggy-back on Steve Jewett's project 95106 (by sharing research platform logistics). The genesis of 95114 (i.e., using stable isotopes to answer questions relating to recruitment of EVOS-affected subtidal species) came about during discussions while working on our other collaborations.

C. R. Spies

S. Jewett

Repaint on statle Butope ascarch Fill

OCT 0 1 1994

EXAMPLATER COLORIDA

Timothy D. Bowman P.O. Box 112886 Anchorage, Alaska 99511 (907) 345-8851 30 September 1994

المراجع المراجع المتعمري الرار

Exxon Valdez Oil Spill Restoration Team Jim Ayers, Executive Director 645 G Street Anchorage, Alaska 99501

Dear Mr. Ayers,

My comments on the Draft 1995 Work Plan are limited to 2 studies on bald eagles (95029 and 95030).

I was the project biologist for the bald eagle damage assessment study from 1989-93. I am thus intimately familiar with the previous bald eagle reproductive and population surveys; their methods, results, strengths, and limitations. The 2 eagle studies proposed in the 1995 Work Plan are replicates of previous surveys. Currently the productivity survey (95030) is a Category 1 study, whereas the population survey (95029) is Category 2. I have only one point I want to make:

#### \*\*\*The priority given to these 2 projects should be reversed.\*\*\*

I believe there are compelling reasons why the population survey should be Category 1:

The purpose of the proposed studies are to document population 1. recovery (monitoring). When we conducted the damage assessment study, we estimated the time it will take the population to recover from the spill based on a population model that incorporated the best available, yet sometimes uncertain, parameters. Given that uncertainty, we could not predict with confidence the recovery time. Consequently, the model, and our projection about recovery time, needs confirmation. Frankly, the best way to document population recovery and monitor population status is to conduct a population survey (i.e., count the number of eagles in the same area we counted before). If reproduction or survival has been impaired significantly in the 6 years after the spill, it should be reflected by a decrease in population size. It is a direct measure of the population response, and estimates derived from the surveys are reasonably precise. Now six years after the spill, it is appropriate that such a survey be conducted.

2. The proposed reproductive survey of bald eagles will measure this years' reproductive performance only, but it will <u>not</u> document population recovery. Reproductive success of bald eagles varies widely, both annually and geographically, due to many factors (e.g., weather, seasonal food availability). This is well documented for eagle populations in Alaska and elsewhere. The truth is, we don't know what constitutes "normal" reproductive rates for eagles in Prince William Sound. Reproductive studies were previously conducted there in only 2 years; 1989, when success was obviously impaired, and 1990, which we assume was normal although we have no way to substantiate that. Although reproductive surveys may be able to detect gross changes in reproductive rates (which I believe are unlikely for this population of eagles), they are not an effective method for longterm monitoring of bald eagle populations. Unless catastrophic, any change between 1990 and 1995 in the observed reproductive rates could be attributed simply to natural variation.

I urge you to seriously consider my comments and re-evaluate the priorities given to the proposed studies on bald eagles.

Feel free to contact me if you need additional information.

Sincerely,

Juroty D. Burner

Timothy D. Bowman



001011994

EXMON VALSEZ OF SPILL TRUSTES COUNCIL SU



 Suite 101, 4175 Tudor Centre Dr. Anchorage, Alaska 99508 (907) 562-3339
 FAX: (907) 562-7223

September 30, 1994

James R. Ayers Executive Director *Exxon Valdez* Oil Spill Trustee Council 645 G Street Anchorage, AK 99501

Dear Mr. Ayers and Members of the Trustee Council,

This is a response by LGL Alaska Research Associates, Inc. to your request for comments on the Draft Fiscal Year 1995 Work Plan which was prepared for the *Exxon Valdez* Oil Spill Trustee Council. Our comments are in several areas as noted in the following.

#### The Issue of Restoration Ideas versus Restoration Proposals

In a document dated May 16, 1994, the Trustee Council invited interested parties to submit restoration projects for 1995. We were informed by Council staff that this announcement was the mechanism the Council intended to use to solicit <u>ideas</u> for restoration, and that the Council would categorize the restoration ideas it received from the public and agencies into two groups: those project ideas appropriate for agencies to accomplish and those project ideas that would be put out for competitive bid. It was clear to us that you were seeking <u>ideas</u>, not fleshed-out restoration proposals. We also understood that the next step in this process would involve a call for detailed restoration proposals which would identify agency track <u>and</u> competitive bid tasks.

Given this, we expected to see in your 1995 Draft Work Plan a dual listing of projects for which we, private sector researchers, could compete. There is no such differentiation in the Plan. Rather, we see explicit research projects, listed by priority, and no listing of projects that might be put out for bid. Most of the projects appear destined for state or federal agencies, which we believe is inconsistent with the U.S. General Accounting Office (GAO) report (GAO/RCED-93-206BR) recommendation "for more open competition for restoration projects,..." We are very disappointed that the Draft 1995 Work Plan appears to be a package of <u>projects</u> that will be funded, as is, with no stated competitive process.

We urge the Trustee Council to reexamine all projects in priority categories 1 and 2 and

54

consider offering some or all to competitive bid. Your own policy is to encourage competitive proposals (Policy 6, p. 13, Draft Restoration Plan). If you choose to do so, a nationwide Request for Proposals in the disciplines you intend to pursue as your restoration strategy undoubtedly will engender a large number of high quality proposals from scientists who are on the leading edge in their respective disciplines. We urge you to put a competitive process in place this year.

#### Specific Comments on Genetics Restoration Projects

There are four genetics projects listed in the draft work plan, all assigning the Alaska Department of Fish & Game arrived agency. Project 95191b is a continuation of an investigation of genetic damage to pink salmon. The experimental approach of exposing fish to oil seems unnecessary; wouldn't monitoring the wild population be more appropriate? If genetic damage is serious enough to be of concern, it should be detectable in wild fish. We would like to see the data generated by this project from prior years. Dr. John Bickham, a geneticist with LGL, proposed to ADF&G in 1991 that LGL use flow cytometry techniques to analyze whether genetic damage had occurred to fish populations in the affected areas. We note that, rather than contracting this work, ADF&G has developed in-house capabilities for flow cytometry, yet, to our knowledge, no reports nor papers published in the peer-reviewed literature are available on this study. Note that since 1991, Dr. Bickham has published papers on the use of flow cytometry for genetic toxicology studies of other species (see attached list). We recommend that the flow cytometry work be available for competitive bid.

Projects 95255 (Kenai River sockeye salmon genetics), 95165 (herring genetics), and 95320d (pink salmon genetics) all are of interest to the private sector, and we suggest that much of the work proposed could be accomplished through competitive bid processes. LGL, for example, has conducted several fish and marine mammal genetic stock identification studies. We have developed techniques for analysis of mitochondrial DNA, and recently nuclear DNA, markers in salmon and marine mammals, and have several papers published or in preparation (a list is attached). We do note that the Project 95255 proposal mentions contracting nuclear DNA marker development for sockeye. Funding for this subcontract (\$20,000) is not much for modern molecular biology research, but we are interested in it. We also acknowledge the RFP from ADF&G for protein electrophoresis work on the pink salmon project; LGL doesn't do this sort of work and forwarded the RFP on to other firms that do.

We strongly recommend that restoration funds not be used to build molecular (DNA) genetics programs in government agencies when the equipment and personnel are already available in the private sector or universities. Some of these projects appear to justify fish stock identification, a normal agency function, as a restoration project in order to fund expansion of an agency in direct competition with nongovernment sources. We believe that the private sector could accomplish research and development and service work faster and more efficiently than government. For example, over the last three years, LGL has determined mitochondrial DNA genotypes for over 1,700 salmon and marine mammals for under \$220,000 in total costs to clients. This included research and development, equipment, overhead, timely reports, *and publication of results*. This is only mtDNA work on aquatic species; we have many other projects with terrestrial animals

and with nuclear DNA. And as suggested in the GAO report, more open competition for restoration projects will improve the quality and timeliness of these projects.

#### Monitoring

For the past seven years, LGL has been the prime contractor to the oil and gas industry to conduct long-term comprehensive monitoring of the effects of oil and gas development on terrestrial, aquatic, and marine biotic resources in the Frudhoe Bay region of Arctic Alaska. We believe that our expertise and qualifications could be brought to the monitoring efforts planned by the Trustee Council. We request that the Trustee Council's monitoring program be re-cast into an issue-based, ongoing synthesis, integration, and assessment program. We believe that such a program could be efficiently conducted by our firm or perhaps other private sector groups.

In the early 1990s, LGL pioneered the process of issue-based monitoring of causeway effects on coastal fish populations and habitats in the central Alaskan Beaufort Sea. This process, of applied to the oil spill monitoring program, would involve:

- continuous **synthesis** of data and information toward understanding what information is necessary for resolution of key issues,
- **integration** of all restoration and monitoring studies into a holistic understanding of marine ecological processes in Prince William Sound, as they relate to natural and human-assisted restoration, and finally
- **assessment** of all available information in a structured process of hypothesis testing in order to resolve all important issues associated with the spill and its environmental perturbation.

We propose that the Trustee Council consider contracting with LGL to administer the monitoring effort for the *Exxon Valdez* oil spill affected area. Monitoring could proceed according to that described in Wilson and Gallaway (In Prep.), which is a manuscript describing the synthesis, integration, and assessment process (attached); this manuscript currently is under review for publication in a future symposium proceedings by the American Fisheries Society. Our recommended process would involve continued monitoring of the affected area and resources, but would be directed toward resolution of issues. The definition of these issues would be by consensus among the Trustee Council members, researchers, and the Principal Scientist. Such an approach would structure the monitoring program toward attaining a series of specific goals. This process would drive the restoration research efforts, guiding them toward collection of data or preparation of analyses that are necessary to determine when an appropriate level of restoration has been reached - at which time that phase of the restoration and monitoring effort could cease, and resources could be used elsewhere.

Obviously the Council cannot make such a sweeping decision without considerable investigation of LGL's qualifications and without gaining an adequate level of comfort with our approach. We propose to provide such documentation and consultation with

the Council and its staff at your earliest convenience. We believe that this will lead to a <u>focused</u> monitoring program that uses a scientifically-structured approach to resolving issues. LGL would subcontract some elements of this monitoring program, such as the archeological tasks. Other private sector or agency research groups would be contracted to assist with various facets of the environmental field data collection effort. Some of the marine mammal, terrestrial wildlife, bird, fish, and human uses tasks could be conducted with in-house experts in these disciplines.

I direct your attention to LGL's June 15, 1994 statement of interest to the Trustee Council in response to the Invitation to Submit Restoration Projects for Fiscal Year 1995. In that transmittal, I-provided a detailed description of our firm and the expertise of our staff.

#### Accountability for Restoration Studies Conducted To Date

LGL is a company with extensive experience in Alaska, but with little familiarity with studies in Prince William Sound occasioned by the *Exxon Valdez* oil spill. Earlier this summer we sought information on the results of monitoring and restoration activities conducted since the spill occurred, in order to write an informed proposal for restoration project ideas to the Trustee Council. We were informed that reports or other published results of the studies conducted to date on the effects of the oil spill by state and federal agency researchers were not available. These studies have been ongoing since the event occurred in spring 1989 - over five years. Admittedly the study results were NRDA related and were tied up in the litigation process during those initial years after the spill. But since 1991 the process has been open, and we do not understand why monitoring and restoration study results haven't been, at the very least, presented in <u>publicly-available</u> Principal Investigator reports on file in the Trustee Council offices.

Our firm was placed in an impossible situation when considering responding to your call for restoration proposals: we had not done studies of the spill, and therefore had no <u>inside</u> knowledge of the various facets of work conducted to date, nor had we access to any publicly-available documentation of this work. We were informed by Council staff that the only mechanism to research a particular spill-related research or restoration issue was to contact current Principal Investigators, from whom we might be able to obtain progress reports. We assert that this is not an appropriate, accountable way of conducting a science-based restoration program.

We urge the Trustee Council not to fund any continuing or new restoration project until all past work conducted by that agency or individual research scientist or team has been released for public review in scientifically-acceptable form (e.g. a close-out final report that has withstood internal peer review and that has been cleared by the Trustee Council's Principal Scientist). Further, we recommend that all continuing and new restoration studies funded by the Council include a mandate, where appropriate, that one or more manuscripts be prepared from the 1994 (and previous years') studies that is suitable for publication in the peer-reviewed literature. By requiring publication, the Council has at least one measure of the scientific credibility and validity of the restoration studies it is funding. As a further consequence, researcher accountability will increase.

(4) 10 (1997) 199 (1997) 11.44

#### Administrative Overhead

We note that the Trustee Council proposes to fund its Executive Director's office, including public information and data management, at a rate that is 17 percent of the proposed 1994 research budget. We believe that spending almost 1 of every 5 dollars on administrative expenses is far too high and should be carefully examined for savings. Your own policy dictates that public information and administrative costs not exceed 5 percent of the overall restoration expenditures (p. 23, Draft Restoration Plan). Each agency, and suboffices within these agencies, also have their own administrative and information transfer expenses. We wonder if some duplication of services is occurring in this restoration program.

If you or your staff have questions or wish to discuss these matters further, please feel free to contact me.

Sincerely, LGL ALASKA RESEARCH ASSOCIATES, INC.

Million 9: M

William J. Wilson Office Manager

cc: Dr. Benny Gallaway Dr. Robert Spies

enclosures

SEP 0 9 1994 9-1-94 Dear Sirs, The facts on your " Research Proposals" Sept 1994 page 3-Prince William Sound had one of the best pink Isalmon runs ever in 1994 -Sincerde ; Kohert Chenier P.O. Baf 39055 NINILOHIK AK 99639

 

 Exxon Valde\_ Oil Spill Trustee Coun..l Restoration Office

 645 G Street, Suite 401, Anchorage, Alaska 99501-3451 Phone: (907) 278-8012 Fax: (907) 276-7178

 MEMORANDUM

 TO:
 Public Advisory Group Members

 FROM:
 Molly McCammon, Director of Operations

14.2.14

RE: PAG Final Report

DATE: October 10, 1994

The Public Advisory Group, at its August 2-3, 1994 meeting, adopted a motion requesting each PAG member to compile a list of issues of concern to them and their constituents, along with alternatives to resolve the issues. The lists were to be submitted by September 1 to EVOS staff for compilation for discussion at the October PAG meeting. It was intended that the issues list serve as the basis for a final report for this term of the PAG.

The following issues and proposed resolutions were received in the EVOS office. (Letters were received from five PAG members.)

Issue:Need to establish an overall policy on the use of settlement funds.Proposal:Develop a simple, clear set of guidelines specifying the purposes for which<br/>settlement funds may be spent, and prioritizing those purposes. For<br/>example:

- 1. Picking up oil which is fouling the environment.
- 2. Restoring injured resources and services by direct action.
- 3. Protecting habitat critical to resources injured by the oil spill
- 4. Establishing an endowment, trust or reserve so there is income after Exxon makes its last payment.
- 5. Replacing injured resources and services by indirect means, i.e. enhance equivalent resources to reduce pressure on injured resources.
- 6. Providing funding for facilities which support 1-5 above.

Questions that should be considered in developing the guidelines include whether a major portion of settlement funds should be used for long-term resource enhancement rather than for short-term restoration efforts, whether state and federal agencies are compensating for declining budgets by seeking EVOS settlement funds to fulfill legislative mandates for resource monitoring and research, and whether it is appropriate to use settlement funds to mediate the conflicts between ANCSA and ANILCA.

Trustee Agencies

Issue:Need to ensure that adequate resources are available to complete the<br/>restoration process.Proposal:Develop a plan and schedule for the gradual use of the Restoration<br/>Reserve and eventual completion of the EVOS restoration effort (i.e., the<br/>point at which resources are restored and monitoring responsibilities are<br/>assumed by state and federal agencies as part of their regular programs).Proposal:Evaluate whether permanent academic chairs would provide greater public<br/>benefit than contract research. If so, request that the federal solicitors find<br/>a way to establish a permanent endowment with a portion of the settlement<br/>funds.

Issue:Need to ensure accountability in the expenditure of trust funds.Proposal:Hire an accounting firm to audit the expenditures of the Trustee Council<br/>and recommend a system of financial controls independent of the Trustee<br/>Council agencies; develop a system for detecting inefficiencies in project<br/>management and implementation; enlist an independent coordinator to<br/>manage the restoration effort; and require financial participation in<br/>projects by non-Trustee agencies, communities, universities, or private<br/>interests.

- Issue:Need to ensure restoration of the Prince William Sound ecosystem.Proposal:Declare the ecosystem, rather than some of its parts, to be a damaged<br/>resource. Evaluate the effectiveness on ecosystem restoration of the<br/>current EVOS program of invited proposals, as compared to some other<br/>means.
- Issue:Need to mediate the conflicting opinions on habitat protection.Proposal:Evaluate alternatives to fee simple purchase, such as land management<br/>agreements, term leases, and land trades. Also, implement land<br/>management techniques designed to enhance habitat on land currently.
- management techniques designed to enhance habitat on land currently owned or managed by the government.
- <u>Proposal:</u> Identify clear and quantifiable links to specific injured resources or services for any land proposed for acquisition.
- <u>Proposal:</u> Mitigate the economic impacts of land acquisition on individuals and communities (e.g., compensate consumers for the loss of locally milled lumber due to Trustee Council acquisition of commercial timberland).

Issue:Need to replace angling opportunities lost due to the Exxon Valdez oil spill.Proposal:Purchase the Karluk River on Kodiak, or acquire public access to it.

| Issue:           | Need to determine what loss birds suffered from the oil spill, and whether restoration is being achieved.   |
|------------------|---|
| Proposal:        | Review restoration policies in regard to birds.   |
| Issue:           | Need to ensure the continued involvement of private parties and the general public in the restoration process.  |
| <u>Proposal:</u> | Maintain a prominent role for the PAG in the Trustee Council's deliberative process. Continue efforts to involve private researchers in the implementation of the restoration plan. |

----

Once the PAG has reviewed this list of issues, EVOS staff will be available to assist in the preparation of a final report.



To: Doug Mutter, PAG Fed. Officer

- 8/X1/2/19 4 ALDEZ OIL SPILL TRUSTEE COUNCIL

Fr: Jim King, PAG Conservation Member

Sub: EVOS Settlement Issues, 1994

Herewith some of the issues I would like to see discussed at the October PAG meeting. I hope they are useful questions. It is an incomplete list and I trust those more knowlegeable will articulate issues for fisheries, archeology, recreation and so forth.

1) Good conservation dictates sustained yield where possible. Should that concept be applied to Settlement funds and a major portion be used for long term/permanent resource enhancement rather than for short term restoration efforts? Yes! Maybe! No!

2) Some elements of the ecosystem can easily be classed as restored, some elements unrestored and some elements in need of long term scrutiny to determine what restoration effort is needed. Should the ecosystem rather than a collection of some of its parts be recognized as the damaged resource? Yes! Maybe! No!

3) Can the "ecosystem approach" to restoration really be achieved by the current program of invited proposals rather than through a coordinated assault by a well directed team? Yes! Maybe! No!

4) Two thirds of respondents to the "EIS brochure" favored establishment of a permanent endowment with some of the Settlement money in hopes of eventually achieving resource enhancement? Should the Trustee Council request that the federal solicitors try to find a way to accommodate this majority interest? Yes! Maybe! No!

5) Would it be better to modify and perfect existing bureaucracy, for instance the University of Alaska Foundation, to manage an EVOS endowment rather than invent a new organization? Yes! Maybe! No!

6) Establishing permanent academic chairs with responsibility for developing an understanding of the ecology of the major damaged resources through graduate study projects would produce peer reviewed publications and EVOS area trained scientists as well as good science. Would endowed chairs ultimately provide greater public benefit than contract research? Yes! Maybe! No!

7) Though tempting, is it appropriate for agencies to try to compensate for declining budgets by appealing for EVOS money to fulfill legislative mandates for resource monitoring and research? Yes! Maybe! No! 8) There are clearly conflicts between the 1971 Alaska Native Claims Settlement Act and the 1980 Alaska National Interest Lands Conservation Act. Is it appropriate or even possible for the Trustee Council to try and moderate any of these Congressionally created problems with EVOS Settlement funds? Yes! Maybe! No!

9) Where habitat protection is the objective the public interest and long term restoration goals can best be served by fee simple purchase. Yes! Maybe! No!

10) Everyone agrees birds, some of which have an ecosystem that spans North and South America or the entire Pacific Ocean, suffered major losses from EVOS but because there was very little pre spill data it is difficult or impossible to determine what the losses were and whether restoration is being achieved. There has been very little effort so far on behalf of the birds. The Trustee Council should review restoration policies which were largely conceived to help better understood resources and see if there may be some innovative ways to do something for birds. Yes! Maybe! No!

11) Is there a danger that in 2001 and beyond there will be a public perception that the resources largely recovered on their own, special interests got the money and society benefitted very little from the EVOS Settlement? Yes! Maybe! No!

September 1, 1994

Exxon Valdez Oil Spill Trustee Council 645 G. Street Anchorage, Alaska 99501

ATTENTION: Jim Ayers, Executive Director

Dear Jim:

While reading the Ecosystems based restoration proposals, and the large dollar amounts which accompany them, sitting through the work session and watching the evaluations of the proposals. I feel with the draft restoration plan and the scientific team, we are almost on the right track. We know not everyone will be satisfied, but at least it's a step in the right direction.

The Public Advisory Group recognized the need for proper direction; it was also our feeling we were not getting the proper recognition or included in the process. I can now see this is beginning to change. I do feel, although we are only in and advisory position and are the representatives of the citizens of Alaska; that needs to continue. I feel Director Ayers is taking very careful long strides to get things lined up properly and efficiently.

I agree with the rest of PAG members, we need an endowment/reserve for future generations of research.

I also agree with some that trying to purchase habitat is not the answer either. With the spruce Bark Beattle infesting the timbers in PWS, are we not purchasing dead forest that cannot serve as habitat anyway?

The Public has been very disallusioned on how the Exxon funds have been spent and everyone sees the dollar as something they should have in their area or organization.

With this new team, I believe things will go in a better direction, cost, effectiveness and damage will be the major components. At this point I believe we can endorse what Jim Ayers is trying to accomplish, express our concerns, support and work with him.

The draft restoration plan at least is something to work with and does provide long term guidance, I encourage endorsing the concept of it for right now.

Recreation has increased because of the spill, there are more businesses for recreation in PWS than ever before. This area will continue to grow. Significant earnings are really being made here.

The Native concerns, ideas and history should be a priority, lessons of the past and into the future will give us a better understanding of the Sound. But we must ask and then we must listen to the answers...if so, everyone will understand and learn.

I am looking forward to the future years of serving on the Public Advisory Group with most of the same people that have been here. It's been and honor.

Respectfully,

Donna M. Fischer Co-Chair, Public Advisory Group

EXKON VALDEZ OIL SPIL

TRUSTEE COURCE

RUPE ANDREWS 9416 LONG RUN DRIVE JUNEAU, AK 99801

August 29, 1994

Ms. Molly McCammon Director, Operations EVOS-PAG 645 G Street , Suite 401 Anchorage, AK 99501-3451

Dear Molly:

Re the last PAG meeting, members of PAG were requested to compile issues that they consider important and submit them to you by September 1. I would like to put forth the following notion for consideration by the Trustees if and when the opportunity may occur. I propose that the Karluk River on Kodiak be considered for purchase as replacement for lost angling opportunities due to the oil spill in PW Sound. The past two years I have seen that anglers and sport hunters essentially will derive little consideration from the oil spill settlement unless there is the chance to purchase a system such as the Karluk River to replace lost angling opportunities.

I am aware that this river is not on any list by the land owners for possible purchase. The Karluk has only been vaguely discussed by some of the trustees and some trustees may not have heard of the river. Arguably, the Karluk is the best wild, steelhead stream left in North America. It should be in public domain and under the protective land classification of the Kodiak Bear Refuge. If the land owners are reluctant to sell then public access and a mutual land management plan should be explored, ie., less than fee simple purchase.

I have no alternative options for sport anglers of lasting benefit. The Karluk River is priceless for the recreational benefits that it offers to sport anglers and worthy of discussion at the October PAG meeting.

Sincerely, Redrews

Rupe/Abdrews, Member, EVOS-PAG Sport Fishing-Sport Hunting Representative

P.O. Box 868 Girdwood Ak. 99587 9-8-94

Molly McCammon, Director of Ops. EVOS Restoration Office 645 G Street, Suite 401 Anchorage, AK 99501

Molly McCammon:

During the past two years, I have learned much about the damages to and the restoration of Prince William Sound in this post oil spill era. I volunteered for a position on the PAG to learn these things, but in the process of informing myself I have learned even more.

In the past year I have witnessed the transformation of an agency generated structure into something with so much imput from the public, from private researchers, and from government agency personnel that the collective imput when ranked and presented in open forums by experts and private citizens cannot be ignored. The infrastructure set up by Jim Ayers' team has been impressive and effective. The 1995 Draft Work Plan is the proof of the pudding.

The next phase of carrying this draft Work Plan, with all its competing proposals, to fruition is daunting.

My chief concern is that the EVOS settlement not be used to create an agency driven research juggernaut that arbitrarily lisplaces local private researchers from their historical roles. If settlement funds are used to build a research center in Seward, then how much say will state and federal agencies have in the allocation of research funds from settlement monies?

Right now I am very happy with the layers of of accountability that Jim Ayer's team has built into the research proposals. I hope that private entities will continue to be involved in future proposals, because the quality of the 1995 Draft Work Plan has been greatly enhanced by their participation. It is important that the best of these private parties now participate in the actual projects to ensure their future involvement in the restoration process.

Please keep up the good, although difficult work. You have my greatest appreciation.

Sincerely,

James A. Diehl, recreational users

Lew M. Williams, Jr. 755 Grant Street Ketchikan, Alaska 99901

#### August 31, 1994

Molly McCammon Director of Operations Exxon Valdez Oil Spill Trustee Council 645 G. Street, #401, Anchorage 99501 FAX 276-7178

Dear Ms. McCammon:

In response to a request of members of the Public Advisory Group for their opinions on restoration direction, here is my opinion as a public member:

GUIDELINES --

Some brief, simple guidelines - following the court decision - are needed for those who apply for restoration grants, for the restoration team, for the public advisory group and even for the trustees. And each segment should know the guidelines for the others.

My understanding from Executive Director Jim Ayers is that the court has said that a restoration plan should be devised that:

 Provides for general restoration.
 Provides habitat protection with acquisition of only critical high-value habitat.
 Provides for monitor and research of the affected area.

And the EIS will allocate money to those three items.

In reviewing restoration projects, the restoration team puts them in five categories.

Under a policy adopted by the Public Advisory Group, priority should be given to:

A. Picking up oil which is fouling the environment.
B. Restoring injured resources and services by direct action.
C. Protect habitat critical to resources injured by the oil spill.
D. Establish an endowment, trust or reserve so there is income after Exxon makes its last payment.
E. Replace injured resources and services by indirect means, i.e. enchance equivalent resources to reduce pressure on injured ones.
F. Provide funding for facilities which support A through E.
A further policy statement by the Public Advisory Group lists tools for protecting habitat aside from acquiring fee title. They include conservation easements, acquiring partial interest, acquisition of timber rights and term easements, land exchanges and cooperative agreements.

WITH ALL OF THE ABOVE from the court, the restoration team and the public advisory group, I think someone can come up with a one page list of guidelines that will guide everyone.

It is much better to have a positive policy statement and guidelines instead of a list of negatives which come to mind:

--No economic development projects are eligible for funds. --No projects considered outside of the designated spill area.

(I'm sure the staff can think of other no-nos from the list of applications for funds.)

A positive WAY TO EXPRESS THINGS COULD BE: Funds are intended for restoration of STATE resources. Fishermen, communities and businesses have to look to other court settlements for their restitution.

RESERVE ACCOUNT --

I am pleased that the trustees are considering a reserve account of up to \$130 million, the earnings of which will finance monitoring and research long after Exxon makes its last payment in seven years. My fear is that the amount of earnings available at from the reserve that time means a sudden drop in restoration effort from the level of the previous seven years. The cost of administration may eat up a high percentage of those reserve earnings.

So, I think a program of gradually using the reserve and earnings and gradually shutting down the program by 2029 or some other date is appropriate. Sosmeone good with figures should be able to figure out something. For example: The program for 2002 might be 20 percent of 2001 (the last year of the Exxon contribution) the program for 2003 is 30 percent of 2001 and so forth.

After all, we should assume that there is a time resources will be restored and monitoring should go to the state and federal agencies as part of their regular programs.

LAND ACQUISTION --

Acquiring fee title to habitat is controversial. The Alaska Coastal Rainforest Campaign, a group of seven environmental organizations, advocates using as much of the spill settlement funds as possible to acquire land for a huge wilderness extending from Kodiak to Ketchikan. On the other hand, there are those who want no land acquisition and one Native timber company official has said publicly that his group won't give up one acre.

There has to be a compromise. And it should meet the primary goal of the settlement of restoring the resource. That is why alternatives to fee simple title should be considered. We must assume the resource will be restored at some point in time. Putting land under government title permanently, when there is going to be a time when the resource is restored, isn't sensible. Some land should go to government, preferrably to the state, to complete parks or reserves. But not for creating a vast reserve for the purpose of creating such a reserve doesn't follow the intent of the settlement.

I certainly hope to see more discussion and guidelines on habitat protection or better understanding of what we have to avoid clashes of interests.

ENDOWMENTS (again!) --

Some members of the public advisory group are pushing for endownments for the University of Alaska despite an opinion from Justice Department lawyers that it isn't possible.

It appears to me that if the University or Prince Williams sound Community College, or any other research agency, wants to endow a chair, they should request it as a project. For example, the institution should describe specifically what it would do in research and monitoring over a periord of years and request \$2 million to finance it. There are enough years left in Exxon payments and work project years that up to four chairs could be endowed. It should be confined to institution within the spill area.

These are just a few of my ideas. I'd like to reiterate what I said at the last meeting: When dealing with legal advisors, ask them how to reach the goal and not ask if such-and-such is legal. It's too easy to say no. Most lawyers can find an answer if they are asked how to reach a goal.

Sorrty to be late with this. I'll mail a hard copy later.

sincerely, Lew (Llewellyn) M. Williams

#### James L. Cloud P O Box 201014 Anchorage, AK 99520-1014

To:Brad Phillips, ChairmanDate: 10/9/94From:Jim Cloud, PAG Member - Public At LargeSubject:Comments on EVOS Trustee Council Issues

At the last meeting we were requested to summarize issues that we believe to be important to the Trustee Council rehabilitation efforts and to comment on those issues.

#### 1. Habitat Protection

I continue to be troubled with the manner in which "Restoration" by way of habitat protection is carried out through acquisition of land which is then turned over to either a State or Federal land manager/owner. The method used to evaluate private land parcels for "protection", i.e., "High, Moderate, or Low" makes no direct link to a specific injured resource or to a lost resource or service. The method merely identifies species or services which may occupy habitat located on the parcel, unrelated to condition of the species and the reason for the condition.

Accordingly, we have no way of knowing how many times over the trustees may be replacing a particular lost resource or service, or how many times over the trustees may be providing habitat protection for a certain injured resource (species).

The use of other methods of protecting or enhancing habitat to facilitate the recovery of injured or lost resources has been conspicuously absent from the habitat protection efforts. Only lip services has been given to land management agreements, term leases and land trades. Virtually no land management tools have been applied to government owned and managed land to improve habitat for injured resources, even though most of the land in the spill affected area is owned by government. Thousands upon thousands of acres of timber uplands are being ravaged by spruce bark beetle changing drastically the habitat supposedly needed by resources that have been injured by the spill.

In the absence of a clear and quantifiable link to a specific injured resource or service, or replacement thereof, or better management of government owned land to enhance habitat needed by injured resources; the trustees may be viewed as simply buying land to increase the amount of government owned acreage throughout the spill affected area.

#### 2. Lost Services

The efforts of the Trustee Council to protect habitat have caused injury and may be causing the loss of natural resource services to consumers in Southcentral Alaska. With the

SEINI BI -

closure of the Seward lumber mill due to a lack of timber, consumers in Southcentral Alaska no longer have locally milled lumber to be used in their building. Virtually all of lumber used in home building must be imported from the lower 48 and Canada.

To the extent that the actions of the Trustee Council to purchase commercial timberlands and remove them from harvest has contributes to the reduction of the availability of lumber or other forest products available to consumers at a reasonable price, the Trustee Council is causing an injuring to a natural resource without replacing that injured natural resource to the consumers.

The final Environmental Impact Statement for the Restoration Plan makes it abundantly clear the high cost to the Alaskan economy of the job loss in the forest products industry due to reduced timber supply and access. The EIS fails, however, to identify the cost to consumers of the loss of locally milled lumber and the necessity of relying on the imported lumber from the lower 48 and Canada.

#### 3. Accountability

- د اسد الا د د سدې

Although the Trustee Council and PAG members review specific projects annually and review the over-all budgets, how can we be assured that funds are being spent as intended and that proper controls are in place to prevent improper expenditures?

Projects often go over several years or are continued with a new project. My experience in business is that projects seldom are completed as plan and without problems.

Every year when we go through the work plan, PAG members wonder what projects are being funded by the trustees that would normally be funded by government as part of their ongoing responsibilities. PAG members have no way to determine whether such "featherbedding" is taking place. For the benefit of the doubt, we trust it is not.

January 9, 1993 I made several recommendations on this subject that I believe are still valid, so I will repeat them here:

1. Engage an independent accounting firm to audit the expenditures of the Trustee Council and recommend a system for financial and accounting controls independent of the government agencies.

2. Based on the above recommendations develop a system for measuring the effectiveness of each project undertaken by the Trustee Council to assure that inefficiencies are detected rapidly and corrected or discontinued.

3. Engage an independent coordinator or "prime contractor" to manage the rehabilitation effort much like the role of the Coast Guard in the clean-up phase.

4. Agencies that do not comply with the system of independent accountability should not be allowed to participate in the projects undertaken.

المحافظة المعددة للمستقابياتيات

001 210 11101# 1/ 1

5. Engage an independent accounting firm to provide annual audited financial statements on the Trustee Council and related expenditures and investments.

. .

In addition, I would add a further recommendation which would help assure accountability and increase the effectiveness of the trustee councils rehabilitation work:

6. Require financial participation in projects and habitat protection efforts by other governments agencies (state or federal), communities, universities, or private interests.

The Trustee Council office and administration has come a long way towards a better and more efficient organization over the past year. The appearance of a better organization and an efficient staff should not replace the need for prudent oversight and controls and fair decision making by the Trustee Council.

#### Oil Spill Public Information Center

148.14 I

#### Project 94423: Brief Status Report on Reference Service

#### September 1, 1994

D) CEIVE The Oil Spill Public Information Center (OSPIC) provides public access to materials pertaining to the Exxon Valdez oil spill and subsequent restoration efforts. The OSPIC staff responds to information requests ander by visitors to the library, or by telephone, fax, mail, electronic mail from Taround the world. Responses to reference requests may take anywhore from on few minutes to several hours over a period of days or weeks.

#### Summary of Statistics:

During the 1994 Fiscal Year (through 8/26/94), the OSPIC staff has received 1,464 visitors, responded to 2,810 requests for information, checked out 450 books, videos and slides, processed 359 interlibrary loan requests, performed 154 online database searches, and distributed 5,846 documents and publications.

See the chart on page 4 for more detail.

#### Who Uses the OSPIC?

Library users are not required to identify themselves, unless they wish to check out materials. Consequently, the OSPIC staff often does not know much, if anything, about some users, such as their identity, affiliation, the reason behind the request for information, where they are from or are calling from, and so on. Statistics are recorded for those requests in which the patron has provided information. (In accordance with Alaska Statute 09.25.140 and the ALA Library Bill of Rights, the identity of library users is kept strictly confidential.)

Generally, those library users that the staff does have information about can be put into the following categories: educators, students (from kindergarten through graduate school), information providers (information brokers and other librarians), scientists, writers and publishers, the media, lawyers and paralegals, business professionals, state and federal legislators, government agency personnel, and tourists.

While interest in all aspects of the spill continues, the OSPIC staff sees reference activity from different user groups increase periodically.

 Increases in teacher/student requests coincide with the academic year, from mid-August to mid-December and mid-January to May. Peak activity for teachers occurs just before each semester, while peak activity for students takes place during the last half of the semester, when projects and term papers are due.

- Increases in reference activity occur just before and after Trustee Council meetings, Public Advisory Group meetings, and publication of new Trustee Council documents. This includes questions from agency personnel, the general public, and the media.
- With each new oil spill large enough to receive newspaper coverage, media attention returns to the Exxon Valdez oil spill. The OSPIC record for the greatest number of requests received in a single week took place in February 1993. After six weeks of increased reference activity following the T/V Braer spill in the Shetland Islands, activity peaked with 129 requests received during the week of February 12th.
- Litigation activities may result in an increase in reference questions and requests for specific documents and publications. During the week of July 25, 1994 (OSPIC's second busiest week on record), the OSPIC staff received 127 requests, a large number of which were from legal staff and the media.
- o Articles mentioning the OSPIC may cause brief increases in reference activity. During the past month, 150 libraries have contacted the OSPIC requesting publications after an announcement appeared in a library periodical.
- The number of tourists visiting the OSPIC increases sharply in late April and falls off again in September.

#### Typical and Frequent Reference Questions:

The most frequent request received is "Please send me everything you have on the Exxon Valdez oil spill." After explaining that the entire OSPIC is focused on this spill, the staff then assists the user in narrowing their request.

Frequent requests include:

- Statistics and details regarding the tanker, the grounding, response, and cleanup, including amount of oil spilled and recovered, number of miles of shoreline oiled, and similar questions.
- Impact of the spill on the environment, especially the injury to various species and types of habitat, including the number of animals that died and how the oil hurts them.

- Impact of the spill on people in the spill area, including economic, social, psychological impacts, and specifically the impact on subsistence and other Native issues.
- Requests for photographs and slides for use in the publication of magazine and newspaper articles, books, and textbooks.
- Requests for video tape footage for use in news broadcasts, movies, documentaries, straining films, and interactive videos.
- o Assistance in locating newly published materials.
- o Impact of the spill on the oil industry, laws and regulations.
- Assistance with class projects, reports, and science fair projects.
- Assistance with locating materials for class lessons on the spill.
- o Information on Trustee Council meetings, decisions, and activities, and requests for copies of documents from the Trustee Council Administrative Record.
- Information on Public Advisory Group activities, meetings and transcripts.

#### Memorable questions:

While most requests fall into the general categories listed above, the OSPIC staff occasionally receives more unusual and memorable requests, such as the following:

- From a seventh grader in New Hampshire, "How do you make dispersants? I'm making an oil spill for my science project and I need to clean it up."
- o From a student in Texas, "When you send the information on bioremediation, please send me some bacteria also."
- Requests for small amounts of crude oil and oiled rocks to use in class projects.
- Callers reporting small oil spills in Alaska and the West Coast.

3

#### Oil Spill Public Information Center

#### Statistics for FY 94 (through 8/26/94)

ŝ

|  | Average/Week        | FY 94                  | 10/90 to Date               |           |
|--|---------------------|------------------------|-----------------------------|-----------|
| Visitors   | 32                  | 1,464                  | 6,980                       |           |
| Reference Requests<br>(On site and off site)               | 60                  | 2,810                  | 9,422                       |           |
| Interlibrary Loans<br>(Includes requests received by OS    | 8<br>PIC from other | 359<br>r libraries and | 1,320<br>requests placed by | y OSPIC.) |
| Documents Distributed<br>(Does not include bulk mailings.) | 125                 | 5,846                  | 17,129                      |           |
| Items Checked Out<br>(Books, slides, videos, reports)      | 10                  | 450                    | 876                         |           |
| Online Database Searches<br>(DIALOG, WLN, and Internet)    | 4                   | 154                    | 1,138                       |           |

#### Oil Spill Public Information Center

#### Project 94423: Brief Status Report on Reference Service

September 1, 1994

The Oil Spill Public Information Center (OSPIC) provides public access to materials pertaining to the Exxon Valdez oil spill and subsequent restoration efforts. The OSPIC staff responds to information requests made by visitors to the staff responds to telephone, fax, mail, electronic mail from around the world. Responses to reference requests may take anywhere from a few minutes to several hours over a period of days or weeks.

#### Summary of Statistics:

During the 1994 Fiscal Year (through 8/26/94), the OSPIC staff has received 1,464 visitors, responded to 2,810 requests for information, checked out 450 books, videos and slides, processed 359 interlibrary loan requests, performed 154 online database searches, and distributed 5,846 documents and publications.

See the chart on page 4 for more detail.

#### Who Uses the OSPIC?

Library users are not required to identify themselves, unless they wish to check out materials. Consequently, the OSPIC staff often does not know much, if anything, about some users, such as their identity, affiliation, the reason behind the request for information, where they are from or are calling from, and so on. Statistics are recorded for those requests in which the patron has provided information. (In accordance with Alaska Statute 09.25.140 and the ALA Library Bill of Rights, the identity of library users is kept strictly confidential.)

Generally, those library users that the staff does have information about can be put into the following categories: educators, students (from kindergarten through graduate school), information providers (information brokers and other librarians), scientists, writers and publishers, the media, lawyers and paralegals, business professionals, state and federal legislators, government agency personnel, and tourists.

While interest in all aspects of the spill continues, the OSPIC staff sees reference activity from different user groups increase periodically.

o Increases in teacher/student requests coincide with the academic year, from mid-August to mid-December and mid-January to May. Peak activity for teachers occurs just before each semester, while peak activity for students takes place during the last half of the semester, when projects and term papers are due.

- o Increases in reference activity occur just before and after Trustee Council meetings, Public Advisory Group meetings, and publication of new Trustee Council documents. This includes questions from agency personnel, the general public, and the media.
- With each new oil spill large enough to receive newspaper coverage, media attention returns to the Exxon Valdez oil spill. The OSPIC record for the greatest number of requests received in a single week took place in February 1993. After six weeks of increased reference activity following the T/V Braer spill in the Shetland Islands, activity peaked with 129 requests received during the week of February 12th.
- Litigation activities may result in an increase in reference questions and requests for specific documents and publications. During the week of July 25, 1994 (OSPIC's second busiest week on record), the OSPIC staff received 127 requests, a large number of which were from legal staff and the media.
- o Articles mentioning the OSPIC may cause brief increases in reference activity. During the past month, 150 libraries have contacted the OSPIC requesting publications after an announcement appeared in a library periodical.
- The number of tourists visiting the OSPIC increases sharply in late April and falls off again in September.

#### Typical and Frequent Reference Questions:

The most frequent request received is "Please send me everything you have on the Exxon Valdez oil spill." After explaining that the entire OSPIC is focused on this spill, the staff then assists the user in narrowing their request.

Frequent requests include:

- Statistics and details regarding the tanker, the grounding, response, and cleanup, including amount of oil spilled and recovered, number of miles of shoreline oiled, and similar questions.
- Impact of the spill on the environment, especially the injury to various species and types of habitat, including the number of animals that died and how the oil hurts them.

#### Oil Spill Public Information Center

2

#### Statistics for FY 94 (through 8/26/94)

| Average/      | /Week  | FY 94  | 10/90 to Date  |   |
|---------------|--|--|--|---|
| 32            |  | 1,464  | 6,980  |   |
| 60            |  | 2,810  | 9,422  |   |
| 8<br>PIC from | other  | 359<br>libraries and   | 1,320<br>requests placed by  | OSPIC.)   |
| 125           |  | 5,846  | 17,129   |   |
| 10            |  | 450  | 876  |   |
| 4             |  | 154  | 1,138<br>1   |   |
|               | Average/<br>32<br>60<br>PIC from<br>125<br>10<br>4 | Average/Week<br>32<br>60<br>PIC from other<br>125<br>10<br>4 | Average/Week       FY 94         32       1,464         60       2,810         PIC from other libraries and       359         125       5,846         10       450         4       154 | Average/Week         FY 94         10/90 to Date           32         1,464         6,980           60         2,810         9,422           8         359         1,320           PIC from other libraries and requests placed by         125         5,846           10         450         876           4         154         1,138 |

4

- o Impact of the spill on people in the spill area, including economic, social, psychological impacts, and specifically the impact on subsistence and other Native issues.
- Requests for photographs and slides for use in the publication of magazine and newspaper articles, books, and textbooks.
- Requests for video tape footage for use in news broadcasts, movies, documentaries, training films, and interactive videos.
- o Assistance in locating newly published materials.
- o Impact of the spill on the oil industry, laws and regulations.
- Assistance with class projects, reports, and science fair projects.
- Assistance with locating materials for class lessons on the spill.
- o Information on Trustee Council meetings, decisions, and activities, and requests for copies of documents from the Trustee Council Administrative Record.
- o Information on Public Advisory Group activities, meetings and transcripts.

#### Memorable questions:

While most requests fall into the general categories listed above, the OSPIC staff occasionally receives more unusual and memorable requests, such as the following:

- From a seventh grader in New Hampshire, "How do you make dispersants? I'm making an oil spill for my science project and I need to clean it up."
- o From a student in Texas, "When you send the information on bioremediation, please send me some bacteria also."
- Requests for small amounts of crude oil and oiled rocks to use in class projects.
- Callers reporting small oil spills in Alaska and the West Coast.

## **Exxon Vaidez Oil Spill Trustee Council**

Restoration Office 645 G Street, Suite 401, Anchorage, Alaska 99501-3451 Phone: (907) 278-8012 Fax: (907) 276-7178



| MEMORANDUM |                                  | NOV 0 C EST                                |
|------------|----------------------------------|--|
| TO:        | Trustee Council Members          | 出業調査者 高点においた かわし ウィオ・<br>工業時代目的時代 アイバン・パート |
| FROM:      | Public Advisory Group Member     | -store area and                            |
| THROUGH:   | Time Avers<br>Executive Director |  |
| DATE:      | October 25, 1994                 |  |
| RE:        | PAG issues                       |  |

The Public Advisory Group requested that I forward on to you a list of issues that individual PAG members have noted as issues to be brought before the Trustees and any newly appointed PAG members. The PAG chose not to identify a group of "consensus" issues. Rather, they wished these letters to be packaged as "individual" comments.

Lew M. Williams, Jr. 755 Grant Street Ketchikan, Alaska 99901

#### August 31, 1994

Molly McCammon Director of Operations Exxon Valdez Oil Spill Trustee Council 645 G. Street, #401, Anchorage 99501 FAX 276-7178

Dear Ms. McCammon:

In response to a request of members of the Public Advisory Group for their opinions on restoration direction, here is my opinion as a public member:

GUIDELINES --

Some brief, simple guidelines - following the court decision - are needed for those who apply for restoration grants, for the restoration team, for the public advisory group and even for the trustees. And each segment should know the guidelines for the others.

My understanding from Executive Director Jim Ayers is that the court has said that a restoration plan should be devised that:

 Provides for general restoration.
 Provides habitat protection with acquisition of only critical high-value habitat.
 Provides for monitor and research of the affected area.

And the EIS will allocate money to those three items.

In reviewing restoration projects, the restoration team puts them in five categories.

Under a policy adopted by the Public Advisory Group, priority should be given to:

A. Picking up oil which is fouling the environment.
B. Restoring injured resources and services by direct action.
C. Protect habitat critical to resources injured by the oil spill.
D. Establish an endowment, trust or reserve so there is income after Exxon makes its last payment.
E. Replace injured resources and services by indirect means, i.e. enchance equivalent resources to reduce pressure on injured ones.
F. Provide funding for facilities which support A through E.

the spill settlement funds as possible to acquire land for a huge wilderness extending from Kodiak to Ketchikan. On the other hand, there are those who want no land acquisition and one Native timber company official has said publicly that his group won't give up one acre.

There has to be a compromise. And it should meet the primary goal of the settlement of restoring the resource. That is why alternatives to fee simple title should be considered. We must assume the resource will be restored at some point in time. Putting land under government title permanently, when there is going to be a time when the resource is restored, isn't sensible. Some land should go to government, preferrably to the state, to complete parks or reserves. But not for creating a vast reserve for the purpose of creating such a reserve doesn't follow the intent of the settlement.

I certainly hope to see more discussion and guidelines on habitat protection or better understanding of what we have to avoid clashes of interests.

ENDOWMENTS (again!) --

 $\sum_{i=1}^{n}$ 

Some members of the public advisory group are pushing for endownments for the University of Alaska despite an opinion from Justice Department lawyers that it isn't possible.

It appears to me that if the University or Prince Williams sound Community College, or any other research agency, wants to endow a chair, they should request it as a project. For example, the institution should describe specifically what it would do in research and monitoring over a periord of years and request \$2 million to finance it. There are enough years left in Exxon payments and work project years that up to four chairs could be endowed. It should be confined to institution within the spill area.

These are just a few of my ideas. I'd like to reiterate what I said at the last meeting: When dealing with legal advisors, ask them how to reach the goal and not ask if such-and-such is legal. It's too easy to say no. Most lawyers can find an answer if they are asked how to reach a goal.

Sorrty to be late with this. I'll mail a hard copy later.

sincerely, Lew (Llewellyn) M. Williams

AUG 1 5 1994

To: Doug Mutter, PAG Fed. Officer

8/4/2//94/LOF7 OIL SPHL TRUSTEE COULCH

Fr: Jim King, PAG Conservation Member

Sub: EVOS Settlement Issues, 1994

Herewith some of the issues I would like to see discussed at the October PAG meeting. I hope they are useful questions. It is an incomplete list and I trust those more knowlegeable will articulate issues for fisheries, archeology, recreation and so forth.

1) Good conservation dictates sustained yield where possible. Should that concept be applied to Settlement funds and a major portion be used for long term/permanent resource enhancement rather than for short term restoration efforts? Yes! Maybe! No!

2) Some elements of the ecosystem can easily be classed as restored, some elements unrestored and some elements in need of long term scrutiny to determine what restoration effort is needed. Should the ecosystem rather than a collection of some of its parts be recognized as the damaged resource? Yes! Maybe! No!

3) Can the "ecosystem approach" to restoration really be achieved by the current program of invited proposals rather than through a coordinated assault by a well directed team? Yes! Maybe! No!

(4) Two thirds of respondents to the "EIS brochure" favored establishment of a permanent endowment with some of the Settlement money in hopes of eventually achieving resource enhancement? Should the Trustee Council request that the federal solicitors try to find a way to accommodate this majority interest? Yes! Maybe! No!

5) Would it be better to modify and perfect existing bureaucracy, for instance the University of Alaska Foundation, to manage an EVOS endowment rather than invent a new organization? Yes! Maybe! No!

6) Establishing permanent academic chairs with responsibility for developing an understanding of the ecology of the major damaged resources through graduate study projects would produce peer reviewed publications and EVOS area trained scientists as well as good science. Would endowed chairs ultimately provide greater public benefit than contract research? Yes! Maybe! No!

7) Though tempting, is it appropriate for agencies to try to compensate for declining budgets by appealing for EVOS money to fulfill legislative mandates for resource monitoring and research? Yes! Maybe! No!

(1 ± 1994

#### RUPE ANDREWS 9416 LONG RUN DRIVE JUNEAU, AK 99801

August 29, 1994

Ms. Molly McCammon Director, Operations EVOS-PAG 645 G Street , Suite 401 Anchorage, AK 99501-3451

Dear Molly:

Re the last PAG meeting, members of PAG were requested to compile issues that they consider important and submit them to you by September 1. I would like to put forth the following notion for consideration by the Trustees if and when the opportunity may occur. I propose that the Karluk River on Kodiak be considered for purchase as replacement for lost angling opportunities due to the oil spill in PW Sound. The past two years I have seen that anglers and sport hunters essentially will derive little consideration from the oil spill settlement unless there is the chance to purchase a system such as the Karluk River to replace lost angling opportunities.

I am aware that this river is not on any list by the land owners for possible purchase. The Karluk has only been vaguely discussed by some of the trustees and some trustees may not have heard of the river. Arguably, the Karluk is the best wild, steelhead stream left in North America. It should be in public domain and under the protective land classification of the Kodiak Bear Refuge. If the land owners are reluctant to sell then public access and a mutual land management plan should be explored, ie., less than fee simple purchase.

I have no alternative options for sport anglers of lasting benefit. The Karluk River is priceless for the recreational benefits that it offers to sport anglers and worthy of discussion at the October PAG meeting.

Sincerely, Kukuns

Rupe/Abdrews, Member, EVOS-PAG Sport Fishing-Sport Hunting Representative F.O. Box 868 Girdwood Ak. 99587 9-8-94

Molly McCammon, Director of Ops. EVOS Restoration Office 645 G Street, Suite 401 Anchorage, AK 99501

Molly McCammon:

During the past two years, I have learned much about the damages to and the restoration of Prince William Sound in this post oil spill era. I volunteered for a position on the PAG to learn these things, but in the process of informing myself I have learned even more.

In the past year I have witnessed the transformation of an agency generated structure into something with so much imput from the public, from private researchers, and from government agency personnel that the collective imput when ranked and presented in open forums by experts and private citizens cannot be ignored. The infrastructure set up by Jim Ayers' team has been impressive and effective. The 1995 Draft Work Plan is the proof of the pudding.

The next phase of carrying this draft Work Plan, with all its competing proposals, to fruition is daunting.

My chief concern is that the EVOS settlement not be used to create an agency driven research juggernaut that arbitrarily displaces local private researchers from their historical roles. If settlement funds are used to build a research center in Seward, then how much say will state and federal agencies have in the allocation of research funds from settlement monies?

Right now I am very happy with the layers of of accountability that Jim Ayer's team has built into the research proposals. I hope that private entities will continue to be involved in future proposals, because the quality of the 1995 Draft Work Plan has been greatly enhanced by their participation. It is important that the best of these private parties now participate in the actual projects to ensure their future involvement in the restoration process.

Please keep up the good, although difficult work. You have my greatest appreciation.

Sincerely,

James A. Diehl, recreational users

September 1, 1994

Exxon Valdez Oil Spill Trustee Council 645 G. Street Anchorage, Alaska 99501

ATTENTION: Jim Ayers, Executive Director

Dear Jim:

While reading the Ecosystems based restoration proposals, and the large dollar amounts which accompany them, sitting through the work session and watching the evaluations of the proposals. I feel with the draft restoration plan and the scientific team, we are almost on the right track. We know not everyone will be satisfied, but at least it's a step in the right direction.

The Public Advisory Group recognized the need for proper direction; it was also our feeling we were not getting the proper recognition or included in the process. I can now see this is beginning to change. I do feel, although we are only in and advisory position and are the representatives of the citizens of Alaska; that needs to continue. I feel Director Ayers is taking very careful long strides to get things lined up properly and efficiently.

I agree with the rest of PAG members, we need an endowment/reserve for future generations of research.



# ) Sierra Club

Alaska Field Office 241 E. Fifth Avenue, Suite 205, Anchorage, Alaska 99501 (907) 276-4048 • FAX (907) 258-6807

October 12, 1994

Exxon Valdez Oil Spill Trustee Council 645 G Street Anchorage AK 99510 Attn: Molly McCammon

RE: PAG member list of "issues of concern"

Dear Members of the Trustee Council,

First, I would like to thank the Trustee Council, once again, for allowing me to represent the Environmental community on the Public Advisory Group for the last two years.

I would also like to express my appreciation to the Trustee Council and to Jim Ayers and Molly McCammon for the considerable improvements they have brought to the complex process of managing the oil spill restoration activities. I commend Jim and Molly for (under your direction) increasing the involvement and influence of independent scientists; organizing restoration planning around a mission, goals, and questions to be answered; making the Workplan goals more clear for 1995 than past Workplans; meeting an ambitious schedule of deadlines; and improving the efficiency and cost effectiveness of administration.

I do still have many, many concerns about issues which I believe need to be improved. These comments are intended as suggestions for ways to continue and expand the recent improvements.

Habitat acquisition:

Appraisal process -- I have long stated that I feared the Trustee Council's procedures make habitat acquisition extremely and unnecessarily difficult. The supposed legal constraints on offering less than fair market value, combined with the Trustee Council's policy against offering more than fair market value, give the Trustees and land owners no room to negotiate. Land appraisal -- always more an art than a science, in my experience -- is extraordinarily arbitrary when there are few if any comparable land sales. The lands which the Trustees are considering are unique; there is no real precedent of nongovernment sales of this magnitude for similar land. The appraised values will necessarily be arbitrary, and may be EVOS Trustee Council October 12, 1994 Page 3

Administration:

Costs -- Jim and Molly have made considerable progress in cost reductions, and I am glad they are dedicated to further cost cutting. Some areas which I find disturbing are the cost of the library (an average of \$100 per public inquiry) and excessive travel by some staff members. If no members of the Trustee Council actually read PAG transcripts, then the transcribing should be discontinued. The cost of printing large public documents (such as the annual workplans) could be reduced by sending a notice to the mailing list in advance of publication with a return form for people to send back if they want to receive the document.

Accounting for past expenditures -- three years after the settlement, it still remains a great mystery how the presettlement money was spent. We not only do not know the specifics -- we do not even know the generalities. Of the approximately \$300 million spent so far, how much has been spent on science, how much on clean-up, how much on attorneys, etc.?

Science projects:

Long term funding -- the level of funding should not drop off precipitously when use of the reserve begins in 20001. Instead, science funding should be reduced gradually each year until it naturally flows into the level available from the reserve fund.

Seward Marine Institute -- Government should not be taking "leaps of faith" with public funds. Alaska is already burdened with a vast and glamorous infrastructure which our small population cannot possibly maintain as oil dollars diminish. Certainly, a new world-class facility would be exciting. But we are a population of only half a million people, and we already have marine science institutes in Kodiak and Cordova, as well as university and college campuses all over the state. At current funding levels, UAF cannot even open some of the buildings it has already built. We should not use public funds to expand Alaska's overgrown research infrastructure. (It is my understanding that the Monterey Bay Aquarium, a model for the planned Seward Institute, was built with private foundation funds.) Although supporters assert that a new institute will benefit research, nobody has even attempted to claim that the benefits are worth the whopping cost of the facility. Also, we have been told that the Seward Institute will "generate more research." As someone who has followed the Trustees' annual workplan process, I believe we need to find ways to limit rather than to generate research appetites. This capital expenditure is an inappropriate and probably illegal use of settlement funds.

#### Kimberley Benton 621 West 90th Avenue Anchorage, Alaska 99515 (907) 522-2163

October 18, 1994

Ì

Jim Ayers, Executive Director EVOS Trustee Council 645 G Street Anchorage, Alaska 99501

Dear Jim:

As two years of participation on the Exxon Valdez Oil Spill Public Advisory Group comes to an end, I would like to pass along the following issues for your consideration:

#### 1) INCREASE PAG HABITAT PROTECTION PROCESS INVOLVEMENT

The PAG has received numerous presentations on the Seward Center under the guise of this being a "big ticket item", and yet the PAG receives little if any opportunity for involvement in the habitat protection process, which is the single largest budgeted area. The PAG is comprised of representatives from diverse interest groups that could bring great benefits to the habitat protection process. But, perhaps most importantly, greater PAG involvement will diminish the perception of the habitat protection process being a closed process that only a select few outside of the Trustee Council may participate in.

#### 2) BROADEN HABITAT PROTECTION MEASURES

Steps have been taken toward obtaining a broadening of habitat protection measures through the landowner's assistance project listed in the 1995 Work Plan. While it has often been said that there is a menu of options available for habitat protection, the only entree selected to date has been habitat acquisition. Broadening the selection of protection measures could help reach the goal of restoration with fewer funds than outright acquisition. Where can you receive the greatest restoration for your habitat protection dollar? This is a question that may best be answered by broadening the protection measures that are available to choose from.

4.4/5

EVO\$ PAG 10/18/94 Page 3

#### 6) MAKE THE SYSTEM MORE USER FRIENDLY

The EVOS system is extremely complex, even for those involved in it on a regular basis. While this may be seen as a benefit to some of those who are inside the system. It is certainly no benefit to anyone who is not. When Trustee Council meetings were first held at the Egan Center, even with extra chairs being brought in to accommodate those wanting to participate, people standing lined the walls. During the teleconference, those commenting from around the state were greater in number than there was time available. Now the chairs are filled with agency personnel working on projects and a just handful of others. The teleconferences have no one on line to testify. Not only has the system become difficult for users, there is no one wanting to use it. Apathy is a natural reaction that occurs when people feel they have no way to participate or their participation has no influence. The first step in making the EVOS system more user-friendly involves an active effort to let people know they can make a difference.

I have appreciated the opportunity to be a part of the Public Advisory Group and I thank you for your invitation to comment on our areas of concern.

1

Sincerely.

i

Kimberley Benton PAG Alternate Forest Products

# MARY L. MCBURNEY

## 1919 Spenard Road Anchorage, Alaska 99503

| Date | October 13, 1994                       |
|------|--|
| То   | Molly McCammon, Director of Operations |
| Re   | Comments on EVOS process               |

I'm generally pleased with the reorganization of the EVOS process and the new emphasis on ecosystem based research, however I have the following concerns:

1 — In many cases, legal issues have not been addressed in a timely manner — the most recent example being the "legal issues" confounding workplan projects involving hatcheries. While there may be legitimate legal questions surrounding hatchery projects, the nature and extent of these concerns have not been communicated to the public or to the authors of the proposals.

The shadowy nature of "legal issues" has given the appearance of an easy out for Trustee Council members and staff who do not wish to address specific projects or deal with politically difficult issues. The PAG ran up against this wall regarding the question of using settlement money to establish an endowment.

This issue could be best addressed by providing the public with legal opinions in a timely manner. If there are difficulties in obtaining a difinitive opinion, a draft opinion with appropriate caveats should be provided along with updated information or revisions as they become available.

At no time should the public be told that there are legal questions surrounding an issue without providing a reasonable description and explanation of the concerns.

2— The current policy regarding timber appraisals should be made more flexible. The Trustees should be allowed more room to negotiate with willing sellers rather than being stuck with the limitations imposed by the "fair market value" standard.

#### James L. Cloud P O Box 201014 Anchorage, AK 99520-1014

|          | 0,                                      |       |         | 1   |              |
|----------|---|-------|---------|---|--------------|
| To:      | Brad Phillips, Chairman                 | Date: | 10/9/94 |   | 1994         |
| From:    | Jim Cloud, PAG Member - Public At Large |       |         | 1<br>1<br>1<br>1<br>1<br>1<br>1<br>1<br>1<br>1<br>1<br>1<br>1<br>1<br>1<br>1<br>1<br>1<br>1 | - * <u>-</u> |
| Subject: | Comments on EVOS Trustee Council Issue  | S     |         |   |              |

At the last meeting we were requested to summarize issues that we believe to be important to the Trustee Council rehabilitation efforts and to comment on those issues.

#### 1. **Habitat Protection**

I continue to be troubled with the manner in which "Restoration" by way of habitat protection is carried out through acquisition of land which is then turned over to either a State or Federal land manager/owner. The method used to evaluate private land parcels for "protection", i.e., "High, Moderate, or Low" makes no direct link to a specific injured resource or to a lost resource or service. The method merely identifies species or services which may occupy habitat located on the parcel, unrelated to condition of the species and the reason for the condition.

Accordingly, we have no way of knowing how many times over the trustees may be replacing a particular lost resource or service, or how many times over the trustees may be providing habitat protection for a certain injured resource (species).

The use of other methods of protecting or enhancing habitat to facilitate the recovery of injured or lost resources has been conspicuously absent from the habitat protection efforts. Only lip services has been given to land management agreements, term leases and land trades. Virtually no land management tools have been applied to government owned and managed land to improve habitat for injured resources, even though most of the land in the spill affected area is owned by government. Thousands upon thousands of acres of timber uplands are being ravaged by spruce bark beetle changing drastically the habitat supposedly needed by resources that have been injured by the spill.

In the absence of a clear and quantifiable link to a specific injured resource or service, or replacement thereof, or better management of government owned land to enhance habitat needed by injured resources; the trustees may be viewed as simply buying land to increase the amount of government owned acreage throughout the spill affected area.

#### 2. Lost Services

The efforts of the Trustee Council to protect habitat have caused injury and may be causing the loss of natural resource services to consumers in Southcentral Alaska. With the 4. Agencies that do not comply with the system of independent accountability should not be allowed to participate in the projects undertaken.

5. Engage an independent accounting firm to provide annual audited financial statements on the Trustee Council and related expenditures and investments.

In addition, I would add a further recommendation which would help assure accountability and increase the effectiveness of the trustee councils rehabilitation work:

6. Require financial participation in projects and habitat protection efforts by other governments agencies (state or federal), communities, universities, or private interests.

The Trustee Council office and administration has come a long way towards a better and more efficient organization over the past year. The appearance of a better organization and an efficient staff should not replace the need for prudent oversight and controls and fair decision making by the Trustee Council.

#### Oil Spill Public Information Center Statistics: Fiscal Year 1994

| Reference Service:  | Average/Week         | FY 94                | 10/90 to Date              |           |
|---|----------------------|----------------------|----------------------------|-----------|
| Visitors  | 31                   | 1,641                | 7,157                      |           |
| Reference Requests<br>(On site and off site)                      | 60                   | 3,099                | 9,711                      |           |
| Interlibrary Loans<br>(Includes requests received by OS           | 8<br>SPIC from other | 399<br>libraries and | 1,360<br>requests placed b | y OSPIC.) |
| Documents Distributed<br>(Does <b>not</b> include bulk mailings.) | 124                  | 6,432                | 17,715 DE T                |           |
| Items Checked Out<br>(Books, slides, videos, reports)             | 10                   | 509                  | 935 ATIVE                  |           |
| Online Database Searches<br>(DIALOG, WLN, and Internet)           | 3                    | 158                  | 1,142 COR<br>700 R         |           |

Acquisitions: During the 1994 Fiscal Year, 168 new items were added to the OSPIC collection, including 40 books, 2 databases, 35 periodicals, 59 reports, and 32 slides and videos. (This does not include NRDA reports or materials published by the Trustee Council.)

**Cataloging:** Approximately 500 items were cataloged in the WLN (Western Library Network) database, including 357 unique items.

Administrative Record: Approximately 300 documents were indexed and filed in the Trustee Council Administrative Record.

## Exxon Valde <u>A Oil Spill Trustee Council</u> Restoration Office 645 G Street, Suite 401, Anchorage, Alaska 99501-3451 Phone: (907) 278-8012 Fax: (907) 276-7178



# MEMORANDUM DECENVE NOV 0 8 1994 TO: Public Advisory Group FROM: Molly McCammon, Director of Operations DATE: October 11, 1994 SUBJ: Project #95199/Improvements Affliated with IMS — Update

The purpose of this memorandum is to provide you with an update on efforts related to the proposed research infrastructure improvements affiliated with the Institute of Marine Science in Seward.

Attached you will find a summary of information regarding the project that have been developed through the course of preparing the detailed project description. A formal recommendation from the Executive Director regarding the project will be provided to the Trustee Council at the meeting on November 2.

If you have questions, please let me know.

enclosure

#### Figure 1. Development of Recommendation Regarding Appropriate and Legally Permissible Funding for IMS Research Infrastructure Improvements



.

DRAFT

# PROPOSED IMPROVEMENTS AFFILIATED WITH THE INSTITUTE OF MARINE SCIENCE IN SEWARD

On January 31, 1994 the Trustee Council directed the Executive Director to develop a formal recommendation regarding improvements affiliated with the Institute of Marine Science in Seward (hereafter, "the facility"). The Trustee Council specifically directed the Executive Director to:

- take needed steps to secure NEPA compliance;
- consult with appropriate entities, including the University of Alaska, the City of Seward, the Seward Association for the Advancement of Marine Science and Trustee Agencies to review the assumptions relating to the proposed improvements and capital operating budgets;
- develop an integrated funding approach which assures that the use of trust funds are appropriate and legally permissible under the terms of the Memorandum of Agreement and Consent Decree; and
- prepare a recommendation of the appropriate level of funding for consideration by the Trustee Council that would be legally permissible under terms of the Memorandum of Agreement and Consent Decree.

These findings draws heavily upon the *Draft Project Description and Supplemental Materials* (September 26, 1994) prepared for the project and should be read together with that document. The process by which the Executive Director's recommendation on the project is being developed is depicted in Figure 1.

#### Background

The proposed research facility improvements referenced in this document have evolved and fundamentally changed from the original Alaska SeaLife Center (ASLC) project proposed by the Seward Association for the Advancement of Marine Science (SAAMS) to the Trustee Council in June 1992. As initially presented, the Alaska SeaLife Center was proposed to serve as a facility with the *primary* mission being the rehabilitation of injured marine mammals and seabirds. A *secondary* mission of the original Alaska SeaLife Center project proposal was to provide a facility for basic biological research on marine mammals and seabirds so that the impacts of human activities such as pollution and fishing could be better understood. The project proposal also called for a substantial tourism/visitation component. The initial funding request presented to the Trustee Council was for \$45.858 million.

As discussed below (and presented in the Project Description in extensive detail), the

# DRAIT

proposed the facility improvements affiliated with the Institute of Marine Science in Seward have been redesigned and structured to serve the bona fide research and monitoring needs of the Trustee Council restoration mission consistent with the purposes of the Memorandum of Agreement and Consent Decree.

## **NEPA Compliance**

A final Environmental Impact Statement (EIS) for the proposed improvements was transmitted to the Environmental Protection Agency on September 16, 1994. A Record of Decision (ROD) will be prepared for signature by October 28.

## Consultation Regarding Purpose and Need for the Project

The proposed research facilities have been the subject of extensive consultation and review by individual federal (USDOI, NOAA, USFS) and state (ADFG, ADEC, Department of Law) Trustee agencies, the Chief Scientist, independent peer reviewers, University of Alaska researchers, design consultants, representatives of the City of Seward, and the Seward Association for the Advancement of Marine Science (SAMMS). As a result of these consultations as well as review by the U.S. Department of Justice, the research infrastructure proposal has been substantially modified, refined and tailored to address the needs of the Trustee Council's long-term restoration mission consistent with the purposes of the Memorandum of Agreement and Consent Decree.

The need for long-term research and monitoring efforts has been explicitly recognized by the Trustee Council in the *Draft Restoration Plan* which expressly states the need for long-term research and monitoring addressing not only individual injured resources but the ecosystem relationships upon which they depend.<sup>1</sup> The proposed facility improvements in Seward would provide needed infrastructure to address these long-term research and monitoring needs.

#### 1. Purpose and Need for the Project

The purpose of the proposed facility improvements at Seward is to provide needed infrastructure for conducting long-term research and monitoring programs required to restore and enhance resources injured by the *Exxon Valdez* oil spill (EVOS). The expanded facilities would enable research and monitoring studies to be undertaken on injured resources and the spill-affected ecosystem with unique and specialized capabilities for studies on marine mammals, marine birds and fish genetics fundamentally important to the long-term restoration effort. The facility research capabilities would also substantially contribute to restoration of the spill area by providing for expanded marine fish and invertebrate studies, oceanographic research, and a library that would serve as a specialized repository for oil spill related data vital to researchers conducting restoration investigations.

<sup>&</sup>lt;sup>1</sup> See Draft Restoration Plan, Chapter 3: Monitoring and Research.

# DRAFT

In the *Draft Restoration Plan*, the Trustee Council specifically recognizes nineteen individual biological resources as injured by the spill.<sup>2</sup> These include a wide variety of marine mammals (Sea otters, Harbor seals); sea birds (Common murres, Harlequin ducks, Marbled murrelets, Pigeon guillemots); complexes of intertidal and subtidal organisms; and several fishery resources (Pink salmon and Pacific herring) that the facility improvements can play a unique role in addressing. With the assistance of representatives of the University of Alaska; NOAA's National Marine Fisheries Service; the USDOI National Biological Survey; and the Alaska Department of Fish and Game in addition to other contracted technical experts; research infrastructure needs to support restoration of injured resources and the ecosystem upon which they depend have been identified.

----

The facility would provide laboratory capabilities for research and monitoring of marine mammals (primarily pinnipeds and Sea otters) and marine birds (primarily pelagic seabirds) in the spill area. Wet and dry labs would be furnished for fish genetics research to examine possible spill-caused heritable genetic damage in salmonids and potentially herring; and for live studies of bioenergetics, disease, reproduction, and neurobiology associated with fish and invertebrates in the spill area. Research on oceanography and ecological modeling would also take place at the facility that would house a specialized library of literature and data pertaining to the northern Gulf of Alaska and spill region.<sup>3</sup> Research would be carried out at the facility by the University of Alaska, ADFG and other Trustee Agencies including the NBS and USFWS. Additionally, it is anticipated that visiting scientists affiliated with agency, academic, and private entities would use the facility for carrying out research in support of or related to the Trustee Council restoration mission.

#### 2. Benefit to Non-Recovering Injured Resources

Trustee Council Policy No. 4 in the *Draft Restoration Plan* states that restoration activities will emphasize "non-recovering" resources.<sup>4</sup> It is these same non-recovering resources that are the focus of the research facility improvements. Nearly all of the resources identified as non-recovering by the Trustee Council should benefit from the research capabilities that the facility improvements would

<sup>&</sup>lt;sup>2</sup> While nineteen individual biological resources have been specifically identified as injured by the oil spill, the *Draft Restoration Plan* explicitly recognizes the possibility that additional resources may be identified as injured resources on the basis of further information generated through research and monitoring (see Apprendix B, page B-5). In fact, additional seabird species have been proposed as injured resources. In the case of at least one species, the Chief Scientist has indicated that preliminary review of the petition to add kittiwates to the injured resources list was favorable although a formal recommendation has not yet been made to the Trustee Council. It can be anticipated that the proposed facilities could also play a significant role in addressing restoration research needs related to these other marine bird species should they be formally recognized as injured by the Trustee Council. <sup>3</sup> This library would become part of the integrated information management system for EVOS restoration efforts.

<sup>&</sup>lt;sup>4</sup> See Draft Restoration Plan, Chapter 2 (Policy #4).

# DRAFT

provide. The research and monitoring programs to be carried out at the facility would contribute to the restoration of those injured, but not recovering, resources including: harbor seal, sea otter, common murre, harlequin duck, marbled murrelet, pigeon guillemot, Pacific herring, pink salmon, intertidal and subtidal resources. Studies conducted at the institute would support the primary restoration strategies for these resources as outlined in the *Draft Restoration Plan*.

#### 3. Anticipated Restoration Research and Monitoring Needs

A detailed *Project Description*, including an extensive statement of Purpose and Need for the facility, has been prepared.<sup>5</sup> A brief summary of anticipated research activities and programs that would be carried out at the facility has been developed as a result of consultations with the University of Alaska, Trustee agency representatives, contracted technical experts. Based on information gathered to date, in consultation with the Chief Scientist, the following long-term restoration research needs are anticipated to exist:

- Marine Mammal Resources: The marine mammal program would be extremely diverse and probably the largest user of the facility in terms of space and personnel. Needed projects would include: captive feeding/energetics, hydrodynamics, development and testing of telemetry equipment, testing of immobilizing drugs, health status and disease studies, reproduction biology, physiology, behavior, and ecosystem modeling and data management. This program would interact with the veterinarian and rehabilitation projects at the facility as well as operate a field program, in coordination with other field studies in the EVOS region. Anticipated future work involving UAF and ADFG personnel that is relevant to use of the proposed facility will require, among other things, specialized research tanks, animal holding and quarantine areas, research habitat with underwater viewing, wet labs with running sea water, dry labs, animal food preparation area, surgery and pharmacy, necropsy room, freezers, offices, library, and computer services. (Additional information concerning marine mammal research needs that the facility would address are provided in the *Project Description*.)
- Marine Bird Resources: The marine bird program would conduct a wide range of projects including captive feeding/energetics, health status and disease studies, reproduction biology, physiology, behavior, development and testing of telemetry equipment, and ecosystem modeling. This program would interact with the veterinarian and rehabilitation projects as well as operate a field program, in coordination with other field studies in the EVOS region. The projects require, among other things, use of specialized research tanks and pens, animal holding and quarantine areas, wet labs, dry labs, and

<sup>&</sup>lt;sup>5</sup> Project Description and Supplemental Materials prepared for the Exxon Valdez Oil Spill Trustee Council, Institute of Marine Science Infrastructure Improvements, EVOS Trustee Council Project #94199, (September 26, 1994).

the research habitat. The marine bird program would share the following facilities with the marine mammal program: animal food preparation areas, surgery and pharmacy, necropsy room, freezers, offices, library, and computer services. (Additional information concerning marine bird research needs that the facility would address are provided in the Project Description.)

LRAFT

- Fish/Invertebrate Resources: The proposed improvements would expand the capabilities of UAF and other fish and invertebrate restoration and monitoring studies to make use of marine laboratory facilities in the EVOS area. At present, non-EVOS studies are currently occupying all available laboratory space at the Seward Marine Center. Additionally, a fish genetics program to examine heritable genetic damage to pink salmon, sockeye salmon, and potentially herring would be conducted by ADFG. Currently, facilities for conducting fish genetics research on spill related injuries are very scarce and current projects are being hampered by water and disease problems and logistical difficulties with conducting studies at multiple locations including Anchorage and Southeast Alaska. The proposed facility would be located near the source of the injured resources and would provide the critical capability to raise individual fish from eggs to maturity (freshwater through saltwater life stages), thereby allowing the analysis of gonads and gametes, along with progeny from oil exposed adults, for evidence of heritable genetic damage. Additional spill related genetics projects that would utilize the facility include inheritance studies using all salmon species to confirm the genetic origins of allozyme polymorphisms; population genetics of pink salmon in Prince William Sound, and genetic marking of hatchery pink salmon in Prince William Sound. These projects require, among other things, wet laboratories with high quality running seawater and freshwater, tanks, incubators, raceways, dry labs, freezers, offices, library, and computer services. (Additional information concerning fish/invertebrate research needs that the facility would address are provided in the *Project Description*.)
- Dedicated Research Vessel and Submersible: The proposed facility could also accommodate the basing of (1) a dedicated research vessel and (2) submersible for work in the spill area. The feasibility of acquiring a research vessel and submersible as part of the project has been examined. A committee considered this issue and identified the opportunity for use of a multi-purpose research vessel/tender that could be acquired and equipped for work in the EVOS area. The committee also examined potential costs of leasing a submersible for work on spill issues. The potential use of a dedicated research vessel and/or submersible in the EVOS area are issues that needs further consideration. (Additional information concerning the research vessel and submersible are provided in the *Project Description*.)

The facility would also provide, on an opportunistic basis, for the rehabilitation and study of marine mammals and marine birds, particularly pinnipeds (Harbor seal and Stellar sea lion), Sea otters, and seabirds (Common murre, Pigeon guillemot,

Marbled murrelet).<sup>6</sup> This function would be integrated with research at the facility to gain an improved understanding of factors affecting animal health. Medical data from rehabilitation efforts could provide insight into processes affecting wild populations that are important to restoration efforts.

While recognizing that restoration research and monitoring needs will evolve as part of an adaptive management process in response to additional information regarding the health and recovery of the spill area, on the basis of available information and the experience of restoration efforts over the past-five years since the spill, it can be reasonably anticipated that the additional research capability provided by the proposed facilities will be needed over the long term to address issues essential to restoration of individual injured resources and the ecosystem upon which they depend.<sup>7</sup>

#### 4. No Facilities in Alaska Can Presently Address Research Needs

The proposed facility improvements would provide laboratory facilities (wet and dry labs, tanks, running seawater and freshwater, and offices) to focus the research and monitoring needs for marine mammals (primarily pinnipeds and Sea otters), marine birds (primarily pelagic seabirds), and fish genetics (primarily Pink salmon and Pacific herring) in the spill area. Capabilities of other coastal research facilities in Alaska have been examined and there are no existing facilities in Alaska that can address these needs.<sup>8</sup>

The determination that the needed facilities are currently lacking has been reinforced by the University of Alaska President Jerome Komisar: " ... there is now no facility ... within the State that can even approach accomplishing the research that must be done to ensure restoration and rehabilitation of the marine mammals and birds species damaged by the spill ... . Without the research capacity projected by the Seward project, it will be impossible to gather the information and knowledge needed ... ."<sup>9</sup> In comments on the IMS Infrastructure Improvement Project DEIS, the Director of the National Biological Survey indicated: "... the IMS project will provide a needed site to facilitate research on marine mammal and bird health issues. In addition, its unique abilities to maintain marine animals because of its saltwater system will provide facilities and opportunities for research that do not presently exist."<sup>10</sup>

<sup>&</sup>lt;sup>6</sup> See Project Description, Chapter 3 discussion regarding Wildlife Rehabilitation Program, p. 3.12.

<sup>&</sup>lt;sup>7</sup> Conversely, waiting until the year 1997 to assess what facility infrastructure needs then exist would simply produce a cycle of inevitable postponement of the project since the new facilities would not then be available to support needed work.

<sup>&</sup>lt;sup>8</sup> See Project Description, Chapter 3, "Anticipated Work Program" p. 3.4.

<sup>&</sup>lt;sup>9</sup> J. Komisar to J. Ayers, letter dated September 8, 1994.

<sup>&</sup>lt;sup>10</sup> R. Pulliam to N. Swanton, "Draft Environmental Impact Statement (EIS) for the Proposed Infrastructure Improvements at the Institute of Marine Science (IMS), Seward, Alaska - Review Comments" (undated).


### 5. Location of the Needed Research Facilities

During the assessment of the purpose and need for the project, the potential for expansion of existing marine research facilities as an alternative to the proposed project was examined. The specific geographic location of the facility improvements at Seward provides a unique set of benefits to the Trustee Council's restoration mission. (Information regarding existing marine research facilities in Alaska is summarized in the *Project Description* in Figures 3-1 through 3-4.)

Important factors in the review of other possible facility locations included. ومعاجب المركز availability of high quality freshwater and seawater for use in the life support system; availability of land for development; accessibility; potential opportunity for the project to be self-supporting; and location within the spill area. Certainty that the facility would have access to high quality of freshwater and saltwater was an especially critical factor. Uncertain or questionable water resources and concerns regarding turbidity, biofouling, salinity and/or temperature for the life support system was a significant limitation with all other potential facility locations (Anchorage, Fairbanks, Cordova, Kodiak, Kasitsna, Auke Bay, Cold Bay, Seattle). Lack or uncertain availability of land for facility expansion was a concern in a number of locations (Cordova, Auke Bay, Kasitsna), as well as limited accessibility (Cold Bay, Kodiak, Kasitsna) and a limited opportunity for the project be selfsupporting (Cordova, Kodiak, Kasitsna). Several of the other existing marine research facilities are located outside of the spill area (Anchorage, Cold Bay, Fairbanks, Seattle, Auke Bay).

Important attributes of the Seward site include:

- location within the spill area;
- close proximity to the injured marine mammal, bird, fish and invertebrate resources and habitats upon which they depend;
- a 21-year record of high quality seawater and access to high quality springwater to support research efforts;
- affiliation with the existing University of Alaska School of Fisheries and Ocean Science (SFOS) and Institute of Marine Science (IMS);
- accessibility by road transportation together with quality port and airport facilities;
- the opportunity to become operationally self supporting with revenue derived from public visitation and education programs.

While there may be other potential research facility sites within the spill area that have one or more of the attributes noted above, location of the facility in Seward

would provide a singular combination of attributes to best to advance the Trustee Council's restoration mission.

### 6. Contribution to Trustee Council Ecosystem Approach

and a

Policy No. 1 in the Trustee Council's *Draft Restoration Plan* expressly recognizes that the restoration program will take an ecosystem approach: "Recovery from the oil spill involves restoring the ecosystem as well as restoring individual resources."<sup>11</sup> In addition to specific marine mammal, marine bird, fishery and invertebrate restoration research needs noted above, there are many restoration research issues that the facility would play a vital role in addressing to understand the ecosystem relationships that may influence or control recovery of injured resources.

As described in the *Invitation to Submit Restoration Projects for Fiscal Year 1995*, ecosystem processes involving (1) food, competition and predation, and (2) climatic and oceanographic processes are widely recognized by the scientific community as high priority areas of investigation needed to advance restoration of almost all non-recovering injured resources.<sup>12</sup> The proposed facility improvements would create important new capabilities to address these important restoration research needs.

- Food Web Relationships/Stable Isotopes: With respect to food, competition and predation issues, the proposed IMS improvements would provide unique opportunities for researchers to use stable isotope fractionation as a research technique. The use of stable isotope research techniques is an important means by which to examine ecosystem structure and food web relationships. As indicated by the Chief Scientist, "... it is anticipated that stable isotope measurements will continue to provide needed information for the ecosystem approach to restoration."<sup>13</sup> (The Trustee Council received sixteen project proposals for FY 95 that included use of stable isotopes to some degree including approximately 11% of all evaluation category 1 and 2 projects.) Development of the proposed facilities and the ability to control the diet of marine mammals and seabirds would provide unique opportunities to investigate isotope transfers and develop information important to understanding food web interactions in the wild. These captive mammal and seabird isotope studies would provide information to assist in the assessment of dietary quality of prey species in terms of trophic energetics.
- Oceanographic Research: The facility improvements would expand the existing oceanographic program at the existing Seward Marine Center to allow for long-term, year round evaluations of oceanographic features of the

<sup>&</sup>lt;sup>11</sup> Draft Restoration Plan, Chapter 2, p. 9.

<sup>&</sup>lt;sup>12</sup> See *Invitation to Submit Restoration Projects for Fiscal Year 1995*, Chapter 3, Table 3: "Summary of Priority Research Issues Concerning Why Resources Currently are Not Recovering."

<sup>&</sup>lt;sup>13</sup> R. Spies to J. Ayers, "Stable isotope studies in the 1995 workplan," memorandum dated August 10, 1994.

spill region including temperature, salinity and nutrients. This would improve the understanding of food web relationships and species interactions within the physical environment of the EVOS area. The facility would also significantly enhance the efforts of other research disciplines (e.g., marine ecology) that would provide additional opportunities for restoration of injured resources.

The proposed research infrastructure improvements are directly responsive to the policy guidance stated in the *Draft Restoration Plan*: "Monitoring and Research activities include an ecosystem monitoring and research program. The ecosystem monitoring and research program will provide an understanding of the physical and biological interactions that affect an injured resource or service."<sup>14</sup>

DRAFT

### 7. Contribution to a Comprehensive Interdisciplinary Restoration Effort

The Mission Statement of the Trustee Council, adopted in November 1993, states that "restoration will be accomplished through the development and implementation of a comprehensive interdisciplinary recovery and rehabilitation program."<sup>15</sup> The facility would substantially contribute to the comprehensive, interdisciplinary restoration effort called for by the Trustee Council.

Despite the efforts of many capable marine scientists and the expenditure of nearly \$100 million dollars on NRDA studies in the EVOS region, scientists and managers are currently unable to understand significant changes occurring in the northern Gulf of Alaska and Prince William Sound ecosystem as manifested by long-term declines of pinnipeds (e.g., harbor seal) and pelagic seabirds (e.g., marbled murrelet, pigeon guillemot) and wild fluctuations and failures of pink salmon and herring stocks in Prince William Sound. In Trustee Council sponsored meetings and forums over the past year, principle investigators, agency resource managers, peer reviewers and others have often commented on the need for more interdisciplinary interaction. Fishery biologists want more access to oceanographers; seabird ornithologists want more interaction with fishery biologists; and all want more interaction with marine ecologists and other specialists.

While the restoration effort to date has produced an enormous quantity of valuable data and information, a more collaborative and interdisciplinary approach is needed to overcome the geographic and institutional isolation of individual researchers. As stated in the *Invitation to Submit Restoration Projects for Fiscal Year 95* because ecosystem processes are complex and may involve multiple resources, restoration projects to address these questions must "involve an integrated, collaborative,

<sup>&</sup>lt;sup>14</sup> Draft Restoration Plan, Chapter 2, p. 9.

<sup>&</sup>lt;sup>15</sup> *Mission Statement* of the *Exxon Valdez* Oil Spill Trustee Council, adopted by the Trustee Council November 30, 1994.



multi-disciplinary approach."<sup>16</sup> The proposed facility improvements would not only provide specific physical research infrastructure needed for restoration efforts, it would provide a location that would concentrate activity and thereby facilitate the interdisciplinary and collaborative research efforts needed to successfully address restoration issues.

At the same time, while the facility is anticipated to be an important center for research on marine mammals, marine birds, and fish genetics in the EVOS area, it is *not* the intent of the facility to control or direct all research and monitoring in the EVOS area. In carrying out restoration research objectives, scientists working at the facility including those with the University of Alaska and ADFG, would collaborate with other agency, academic and private scientists including those with the NBS, USFWS, and NOAA as well as other research institutions including the Prince William Sound Science Center, Copper River Delta Institute, Fisheries Industrial and Technology Center and Auke Bay Laboratories.

### 8. Scientific Peer Review of Proposed Facilities

The proposed facility improvements have been reviewed by the Chief Scientist and two other core scientific reviewers.<sup>17</sup> In written comments addressing the proposed facility, these reviewers concurred with the need for the facilities: "... there is no adequate marine research facility in the northern Gulf of Alaska spill region [and] there is a compelling demand and need for a modern marine laboratory facility for housing and promoting vital research efforts." This peer review comment noted the high quality and qualifications of the planning team that has developed the facility proposal and the appropriate match of the facility design to meeting research needs pertaining to the injured seabirds, marine mammals and fishes "that suffered the greatest damages and present the greatest challenges for restoration and management." (A copy of the peer review comment letter from the Chief Scientist is attached as Appendix B.)

### **Facility Ownership and Operation Structure**

The facility will be owned by the City of Seward, and operated by the Seward Association for the Advancement of Marine Science (SAMMS), a non-profit corporation. SAMMS is currently administering the development of the facility and will continue in the role of "operator" of the project. The SAMMS corporation is organized for any lawful purpose including, but not limited to, educational, social and cultural purposes including marine research, public education, and providing educational and scientific programs and any other lawful purpose or endeavor permitted under the laws of the State of Alaska to non-profit corporations incorporated under AS 10.20. The SAMMS corporation is organized exclusively for

<sup>&</sup>lt;sup>16</sup> Invitation to Submit Restoration Projects for Fiscal Year 1995, Chapter 3, p. 23.

<sup>&</sup>lt;sup>17</sup> R. Spies (Chief Scientist), C. Petersen, and P. Mundy to J. Ayers, "Proposed Institute of Marinbe Science in Seward," memorandum dated September 24, 1994.

## Oc er 11, 1994 – DRAFT

charitable purposes within the meaning of Section 501(c)(3) of the Internal Revenue Code. The Corporation shall have no stock and no dividends or pecuniary profits shall be declared or paid to the directors thereof, or to any private individual, and all of its earnings shall be used to further the purpose of the corporation. The affairs of the SAMMS corporation shall be managed by its Board of Directors.<sup>18</sup>

Research activities at the facility will be directed and managed to serve the EVOS restoration mission. Trustee Council funded activities and restoration research needs will have the highest priority for use of the facility.

- the Facility Director (an employee of SAMMS) will establish a working relationship with the Trustee Council Executive Director and the Council's scientific review program;
- all scientific and research programs at the facility will be coordinated by the Facility's Chief Scientist (a representative of the University of Alaska) and the Facility's Director with the Trustee Council's scientific review program;
- the University of Alaska will provide quality assurance and standard operating procedures for all research to be conducted at the facility;
- the SAMMS Board will have a direct reporting relationship to the Executive Director of the Trustee Council who shall provide a direct point of contact for Trustee Council policy matters including funding for research infrastructure and research activities.

This interrelationship will ensure that the Trustee Council's restoration priorities are being met at the facility. (A diagram of the Trustee Council's interrelationship with the facility operating structure is provided as Attachment A.<sup>19</sup>)

To ensure that the facility is appropriately managed to support the Trustee Council's restoration mission, an advisory group will be established to work with the current board to modify their composition.<sup>20</sup> The SAMMS Board has established an advisory group to assist them in modifying their composition to reflect:

- (1) the needs of the Trustee Council to carry out restoration research;
- (2) the use of public and private funds to be operationally self-supporting;

(3) the central role of the University of Alaska to integrate the facility into the statewide research infrastructure; and

(4) the harmonious co-existence of the facility with the community of Seward.

<sup>&</sup>lt;sup>18</sup> A list of current SAMMS Board members is provided as Appendix B to the *Project Description*.

<sup>&</sup>lt;sup>19</sup> The Operating Structure diagram is found as Figure 7-1 in the Project Description.

<sup>&</sup>lt;sup>20</sup> The number of directors is currently eight (8).



The advisory group includes representatives from the University of Alaska, the Trustee Council's Executive Director, the City of Seward, and statewide leadership of science, finance and industry.

### **Capital Costs and Funding Request**

Total capital costs for the facility are estimated to be \$47.456 million (including both the research and education components). Funding in the amount of \$24.956 is being requested of the Trustee Council for the research component only of the project.

1. Capital Costs Identified for Research Component Only

The research only components of the facility have been identified separately from the other (education) components of the project. Capital cost estimates for the facility have been prepared by Estimations, Inc., a professional cost estimating consultant, reviewed by Heery International, Inc., and analyzed by HMS, Inc. another cost estimating consultant. A Construction Costs Budget Review document (dated July 26, 1994)<sup>21</sup> was prepared by the project team and reviewed by the Trustee Council's legal advisors. This review demonstrated the rationale that was used to identify the costs of the research component of the project. The capital budget for the project's <u>research only component</u> is \$36.996 million. The capital budget for the education component only is estimated to be \$10.460 million.

2. Trustee Council Funding Request: \$24.956 Million

As called for by the action on January 31, 1994, the project team has prepared a recommendation of the appropriate level of funding for consideration by the Trustee Council that would be legally permissible under the terms of the Memorandum of Agreement (MOA) and Consent Decree. The proposed request of **\$24.956 million would be used for the research component of the project only.** (Detailed regarding project capital costs is provided in the *Project Description*.)

### **Operation Costs Projected to be Self-Supporting**

On the basis of three feasibility/market studies,<sup>22</sup> including a detailed update of key visitation assumptions by Fox Practical Marketing in August 1994, it is projected that annual operating revenues derived from the facility will support annual operating costs. The annual facility operating expenses (personnel, facility operations, curatorial costs and administration) for the total project are projected to be \$3.8

<sup>&</sup>lt;sup>21</sup> Construction Cost Budget Review prepared by Livingston Sloan, Inc. (July 1994).

<sup>&</sup>lt;sup>22</sup> These studies include: (1) Feasibility Study for the Alaska Sealife Center, prepared by The Office of Thomas J. Martin (August 1993); (2) Alaska SeaLife Center Feasibility Study Evaluation, prepared by Public Financial Management Inc., (September 1993); and (3) Update and Expansion of Market Demand Analysis for the Alaska Sealife Center, prepared by Fox Practical Marketing and Management (August 1994).



### Integrated Funding Approach

The integrated funding approach for the facility presents an exceptional opportunity for the Trustee Council to use civil settlement funds in a collaborative manner that will take advantage of other public and private sources of funding. Additionally, a phasing strategy has been developed to respond to potential uncertainties in the success of private fundraising efforts as part of the integrated funding approach.

### 1. Collaborative Public-Private Funding for the Facility

The Alaska Legislature has already appropriated \$12.5 million for the project and the Trustee Council is now in the position of being able to optimize the use of civil settlement funds by combining future restoration infrastructure needs with the Legislature's prior appropriation. (Such a coordinated and collaborative effort is very similar to the Trustee Council's prior action to purchase lands in Kachemak Bay using a combination of State of Alaska funding sources together with the civil settlement funds.) In addition to funding provided by the Legislature, a private fundraising campaign has been designed<sup>25</sup> to: (1) raise an additional \$10 million in capital funding (\$5 million for the research component and \$5 million for the education component); as well as (2) an additional \$6 million for endowed research chairs (campaign beginning in 1996 with first chair to be funded by the year 2000).

### 2. Responding to Uncertainty in Private Fundraising — A Phasing Strategy

The private fundraising campaign is based on conservative projections of available funds for the construction of the project. A phasing strategy has been developed which represents three scenarios with respect to the potential success of the private fund raising efforts.

<sup>&</sup>lt;sup>23</sup> As indicated in the Project Description, annual operating costs are comprised of personnel (\$1.9 million), administration (\$776,000), facilities costs (\$720,000), and curatorial costs (\$375,000). <sup>24</sup> Projected annual revenues from the facility include: admissions (\$2.35 million based on 250,500 visitors); memberships (\$\$360,000); shop sales (\$603,200); charges for research-related utility consumption not to exceed \$0.55/sq. ft./month (\$246,000); rehabilitation charges (\$150,000); and miscellaneous (\$20,000).

<sup>&</sup>lt;sup>25</sup> The fund raising plan was developed under a competetively awarded contract with J. Donovan Associates, a professional fund raising consulting firm. *Fund Raising Plan* prepared by J. Donovan Associates (September 1994).

# DRAFT

These three scenarios include:

(1) a "\$47.5 million scenario" (i.e., 100% of the facility is built — fundraising efforts are fully successful: the \$5 million campaign for research as well as the \$5 million campaign for education);

(2) a "\$42.5 million scenario" (i.e., 89% of the facility is built — fundraising efforts are not fully successful: assumes that the \$5 million for the research component is secured and that component built, but only a portion of the education component would be completed); and

(3) a "\$37.5 million scenario" (i.e., 78% of the facility is built — fundraising efforts are not fully successful, assumes that only the legislative appropriation and Trustee Council funds are available for the facility, leaving a portion of the visitation and education components to be completed at a future date when private funds are available).

Each of these scenarios has been examined and the extent of facility development altered to reflect reduced funding resources. (Additional information on the phasing strategy is provided in the *Project Description*.)

### **Proposed Fund Transfer**

The Trustee Council would transfer civil settlement funds for the project to the Alaska Department of Fish and Game; in turn, ADFG would transfer capital funds to the City of Seward pursuant to AS 37.05.315(c). In accepting these funds, the City of Seward would agree by contract with the State of Alaska that it will operate and maintain the facility for the practical life of the facility and the City of Seward will not look to the State of Alaska or the Trustee Council (apart from funding for specific research projects) to operate or maintain the facility or pay for its operations and maintenance. The method of fund transfer would be a continuing capital designation as provided by AS 37.25.020. Contract language describing the fund transfer and obligations to the City of Seward will be developed between ADFG and the City of Seward. A Memorandum of Agreement (MOA) for the long term development and operations of the facility will be developed between the City of Seward and SAAMS.

### Prudency and Cost-Efficiency of Facility Funding

Funding the proposed research infrastructure affiliated with the Institute of Marine Science in Seward would provide needed facilities for the Trustee Council restoration effort in a cost-efficient manner reflecting a reasonable balance between costs and benefits. As discussed above and in the *Project Description* at great length, the proposed facilities are needed to address long term restoration research and monitoring concerns. The central and essential component of the proposed research infrastructure is the life support system that will provide the capability to support the specialized tanks, animal holding and quarantine areas, wet labs with running seawater, underwater viewing, and fish genetics capabilities among other research opportunities. It would not be prudent to develop such a life support system (a cost of approximately \$5.6 million) at more than one location. With its specific combination of attributes, Seward is both the most suitable site as well as the most cost-efficient location for development of the needed facilities.

Capital construction funding and location of the new research infrastructure at a single location rather than at multiple alternative locations within or outside the spill area is also cost-efficient by reducing and/or eliminating the possibility of duplicative furniture, fixture and equipment (FFE) purchases at various different facilities. The concentration of FFE investment (another large cost component in excess of \$3.5 million) at a single location will help ensure the efficient use of this investments. Funding and location of the new research infrastructure facilities at a single location will also help reduce and/or eliminate redundant administration and overhead costs. The facility proposal also provides a unique, one-time opportunity to make cost-efficient use of joint settlement funds by taking advantage of the already appropriated \$12.5 million from the State of Alaska. Further, the projected revenue from visitor patronage to support operational costs at the facility would provide long term cost-efficiencies for the Trustee Council's research and monitoring program.

Finally, there is the cost-efficiency associated with having a concentration of individual researchers of various disciplines working at a single location where they can readily interact, exchange information and learn from one another in a collaborative and interdisciplinary manner. While this cost-efficiency may be difficult to quantify, it is no less real. In fact, given the extraordinary complexity of the spill area ecosystem, this may be one of the project's most important attributes as the Trustee Council moves forward in its efforts to restore the injured resources and services of the spill area.

\* \* \* \* \*

In summary, based on the information available at this time, it is evident that:

- additional research and monitoring infrastructure to support the Trustee Council's long term restoration research and monitoring efforts is needed;
- the proposed facility design, with its focus on non-recovering marine mammal, marine bird and fishery/invertebrate resources, presents a unique opportunity to address anticipated restoration research and monitoring needs;
- the research infrastructure proposed has been substantially modified on the basis of extensive consultation and review with representatives of the Trustee Council agencies, peer scientific reviews, other technical reviews and



consultation with the Trustee Council's legal advisors so as to tailor the project to address the long-term EVOS restoration mission consistent with the purposes of the Memorandum of Agreement and Consent Decree;

 there are no facilities presently in Alaska that can adequately address the needs identified;

DRAFT

- location of the project at Seward provides a unique combination of values that makes the site most appropriate for the facility improvements;
- the facility would make an important contribution to the ecosystem approach called for by the Trustee Council;
- the facility would make an important contribution to the interdisciplinary research effort called for by the Trustee Council;
- an operational structure for the facility has been developed; and
- an integrated funding approach for the facility has been developed that would make use of civil settlement funds in a collaborative manner that will take advantage of other public and private sources of funding in order to ensure a prudent and efficient use of settlement funds.

Attachment A — Proposed Operating Structure Attachment B — Peer Review Comment Letter from the Chief Scientist



SCIENCES

and a second transferred from

September 24, 1994

To: James Ayers, Executive Director, *Exxon Valdez* Oil Spill Trustee Council

From: Dr. Robert B. Spies, Chief Scientist; Dr. Charles Peterson, Core Reviewer: and Dr. Philip Mundy, Core Reviewer

Re: Proposed Institute of Marine Science in Seward

We attended the briefing on September 17 where the plans for the proposed Institute of Marine Sciences in Seward were presented. We have several comments on this project as it is now conceived.

First, if the settlement funds are spent only to monitor recovery of damaged resources and to enhance others that are recovering too slowly by natural processes, there would in the end remain a net loss of goods and services from the ecosystem because of the spill. By only achieving an eventual return of the ecosystem to conditions that would have prevailed in the absence of the spill, the public will not have been compensated for the long period in which the goods and services are being provided at less than natural levels. Such compensation can be provided by investments made by the Trustee Council that will pay dividends in the form of enhancing ecosystem values in the future beyond those that would have occurred in the absence of the spill. One example of the implementation of this sort of approach is an investment in the Institute of Marine Science in Seward.

Investment in the Seward Marine Science Center would represent enlightened stewardship by the Trustee Council. Establishing a facility in the spill area for conducting research on Alaska's marine resources will provide long-term benefits for better management, protection and enhancement of biological resources in the spill area. Through improved scientific understanding, there will be long-term and continuing improvement of management and stewardship of the natural resources of the ecosystem, an enduring legacy to be left by the actions of today's Trustee Council. Such action would compensate the public for the many years of damage from the spill.

Second, there is no adequate marine research facility in the northern Gulf of Alaska spill region. Given the very extensive coastline in this region, the bounty of her living marine resources, and the large numbers of outstanding marine scientists in the university system, in the state and federal agencies, and in the private sector, there is compelling demand and need for a modern marine laboratory facility for housing and promoting vital research efforts.

Third, Seward is the ideal location for such a facility. Unlike Cordova (PWS Science Center), Kasitsna Bay (UAF Field Station) and Kodiak (UAF Fisheries Technology Center), Seward is accessible by road to a large majority

1.1.1

of Alaskans, both in the scientific community and the general public. The concept of combining a research mission and a public education function in the same facility has proven a success elsewhere. Careful economic analyses has shown this to be viable in Seaward because of its road access to most Alaskans and its location at the terminus of operations of a large cruise line. No other location can match Seward for economic promise in siting such a facility, not to mention the spectacular scenic setting of the city itself.

:

Fourth, the planning conducted for the Institute of Marine Science has been absolutely world-class. Sufficient thought and review has been invested by talented and experienced professionals in all necessary sub-specialties to design a state-of-the- art facility. This careful planning includes specialized engineering, architecture, education, scientific research, and animal care. The experience of both success and failures of previous projects built around the world has been used to maximize the effectiveness and success of this one. Furthermore, the planning has highlighted the most unique, attractive and important components of the coastal ecosystem of the northern Gulf of Alaska-seabirds, marine mammals and fishes. These groups also suffered the greatest damages and present the greatest challenges for restoration and management, so the match to the Trustee's mandate is excellent.

Fifth, the use of such a facility by scientists at work on spill studies will fill legitimate research needs for study of non-recovering or slowly recovering species. Also, because of the availability of a scientific facility where none existed before generates new possibilities to address real research needs, it is difficult to accurately predict what the future demands for the unique research space at the Institute of Marine Science will be. We do expect the facility to be heavily used. It is reasonable to anticipate that a number of EVOS projects now in progress or likely to begin this coming year would greatly benefit from the effective use of this facility if there are no administrative barriers. Specifically we anticipate its use by marine mammal researchers to investigate health of populations using captive animals: particularly for studies of harbor seals (K. Frost and Dr. L. Lowry); sea lions, a species in sharp decline in the northern Gulf of Alaska (Dr. Castellini); and sea otters (Dr. Ballachev and others). Researchers will also find this facility useful in assessing health, disease, reproductive biology and other aspects of bird biology (K, Kuletz and others). Finally fish and invertebrate biology studies, for example the genetic stock identification work on salmon and herring (J. Seeb and L. Seeb), will be done in this facility. This facility is also well suited for aquatic toxicology experiments with a variety of organisms that are curently being carried out elsewhere, for example the studies of injury to salmon eggs and pre-emergent fry (S. Sharr/B. Bue/ J. Rice).

This is a minimal list, based on our knowledge of ongoing projects that could logically be facilitated and enhanced by use of a marine laboratory facility that could be used for experiments with captive marine mammals, seabirds, fishes and invertebrates within the oil spill region.

Our largest remaining concern is over the administrative structure of the Institute of Marine Science. The success of this laboratory will depend to a large extent on effective management during its early development. Some credible entity needs to be identified to operate the facility. One model would be an independent corporation, such as operates the Woods Hole Institution of Oceanography. With this model some potential financial backing would be necessary to ensure the viability of the institution until it is independent. Involvement of the University of Alaska in some way will be important in the development of the Institute in its formative years. In any case such issues of administrative organization remain to be resolved and are critical to success.

A smaller particular concern is that there should be a freshwater storage tank somewhere in the system to allow for a buffer in case of a sudden loss of the source, and to provide flexibility in the use and allocation of freshwater resources.

CC: M. McCammon

-

Restoration clusters appear in the following order: PWS system investigation Other pink salmon projects Other herring projects Sockeye salmon program Other fish/shellfish projects Marine bird/forage fish interaction Other marine bird projects Nearshore ecosystem studies Intertidal/subtidal community structure Marine mammal ecosystem studies Oil toxicity projects Archaeology projects Habitat protection/acquisition **Recreation** projects Subsistence projects Reducing marine pollution Miscellaneous research projects Miscellaneous monitoring projects Miscellaneous general restoration projects Administration/science management/public information Institute of Marine Science Restoration reserve

a frankje manihile sam

•••••

### DRAFT 1995 WORK PLAN -- PROJECT NUE

|     | PROJECT #     | PROJECT_TITLE  | RESTORATION CLUSTER                       |
|-----|---------------|--|---|
|     | 95001         | Condition and Health of Harbor Seals   | Marine Mammal Ecosystem Studies           |
|     | 95002         | Leave No Trace Education Program   |   |
|     | 95003         | Area E Commercial Salmon Permit Buyback Program  | Other Print Samon Projects C              |
|     | 95005         | Harlequin Duck Abundance and Productivity in Western Cook Inlet  | Other Marine Bird Projects                |
|     | 95006         | Paint River Pink Salmon Development  | Other Pink Salmon Projects                |
| • • | ~95007A       | Archaeological Site Restoration - Index Site Monitoring  | Archae SXXON royAkDEZ OIL SPILL           |
|     | 95007B        | Archaestogical Site Restoration  | Archae ADMINISTRATIVE RECORD              |
|     | 95009A        | Trophics and Community Structure in the Intertidal and Shallow Subtidal  | Intertidal/Subtidal Community Structure   |
|     | 95009B        | Primary Productivity as a factor in the Recovery of Injured Resources<br>in Prince William Sound                               | Intertidal/Subtidal Community Structure - |
|     | 95009C        | Trophic Dynamics and Energy Flow: Impacts of Herring Spawn and<br>Sea Otter Predation on Nearshore Benthic Community Structure | Nearshore Ecosystem Studies               |
|     | 95009D        | Survey and Experimental Enhancement of Octopuses in Intertidal<br>Habitats   | Intertidal/Subtidal Community Structure   |
|     | 95009E        | Community Structure of Mobile Foragers Using the Nearshore   | Intertidal/Subtidal Community Structure   |
|     | 95010         | Intertidal Fauna and Flora Species Composition, Abundance and Variability Relative to Physical Habitat Controls                | Intertidal/Subtidal Community Structure   |
|     | 95013         | Killer Whale Monitoring in PWS   | Other Marine Mammal Projects              |
|     | 95014         | Predation by Killer Whales in PWS: Feeding Behavior and Distribution of Predators and Prey                                     | Marine Mammal Ecosystem Studies           |
|     | 95016         | A Tribute to Prince William Sound  | Recreation Projects                       |
|     | 95017         | Port Graham Coho Salmon Subsistence Fishery Restoration Project  | Subsistence Projects                      |
|     | 95018         | Partitioning of Primary Production Between Pelagic and Benthic Communities   | PWS System Investigation                  |
|     | <b>95</b> 019 | Distribution and Abundance of Forage Fish as Indicated by Puffin Diet Sampling   | Marine Bird/Forage Fish Interaction       |
|     | 95021         | Seasonal Movement and Pelagic Habitat Use by Common Murres from the Barren Islands   | Other Marine Bird Projects                |
|     | 95022         | Foraging Efficiencies at Temporary Food Patches  | Marine Bird/Forage Fish Interaction       |
|     | 95023         | Food Web Relationships of Pelagic Species Exhibiting Long-term Decline   | Marine Bird/Forage Fish Interaction       |
|     | 95024         | Enhancement of Wild Pink Salmon Stocks   | Other Pink Salmon Projects                |
|     | 95025A        | Factors Affecting Recovery of Sea Ducks and Their Prey   | Nearshore Ecosystem Studies               |
|     | 95025B        | Sea Otter Abundance and Distribution, Food Habits and Population<br>Assessment   | Nearshore Ecosystem Studies               |
|     | 95025C        | Pigeon Guillemots and River Otters as Bioindicators of Nearshore<br>Ecosystem Health   | Nearshore Ecosystem Studies               |
|     | 95025D        | Settlement Rates of Nearshore Invertebrates, Oceanic Processes and Population Recovery: Are They Linked?                       | Nearshore Ecosystem Studies               |
|     | 95025E        | Algal Competition Limiting Recovery in the Intertidal  | Intertidal/Subtidal Community Structure   |
|     | 95025F        | Availability and Utilization of Musculus spp. as Food for Sea Ducks and Sea Otters   | Nearshore Ecosystem Studies               |
|     | 95025G        | Relation of Clam Population Structure to Recovery of Injured Nearshore<br>Vertebrate Predators                                 | Nearshore Ecosystem Studies               |

# DRA 1995 WORK PLAN -- PROJECT INDEX DRAFT

| PROJECT #     | PROJECT TITLE  | RESTORATION CLUSTER                        |
|---------------|--|--|
| 95025H        | Effects of Predatory Invertebrates on Nearshore Clam Populations in PWS  | Nearshore Ecosystem Studies                |
| 95025J        | Primary Productivity as a Factor in the Recovery of Injured Resources<br>in Prince William Sound                 | Nearshore Ecosystem Studies                |
| 95026         | Hydrocarbon Monitoring: Integration of Microbial and Chemical Sediment Data                                      | Oil Toxicity Projects                      |
| 95027         | Kodiak Shoreline Assessment: Monitoring Surface and Subsurface Oil   | Oil Toxicity Projects                      |
| 95029         | Population Survey of Bald Eagles in PWS  | Miscellaneous Monitoring Projects          |
| 95030         | Productivity Survey of Bald Eagles in PWS  | Miscellaneous Monitoring Projects          |
| 95031         | Reproductive Success as a Factor Affecting Recovery of Murrelets in PWS  | Other Marine Bird Projects                 |
| 95033         | Kittiwakes as Indicators of Forage Fish Availability   | Marine Bird/Forage Fish Interaction        |
| 95038         | Symposium on Seabird Restoration   | Other Marine Bird Projects                 |
| 95039         | Common Murre Productivity Monitoring   | Other Marine Bird Projects                 |
| 95041         | Introduced Predator Removal from Islands - Follow-up Surveys   | Other Marine Bird Projects                 |
| 9504 <b>2</b> | Five-year Plan to Remove Predators from Seabird Colonies   | Other Marine Bird Projects                 |
| 95043A        | Cordova Cutthroat Trout Habitat  | Other Fish/Shellfish Projects              |
| 95043B        | Carry-forward: Cutthroat and Dolly Varden Rehabilitation in Western PWS  | Other Fish/Shellfish Projects              |
| 95044         | In Situ Formation and Ecotoxicity of Hydrocarbon Degradation<br>Products Produced by Ultramicrobacteria          | Oil Toxicity Projects                      |
| 95045         | Green Island Intertidal Restoration Monitoring   | Intertidal/Subtidal Community Structure    |
| 95046         | Long-term Record in Tree Rings of Climatic Features  | Miscellaneous Research Projects            |
| 95047         | Seal Contamination   | Miscellaneous General Restoration Projects |
| 95048         | Historical Analysis of Sockeye Salmon Growth   | Sockeye Salmon Program                     |
| 95049         | Independent Review of Restoration and Monitoring Projects  | Administration/Science Mgt./Public Info.   |
| 95050         | A Test of Sonar Accuracy in Estimating Escapement of Sockeye Salmon  | Sockeye Salmon Program                     |
| 95051         | Large-scale Coded Wire Tagging of PWS Herring  | Other Herring Projects                     |
| 95052         | Community Involvement/Use of Traditional Knowledge (a)   | Subsistence Projects                       |
| 95053         | Cordova's Mini-Imaginarium   | Recreation Projects                        |
| 95055         | Prehistoric Ecological Baseline for PWS  | Miscellaneous Research Projects            |
| 95057         | Movement of Larval and Juvenile Fishes within PWS  | Other Herring Projects                     |
| 95058         | Restoration Assistance to Private Landowners   | Habitat Protection/Acquisition             |
| 95060         | Spruce Bark Beetle Infestation Impacts on Injured Fish and Wildlife Species of the <i>Exxon Valdez</i> Oil Spill | Habitat Protection/Acquisition             |
| 95062         | River Otter Recovery Monitoring  | Miscellaneous Monitoring Projects          |
| 95064         | Monitoring, Habitat Use, and Trophic Interactions of Harbor Seals in PWS   | Marine Mammal Ecosystem Studies            |
| 95065         | PWSAC Pink Salmon Fry Mortality  | PWS System Investigation                   |
| 95069         | Restoration of Salmon Stocks of Special Importance to Native Cultures  | Other Pink Salmon Projects                 |
| 95071         | Monitoring Nearshore Fish Species for Persistence of Oil Exposure and Ecotoxicological Effects                   | Oil Toxicity Projects                      |

---

## DRAFT 19 WORK PLAN -- PROJECT INPEX DRAFT

**RESTORATION CLUSTER** 

### PROJECT # PROJECT TITLE

### 95073 Impact of Killer Whale Predation on Harbor Seals in PWS Marine Mammal Ecosystem Studies 95074 Herring Reproductive Impairment Other Herring Projects 95075 Population Structure of Blue Mussels in Relation to Levels of Oiling and Nearshore Ecosystem Studies **Densities of Vertebrate Predators** Effects of Oiled Incubation Substrate on Survival and Straying of Wild 95076 Other Pink Salmon Projects<sup>+</sup> Pink Salmon 95077 Recreation Impacts in PWS: Human Impacts as a Factor Constraining **Recreation Projects** Long Term Ecosystem Recovery 95078 Culture, History, and Ecosystems: Assessment of Cultural/Historical Archaeology Projects Strategies to Building Long-term Understanding of Ecosystems in the 5. Oil Spill Area 95079 Pink Salmon Restoration Through Small-scale Hatcheries 1 Other Pink Salmon Projects 95080 Fleming Spit Recreation Area Enhancements **Recreation Projects** 95082 "Mor-Pac Hill" Campground Improvements **Recreation Projects** 95084 **Odiak Camper Park Expansion Recreation Projects** 95085 Cordova Historical Marine Park **Recreation Projects** 95086A Coastal Habitat Intertidal Monitoring and Experimental Design Intertidal/Subtidal Community Structure Verification 95086B Population Dynamics of Eelgrass and Associated Fauna Intertidal/Subtidal Community Structure 95086C Herring Bay Monitoring and Restoration Studies Intertidal/Subtidal Community Structure 95087 Relation of Sea Urchin Population Structure to Recovery of Injured Nearshore Ecosystem Studies Nearshore Vertebrate Predators 95089 Administration/Science Mgt./Public Info. Information Management System 95090 Mussel Bed Restoration and Monitoring in PWS and Gulf of Alaska Oil Toxicity Projects 95092 Recovery Monitoring of PWS Killer Whales Other Marine Mammal Projects 95093 PWSAC: Restoration of Pink Salmon Resources and Services -Other Pink Salmon Projects Quantification of Stream Habitat for Harlequin Ducks and Anadromous 95095 Habitat Protection/Acquisition Fish Species from Remotely Sensed Data 95096 Restoration of Murres by Way of Social Attraction and Predator Removal Other Marine Bird Projects 95097 Restoration of Murres by Way of Transplantation of Chicks: As Other Marine Bird Projects Feasibility Study 95098 Identification of Seabird Feeding Areas from Remotely Sensed Data Other Marine Bird Projects Murrelet Vocalization in Conjunction with Artificial Nests: A Possible 95099 Other Marine Bird Projects Means of Attraction to Habitat 95100 Administration, Science Management and Public Information Administration/Science Mgt./Public Info. 95102-CLO Closeout: Murrelet Prey and Foraging Habitat in Prince William Sound Other Marine Bird Projects 95105 Kenai River Ecosystem Restoration Pilot Enclosure Study Sockeye Salmon Program 95106 Subtidal Monitoring: Eelgrass Communities Intertidal/Subtidal Community Structure 95107 Subtidal Site Verification Intertidal/Subtidal Community Structure 95110-CLO Closeout: Habitat Protection and Acquisition Habitat Protection/Acquisition 95111 Sustainable Rockfish Yield Miscellaneous General Restoration Projects 95112 Rockfish Restoration Objective Miscellaneous General Restoration Projects

DRAFT Updated - 10/11/94

### DRAF 1995 WORK PLAN -- PROJECT INDEX

## DRAFT

e.

**RESTORATION CLUSTER** 

### PROJECT # PROJECT TITLE

| 95113                  | Energetics of Intertidal Fish: The Connection between Lower and Upper Trophic Levels                            | Marine Bird/Forage Fish Interaction     |
|------------------------|---|---|
| 95114                  | Eelgrass Community Structure Restoration Assessment Using Stable<br>Isotope Tracers                             | Intertidal/Subtidal Community Structure |
| 95115                  | Sound Waste Management Plan   | Reducing Marine Pollution               |
| 95116                  | Restoration of Intertidal Oiled Mussel Beds by Nondestructive<br>Manipulation/Flushing with PES-51              | Oil Toxicity Projects                   |
| 95 <del>117-B</del> AA | Harbor Seals and EVOS: Blubber and Lipids as Indices of Food<br>Limitation                                      | Marine Mammal Ecosystem Studies         |
| 95118-BAA              | Diet Composition, Reproductive Energetics and Productivity of Seabirds<br>Damaged by the Exxon Valdez Oil Spill | Marine Bird/Forage Fish Interaction     |
| -95119-BAA             | Food Limitation on Recovery of Injured Marine Bird Populations  | Marine Bird/Forage Fish Interaction     |
| 95120-BAA              | Proximate Composition and Energetic Content of Selected Forage Fish<br>Species in PWS                           | Marine Bird/Forage Fish Interaction     |
| 95121                  | Stable Isotope Ratios and Fatty Acid Signatures of Selected Forage Fish<br>Species in PWS                       | Marine Bird/Forage Fish Interaction     |
| 95122                  | Mapping Potential Nesting Habitat of Marbled Murrelets in PWS Using<br>Geographic Databases                     | Habitat Protection/Acquisition          |
| 95123                  | Tatitlek Community Store  | Subsistence Projects                    |
| 95124A                 | Tatitlek Mariculture Development Project  | Subsistence Projects                    |
| 95124B                 | Tatitlek Mariculture Development Project - Capital Outlay   | Subsistence Projects                    |
| 95125                  | Tatitlek Sockeye Salmon Release Program   | Sockeye Salmon Program                  |
| 95126                  | Habitat Protection and Acquisition Support  | Habitat Protection/Acquisition          |
| 95127                  | Tatitlek Coho Salmon Release Program  | Subsistence Projects                    |
| 95128                  | Teaching Subsistence Practices and Values   | Subsistence Projects                    |
| 95129                  | Tatitlek Fish and Game Processing Center/Smokery  | Subsistence Projects                    |
| 95130                  | Mental Health Center  | Subsistence Projects                    |
| 95131                  | Clam Restoration (Nanwalek, Port Graham, Tatitlek)  | Subsistence Projects                    |
| 95132                  | Port Graham and Nanwalek Subsistence Baseline   | Subsistence Projects                    |
| 95133                  | English Bay River Sockeye Subsistence Project   | Subsistence Projects                    |
| 95134                  | Chenega Bay Mariculture Development Project   | Subsistence Projects                    |
| 95135                  | Subsistence Harvest Support   | Subsistence Projects                    |
| 95136                  | Skin Sewing Crafts Restoration  | Subsistence Projects                    |
| <b>951</b> 37          | Prince William Sound Salmon Stock Identification and Monitoring Studies   | Other Pink Salmon Projects              |
| 95138                  | Elders/Youth Conference   | Subsistence Projects                    |
| 95139A1                | Salmon Instream Habitat and Stock RestorationLittle Waterfall<br>Creek Barrier Bypass                           | Other Pink Salmon Projects              |
| 95139A2                | Spawning Channel - Port Dick Creek  | Other Pink Salmon Projects              |
| 95139B                 | Closeout: Otter Creek/Shrode Creek Instream Restoration   | Other Fish/Shellfish Projects           |
| 95139C1                | Montague Riparian Rehabilitation  | Other Fish/Shellfish Projects           |

## DRAFT 1995 WORK PLAN -- PROJECT POEX DRAFT

| PROJECT #          | PROJECT TITLE   | RESTORATION CLUSTER                        |
|--------------------|---|--|
| 95139C2            | Salmon Instream Habitat and Stock Restoration Lowe River  | Other Fish/Shellfish Projects              |
| 95139Ð             | Salmon Instream Habitat and Stock RestorationPink Creek and Horse<br>Marine Barrier Bypass Development                                    | Other Pink Salmon Projects                 |
| 95140              | Subsistence Skills Program  | Subsistence Projects                       |
| 95141              | Afognak Island State Park Interim Support   | Miscellaneous General Restoration Projects |
| 95159              | Surveys to Determine Additional Oil Spill Effects and Recovery of<br>Marine Bird and Sea Otter Populations in PWS                         | Other Marine Bird Projects 🦈 🛥             |
| 95163              | Abundance and Distribution of ForegorFish and their Influence on Recovery of Injured Species  | Marine Bird/Forage Fish Interaction        |
| 95165              | Carry-forward: PWS Herring<br>Genetic Stock Identification  | Other Herring Projects                     |
| 95166              | Herring Natal Habitats  | Other Herring Projects                     |
| 9 <b>5</b> 173     | Factors Affecting Recovery of PWS Pigeon Guillemot Populations  | Marine Bird/Forage Fish Interaction        |
| 95191A             | Investigating and Monitoring Oil Related Egg and Alevin Mortalities   | Other Pink Salmon Projects                 |
| 95191B             | Injury to Salmon Eggs and Pre-emergent Fry Incubated in Oiled Gravel (Laboratory Study)   | Other Pink Salmon Projects                 |
| 95199-CLO          | Institute of Marine Science - Seward Improvements EIS   | Institute of Marine Science                |
| 95200              | Public Access   | Habitat Protection/Acquisition             |
| 95244              | Seal and Sea Otter Cooperative Subsistence Harvest Assistance   | Subsistence Projects                       |
| 95255              | Kenai River Sockeye Restoration   | Sockeye Salmon Program                     |
| 95258              | Sockeye Salmon Overescapement   | Sockeye Salmon Program                     |
| 95259              | Restoration of Coghill Lake Sockeye   | Sockeye Salmon Program                     |
| 95266              | Shoreline Assessment and Oil Removal  | Oil Toxicity Projects                      |
| 95272              | Chenega Chinook Release Program   | Subsistence Projects                       |
| 95279              | Subsistence Restoration Project   | Subsistence Projects                       |
| 95285-CLO          | Closeout: Subtidal Sediment Recovery Monitoring   | Intertidal/Subtidal Community Structure    |
| 95290              | Hydrocarbon Data Analysis, Interpretation, and Database Maintenance<br>for Restoration and NRDA Environmental Samples Associated with the | Oil Toxicity Projects                      |
| 95320A             | Salmon Growth and Mortality   | PWS System Investigation                   |
| 95320B             | PWS Pink Salmon Stock Identification and Monitoring (CWT)   | Other Pink Salmon Projects                 |
| 95320C             | Otolith Thermal Mass Marking of Hatchery Reared Pink Salmon in PWS  | Other Pink Salmon Projects                 |
| 95320D             | PWS Pink Salmon Genetics  | Other Pink Salmon Projects                 |
| 95320E             | Juvenile Salmon and Herring Integration   | PWS System Investigation                   |
| 95320G             | Phytoplankton and Nutrients   | PWS System Investigation                   |
| 95320H             | Role of Zooplankton in the PWS Ecosystem  | PWS System Investigation                   |
| 95320I(1)          | Isotope Tracers - Food Web Dependencies in PWS Using Stable Isotopes (Marine Mammals and Birds)   | PWS System Investigation                   |
| 9 <b>5320</b> I(2) | Isotope Tracers - Food Webs of Fish   | PWS System Investigation                   |
| 95320I(3)          | Purchase of Isotope Radio Mass Spectrometer   | PWS System Investigation                   |
| 95320J             | Information Systems and Model Development   | PWS System Investigation                   |

### DRAFT 1995 WORK PLAN -- PROJECT INDEX

## DRAFT

### PROJECT TITLE PROJECT #

| PROJECT #       | PROJECT TITLE   | RESTORATION CLUSTER                      |
|-----------------|---|--|
| 95320K          | PWSAC: Experimental Fry Release   | PWS System Investigation                 |
| 95320M          | Observational Physical Oceanography in PWS and the Gulf of Alaska   | PWS System Investigation                 |
| 95320N          | Nearshore Fish  | PWS System Investigation                 |
| 95320Q          | Avian Predation on Herring Spawn  | PWS System Investigation                 |
| 95320S          | Disease Impacts on PWS Herring Populations (competitive solicitation under State of Alaska two-step, RFQ-RFP process) | PWS System Investigation                 |
| 95320T          | Juvenile Herring Growth and Habitat Partitioning  | PWS System Investigation                 |
| 95320U          | Somatic and Spawning Energetics of Herring/Pollock  | PWS System Investigation                 |
| 9 <b>5</b> 320V | Herring Predation by Humpback Whales in PWS   | Marine Mammal Ecosystem Studies          |
| 95320Y          | Variation in Local Predation Rates on Hatchery-Released Fry   | PWS System Investigation                 |
| 95417           | Carry-forward: Waste Oil Disposal Facilities  | Reducing Marine Pollution                |
| 95422-CLO       | Closeout: Restoration Plan EIS/Record of Decision   | Administration/Science Mgt./Public Info. |
| 95424           | Restoration Reserve   | Restoration Reserve                      |
| 95427           | Harlequin Duck Recovery Monitoring  | Other Marine Bird Projects               |
| 95428-CLO       | Closeout: Subsistence Planning Project  | Subsistence Projects                     |
| 95505B          | Data Analysis for Stream Habitat  | Habitat Protection/Acquisition           |
| 95999           | New Project: Program Management and Integration   | Marine Bird/Forage Fish Interaction      |

### DRA 1995 WORK PLAN -- SUMMARY

## DRAFT

| Ca  | it. Proj. No.   | Title   | Cost<br>FY 95  | Interim<br>Funding | Balance    | Preliminary<br>Chief Sci. Rec. |
|-----|-----------------|---|----------------|--------------------|------------|--------------------------------|
| PW  | S System Invest | tigation  | \$5,768.3      | \$1,077.4          | \$4,690.9  |                                |
| 2   | 95018           | Partitioning of Primary Production Between Pelagic<br>and Benthic Communities   | \$219.2        | <b>\$0.0</b>       | \$219.2    | \$0.0                          |
| 4   | 95065           | PWSAC Pink Salmon Fry Mortality   | \$59.6         | \$0.0              | \$59.6     | \$0.0                          |
| 1*  | 95320A          | Salmon Growth and Mortality   | \$267.8        | \$48.7             | \$219.1    | \$219.1                        |
| 1*  | 95320E          | Juvenile Salmon and Herring Integration   | \$943.1        | \$98.0             | \$845.1    | \$845.1                        |
| 1*  | 95320G          | Phytoplankton and Nutrients   | \$239.3        | \$88.5             | \$150.8    | \$150.8                        |
| 1*  | 95320H          | Role of Zooplankton in the PWS Ecosystem  | \$247.4        | \$ <b>51</b> .9    | \$195.5    | \$195.5                        |
| 1   | 95320I(1)       | Isotope Tracers - Food Web Dependencies in PWS<br>Using Stable Isotopes (Marine Mammals and Birds)                          | \$115.4        | \$0.0              | \$115.4    |                                |
| 1*  | 95320I(2)       | Isotope Tracers - Food Webs of Fish   | \$79.4         | \$30.0             | \$49.4     |                                |
| 3   | 95320I(3)       | Purchase of Isotope Radio Mass Spectrometer   | \$257.4        | \$0.0              | \$257.4    | \$0.0                          |
| 1*  | 95320J          | Information Systems and Model Development   | \$836.2        | \$185.4            | \$650.8    | \$650.8                        |
| 4*  | 95320K          | PWSAC: Experimental Fry Release   | \$47.3         | <b>\$0</b> .0      | \$47.3     | \$47.3                         |
| 1*  | 95320M          | Observational Physical Oceanography in PWS and the Gulf of Alaska   | \$577.8        | \$138.7            | \$439.1    | \$439.1                        |
| 1*  | 95320N          | Nearshore Fish  | \$635.2        | \$413.1            | \$222.1    | \$222.1                        |
| 1*  | 95320Q          | Avian Predation on Herring Spawn  | <b>\$</b> 99.0 | <b>\$23</b> .1     | \$75.9     | \$75.9                         |
| 1   | 953205          | Disease Impacts on PWS Herring Populations<br>(competitive solicitation under State of Alaska<br>two-step, RFQ-RFP process) | \$543.3        | <b>\$0.0</b>       | \$543.3    | \$543.3                        |
| 1*  | 95 <b>32</b> 0T | Juvenile Herring Growth and Habitat Partitioning  | \$340.3        | <b>\$0</b> .0      | \$340.3    | \$340.3                        |
| 1*  | 95320U          | Somatic and Spawning Energetics of Herring/Pollock  | \$99.4         | \$0.0              | \$99.4     | \$50.0                         |
| 1   | 95320Y          | Variation in Local Predation Rates on<br>Hatchery-Released Fry  | \$161.2        | <b>\$0</b> .0      | \$161.2    | Reduce                         |
| Oth | er Pink Salmon  | Projects  | \$16,638.7     | \$522.3            | \$16,116.4 |                                |
| 4   | 95003           | Area E Commercial Salmon Permit Buyback Program   | \$11,735.0     | \$0.0              | \$11,735.0 | No comment                     |
| 3   | 95006           | Paint River Pink Salmon Development   | \$173.9        | \$0.0              | \$173.9    | \$0.0                          |
| 2   | 95024           | Enhancement of Wild Pink Salmon Stocks  | \$184.3        | \$0.0              | \$184.3    | \$0.0                          |
| 2   | 95069           | Restoration of Salmon Stocks of Special Importance to Native Cultures   | \$375.1        | \$0.0              | \$375.1    | \$0.0                          |
| 1   | 95076           | Effects of Oiled Incubation Substrate on Survival and Straying of Wild Pink Salmon  | \$179.9        | \$0.0              | \$179.9    | \$179.9                        |
| 4   | 95079           | Pink Salmon Restoration Through Small-scale<br>Hatcheries   | \$150.0        | \$0.0              | \$150.0    | \$0.0                          |
| 4   | 95093           | PWSAC: Restoration of Pink Salmon Resources and Services  | \$1,690.3      | \$0.0              | \$1,690.3  | Reduce                         |

· · · ·

jf **•**5

### TAFT 1995 WORK PLAN -- SUMN Y

| Ca  | t. Proj. No.      | Title  | Cost<br>FY 95        | Interim<br>Funding | Balance            | Preliminary<br>Chief Sci. Rec. |
|-----|-------------------|--|----------------------|--------------------|--------------------|--------------------------------|
| 1   | 95137             | Prince William Sound Salmon Stock Identification<br>and Monitoring Studies                 | \$277.5              | \$55.8             | \$221.7            | \$0.0                          |
| 6   | 95139A1           | Salmon Instream Habitat and Stock Restoration<br>Little Waterfall Creek Barrier Bypass     | \$90.0               | \$90.0             | \$0.0              | \$0.0                          |
| 2   | 95139A2           | Spawning Channel - Port Dick Creek   | <sup>-</sup> \$171.6 | \$0.0              | \$171.6            | \$0.0                          |
| 3.  | 95139D <          | Salmon Instream Habitat and Stock RestorationPink  |                      | · \$0.0-           | <b>∷ -\$61.6</b> ∿ | <b>\$0.0</b>                   |
| 1.  | 95191A            | - MVestigating and Monitoring Oil Related Egg and Alevin Mortalities                       | \$265.0              | \$68.4             | <b>\$19</b> 6.6    | \$196.6                        |
| 1.  | 95191B            | Injury to Salmon Eggs and Pre-emergent Fry<br>Incubated in Oiled Gravel (Laboratory Study) | \$331.0              | \$165.4            | \$165.6            | · \$165.6                      |
| 4 · | 95320B            | PWS Pink Salmon Stock Identification and<br>Monitoring (CWT)                               | \$84.3               | \$84 <del>.3</del> | \$0.0              | Revise                         |
| 4   | 95320C            | Otolith Thermal Mass Marking of Hatchery Reared<br>Pink Salmon in PWS                      | \$642.2              | \$1.9              | \$640.3            | Revise                         |
| 2   | 95320D            | PWS Pink Salmon Genetics   | \$227.0              | \$56.5             | \$170.5            |                                |
| Oth | er Herring Proje  | ects   | \$1,585.3            | \$387.4            | \$869.8            |                                |
| 1   | 95051             | Large-scale Coded Wire Tagging of PWS Herring  | \$231.9              | \$0.0              | \$231.9            | \$0.0                          |
| 2   | 95057             | Movement of Larval and Juvenile Fishes within PWS  | \$328.1              | \$0.0              | \$0.0 (a)          | \$0.0                          |
| 1   | 95074             | Herring Reproductive Impairment  | \$407.1              | \$148.8            | <b>\$25</b> 8.3    | \$258.3                        |
| 6   | 95165             | Carry-forward: PWS Herring<br>Genetic Stock Identification                                 | \$105.4              | \$0.0              | \$105.4            |                                |
| 1   | 95166             | Herring Natal Habitats   | \$512.8              | <b>\$238</b> ,6    | \$274.2            | Reduce                         |
| Soc | keye Salmon Pro   | ogram  | \$2,598.4            | \$944.1            | \$1,654.3          |                                |
| 1   | 95048             | Historical Analysis of Sockeye Salmon Growth   | \$99.2               | \$0.0              | \$99.2             |                                |
| 4   | 95050             | A Test of Sonar Accuracy in Estimating Escapement of Sockeye Salmon                        | \$79.3               | \$0.0              | \$79.3             | \$0.0                          |
| 1   | 95105             | Kenai River Ecosystem Restoration Pilot Enclosure<br>Study                                 | \$404.8              | \$0.0              | \$404.8            |                                |
| 4   | 95125             | Tatitlek Sockeye Salmon Release Program  | \$39.0               | \$0.0              | \$39.0             | \$0.0                          |
| 1   | 95255             | Kenai River Sockeye Restoration  | \$645.0              | \$372.4            | <b>\$272</b> .6    |                                |
| 1   | 95258             | Sockeye Salmon Overescapement  | \$998.1              | \$485.1            | \$513.0            |                                |
| 3   | 95 <b>2</b> 59    | Restoration of Coghill Lake Sockeye  | \$333.0              | <b>\$</b> 86.6     | <b>\$246.4</b>     |                                |
| Oth | er Fish/Shellfish | Projects   | \$379.9              | \$310.1            | \$69.8             |                                |
| 3   | 95043A            | Cordova Cutthroat Trout Habitat  | \$23.6               | \$0.0              | \$23.6             | \$0.0                          |
| 6   | <b>950</b> 43B    | Carry-forward: Cutthroat and Dolly Varden<br>Rehabilitation in Western PWS                 | \$134.8              | \$134.8            | \$0.0              | \$0.0                          |

# DR/ 1995 WORK PLAN -- SUMMARY

| Ca  | t. Proj. No.    | Title  | Cost<br>FY 95 | Interim<br>Funding | Balance Cl  | Preliminary<br>nief Sci. Rec. |
|-----|-----------------|--|---------------|--------------------|-------------|-------------------------------|
| 5   | 95139B          | Closeout: Otter Creek/Shrode Creek Instream<br>Restoration   | \$5.2         | \$5.2              | \$0.0       | \$0.0-                        |
| 2   | 95139C1         | Montague Riparian Rehabilitation   | \$46.2        | \$0.0              | \$46.2      | Clarify                       |
| 6   | <b>95</b> 139C2 | Salmon Instream Habitat and Stock Restoration<br>Lowe River  | \$170.1       | \$170.1            | \$0.0       | \$0.0                         |
| Ma  | rine Bird/Forag | e Fish Interaction   | \$3,300.7     | \$249.9            | \$2,065.2   |                               |
| 1   | <b>95</b> 019   | Distribution and Abundance of Forage Fish as<br>Indicated by Puffin Diet Sampling                                  | \$262.8       | \$0.0              | \$50.0 (a)  |                               |
| 3   | . <b>-95022</b> | Foraging Efficiencies at Temporary Food Patches  | \$183.0       | - \$0:0            | \$183.0     | \$0.0                         |
| 2   | 95023           | Food Web Relationships of Pelagic Species Exhibiting Long-term Decline   | \$168.0       | \$0.0              | \$168.0     | \$0.0                         |
| 1   | 95033           | Kittiwakes as Indicators of Forage Fish Availability   | \$198.5       | \$0.0              | \$180.0 (a) |                               |
| 3   | 95113           | Energetics of Intertidal Fish: The Connection between Lower and Upper Trophic Levels                               | \$392.5       | \$0.0              | \$392.5     | \$0.0                         |
| 1   | 95118-BAA       | Diet Composition, Reproductive Energetics and<br>Productivity of Seabirds Damaged by the Exxon<br>Valdez Oil Spill | \$140.6       | \$0.0              | \$140.6     |                               |
| 3   | 95119-BAA       | Food Limitation on Recovery of Injured Marine Bird Populations   | \$124.9       | \$0.0              | \$124.9     | \$0.0                         |
| 1   | 95120-BAA       | Proximate Composition and Energetic Content of<br>Selected Forage Fish Species in PWS                              | \$43.0        | \$0.0              | \$43.0      |                               |
| 2   | 95121           | Stable Isotope Ratios and Fatty Acid Signatures of Selected Forage Fish Species in PWS                             | \$48.1        | \$0.0              | \$48.1      | Revise                        |
| 1   | 95163           | Abundance and Distribution of Forage Fish and their Influence on Recovery of Injured Species                       | \$1,330.5     | \$194.8            | \$475.2 (a) |                               |
| 1   | 95173           | Factors Affecting Recovery of PWS Pigeon Guillemot<br>Populations  | \$408.8       | \$55.1             | \$194.9 (a) |                               |
|     | <b>95</b> 999   | New Project: Program Management and Integration  |               |                    | \$65.0 (a)  |                               |
| Oth | er Marine Bird  | Projects   | \$2,294.7     | \$132.0            | \$2,192.6   |                               |
| 2   | <b>95</b> 005   | Harlequin Duck Abundance and Productivity in Western Cook Inlet  | \$40.5        | \$0.0              | \$40.5      | \$0.0                         |
| 2   | 95021           | Seasonal Movement and Pelagic Habitat Use by<br>Common Murres from the Barren Islands                              | \$227.8       | \$0.0              | \$227.8     | \$0.0                         |
| 1   | 95031           | Reproductive Success as a Factor Affecting Recovery of Murrelets in PWS  | \$444.8       | \$0.0              | \$448.0     |                               |
| 2   | 95038           | Symposium on Seabird Restoration   | \$74.4        | \$0.0              | \$74.4      | \$74.4                        |
| 1   | 95039           | Common Murre Productivity Monitoring   | \$154.2       | \$30.5             | \$150.4 (a) | \$0.0                         |
| 1   | 95041           | Introduced Predator Removal from Islands -<br>Follow-up Surveys  | \$66.5        | \$20.4             | \$46.1      | \$46.1                        |
| 4   | <b>95</b> 042   | Five-year Plan to Remove Predators from Seabird Colonies   | \$75.0        | \$0.0              | \$75.0      | \$0.0                         |

### DRAFT 1995 WORK PLAN -- SUM ARY

| Ca   | it. Proj. No.   | Title   | Cost<br>FY 95 | Interim<br>Funding | Balance   | Preliminary<br>Chief Sci. Rec. |
|------|-----------------|---|---------------|--------------------|-----------|--------------------------------|
| 3    | 9 <b>5</b> 096  | Restoration of Murres by Way of Social Attraction<br>and Predator Removal   | \$167.0       | \$0.0              | \$167.0   | \$0.0                          |
| 3    | 95097           | Restoration of Murres by Way of Transplantation of Chicks: A Feasibility Study  | \$176.0       | \$0.0              | \$176.0   | \$0.0                          |
| 3    | 95098           | Identification of Seabird Feeding Areas from Remotely Sensed Data   | \$74.0        | \$0.0              | \$74.0    | \$0.0                          |
| 3    | 95099           | Murrelet Vocalization in Conjunction with Artificial Nests: A Possible Means of Attraction to Habitat                             | \$77.0        | \$0.0              | \$77.0    | \$0.0                          |
| 5    | 95102-CLO       | Closeout: Murrelet Prey and Foraging Habitat in Prince William Sound  | \$63.8        | \$63.8             | \$0.0     | \$0.0                          |
| 2    | 95159           | Surveys to Determine Additional Oil Spill Effects and<br>Recovery of Marine Bird and Sea Otter Populations in<br>PWS              | \$426.8       | \$0.0              | \$426.8   | \$0.0                          |
| 1    | 95427           | Harlequin Duck Recovery Monitoring  | \$226.9       | \$17.3             | \$209.6   | \$209.6                        |
| Nea  | rshore Ecosyste | em Studies  | \$2,285.5     | \$0.0              | \$2,285.5 |                                |
| 2    | 95009C          | Trophic Dynamics and Energy Flow: Impacts of<br>Herring Spawn and Sea Otter Predation on Nearshore<br>Benthic Community Structure | \$217.3       | \$0.0              | \$217.3   | <b>\$</b> 0.0                  |
| 1    | 95025A          | Factors Affecting Recovery of Sea Ducks and Their Prey  | \$407.1       | \$0.0              | \$407.1   |                                |
| 1    | 95025B          | Sea Otter Abundance and Distribution, Food Habits and Population Assessment   | \$163.2       | \$0.0              | \$163.2   |                                |
| 1    | 95025C          | Pigeon Guillemots and River Otters as Bioindicators of Nearshore Ecosystem Health   | \$180.0       | \$0.0              | \$180.0   |                                |
| 3    | 95025D          | Settlement Rates of Nearshore Invertebrates, Oceanic Processes and Population Recovery: Are They Linked?                          | \$429.4       | \$0.0              | \$429.4   |                                |
| 2    | 95025F          | Availability and Utilization of Musculus spp. as Food for Sea Ducks and Sea Otters  | \$5.5         | \$0.0              | \$5.5     |                                |
| 3    | 95025G          | Relation of Clam Population Structure to Recovery of Injured Nearshore Vertebrate Predators                                       | \$121.3       | \$0.0              | \$121.3   |                                |
| 1    | 95025H          | Effects of Predatory Invertebrates on Nearshore Clam<br>Populations in PWS  | \$118.4       | \$0.0              | \$118.4   |                                |
| 3    | 95025J          | Primary Productivity as a Factor in the Recovery of<br>Injured Resources in Prince William Sound                                  | \$397.0       | \$0.0              | \$397.0   |                                |
| 2    | 95075           | Population Structure of Blue Mussels in Relation to<br>Levels of Oiling and Densities of Vertebrate Predators                     | \$197.5       | \$0.0              | \$197.5   | \$0.0                          |
| 1    | 95087           | Relation of Sea Urchin Population Structure to<br>Recovery of Injured Nearshore Vertebrate Predators                              | \$48.8        | \$0.0              | \$48.8    | \$48.8                         |
| Inte | rtidal/Subtidal | Community Structure   | \$3,950.9     | \$448.3            | \$3,502.6 |                                |
| 3    | 95009A          | Trophics and Community Structure in the Intertidal and Shallow Subtidal   | \$455.4       | <b>\$</b> 0.0      | \$455.4   | \$0.0                          |
| 3    | 95009B          | Primary Productivity as a Factor in the Recovery of<br>Injured Resources in Prince William Sound                                  | \$218.9       | \$0.0              | \$218.9   | \$0.0                          |

## DR/ `1995 WORK PLAN -- SUMMARY

## DRAFT

| Ca  | t. Proj. No.    | Title   | Cost<br>FY 95     | Interim<br>Funding    | Balance         | Preliminary<br>Chief Sci. Rec. |
|-----|-----------------|---|-------------------|-----------------------|-----------------|--------------------------------|
| 1   | 95009D          | Survey and Experimental Enhancement of Octopuses in Intertidal Habitats   | <b>\$188</b> ,9   | \$0.0                 | \$188.9         | \$188.9                        |
| 3   | 95009E          | Community Structure of Mobile Foragers Using the Nearshore  | \$280.5           | \$0.0                 | \$280.5         | \$0.0                          |
| 3   | 95010           | Intertidal Fauna and Flora Species Composition,<br>Abundance and Variability Relative to Physical<br>Habitat Controls | \$73.5            | \$0.0                 | \$73.5          | \$0.0                          |
| 2   | 95025E          | Algal Competition Limiting Recovery in the Intertidal   | -\$220.0          | <b>\$</b> 0. <b>0</b> | \$220.0         | \$0.0                          |
| 3   | 95045           | Green Island Intertidal Restoration Monitoring  | \$26.4            | <b>\$</b> 0. <b>0</b> | <i>±</i> \$26.4 | \$0.0                          |
| 1   | 95086A          | Coastal Habitat Intertidal Monitoring and Experimental Design Verification  | \$954.1           | \$0.0                 | \$954.1         | Revise                         |
| 3   | 95086B          | Population Dynamics of Eelgrass and Associated Fauna  | \$106.3           | <b>\$0.0</b>          | \$106.3         | \$0.0                          |
| 1   | 95086C          | Herring Bay Monitoring and Restoration Studies  | \$904.2           | \$327.3               | \$576.9         | \$576.9                        |
| 1   | 95106           | Subtidal Monitoring: Eelgrass Communities   | \$200.4           | \$0.0                 | \$200,4         | \$200.4                        |
| 4   | 95107           | Subtidal Site Verification  | \$56.2            | \$0.0                 | \$56.2          | \$0.0                          |
| 3   | 95114           | Eelgrass Community Structure Restoration<br>Assessment Using Stable Isotope Tracers                                   | \$145.1           | \$0.0                 | \$145.1         | \$0.0                          |
| 5   | 95285-CLO       | Closeout: Subtidal Sediment Recovery Monitoring   | \$121.0           | <b>\$12</b> 1.0       | \$0.0           | \$0.0                          |
| Mar | ine Mammal E    | cosystem Studies  | \$1,299.9         | \$114.7               | \$1,299.9       |                                |
| I   | 95001           | Condition and Health of Harbor Seals  | \$172.8           | \$0.0                 | \$172.8         | \$172.8                        |
| 1   | 95014           | Predation by Killer Whales in PWS: Feeding<br>Behavior and Distribution of Predators and Prey                         | <b>\$177</b> .6   | <b>\$</b> 0.0         | \$177.6         |                                |
| 1   | 95064           | Monitoring, Habitat Use, and Trophic Interactions of Harbor Seals in PWS  | \$347.1           | \$114.7               | \$347.1         | \$347.1                        |
| 3   | 95073           | Impact of Killer Whale Predation on Harbor Seals in PWS   | \$228.2           | \$0.0                 | \$228.2         | \$0.0                          |
| 1   | 95117-BAA       | Harbor Seals and EVOS: Blubber and Lipids as<br>Indices of Food Limitation  | \$94.4            | \$0.0                 | - \$94.4        | \$94.4                         |
| 3   | 9 <b>5</b> 320V | Herring Predation by Humpback Whales in PWS   | <b>\$27</b> 9.8   | \$0.0                 | \$279.8         | \$0.0                          |
| Oth | er Marine Man   | mal Projects  | \$223.7           | \$0.0                 | \$223.7         |                                |
| 1   | 95013           | Killer Whale Monitoring in PWS  | \$113.7           | \$0.0                 | \$113.7         |                                |
| 1   | 95092           | Recovery Monitoring of PWS Killer Whales  | \$110.0           | \$0.0                 | <b>\$1</b> 10.0 |                                |
| Oil | Toxicity Projec | ts  | <b>\$3,0</b> 65.8 | \$350.2               | \$2,715.6       |                                |
| 1   | 95026           | Hydrocarbon Monitoring: Integration of Microbial<br>and Chemical Sediment Data  | \$146.9           | <b>\$0</b> .0         | \$146.9         | \$146.9                        |
| 2   | 95027           | Kodiak Shoreline Assessment: Monitoring Surface<br>and Subsurface Oil   | <b>\$447</b> .8   | \$0.0                 | \$447.8         |                                |
| 1   | 95044           | In Situ Formation and Ecotoxicity of Hydrocarbon Degradation Products Produced by Ultramicrobacteria                  | \$135.1           | \$0.0                 | \$135.1         | Revise                         |

.4

### RAFT 1995 WORK PLAN -- SUMMRY

| Ca  | t. Proj. No.    | Title  | Cost<br>FY 95     | Interim<br>Funding | Balance           | Preliminary<br>Chief Sci. Rec.        |
|-----|-----------------|--|-------------------|--------------------|-------------------|---------------------------------------|
| 3   | 95071           | Monitoring Nearshore Fish Species for Persistence of<br>Oil Exposure and Ecotoxicological Effects  | \$231.0           | \$0.0              | \$231.0           | \$0.0                                 |
| 1   | <b>95</b> 090   | Mussel Bed Restoration and Monitoring in PWS and Gulf of Alaska  | \$438.8           | <b>\$16</b> 0.4    | \$278.4           | \$278.4                               |
| 4   | 95116           | Restoration of Intertidal Oiled Mussel Beds by<br>Nondestructive Manipulation/Flushing with PES-51   | \$91.7            | \$0.0              | \$91.7            | \$0.0                                 |
| 2   | <b>952</b> 66   | Shoreline Assessment and Oil Removal   | \$1,411.1         | \$97.9             | \$1,313.2         |                                       |
| 1   | <b>952</b> 90   | Hydrocarbon Data Analysis, Interpretation, and<br>Database Maintenance for Restoration and NRDA<br>Environmental Samples Associated with the Exxon<br>Valdez Oil Spill | \$163.4           | \$91.9             | \$71.5<br>•       | ~ \$71.5                              |
| Arc | haeology Proje  | ects   | \$668.7           | \$223.9            | \$444.8           | -                                     |
| 1   | 95007A          | Archaeological Site Restoration - Index Site<br>Monitoring   | \$386.0           | \$191.7            | \$194.3           | Reduce                                |
| 1   | 95007B          | Archaeological Site Restoration  | \$116.0           | \$32.2             | \$83.8            | Reduce                                |
| 3   | 95078           | Culture, History, and Ecosystems: Assessment of<br>Cultural/Historical Strategies to Building Long-term<br>Understanding of Ecosystems in the Oil Spill Area           | \$166.7           | \$0.0              | \$166.7           | <b>\$0</b> .0                         |
| Hab | itat Protection | /Acquisition   | \$2,181.5         | \$770,2            | \$1,270.2         | · · · · · · · · · · · · · · · · · · · |
| 2   | 95058           | Restoration Assistance to Private Landowners   | \$411.7           | \$0.0              | \$270.6 (a)       | No comment                            |
| 4   | <b>950</b> 60   | Spruce Bark Beetle Infestation Impacts on Injured Fish and Wildlife Species of the <i>Exxon Valdez</i> Oil Spill   | \$201.7           | \$0.0              | \$201.7           | \$0.0                                 |
| 3   | 95095           | Quantification of Stream Habitat for Harlequin Ducks<br>and Anadromous Fish Species from Remotely Sensed<br>Data   | \$88.0            | <b>\$0</b> .0      | \$88.0            | <b>\$0</b> .0                         |
| 5   | 95110-CLO       | Closeout: Habitat Protection and Acquisition   | <b>\$1</b> 44.0   | \$144.0            | \$0.0             | \$0.0                                 |
| 3   | 95122           | Mapping Potential Nesting Habitat of Marbled<br>Murrelets in PWS Using Geographic Databases  | \$169.2           | <b>\$0</b> .0      | \$169.2           | \$0.0                                 |
| 1   | 95126           | Habitat Protection and Acquisition Support   | \$1,099.5         | \$626.2            | \$473.3           | \$473.3                               |
| 3   | 95200           | Public Access  | \$50.2            | \$0.0              | \$50.2            | No comment                            |
| 1   | 95505B          | Data Analysis for Stream Habitat   | \$17.2            | \$0.0              | \$17.2            | \$17.2                                |
| Rec | reation Project | S  | \$2,705.8         | \$0.0              | \$2,705.8         |                                       |
| 4   | 95002           | Leave No Trace Education Program   | \$177.7           | \$0.0              | \$177.7           | No comment                            |
| 4   | 95016           | A Tribute to Prince William Sound  | \$161.0           | \$0.0              | \$161.0           | No comment                            |
| 4   | 95053           | Cordova's Mini-Imaginarium   | \$62.6            | <b>\$0</b> .0      | \$62.6            | No comment                            |
| 3   | 95077           | Recreation Impacts in PWS: Human Impacts as a Factor Constraining Long Term Ecosystem Recovery   | <b>\$1</b> 17.0   | \$0.0              | \$117.0           | \$0.0                                 |
| 4   | <b>95</b> 080   | Fleming Spit Recreation Area Enhancements  | <b>\$1,36</b> 5.0 | <b>\$</b> 0.0      | <b>\$1,365</b> .0 | No comment                            |
| 4   | 95082           | "Mor-Pac Hill" Campground Improvements   | \$360.0           | <b>\$0</b> .0      | \$360.0           | No comment                            |
| 4   | 95084           | Odiak Camper Park Expansion  | <b>\$266</b> 0    | \$0.0              | \$266.0           | No comment                            |

### DR/ 1995 WORK PLAN -- SUMMARY

## DRAFT

| C   | at. Proj. No.  | Title  | Cost<br>FY 95  | Interim<br>Funding    | Balance        | Preliminary<br>Chief Sci. Rec. |
|---|----------------|--|----------------|-----------------------|----------------|--------------------------------|
| 4   | 95085          | Cordova Historical Marine Park                                     | \$196.5        | \$0.0                 | \$196.5        | No comment                     |
| Subsistence Projects     3   95017     Port Graham Coho Salmon Subsistence Fishery<br>Restoration Project |                | \$4,311.8  | \$231.6        | \$3,634.7             |                |                                |
| 3   | 95017          | Port Graham Coho Salmon Subsistence Fishery<br>Restoration Project | \$587.9        | \$0.0                 | \$587.9        | \$0.0                          |
| 1   | <b>95</b> 052  | Community Involvement/Use of Traditional<br>Knowledge (a)          | \$230.5        | \$0.0                 | \$230.5        | \$230.5-                       |
| 4   | <b>9512</b> 3  | Tatitlek Community Store   | \$300.0        | \$0.0                 | \$300.0        | No comment                     |
| 4   | 95124A         | Tatitlek Mariculture Development Project                           | \$109.5        | \$0.0                 | \$109.5        | Policy/legal                   |
| 4   | 95124B         | Tatitlek Mariculture Development Project - Capital Outlay          | \$405.0        | <b>\$0</b> .0         | \$405,0        | Policy/legal                   |
| 4   | 95127 -        | Tatitlek Coho Salmon Release Program                               | \$39.0         | \$0.0                 | \$39.0         | Policy/legal                   |
| 4   | 95128          | Teaching Subsistence Practices and Values                          | \$69.0         | <b>\$</b> 0. <b>0</b> | \$69.0         | Policy/legal                   |
| 4   | 95129          | Tatitlek Fish and Game Processing Center/Smokery                   | \$515.5        | \$0.0                 | \$325.0 (a)    | No comment                     |
| 4   | 95130          | Mental Health Center   | \$106.1        | \$0.0                 | \$106.1        | No comment                     |
| 1   | 95131          | Clam Restoration (Nanwalek, Port Graham, Tatitlek)                 | \$445.0        | \$0.0                 | \$208.3 (a)    | Pilot                          |
| 2   | 95132          | Port Graham and Nanwalek Subsistence Baseline                      | \$518.7        | \$0.0                 | \$518.7        | Pilot                          |
| 2   | 95133          | English Bay River Sockeye Subsistence Project                      | \$147.2        | \$0.0                 | \$128.9 (a)    | \$0.0                          |
| 4   | 95134          | Chenega Bay Mariculture Development Project                        | \$184.3        | \$0.0                 | \$184.3        | Policy/legal                   |
| 4   | 95135          | Subsistence Harvest Support  | \$50.0         | \$0,0                 | \$50.0         | No comment                     |
| 4   | 95136          | Skin Sewing Crafts Restoration                                     | \$29. <b>9</b> | \$0.0                 | \$29.9         | \$0.0                          |
| 1   | 95138          | Elders/Youth Conference  | \$85.8         | \$0.0                 | \$85.8         | \$85.8                         |
| 4   | <b>9514</b> 0  | Subsistence Skills Program   | \$36.7         | \$0.0                 | \$36. <b>7</b> | Policy/legal                   |
| 1   | 95244          | Seal and Sea Otter Cooperative Subsistence Harvest<br>Assistance   | \$93.9         | \$52.6                | \$41.3         | \$41.3                         |
| 1   | 95272          | Chenega Chinook Release Program                                    | \$47.2         | \$0.0                 | \$47.2         | Policy/legal                   |
| 2   | 95279          | Subsistence Restoration Project                                    | \$210.6        | \$81.1                | \$129.5        |                                |
| 5   | 95428-CLO      | Closeout: Subsistence Planning Project                             | \$100.0        | \$97.9                | \$2.1          | \$2.1                          |
| Red   | ucing Marine   | Pollution  | \$479.8        | \$232.2               | \$284.5        |                                |
| 1   | 95115          | Sound Waste Management Plan  | \$247.6        | \$0.0                 | \$284.5 (a)    | \$284.5                        |
| 6   | 95417          | Carry-forward: Waste Oil Disposal Facilities                       | \$232.2        | \$232.2               | \$0.0          | \$0.0                          |
| Mis   | cellaneous Res | search Projects  | \$295.2        | \$0.0                 | \$295.2        |                                |
| 3   | 95046          | Long-term Record in Tree Rings of Climatic Features                | \$153.6        | \$0.0                 | \$153.6        | \$0.0                          |
| 3   | 95055          | Prehistoric Ecological Baseline for PWS                            | \$141.6        | <b>\$</b> 0. <b>0</b> | \$141.6        | \$0.0                          |

·• · • • • •

### --- DRAFT 1995 WORK PLAN --- SUMMARY

## DRAF

| Ca   | t. Proj. No.  | Title  |                | Cost<br>FY 95 | Interim<br>Funding | Balance    | Preliminary<br>Chief Sci. Rec.               |
|------|---|--|----------------|---------------|--------------------|------------|--|
| Mis  | cellaneous Mo   | nitoring Projects  |                | \$205.0       | \$0.0              | \$205.0    |  |
| 2    | 95029   | Population Survey of Bald I                                  | \$48.7         | \$0.0         | \$48.7             | \$0.0      |  |
| 1    | 95030   | Productivity Survey of Bald                                  | Eagles in PWS  | \$81.9        | \$0.0              | \$81.9     | \$81.9                                       |
| 2    | 95062   | River Otter Recovery Monit                                   | \$74.4         | \$0.0         | \$74:4             | \$0.0      |  |
| Mis  | cellaneous Ger  | eral Restoration Projects                                    |                | \$585.8       | \$0.0              | \$585.8    |  |
| 3    | <b>9</b> 5047   | Seal Contamination   |                | ·             |                    | \$0.0      |  |
| 3    | 95111   | Sustainable Rockfish Yield                                   | \$222.6        | \$0.0         | \$222.6            | \$0.0      |  |
| 3    | 95112   | Rockfish Restoration Object                                  | \$53. <b>7</b> | \$0.0         | \$53.7             | \$0.0      |  |
| 4    | 95141   | Afognak Island State Park I                                  | \$309.5        | \$0.0         | \$309.5            | No comment |  |
| Adı  | ninistration/Sc   | ience Mgt./Public Info.                                      |                | \$4,239.8     | \$3,922.0          | \$317.8    |  |
| 3    | <b>95</b> 049   | Independent Review of Restoration and Monitoring<br>Projects |                | \$31.9        | \$0.0              | \$31.9     | \$0,0  |
| 1    | 95089   | Information Management System                                |                | \$590.7       | \$304.8            | \$285.9    | Clarify                                      |
| 1    | 95100   | Administration, Science Ma<br>Information                    | \$3,597.2      | \$3,597.2     | \$0.0              | No comment |  |
| 5    | 95422-CLO   | Closeout: Restoration Plan l                                 | \$20.0         | \$20.0        | \$0.0              | No comment |  |
| Inst | itute of Marine   | Science  |                | \$46.5        | \$46.5             | \$0.0      |  |
| 5    | 95199-CLO   | Institute of Marine Science - Seward Improvements<br>EIS     |                | \$46.5        | \$46.5             | \$0.0      | \$0.0  |
| Res  | toration Reserv   | e  |                | \$12,000.0    | \$0.0              | \$12,000.0 |  |
| 1    | 95424   | Restoration Reserve  |                | \$12,000.0    | \$0.0              | \$12,000.0 | \$12,000.0                                   |
|      | Total Number of Projects:<br>Total FY 95 Request:<br>Total Interim Funding Approved by Trustees:<br>Balance of FY 95 Request: |  |                |               |                    | ees:       | 175<br>\$71,111.7<br>\$9,962.8<br>\$59,430.1 |

 Indicates project is part of "core" SEA-plan.
(a) Denotes a revised budget, submitted by the project proposer since publication of the Draft FY95 Work Plan. Note: Funding totals do not include funds requested for development and construction of the Institute of Marine Science (a total of \$24.9 million) or for actual acquisition of habitat.

### APPLIED

### manne

SCIENCES

11**-** . .

September 26, 1994

To:James Ayers, Executive DirectorFrom:Dr. Robert B. Spies, Chief ScientistRe:Recommendations on herring research and monitoring for 1995

On September 12-13, I conducted a review of herring research and monitoring needs for 1995 in Prince William Sound with the help of core reviewers and herring biologists. During the course of the review the projects proposed for the 1995 work plan were evaluated by the peer reviewers. The purpose of this memo is to summarize the meeting and its findings and to present a final recommendation to you for herring research and monitoring in the 1995 work plan. I will also propose a general plan for gradual implementation of herring research and monitoring in Prince William Sound.

### Summary and recommendation

A successful workshop was held on research and monitoring needs for Pacific herring. Current tools for stock size assessment and forecasting year class strength, aerial surveys (ADF&G base funding) and egg deposition surveys (95166), should continue and be supplemented by development during 1995 of an indexing survey (95320 T) to be implemented in 1996. It is not feasible to implement large-scale coded wire tagging of herring (95051) at present. The project on movement or larval and juvenile herring (95057) should be delayed until 1996. The reproductive impairment (95074) and disease impact work (95320S) should continue and be closed out in 1996. The work on herring somatic and spawning energetics could start but its full development within PWS is hindered by lack of a stock composition model. Management and coordination needs to be immediately improved in order for the work on herring to move forward in a efficient manner--a coordinator and chief investigator needs to be identified. In addition a synthesis of all available information on Pacific herring in PWS and development of a stock composition model should be a prerequisite for any work undertaken beyond 1995.

### Studies reviewed in the workshop

| 95166   | Herring Natal Habitat                         |
|---------|---|
| 95051   | Large-scale coded wire tagging of herring     |
| 95057   | Movement of larval and juvenile fish          |
| 95320T  | Juvenile growth and habitat partitioning      |
| 95165   | Genetic stock identification                  |
| 95074   | Reproductive impairment                       |
| 95320S  | Herring disease                               |
| 0522011 | Compting and anormaling anormatics of harring |

In addition to these studies there were several others (e.g., 95320 N, the nearshore fish/hydroacoustics study; 95163, Abundance and distribution of forage fish) whose integration with the herring work was considered). Project 95165 (Genetic stock identification) will also be reviewed in a mini-workshop on fish genetics for stock assessment to be held on October 7<sup>th</sup> in Anchorage.

### Structure and format of the workshop ~

We began the workshop with a review of the current status of the herring resource in Prince William Sound. This was led by John Wilcox of ADF&G with significant help from Evelyn Biggs-Brown. This summary was 👘 followed by a long group discussion of the possible factors constraining herring production and recovery. An effective tool during this discussion for matching needs and proposed actions was a population dynamics matrix consisting of the potential important limiting factors (e.g., food. water temperature, predation, toxicity and disease) arrayed against the various life history stages (e.g., egg, larvae, juvenile and adult). This was followed by a discussion of the stock identification issues (particularly in relationship to the proposed projects on coded-wire tagging and genetics). As a result of this process the needs for further information were identified with reference to the proposed 1995 work plan projects. Towards the end of the meeting, the reviewers also had a chance to present their views of the priorities in herring research. The written comments from the reviewers (Drs. Phil Mundy, Jake Schweigert, Max Stocker) were sent to me following the review. A set of notes on the meeting was also provided by Evelyn Biggs-Brown.

### Significant general findings of the workshop

### Organizational

LE

1. There is a need to summarize the status and history of the herring resource in Prince William Sound and our understanding of the factors that have affected it. This will be a benchmark from which a rational program for herring research and monitoring can be constructed. It should also probably be revised annually. All reviewers concurred with this finding.

2. There is a need for a scientific coordinator for herring research and monitoring to ensure the most effective integration and application of project activities towards herring restoration goals.

### Technical

1. While the egg deposition and aerial survey methods are appropriate management tools for estimating the size of the adult spawning biomass, the best predictor of the strength of a year class will be the abundance of year 0+

2

juveniles. This data is not currently being collected, and a program to obtain this information needs to be developed. If the Juvenile Herring Growth and Habitat Partitioning project (95320T) goes forward the first year will be devoted to developing the indexing stations for such an annual survey of O+ age class herring.

2. There needs to be a reigning hypothesis and model of stock structure of herring in PWS before a substantial amount of the genetic work is carried out. The simplest hypothesis would be a one stock hypothesis. It is very unlikelythat allozyme malyses (a standard technique for genetic stock separation) of herring will reveal more than one stock in PWS. Similarly, mitochondrial and nuclear DNA work done-elsewhere on Pacific herring stocks have not yet produced anything very promising in terms of finding more subtle differences. It may be worth investing a modest amount of funds in pursuing some of the newer molecular techniques, but it will probably take at least a year before these would begin to provide answers.

3. It is unclear how useful hydroacoustic surveys of herring would be in providing information for management. The spawn deposition and aerial surveys now carried out by ADF&G and the indexing surveys of 0+ age class juveniles developed in the next two years would probably provide enough information for management. The calibration of hydroacoustic survey data with that of the other three methods and the overall interpretation of stock abundance could be problematical.

4. The coded wire tag studies will require a long-term commitment of Trustee Council funds. A great number of juvenile fish will have to be tagged to get a good recovery. There is considerable doubt that the fish in possession of all the processors would be accessible for tag recovery. The overall chances for success of this project are considered to be very lowat this time.

5. Gathering information on egg loss and embryo mortality in the natal habitat project is of lower priority. It is unlikely that such studies will contribute anything to the overall improvement of year-class strength predictions; the best predictor is likely to be 0+ age class abundance.

## A plan for gradual implementation of herring research and monitoring in Prince William Sound

### Population dynamics

\* C7 L

In 1995 natal habitat monitoring (95166) and aerial surveys (ADF&G base funds) should continue to provide the basic information on spawning adult biomass for PWS as well as a possible modest effort in modeling egg loss and other factors in early life history affecting age class strength. The juvenile growth and habitat partitioning project (95320T) should develop a series of

indexing stations for eventual use in sampling of juvenile herring. This development would be conducted in conjunction with work in the SEA program now targeting the survival of juvenile pink salmon. The reproductive toxicology (95074) and disease work (95320S) would be continued to determine the potential effects of oil on herring reproduction and the effects of disease on population size. A modest amount of work on somatic and spawning energetics could be started (95320U), but this work cannot be completed satisfactorily until a stock structure model is in place. A herring research and coordinator should be appointed and a stock structure model implemented.

In 1996, when more data on oceanographic conditions in the Sound are available, it may make sense to implement the study proposed this year on Movement of larval and juvenile fish (95057). Projects 95166 and 95320T would be continued as providing the basic information needed for forecasting stocks in the management of the fishery. Projects 95074 and 95320S would probably be closed out.

### Stock identification

ŧ

÷

In 1995 a stock structure model needs to be developed for guiding this whole effort. In addition a very modest investment of funds in pursuing some of the newer molecular techniques that might be more powerful for use in stock separation should be made. The coded wire tag studies would be deferred until such time that new technology, the circumstances of harvesting or information on stock structure indicates that such an effort will have a higher chance of success than is apparent now. Any activities beyond 1995 will depend on more encouraging results from the genetics work.

### Summary of recommendations by project

Below is a tabular presentation of my recommendations developed with the help of the reviewers. Funds for the stock model development and herring research coordinator might come from savings realized in 95166, 95320T or another source. These recommendations are not meant to preclude a careful budgetary review.

4

| Project No. | Short title       | Recommendation                         |
|-------------|-------------------|--|
| 95166       | Herring Natal     | Fund spawn deposition surveys, and     |
|             | Habitat           | historical habitat data base           |
|             |                   | development only; egg loss and embryo  |
|             |                   | survival work not likely to contribute |
|             |                   | to improved management.                |
| 95051       | Large-scale coded | Defer funding; low probability of      |
|             | wire tagging of   | success at present.                    |
|             | herring           |  |
| 95057       | Movement of       | Defer funding; reconsider when SEA     |
|             | larval and        | oceanographic data are available.      |
|             | juvenile fish     |  |
| 95320T      | Juvenile growth   | Fund juvenile abundance survey         |
|             | and habitat       | development and some diet, predation   |
|             | partitioning      | and co-occurring species work;         |
|             |                   | cytogenetics work of lower priority.   |
| 95165       | Genetic stock     | Possibly fund some exploratory work    |
|             | identification    | with new DNA technology; subject to    |
|             |                   | another review on 10/7/94.             |
| 95074       | Reproductive      | Continue funding as requested.         |
|             | impairment        |  |
| 95320S      | Herring disease   | Fund as requested.                     |
| 95320U      | Somatic and       | Fund preliminary effort at about 50K;  |
|             | spawning          | possible increases in 1996.            |
|             | energetics of     |  |
|             | herring and       |  |
|             | pollack           |  |

CC: M. McCammon P. Mundy

-----

APPLIED

### inmarne

SCIENCES

### October 3, 1994

To:James Ayers, Executive DirectorFrom:Dr. Robert B. Spies, Chief ScientistRe:Recommendations on pink salmon monitoring for 1995

On September 29-30, I conducted a review of pink salmon monitoring needs for 1995 in Prince William Sound with the help-ofcore reviewers and salmon biologists. During the course of the review the monitoring and restoration projects proposed for the 1995 work plan were evaluated by the peer reviewers. There is a separate group of projects, mainly those in the 94320 package that address research needs for pink salmon in the context of the spill area ecosystem; those projects are not covered in this memo but will be reviewed in Cordova on October 4-6, 1994 and subject to a separate memo. The purpose of this memo is to summarize the monitoring workshop and its findings and to present a recommendation to you for pink salmon monitoring and restoration in the 1995 work plan.

### Summary and recommendation

sectors concerned to the end to the first of the sectors of the se

A successful workshop was held on monitoring and restoration needs for pink salmon. The common goal of the monitoring and other restoration projects proposed is to provide better tools for monitoring the wildstock component of the run. Better estimates of the wildstock component will allow better management of the harvest, and thereby make it possible to restore wild stocks of pink salmon. Current tools for stock size assessment are mainly aerial surveys (ADF&G base funding) and coded wire tagging (94320B).

There was great support for instituting thermal mass marking (TMM) as a replacment for CWT. This method is technically superior to CWT as it is possible to mark all of the hatchery incubated fish, eliminate the criticisms of the CWT technology, and improve inseason management. The Trustee Council could make a lasting contribution to the protection of wildstocks by funding the conversion toTMM. The EVOS Trustee Council should only provide funds for the transition to this new technology, however, if the future cost of sustaining the thermal mass marking is such that ADF&G can assure the Trustee Council it will sustain the program with base funding. Also, there needs to be a

 $\hat{\mathbb{C}}$ 

committment from the Prince William Sound Aquaculure Corporation (PWSAC) that it will maintain the TMM proceedure in its hatcheries. The key to this sustainability is an estimate to be provided to me in the next 10 days by biologists from ADF&G and PWSAC managers of the cost of the transition to the TMM program, both during the proposed transition period and in the future.

A second tool that could be instituted for better management of the run to protect wildstocks is a change of run timing and instituting remote releases/returns of hatchery fish. There are many biological, economic and social/political issues in making such changes and the scope of such an effort is larger than the perview of the EVOS Trustee Council. However, if Trustee Council funding can be used to leverage such changes these could also potentially provide lasting protection to the wildstocks. If the Trustee Council were to enter this arena it may be by way of a planning effort in conjunction with the Regional Planning Team.

Finally, a proposal from the PWSAC was presented and The scope of the proposed effort is very large, discussed. encompassing stock identification, enumeration, direct restoration, monitoring, and improved mangement. The goal of all of these activities is again to restore wildstocks of The PWSAC proposal also includes the two pink salmon. activities mentioned above (TMM and altertion of hatchery runs). The PWSAC effort is proposed within the context of other efforts. studies and restoration efforts on pink salmon salmon. There was support for several aspects of this proposal: monitoring of stock baselines, research on genetic interactions of wild and hatchery stocks, and, as mention above, TMM and altertion of hatchery runs. There was little support for widespread taking of wildstock eggs for hatchery incubation and subsequent release of the fry in the original streams. Instead an alteration of the proposed genetic manipulation experiments was proposed to include one or two streams where concerns about the possible deleterious effects of hatchery rearing on genetic fitness could be tested through several generations on a small scale.

Studies reviewed in the workshop

2
| 95076    | Effect of oil on straying                              |
|----------|--|
| 95137    | PWS salmon stock identification                        |
| 95191A/B | Early life history stage mortality                     |
| 95024    | Enhancement of wild pink salmon                        |
| 95069    | Restoration of salmon of special importance to natives |
| 95139A/B | Spawning channel/marine barrier bypass-Port Dick Creek |
| 95006    | Paint River salmon development                         |
| 95065    | PWSAC: Pink salmon fry mortality                       |
| 95079    | Restoration through small scale hatcheries             |
| 95320B   | Stock idetification by coded wire tagging              |
| 95320C   | Otolith thermal mass marking of hatchery reared fish   |
| 95320K   | PWSAC: Experimental fry release                        |
| 95093    | PWSAC: Restoration of wild stock pink salmon           |

In addition to these studies there were several others (e.g., 95320A, salmon growth and mortality; 95320E, juvenile salmon and herring integration; 95320 N, the nearshore fish/hydroacoustics study; 95320Y, variation in local predation rates on hatchery released fry) which will be considered in the review of the SEA package, 94320). Project 95165 (Genetic stock identification) will also be reviewed in a mini-workshop on fish genetics for stock assessment to be held on October 7<sup>th</sup> in Anchorage.

## Structure and format of the workshop

We began the workshop with a review of results of past Trustee Council sponsored studies of pink salmon damage and recovery. This was followed by a summary of the 1994 pink salmon run in Prince William Sound. These presentations were made by Sam Sharr of ADF&G. A long group discussion ensued on the tools needed for better managment of wild stocks of pink salmon. As with the herring issue, stock identification (including separation of wildstocks and hatchery stocks) was a key issue. Another part of the workshop was devoted to ecotoxicology. The main ecotoxicological issues were the continued investigations of high egg mortality in oiled streams (95191a/b) and the possible effect of oil on rate of straying or homing to the natal stream (95076). A large portion of the second day of the workshop was devoted to a discussion of the PWSAC proposal for broad scale restoration of wild stocks. As a result of this process the needs for further information were identified with reference to the proposed 1995 work plan projects. Towards the end of the meeting, Dr. Phil Mundy, the main reviewer, also had a chance to present his views of the priorities in pink salmon restoration. The

3

written comments from Dr. Mundy were also supplied to me following the review.

## Significant general findings of the workshop

1. The aerial survey method and coded wire tagging are appropriate management tools for stock identification for the purposes of in season management. However, TMM is generally regarded as a superior method for differentiating wild stock fish from hatchery fish and would improve the ability of ADF&G to manage the return for protection of wild stocks.

2. Genetic research carried out on a few streams using the methods proposed for marking salmon could provide very useful information on straying rates and other aspects of pink salmon population genetics. Questions raised during the review with regard to the longterm effects of hatchery incubation of wild stock eggs might also be answered during such a review. The state geneticist might be favorably inclined to approve small scale genetic manipulation of stocks for the purposes of answering such questions.

3. There was little support from salmon biologists for direct and broad-scale intervention in wild streams with hatchery incubation of eggs and subsequent return of juveniles to the stream of origin. In the judgement of most of the salmon biologists, including the state geneticist from ADF&G, the risk of introducing undesirable traits leading to poor fitness of stocks outweighed the potential advantages from such a program.

4. The studies on the effects of oil on the natal habitat (95191) should be continued to their logical conclusion. If there are enough fish available from the 1993 brood year experiments when they return (there was a large release of fish that had been exposed as eggs and fry) then the study should perhaps continue through the f<sub>2</sub> generation. This would mean extending the research through 1996.

5. The proposed studies of the abnormally high mortality of pink salmon fry at Cannery Creek Hatchery in 1993 and at Cannery Creek and AFK Hatchery (95065) in 1994 were not favorably received. Although this is an important problem and is of significant concern, there is no demonstrable link to the oil spill and no way to show a link with the results of the study.

4

## Implementing improved pink salmon monitoring and management in Prince William Sound

There are several more steps needed to firm up my recommendations to you on pink salmon projects for 1995. In , addition, there are some longer term planning efforts that need to go hand in hand with implementing improved managment for the purposes of wild stock pink-salmon restoration. First, with regard to the implementation of thermal mass marking a proposal jointly developed jointly by ADF&G and PWSAC to include costs for the transition to TMM and estimates of the annual cost of TMM. We then need a department-level decision on whether they can committ to TMM once it is developed. If the transition costs are reasonable and the annual costs are sustainable by base ADF&G funding then I would recommend that the Trustee Council fund the transition. Secondly, the other major action that could help restore the wildstocks would be to separate the harvest of hatchery stocks from the wild stocks by separating the runs in time and space. This would entail a major review on the part of the Regional Planning Team. There would be a series of important desions to be made with economical/political/social implications for the fishing community. If the Trustee Council is interested in exploring such an option then a process needs to be identified and a plan developed for Trustee Council participation. Thius is an apporach that I would be willing to explore with the help of Dr. Mundy, put it will take some time. Perhaps the best way to handle this issue is to defer any immediate Trustee Council action until the appropriate participants have been contacted and the potential role of the Trustee Council can be better defined in such a process.

## Summary of recommendations by project

Below is a tabular presentation of my recommendations developed from the review process. These recommendations are not meant to preclude a careful budgetary review.

| Project<br>No. | Short title  | Recommendation  |
|----------------|--|---|
| 95076          | Effect of oil on<br>straying                                       | Fund as a follow up on damage<br>assessment; however could be<br>eliminated if there is a request for<br>significant reduction of the overall<br>1995 budget. This project not likely<br>to contribute to improved<br>management. |
| 95137          | PWS salmon<br>stock<br>identification                              | Defer funding;addresses only-<br>salmon species in PWS not shown<br>to damaged by the spill   |
| 95191A/<br>B   | Early life<br>history stage<br>mortality                           | Continue funding as requested.  |
| 95024          | Enhancement of<br>wild pink<br>salmon                              | Combined with the PWSAC proposal  |
| 95069          | Restoration of<br>salmon of<br>special<br>importance to<br>natives | Combined with the PWSAC proposal  |
| 95139Ag<br>B   | Spawning<br>channel/marine<br>barrier bypass-<br>Port Dick Creek   | Defer funding: link to damage<br>questionable, low probability of<br>success, also doubts about cost-<br>benefit; goal appears to be to<br>produce fish for harvest   |
| 95006          | Paint River<br>salmon<br>development                               | Do not fund; low technical merit;<br>weak link to spill (Paint River was<br>not oiled).   |
| 95065          | PWSAC Pink<br>salmon fry<br>mortality                              | Do not fund; no demonstrable link<br>between oil spill and abnormally<br>high mortality of pink salmon fry<br>at some hatcheries in 1993 and<br>1994  |
| 95079          | Restoration<br>through small<br>scale hatcheries                   | Do not fund; there may be<br>significant new risks to wild stocks<br>through operation of another<br>hatchery   |

•

•

ar webs

| 95320B | Stock<br>identification<br>by coded wire<br>tagging           | Fund; a year's overlap will still be<br>needed if the TMM program is<br>instituted.              |
|--------|---|--|
| 95320C | Otolith thermal<br>mass marking<br>of hatchery<br>reared fish | Fund only if transition costs are<br>reasonable and ADF&G committs to<br>long-tern base funding. |
| 95320K | PWSAC<br>experimental<br>fry release                          | Fund; this is needed for 95320 program.  |
| 95093  | PWSAC<br>Restoration of<br>wild stock pink<br>salmon          | Recommendation awaits a revised proposal.  |

CC M. McCammon

~~ .

P. Mundy

١